

SEATTLE PUBLIC UTILITIES
SEPA ENVIRONMENTAL CHECKLIST

This SEPA environmental review of Seattle Public Utilities’ Sewer Lining Contract 2 Project (C317017) has been conducted in accordance with the Washington State Environmental Policy Act (SEPA) (RCW 43.21C), State SEPA regulations [Washington Administrative Code (WAC) Chapter 197-11], and the City of Seattle SEPA ordinance [Seattle Municipal Code (SMC) Chapter 25.05].

A. BACKGROUND

1. Name of proposed project:

Sewer Lining Contract 2 (C317017)

2. Name of applicant:

Seattle Public Utilities (SPU)

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

Samantha Menathy, Project Manager
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4. Date checklist prepared:

January 27, 2021

5. Agency requesting checklist:

Seattle Public Utilities (SPU)

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

This Checklist describes the proposed repair of existing large-diameter sewers (more than 12 inches in diameter) using cured-in-place pipe (CIPP) lining at five sites in the south and southwest parts of the City of Seattle. For efficiency and due to the repetitive nature of the work, SPU plans to bundle this large-diameter CIPP work into a single construction contract with the CIPP rehabilitation of small-diameter sewers (12 inches or less in diameter or less) at approximately 56 sites, most of which are also in south and southwest Seattle. Collectively, SPU refers to this large-diameter and small-diameter sewer rehabilitation work as the Sewer Lining Contract 2 Project (C317017).

Construction of this project is anticipated to begin in or around June 2022 and be complete by the end of 2022. Work at each of the five sites described in this Checklist is expected to take between 1.5 and 6 working days.

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

As mentioned in Section A.6, SPU plans to bundle the proposed large-diameter CIPP work into a single construction contract with the CIPP rehabilitation of small-diameter sewers (12 inches or less in diameter) at approximately 56 sites. Work at each of these small-diameter sites is not dependent on the rehabilitation of any of the large-diameter or other small-diameter sewers; contract bundling is for efficiency and convenience only. Therefore, work on the small-diameter sewers is exempted from a SEPA threshold determination and is not described in this SEPA checklist. If SPU identifies other large-diameter sewers needing repair using CIPP, SPU would conduct additional SEPA review prior to undertaking that additional work.

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

No formal environmental information has been prepared that is related to this proposal.

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.

SPU is not aware of pending government approvals of other proposals that directly affect the property or rights-of-way covered by this proposal.

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

Implementation of the proposed work at some or all sites would require these permits or approvals:

- Washington State Department of Transportation (WSDOT) access permit (Site 48)
- Seattle Department of Neighborhoods Certificate of Approval (Site 48). This approval would be required before any changes could be made to the external appearance of any building, structure, or site— including features such as brick paving or stone curbs—within the City's Pioneer Square Preservation District.
- Seattle Department of Parks and Recreation (SPR) Revocable Use Permit (Site 4)
- Seattle Department of Transportation (SDOT) Street Use Permit (all sites)

11. Give a brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page.

SPU uses its Sewer Lining Program to rehabilitate sewers in the City of Seattle relatively quickly and with minimal impacts. The Program addresses deteriorated sewer pipes and associated structures typically in City-owned street rights-of-way or in City easements. Rehabilitation is achieved by installing CIPP liners in existing pipes. Work typically includes traffic control and permitting, public relations, coordination with other utilities, bypass pumping, pre-installation pipe cleaning and inspection using closed circuit television (CCTV), debris removal, obstruction removal, CIPP installation, reinstatement of active laterals, post-installation CCTV inspection, and restoration of undeveloped areas to pre-construction conditions.

CIPP is a rehabilitation method that installs a jointless, seamless, pipe-within-a-pipe to repair or rehabilitate existing pipelines. The process involves pulling a resin-impregnated felt pipe liner into the pipe to be rehabilitated. Both ends of the liner are then sealed with protective end caps and air pressure is introduced, forcing the liner to expand into place. The liner is then cured using ultraviolet light. In this method, an ultraviolet light train is inserted into the liner; cameras on the train allow for viewing of the alignment and fit. Once proper placement is confirmed, the ultraviolet light train is activated and drawn through the pipe at a controlled, preconfigured speed of up to six feet per minute. When the CIPP process is complete, laterals are reinstated using a remote-controlled cutting unit or via worker entry into larger-diameter pipes.

Generally, CIPP lining is a 'no-dig' operation requiring no excavation. However, minor vegetation removal and excavation may be required to locate and access maintenance holes (MH) and to stage equipment. Where sites are located partially within or adjacent to an Environmentally Critical Area (ECA), including wetlands, watercourses, or shorelines, staging would be located as far from the ECA as possible to avoid vegetation impacts and ground disturbance in the ECA or its buffer.

The proposed large-diameter sewer work includes rehabilitation of 2,474 linear feet of 15-inch diameter sewer mainline pipe at five sites. Each site includes one to four segments of mainline sanitary sewer or combined sewer. For each mainline segment, a CIPP liner would be installed along the entire segment between upstream and downstream MHs. Existing MHs would be used for access during CIPP installation and associated work. A brief summary of each site is provided below.

Site 2

Segment 2D: Install CIPP liner along the mainline sanitary sewer between MHs 046-053 and 046-051. Subject pipe is a 13-foot segment of 15-inch diameter cast iron pipe in travel lanes of Lakeside Ave S and S Charles St.

Segment 2E: Install CIPP liner along the mainline sanitary sewer between MHs 046-054 and 046-053. Subject pipe is a 9-foot segment of 15-inch diameter concrete pipe in travel lanes of Lakeside Ave S and S Charles St.

Segment 2F: Install CIPP liner along the mainline sanitary sewer between MHs 046-176 and 046-054. Subject pipe is a 29-foot segment of 15-inch diameter reinforced concrete pipe in travel lanes of Lakeside Ave S south of S Charles St.

Segment 2G: Install CIPP liner along the mainline sanitary sewer between MHs 046-209 and 046-176. Subject pipe is a 29-foot segment of 15-inch diameter reinforced concrete pipe in travel lanes of Lakeside Ave S from about 40 feet south of S Charles St to S Parkland Pl.

Site 4

Segment 4A: Install CIPP liner in mainline sanitary sewer between MHs 060W-012 and 060W-011. Subject pipe is a 130-foot segment of 15-inch vitrified clay pipe in the travel lanes of S Genesee Wy between Lake Washington Blvd S and 51st Ave S.

Segment 4B: Install CIPP liner in mainline sanitary sewer between MHs 060W-013 and 060W-012. Subject pipe is a 318-foot segment of 15-inch vitrified clay pipe in the vegetative embankment on the west side starting on S Genesee Wy to Lake Washington Blvd S.

Segment 4C: Install CIPP liner in mainline sanitary sewer between MHs 060W-014 and MH 060W-013. Subject pipe is a 132-foot segment of 15-inch diameter vitrified clay pipe in the vegetated embankment on the west side of Lake Washington Blvd S.

Segment 4D: Install CIPP liner in mainline sanitary sewer between MHs 060W-017 and 060W-014. Subject pipe is a 254-foot segment of 15-inch diameter vitrified clay pipe in the grass on the southwest side of Lake Washington Blvd S just west of 53rd Ave S.

Site 25

Segment 25J: Install CIPP liner in mainline combined sewer between MHs 301-068 and 301-069. Subject pipe is a 418-foot segment of 15-inch diameter reinforced concrete pipe in the west lane of 30th Ave SW from SW 102nd St going south.

Site 25K: Install CIPP liner in mainline combined sewer between MHs 301-069 and 301-070. Subject pipe is a 411-foot segment of 15-inch diameter reinforced concrete pipe in the center of 30th Ave SW between SW 102nd St and SW 104th St.

Site 48

Segment 48A: Install CIPP liner in mainline sanitary sewer between MHs 043-130 and 043-131. Subject pipe is a 326-foot segment of 15-inch diameter vitrified clay pipe in the west travel lane and shoulder of 1st Ave S mid-block between Railroad Wy S and S Royal Brougham Wy.

Site 75

Segment 75A: Install CIPP liner in mainline sanitary sewer between MHs 059-250 and 059-509. Subject pipe is a 270-foot segment of 15-inch diameter vitrified clay pipe in the travel lanes of 38th Ave S starting mid-block between S Genesee St and S Oregon St and ending at S Oregon St.

- 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.**

Except for Site 4, all sites are wholly in street rights-of-way. At Site 4, MH access is in Lake Washington Boulevard Park (parcel 5249804270, an SPR property). See Attachment A for a

vicinity map. Attachment B lists the physical address closest to each site and nearest upstream and downstream MH numbers. Nearby street addresses for the five sites are as follows:

- Site 2
 - Segment 2D, 903 LAKESIDE AVE S (Section 3, Township 24N, Range 4E)
 - Segment 2E, 900 LAKESIDE AVE S (Section 3, Township 24N, Range 4E)
 - Segment 2F, 903 LAKESIDE AVE S (Section 3, Township 24N, Range 4E)
 - Segment 2G, 914 LAKESIDE AVE S (Section 3, Township 24N, Range 4E)

- Site 4:
 - Segment 4A, 4506 51st AVE S (Section 14, Township 24N, Range 4E)
 - Segment 4B, 4523 52nd AVE S (Section 14, Township 24N, Range 4E)
 - Segment 4C, 4603 LAKE WASHINGTON BLVD S (Section 14, Township 24N, Range 4E)
 - Segment 4D, 4621 LAKE WASHINGTON BLVD S (Section 14, Township 24N, Range 4E)

- Site 25:
 - Segment 25J, 10053 30th AVE SW (Section 1, Township 23N, Range 3E)
 - Segment 25K, 10224 31st AVE SW (Section 1, Township 23N, Range 3E)

- Site 48: Segment 48A, 1041 1st AVE S (Section 6, Township 24N, Range 4E). The original work order cited the address of this site as 926 Alaskan Wy S.

- Site 75: Segment 75A, 4421 38th AVE S (Section 15, Township 24N, Range 4E)

B. ENVIRONMENTAL ELEMENTS

1. Earth

a. General description of the site:

Flat Rolling Hilly Steep Slopes Mountainous Other:

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

All five sites are in developed street rights-of-way that have flat to gentle slopes, with grades ranging from one to 5 percent.

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 agricultural land of long-term commercial significance and whether the proposal results in removing these soils.

Geologic conditions of the Puget Sound region are a result of glacial and non-glacial activity that occurred over the course of millions of years and are described in the Washington Department of Natural Resources' Washington Geologic Information Portal (<https://geologyportal.dnr.wa.gov/>). However, urban development at all five sites over

the last 100 years has resulted in predominance of disturbed native soils/sediments, cut slopes, and placements of fill material. All project sites and their immediately surrounding areas have been completely developed and disturbed in this way. Except for a portion of Site 4, sites are in developed street rights-of-way and within developed roadway prisms. The project does not propose substantive excavation. There would be minimal disturbance to soils, mainly related to uncovering buried MHs, as necessary. There are no agricultural lands of long-term commercial significance designated in the project area.

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

The City of Seattle designates geologically hazardous areas as ECAs based on historic and current geologic conditions, including topography and underlying soils. According to City of Seattle ECA maps (<http://seattlecitygis.maps.arcgis.com/apps/webappviewer/index.html?id=f822b2c6498c4163b0cf908e2241e9c2>), Site 2 is mapped as being in a Potential Slide ECA and Sites 48 and 75 are mapped as being in a Liquefaction ECA. Sites are generally in street rights-of-way and within developed roadway prisms. None of the sites show surface features such as head scarps, hummocky terrain, seepage along steep slope surfaces, bulging at the bases of slopes, and/or evidence of permeable strata over relatively impermeable strata that indicate past or possible future instability.

e. Describe the purpose, type, total area, and approximate quantities and total affected area of any filling, excavation, and grading proposed. Indicate the source of fill.

This project is not proposing to fill, excavate, or grade the ground surface. Typically, excavation associated with a CIPP lining project would be related to exposing buried MH covers. Should initial construction inspection indicate the subject pipe at a given site is no longer eligible for rehabilitation using CIPP and that significant ground disturbance would be necessary (e.g. for pipe replacement), work would stop at that site.

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

Erosion is expected to be minimal because no excavation is proposed. Some erosion could occur due to vegetation clearing to access MHs if needed. Some erosion could also occur as a result of construction staging and access. Generally, sites are in street rights-of-way and within developed roadway prisms. Construction staging and access would be located on existing paved surfaces. To minimize traffic disturbance, staging may be partially located on grassy shoulders adjacent to paved surfaces but within the roadway prism.

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

No new impervious surfaces are proposed. Most of the work is in existing paved areas or partially on compacted roadway shoulders. Existing paved surfaces damaged by construction would be repaired as required by SDOT. Proposed work would not result in an increase or decrease in impervious surfaces.

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

Wherever possible, construction staging and access would be located on existing paved surfaces. Risk of erosion and sedimentation is low because minimal clearing and disturbance is proposed and most project sites are flat or relatively flat. Temporary erosion and sediment control best management practices would be deployed, inspected, and maintained as needed per the City of Seattle’s Stormwater Code (Seattle Municipal Code Title 22, Subtitle VIII), the City of Seattle Director’s Rule SDCI 17-2017/SPU DWW-200, and Volume 2 Construction Stormwater Control Manual. Disturbed vegetated areas would be revegetated in-kind.

2. Air

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

Mobile and stationary equipment would be used to construct the proposed project, thus generating emissions due to the combustion of gasoline and diesel fuels (such as oxides of nitrogen, carbon monoxide, particulate matter and smoke, uncombusted hydrocarbons, hydrogen sulfide, carbon dioxide, and water vapor). Emissions during construction would also include dust from ground-disturbing activities and exhaust (carbon monoxide, sulfur, and particulates) from construction equipment and are expected to be minimal, localized, and temporary. In certain CIPP applications, installation generates fumes from curing of resin (mainly styrene, but possibly including minor amounts of acetone; benzene; chloroform; isopropylbenzene; methylene chloride; methyl ethyl ketone; N-propylbenzene; 1,2,4-trimethylbenzene [TMB]; 1,3,5-TMB); and other substances (see also Section B.7, Environmental Health).

This project would generate greenhouse gas (GHG) emissions through construction activity only. GHG emission calculations are shown in Attachment C and summarized in the table below. One metric ton metric ton of carbon dioxide emission (MTCO₂e) is equal to 2,205 pounds. Though not calculated here, SPU anticipates the CIPP method emits fewer GHGs compared to traditional open cut and backfill pipe replacement methods.

This project would generate GHG emissions during the estimated 4 working days (on average) required per site through the operation of diesel- and gasoline-powered equipment and to transport materials, equipment, and workers to and from the project sites. Estimates are also based on typical transportation and construction equipment used for this type of work. Embodied energy in CIPP materials used in this project has not been estimated as part of this SEPA environmental review due to the difficulty and inaccuracy of calculating such estimates.

During project operation, the project is not expected to result in increased GHG emissions as compared with pre-project levels because the pipes rehabilitated using CIPP installation are not expected to require maintenance or replacement for approximately 50 years.

Summary of Greenhouse Gas (GHG) Emissions

Activity/Emission Type	GHG Emissions (pounds of CO ₂ e) ¹	GHS Emissions (metric tons of CO ₂ e) ¹
Buildings	0	0
Paving	0	0
Construction Activities (Diesel)	68,950	31.3
Construction Activities (Gasoline)	4,860	2.2
Long-term Maintenance (Diesel)	0	0
Long-term Maintenance (Gasoline)	0	0
Total GHG Emissions	73,810	33.5

¹Note: 1 metric ton = 2,204.6 pounds of CO₂e. 1,000 pounds = 0.45 metric tons of CO₂e

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

There are no known off-site sources of emissions that would affect this proposal.

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.

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 so, describe type and provide names. If appropriate, state what stream or river it flows into.

Sites 2 and 4 are near Lake Washington. Site 48 is near Elliott Bay, an embayment of Puget Sound.

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

Sites 2, 4, and 48, are near bodies of water but work would be contained within existing MHs and pipe sections. At these sites, staging and vehicle access areas would be restricted to paved surfaces adjacent to these bodies of water but would not be over or within them.

(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 material would be placed in or removed from surface water or wetlands.

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

The proposed work would not require surface water withdrawals or diversions.

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

No portion of the project lies 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 proposed project would not discharge waste materials to surface waters.

b. Ground:

- (1) Will groundwater be withdrawn from a well for drinking water or other purposes? If so, give a general description of the well, proposed uses and approximate quantities withdrawn from the well. Will water be discharged to groundwater? Give general description, purpose, and approximate quantities if known.**

The proposed project would not withdraw, discharge, or surcharge groundwater.

- (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.**

No waste material would be discharged to groundwater for this 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.**

Stormwater runoff may need to be managed during construction to prevent sediment from entering and leaving the construction site. Any precipitation that lands on the construction site would be contained on-site and allowed to infiltrate. Barriers such as sandbags would be used to prevent runoff from entering the construction zone. Once construction is complete, temporary erosion control measures would be removed. The completed project would not create a need to manage additional stormwater runoff beyond current conditions. Stormwater would follow pre-construction pathways. The current volume, timing, and duration of these stormwater flows are not known.

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

There would be no waste materials from this project that could enter ground or surface waters.

(3) Does the proposal alter or otherwise affect drainage patterns in the vicinity of the site? If so, describe.

No, the proposal would not alter drainage patterns. Any disturbed vegetated areas would be restored in-kind.

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

No adverse impacts to surface, ground, or runoff water are anticipated. Best management practices, as identified in the City of Seattle’s Stormwater Code (Seattle Municipal Code Title 22, Subtitle VIII), the City of Seattle Director’s Rule SDCI 17-2017/SPU DWW-200, and Volume 2 Construction Stormwater Control Manual, would be used as needed to control erosion and sediment transport from and to project sites during construction.

4. Plants

a. Types of vegetation found on the site:

<input checked="" type="checkbox"/> Deciduous trees:	<input checked="" type="checkbox"/> Alder	<input checked="" type="checkbox"/> Maple	<input type="checkbox"/> Aspen	<input type="checkbox"/> Other:
<input checked="" type="checkbox"/> Evergreen trees:	<input checked="" type="checkbox"/> Fir	<input checked="" type="checkbox"/> Cedar	<input checked="" type="checkbox"/> Pine	<input type="checkbox"/> Other:
<input checked="" type="checkbox"/> Shrubs				
<input checked="" type="checkbox"/> Grass				
<input type="checkbox"/> Pasture				
<input type="checkbox"/> Crop or grain				
<input type="checkbox"/> Orchards, vineyards, or other permanent crops				
<input type="checkbox"/> Wet soil plants:	<input type="checkbox"/> Cattail	<input type="checkbox"/> Buttercup	<input type="checkbox"/> Bulrush	<input type="checkbox"/> Skunk cabbage
<input type="checkbox"/> Other:				
<input type="checkbox"/> Water plants:	<input type="checkbox"/> water lily	<input type="checkbox"/> eelgrass	<input type="checkbox"/> milfoil	<input type="checkbox"/> Other:
<input type="checkbox"/> Other types of vegetation:				

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

Generally, sites are in developed street rights-of-way. Access to Site 4 involves access across a grassy area in Lake Washington Boulevard Park. No vegetation is proposed for permanent removal. Should construction, staging, or access activities damage vegetation, including lawn, etc., such vegetation would be restored to pre-project conditions following project completion.

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

No federally listed endangered or threatened plant species or State-listed sensitive plant species are known to occur within the City of Seattle municipal limits. The project sites have been disturbed by development and redevelopment over the last 100 years and have been extensively excavated, filled, paved, or occupied by street, utility, residential, and other constructed features.

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

The proposed work would limit plant removal, pruning, and other disturbance to that required for project construction. Project construction would not remove any trees or shrubs. All damaged vegetation would be restored to pre-project conditions following project completion.

e. List all noxious weeds and invasive species known to be on or near the site.

Site 25 is near infestations of giant hogweed (*Heracleum mantegazzianum*) and gorse (*Ulex europaeus*). Site 48 is near infestations of spotted knapweed (*Centaurea stoebe*). Giant hogweed is a King County-listed Class A noxious weed. Gorse and spotted knapweed are King County-listed B-designate noxious weeds.

5. Animals

a. List any birds and other 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: Due to the geographic extent of the project its location within the Pacific Flyway migratory corridor, the project area is known to host a wide variety of resident and migratory waterfowl, songbirds, and raptors. In addition to boxes checked, some commonly observed species include geese, ducks, crows, pigeons, and gulls.

Mammals: Deer Bear Elk Beaver
 Other: The geographic extent of the project encompasses presence and habitats for a variety of animal species commonly found in urban areas. Commonly observed species include opossums, rabbits, raccoon, skunk, squirrel, rats, mice, and bats.

Fish: Bass Salmon Trout Herring
 Shellfish Other: These and other fish species are present in the Duwamish Waterway, Puget Sound, and Lake Washington.

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

Based on a check of the Washington Department of Fish and Wildlife’s “Priority Habitat Species on the Web” database on January 6, 2021, no federal Endangered Species Act-listed species or State of Washington-identified priority species are known from or near any of the five sites included in this environmental review.

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

Seattle is located within the migratory route of many birds and other animal species and is part of the Pacific Flyway, a major north-south route of travel for migratory birds in the Americas extending from Alaska to Patagonia, South America. Also, Puget Sound, Duwamish Waterway, and Lake Washington are important water migration routes for many animal species.

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

The proposed work would limit plant removal, pruning, and other disturbance to that required for project construction. Project construction would not remove any trees or shrubs, but may temporarily damage lawn or landscaped areas. All damaged vegetation would be restored to pre-project conditions following project completion. No in-water work is proposed.

e. List any invasive animal species known to be on or near the site.

King County lists the European starling, house sparrow, Eastern gray squirrel, and fox squirrel as terrestrial invasive species for this area (<http://www.kingcounty.gov/services/environment/animals-and-plants/biodiversity/threats/Invasives.aspx>).

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.

No additional energy would be required to meet the constructed project's energy needs, beyond the energy already utilized for the existing sewer and storm systems.

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

The proposed project does not involve building structures or planting vegetation that would block access to the sun for adjacent properties.

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

There are no conservation features or proposed measures to reduce or control energy impacts because there would be no such impacts.

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:

Small amounts of materials likely to be present during construction, mainly to support vehicle and construction equipment, include gasoline and diesel fuels, hydraulic fluids, oils, lubricants, but also may include solvents, paints, and other chemical products. A spill of one of these chemicals could potentially occur during construction due to equipment failure or worker error. Though unlikely, contaminated soils, sediments, or groundwater could also be exposed during excavation. If disturbed, contaminated substances could expose construction workers and potentially other individuals in the vicinity through blowing dust, stormwater runoff, or vapors.

CIPPs are manufactured using either thermal curing (hot water or steam) or photo curing (ultraviolet [UV] light) methods. The proposed CIPP work at all sites would use UV light to cure the resin. The photo-curing installation process uses liners impregnated with a mixture of unsaturated polyester resins and other compounds that cures upon exposure to UV light. Once the liner has been exposed to UV light, the liner hardens inside the existing deteriorated pipe to create a new pipe-within-a-pipe.

Because UV curing CIPP technology is relatively new, limited research has been conducted regarding its potential chemical emissions into the air or water during installation or released into water after installation. Because chemical emissions resulting from use of this technology are poorly known, the environmental effects related to Environmental Health are difficult to evaluate. However, concerns regarding chemical emissions into the environment by both thermal and UV curing CIPP technologies have been identified as possible or confirmed worker safety, public safety, and environmental issues. During installation and post-installation, UV-cured CIPP installations release a variety of organic compounds such as carcinogens, endocrine-disrupting compounds, and hazardous air pollutants—including phenol, styrene, dibutyl phthalate, and possibly ozone¹.

Except for styrene, total maximum exposures for these and other hazardous or potentially hazardous compounds released into the environment by the proposed work are unknown and have not been evaluated for purposes of this SEPA environmental review. For styrene, photo-curing methods are generally acknowledged to result in lower styrene emissions than thermal curing methods. Styrene has been determined by the federal government to be “a reasonably anticipated carcinogen.” SPU anticipates that total maximum exposures resulting from the UV-curing process would be on the order of a few ppm at each site, at most, during a period of several hours. This exposure is well below the Occupational Safety and Health Administration’s (OSHA) established regulatory styrene exposure limit (Permissible Exposure Limit [PEL]) of 100 ppm for healthy adult workers in the workplace (8 hours per day, 5 days per week). OSHA’s air regulatory exposure limit for styrene is not protective of infants, children, or immunocompromised individuals who would be more susceptible to chemical toxicity. Based on risk assessments by the United States and the Netherlands, the International Toxicity Estimates for Risk (ITER) values for styrene for these susceptible populations range from 20 to 25 ppm.

(1) Describe any known or possible contamination at the site from present or past uses.

None of the project sites are known to have environmental contamination. However, it is possible that contamination of soil or groundwater associated with past uses or activities on or near a site may be present.

¹ Li, Xianzhen, R. Kyungyeon, M. Nuruddin, S.M.T. Sendesi, J.A. Howarter, J.P. Youngblood, N. Zyaykina, C.T. Jafvert, and A.J. Whelton. 2019. Outdoor manufacture of UV-cured plastic linings for storm water culvert repair: Chemical emissions and residual. *Environmental Pollution* 245: 1031-1040. <https://doi.org/10.1016/j.envpol.2018.10.080>

- (2) Describe existing hazardous chemicals/conditions that might affect project development and design. This includes underground hazardous liquid and gas transmission pipelines located within the project area and in the vicinity.**

There are no known hazardous chemicals or conditions that might affect project development and design.

- (3) Describe any toxic or hazardous chemicals that might be stored, used, or produced during the project's development or construction, or at any time during the operating life of the project.**

Chemicals and pollutants that may be present during construction include:

- Petroleum products associated with vehicular and equipment use, including fuel, lubricants, hydraulic fluids, and form-release oils
- Paints, glues, solvents, and adhesives
- Chemicals associated with portable toilets.

No toxic or hazardous chemicals would be stored, used, or produced at any time during the operating life of the constructed project.

- (4) Describe special emergency services that might be required.**

No special emergency services such as confined space rescue would be required during construction or operation of the project. Possible fire or medic services could be required during project construction, as well as possibly during operation of the completed project. However, the completed project would not demand higher levels of special emergency services than already exist at the project location.

- (5) Proposed measures to reduce or control environmental health hazards, if any:**

SPU's construction contractor would be required to develop and implement a Spill Plan to control and manage spills during construction. In addition, a spill response kit would be maintained at each site during construction work at that site, and all project site workers would be trained in spill prevention and containment consistent with the City of Seattle's Standard Specifications for Road, Bridge, and Municipal Construction. During construction, the contractor would use standard operating procedures and best management practices identified in the City of Seattle's Stormwater Code (Title 22, Subtitle VIII), the City of Seattle Director's Rule SDCI 17-2017/SPU DWW-200, and Volume 2 Construction Stormwater Control Manual to reduce or control any possible environmental health hazards. Soils contaminated by spills during construction would be excavated and disposed of in a manner consistent with the level and type of contamination, in accordance with federal, state and local regulations, by qualified contractor(s) and/or City staff.

Additionally, workers would be required to follow the Washington State safety standards for entry and work in confined spaces (WAC Chapter 296-809), which includes requirements for atmospheric testing in a confined space structure prior to

entry and work within the structure. Following completion of construction, SPU workers performing routine operation and maintenance activities requiring entry to MHs and other underground confined space structures would be required to follow the requirements of SPU's Confined Space Safety Program which implements the requirements of WAC 296-809.

b. Noise

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

Noise that exists in the area would not affect the project.

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

Noise levels in the vicinity of project construction would temporarily increase during construction. Short-term noise from construction equipment would be limited to the allowable maximum levels of applicable laws, including the City of Seattle's Noise Control Ordinance (SMC Chapter 25.08.425—Construction and Equipment Operations). Within the allowable maximum levels, SMC 25.08 permits noise from construction equipment between the hours of 7 a.m. and 7 p.m. weekdays, and 9 a.m. and 7 p.m. weekends and legal holidays. SPU anticipates construction at each site would take 1.5 to 6 working days to complete. The completed project would generate no additional noise from equipment used for operation or maintenance.

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

Construction equipment would be muffled in accordance with the applicable laws. SMC Chapter 25.08, which prescribes limits to noise and construction activities, would be enforced while the project is being constructed and during operations, except for during any emergencies.

8. Land and Shoreline Use

a. What is the current use of the site and adjacent properties? Will the proposal affect current land uses on nearby or adjacent properties? If so, describe.

All sites are in City-owned street rights-of-way except

- Site 48: where MH access is on WSDOT right-of-way (State Route 99). SPU has procured WSDOT's access permit for work at this site.
- Site 4: where MH access is on SPR property (Lake Washington Boulevard Park). SPU has procured SPR's Revocable Use Permit for work at this site.

Adjacent land uses are residential. The work would not change land uses on nearby or adjacent properties.

- b. Has the project site been used as working farmlands or working forest lands? If so, describe. How much agricultural or forest land of long-term commercial significance will be converted to other uses as a result of the proposal, if any? If resource lands have not been designated, how many acres in farmland or forest land tax status will be converted to nonfarm or non-forest use?**

The project sites have not been recently used for agricultural purposes or forestry. The project would not result in land use conversion of any kind.

- (1) Will the proposal affect or be affected by surrounding working farm or forest land normal business operations, such as oversize equipment access, the application of pesticides, tilling, and harvesting? If so, how?**

The proposed work would neither be affected by nor affect surrounding working farm or forest land normal business operations because there are no such operations at or near any of the project sites.

- c. Describe any structures on the site.**

Nearby structures include residential buildings and utility structures, such as light poles and street signs. Nearby structures are not associated with the project and would not be affected.

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

The project would not demolish any aboveground structures.

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

Site	Zoning Classification
2	Single-Family Residential (SF 5000)
4	Single-Family Residential (SF 7200)
25	Single-Family Residential (SF 5000)
48	Pioneer Square Mixed (PSM-85-120), a zone in Downtown where both commercial and residential development is generally allowed.
75	Single-Family Residential (SF 5000)

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

Site	Zoning Classification
2	Single-Family Residential
4	Single-Family Residential
25	Single-Family Residential
48	Downtown Urban Center
75	Single-Family Residential

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

Sites 2 and 4 are the City of Seattle's Shoreline Management District; development is therefore governed by the Shoreline Master Program regulations (SMC Chapter 23.60A).

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

As mapped by the City of Seattle
(<http://seattlecitygis.maps.arcgis.com/apps/webappviewer/index.html?id=f822b2c6498c4163b0cf908e2241e9c2>), Site 2 is in a Potential Slide ECA, Site 48 is in a Liquefaction ECA, and Site 75 is in Historic Landfill and Liquefaction ECAs.

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

No people would reside or work in the completed project.

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

The project would not displace any people.

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

There would be no displacement impacts.

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

The project would not change existing land uses. No measures are required to ensure the proposal is compatible with existing and projected land uses and plans.

m. Proposed measures to reduce or control impacts to agricultural and forest lands of long-term commercial significance, if any:

There are no nearby agricultural and forest lands of long-term commercial significance. No measures are required to reduce or control impacts to agricultural and forest lands of long-term commercial significance.

9. Housing

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

The proposed project would not construct any housing units.

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

The proposed project would not eliminate any housing units.

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

No measures are proposed because there would be no housing impacts.

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?**

All structures are buried. Above-ground MHs would not be modified.

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

No views would be altered or obstructed.

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

No such measures are proposed because there would be no aesthetic impacts.

11. Light and Glare

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

The constructed project would not produce light or glare. No new streetlights are proposed or required. During construction, if an emergency situation calls for after-dark work, the construction contractor may deploy portable lights that temporarily produce light and glare.

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

The completed project would not create light or glare.

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

There are no existing off-site sources of light and glare that would affect the proposal.

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

No measures are needed to reduce or control light and glare impacts because no impacts would occur. If an emergency requires after-dark work during construction, portable lighting would be adjusted as feasible to minimize glare.

12. Recreation

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

Except for Site 4, all sites are wholly in street rights-of-way, which are used for informal recreational activities such as dog-walking, walking, jogging, and bicycling. At Site 4, MH access is in Lake Washington Boulevard Park (SPR property) which is used for informal recreational activities such as dog-walking, walking, jogging, picnicking, and bicycling.

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

The proposed work would not permanently displace existing recreational uses. Access to streets and parking areas affected by project construction would be more challenging during construction, but SPU would require the project contractor to maintain safe pedestrian and vehicle access at all times.

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

Temporary lane closures and detours affecting vehicle and pedestrian routes/access may be required during construction. The work may be required to submit, obtain approval for, and implement Traffic Control Plans that maintain pedestrian and bicycle access through or around the project sites during construction. The project would attempt to make detours as brief as possible.

13. Historic and Cultural Preservation

a. Are there any buildings, structures, or sites, located on or near the site that are over 45 years old listed in or eligible for listing in national, state, or local preservation registers? If so, specifically describe.

All or portions of Sites 2 and 4 are in the Lake Washington Boulevard Historic District, which is eligible for listing on the National Register of Historic Places and is listed in the State of Washington Heritage Register. Site 48 is in the Pioneer Square Preservation District and near the Roebling Building (900 1st Ave S), the A.L. Palmer Building (1000 1st Ave S), the M.F. Backus Warehouse (1014 1st Ave S), and the E.O. Graves Building (1022 1st Ave S)—all of which are National Register properties or properties determined to be eligible for listing on the National Register. Numerous other structures known to be 45 years old or older are near and adjacent to each of the five project sites. However, few of these have been evaluated for eligibility for listing in national, state, or local preservation registers. No other buildings, structures, sites, or objects listed on, or proposed for, national, state, or local preservation registers are known to be on or immediately adjacent to the project sites.

b. Are there any landmarks, features, or other evidence of Indian or historic use or occupation? This may include human burials or old cemeteries. Are there any material evidence, artifacts, or areas of cultural importance on or near the site? Please list any professional studies conducted at the site to identify such resources.

No landmarks, features, or other evidence of Indian or historic use or occupation are known to be on or adjacent to the project sites. However, according to the Washington Information System for Architectural and Archaeological Records Data predictive model based on environmental factors, the five sites are in locations with Very High Risk (Sites 2, 4, and 48) and High Risk (Sites 25 and 75) ratings for detecting archaeological resources. No cultural resource surveys were conducted for the proposed project. No known archaeological materials or cemeteries have been found in or near project sites.

c. Describe the methods used to assess the potential impacts to cultural and historic resources on or near the project site. Examples include consultation with tribes and the Department of Archaeology and Historic Preservation, archaeological surveys, historic maps, GIS data, etc.

To determine if National Register or Washington Heritage Register eligible properties are in or adjacent to the project, the project sites were checked against the following resources on January 6, 2021:

Seattle Department of Neighborhoods Landmark Map:
<http://www.seattle.gov/neighborhoods/programs-and-services/historic-preservation/landmarks/landmarks-map>

Seattle Department of Neighborhoods Historic Resources Survey Database:
<http://www.seattle.gov/neighborhoods/programs-and-services/historic-preservation/historic-resources-survey#historicresourcesurveydatabase>

King County Historic Preservation Viewer:
<https://kingcounty.maps.arcgis.com/apps/View/index.html?appid=08c6e1fe041b4f7a8912e21b55219de1>

Washington Heritage Register and National Register of Historic Places:
<http://www.dahp.wa.gov/historic-register>

Washington Information System for Architectural and Archaeological Records Data database: <https://wisaard.dahp.wa.gov/>

d. Proposed measures to avoid, minimize, or compensate for loss, changes to, and disturbance to resources. Please include plans for the above and any permits that may be required.

The proposed work would be confined predominantly to the interiors of existing MH structures and pipes and would only minimally disturb previously disturbed and filled upland areas. The proposed work would not affect buildings or known cultural resources; none of this portion of SPU's existing sewer and stormwater system is considered historically or culturally important. The work's location on previously disturbed and filled ground and confinement to the interior of existing utility structures importantly reduces the chance of encountering contextually significant archaeological materials. However, given the Very High and High risk ratings for potentially encountering archaeological materials, these project sites will have an approved inadvertent discovery plan onsite and in effect during all construction and ground-disturbing activities.

14. Transportation

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

Generally, the project sites are in City-owned street rights-of-way. Staging areas would be within 200 feet of each MH, on existing street rights-of-way.

b. Is the site or affected geographic area currently served by public transit? If so, generally describe. If not, what is the approximate distance to the nearest transit stop?

Public bus transit service is provided by King County Metro. The availability and level of service near the project sites varies by site; however, all sites are within one half mile of a bus stop.

c. How many additional parking spaces would the completed project or non-project proposal have? How many would the project or proposal eliminate?

The completed project would neither permanently create nor eliminate any parking spaces. However, during construction, there may be temporary on-street parking closures during construction activities. The specific timing and duration of parking closures are not known at this time, but such closures would comply with relevant policies administered by SDOT as part of their street use permitting process.

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

The project would restore any damaged street panels, curbs, traffic aprons, or other transportation infrastructure to pre-construction conditions or better and consistent with SDOT requirements. The proposal would not require any new or improved public or private transportation infrastructure.

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

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

f. How many vehicular trips per day would be generated by the completed project or proposal? If known, indicate when peak volumes would occur and what percentage of the volume would be trucks (such as commercial and non-passenger vehicles). What data or transportation models were used to make these estimates?

Project work would be conducted at existing sewer and storm drain sites. These sites currently require infrequent, periodic trips to transport SPU crews, contractors, and equipment to perform visual inspections, maintenance, and repairs when needed. No long-term additional traffic would result from the completed project. Transport of materials and equipment during construction would generate approximately 265 round trips. The completed project is not anticipated to require any maintenance and would not generate any round trips.

g. Will the proposal interfere with, affect or be affected by the movement of agricultural and forest products on roads or streets in the area? If so, generally describe.

The proposal would not interfere with, affect, or be affected by movement of agricultural and forest products on roads or streets in the area.

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

The proposed work does not have any transportation-related permanent impacts. Temporary lane closures or detours affecting vehicle and pedestrian routes/access may be required during construction. The work may be required to submit, obtain approval for, and implement Traffic Control Plans that maintain pedestrian and bicycle access

through or around the project sites during construction. The following measures would be used to reduce or control transportation impacts:

- SPU would require the construction contractor to submit a traffic control plan for approval and enforcement by SPU and SDOT.
- SPU would conduct public outreach before and during project construction to notify residents, local agencies, Metro, and other stakeholders of work progress and expected disruptions or changes in traffic flow.
- Access for emergency-response vehicles would be maintained at all times.
- Through access may not be available at all times during construction, but temporary closures would be minimized and detour routes would be properly and clearly signed. Vehicle access to private properties would be maintained, subject to temporary traffic control measures such as signage and flagging.
- Alternative routes for pedestrians, bicyclists, and those with disabilities would be identified and clearly signed, as needed.

15. Public Services

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

The proposed project is not expected to create an increased need for public services. The project would be required at all times to accommodate emergency access for buildings accessed via affected streets. Emergency access would comply with relevant policies administered by SDOT as part of its street use permitting process.

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

During construction, the project would be required at all times to accommodate emergency access. No mitigation is being proposed because the project would not increase impacts on public services.

16. Utilities

- a. Check utilities available at the site:**

- | | | | |
|--|--|---|--|
| <input type="checkbox"/> None | | | |
| <input checked="" type="checkbox"/> Electricity | <input checked="" type="checkbox"/> Natural gas | <input checked="" type="checkbox"/> Water | <input checked="" type="checkbox"/> Refuse service |
| <input checked="" type="checkbox"/> Telephone | <input checked="" type="checkbox"/> Sanitary sewer | <input type="checkbox"/> Septic system | |
| <input checked="" type="checkbox"/> Other: cable, fiber optics | | | |

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

During CIPP installation, sewer service would be interrupted for brief periods to install and then disconnect a flow bypass around the affected mainline. SPU would notify affected residents and businesses by issuing Service Disruption Notices (in the form of door hangers) at least 48 hours before those outages occur. No interruptions of other utilities or services are anticipated during project construction. No new utilities are being proposed.

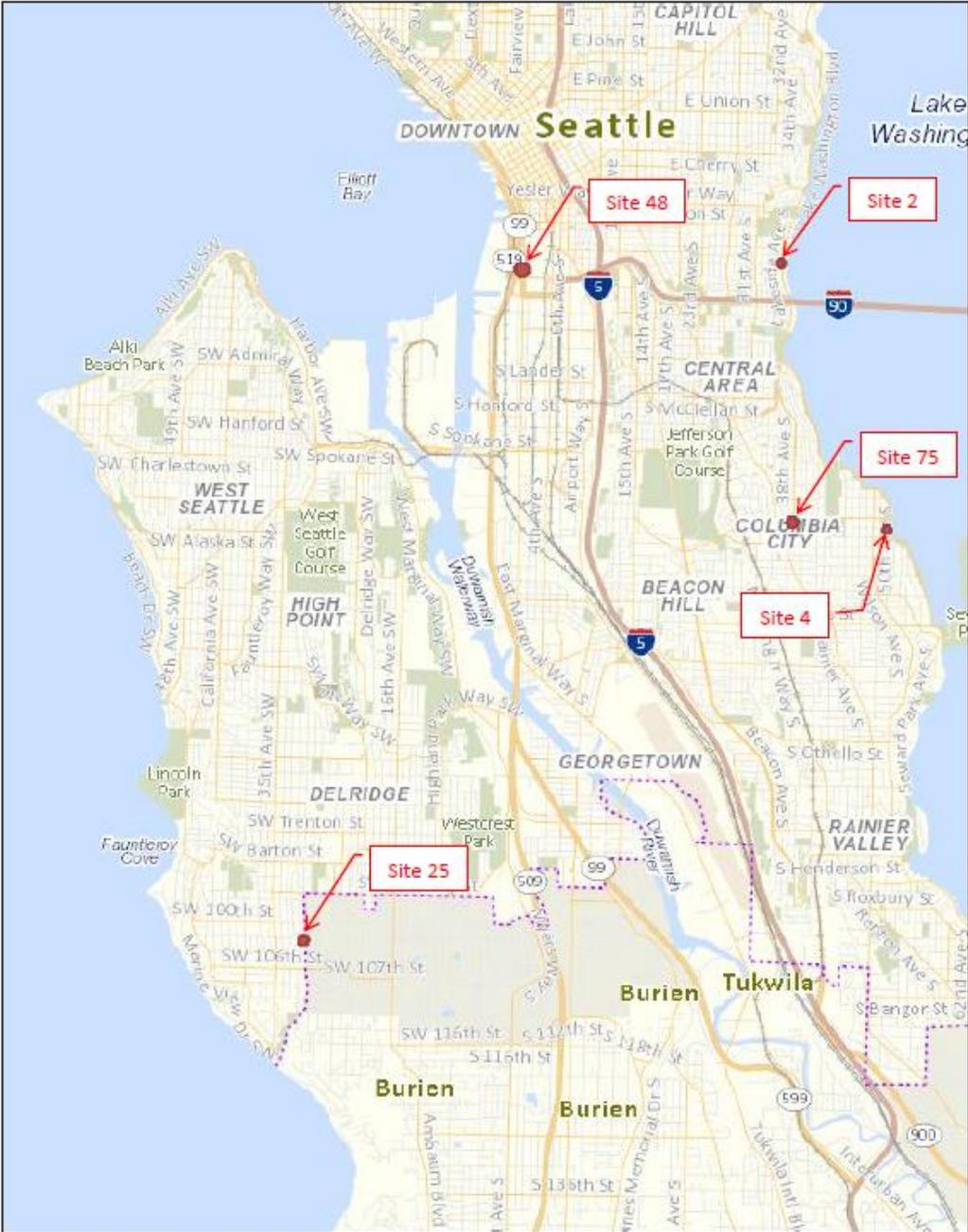
C. SIGNATURE

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

Signature: _____
Samantha Menathy, Project Manager

- Attachment A: Vicinity Map
- Attachment B: Summary of Sewer Lining C317017 Contract 2 Sites
- Attachment C: Greenhouse Gas Emissions Worksheet

Sewer Lining Contract 2 – SEPA Checklist Sites



Attachment B: Summary of Sewer Lining Contract 2 (C317017) Sites

Pipe Materials: CI = cast iron; CON = concrete; RC = reinforced concrete; VC = vitrified clay

Site #	Sewage Conveyance System	Pipe Segment	Upstream Maintenance Hole	Downstream Maintenance Hole	Work Address	SPU Work Order	Linear Feet of Pipe Repair	Pipe Diameter (in) and Material
2	sanitary	2D	046-053	046-051	903 LAKESIDE AVE S	5592007	13	15 CI
		2E	046-054	046-053	900 LAKESIDE AVE S	5591957	9	15 CON
		2F	046-176	046-054	903 LAKESIDE AVE S	5591895	29	15 RC
		2G	046-209	046-054	914 LAKESIDE AVE S	10385065	164	15 RC
4	4A,B,C: combined 4D: sanitary	4A	060W-012	060W-011	4506 51st AVE S	7401311	130	15 VC
		4B	060W-013	060W-012	4523 52nd AVE S	7405250	318	15 VC
		4C	060W-014	060W-013	4603 LAKE WASHINGTON BLVD S	7414166	132	15 VC
		4D	060W-017	060W-014	4621 LAKE WASHINGTON BLVD S	7416048	254	15 VC
25	sanitary	25J	301-068	301-069	10053 30th AVE SW	6035936	418	15 RC
		25K	301-069	301-070	10224 31st AVE SW	6034675	411	15 RC
48	combined	48A	043-130	043-131	1041 1st AVE S (the work order cites the address as 926 Alaskan Wy S)	6018817	326	15 VC
75	sanitary	75A	059-250	059-509	4421 38th AVE S	6108580	270	15 VC

Attachment C: Greenhouse Gas Emissions Worksheet

Section I: Buildings						
			Emissions Per Unit or Per Thousand Square Feet (MTCO ₂ e)			
Type (Residential) or Principal Activity (Commercial)	# Units	Square Feet (in thousands of square feet)	Embodied	Energy	Transportation	Lifespan Emissions (MTCO ₂ e)
Single-Family Home	0		98	672	792	0
Multi-Family Unit in Large Building	0		33	357	766	0
Multi-Family Unit in Small Building	0		54	681	766	0
Mobile Home	0		41	475	709	0
Education		0.0	39	646	361	0
Food Sales		0.0	39	1,541	282	0
Food Service		0.0	39	1,994	561	0
Health Care Inpatient		0.0	39	1,938	582	0
Health Care Outpatient		0.0	39	737	571	0
Lodging		0.0	39	777	117	0
Retail (Other than Mall)		0.0	39	577	247	0
Office		0.0	39	723	588	0
Public Assembly		0.0	39	733	150	0
Public Order and Safety		0.0	39	899	374	0
Religious Worship		0.0	39	339	129	0
Service		0.0	39	599	266	0
Warehouse and Storage		0.0	39	352	181	0
Other		0.0	39	1,278	257	0
Vacant		0.0	39	162	47	0
TOTAL Section I Buildings						0

Section II: Pavement						
						Emissions (MTCO ₂ e)
Pavement (sidewalk, asphalt patch)		0.0				0
Concrete Pad		0.0				0
TOTAL Section II Pavement						

Section III: Construction						
						Emissions (MTCO ₂ e)
(See detailed calculations below)						
TOTAL Section III Construction						33.5

Section IV: Operations and Maintenance						
						Emissions (MTCO ₂ e)
(See detailed calculations below)						
TOTAL Section IV Operations and Maintenance						0

TOTAL GREENHOUSE GAS (GHG) EMISSIONS FOR PROJECT (MTCO₂e)						33.5
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Attachment C: Greenhouse Gas Emissions Worksheet, continued

Section III Construction Details		
Construction: Diesel		
Equipment	Diesel (gallons)	Assumptions
Jetter/vactor truck (for pre-cleaning pipe)	330	5 hours/segment x 12 segments x 5.5 gallons/hour (270 hp engine)
Refrigeration truck (transporting pre-fab liners)	1,100	10 hours/day (2 hours travel + 8 hours working) x 4 working days (on average) x 5 sites x 5.5 gallons/hour (270 hp engine)
Installation truck with air compressor, bypass pump	1,100	10 hours/day (2 hours travel + 8 hours working) x 4 working days (on average) x 5 sites x 5.5 gallons/hour (270 hp engine)
Support box truck with hydraulic lift	67	4 working days (on average) x 5 sites x 1 round trip/day x 20 miles/round trip ÷ 6 mpg
Subtotal Diesel Gallons	2,597	
GHG Emissions in lbs CO₂e	68,950	26.55 lbs CO ₂ e per gallon of diesel
GHG Emissions in metric tons CO₂e	31.3	1,000 lbs = 0.45359237 metric tons

Construction: Gasoline		
Equipment	Gasoline (gallons)	Assumptions
Pick-up Trucks or Crew Vans	200	4 working days (on average) x 5 sites x 5 vehicles x 2 round-trip/day x 20 miles/round trip ÷ 20 mpg
Subtotal Gasoline Gallons		
GHG Emissions in lbs CO₂e	4,860	24.3 lbs CO ₂ e per gallon of gasoline
GHG Emissions in metric tons CO₂e	2.2	1,000 lbs = 0.45359237 metric tons

Construction Summary		
Activity	CO ₂ e in pounds	CO ₂ e in metric tons
Diesel	68,950	31.3
Gasoline	4,860	2.2
Total for Construction	73,810	33.5

Section IV Long-Term Operations and Maintenance Details		
Operations and Maintenance: Diesel		
Equipment	Diesel (gallons)	Assumptions
Subtotal Diesel Gallons		
GHG Emissions in lbs CO₂e		26.55 lbs CO ₂ e per gallon of diesel
GHG Emissions in metric tons CO₂e		1,000 lbs = 0.45359237 metric tons

Operations and Maintenance: Gasoline		
Equipment	Gasoline (gallons)	Assumptions
Subtotal Gasoline Gallons		
GHG Emissions in lbs CO₂e		24.3 lbs CO ₂ e per gallon of gasoline
GHG Emissions in metric tons CO₂e		1,000 lbs = 0.45359237 metric tons

Operations and Maintenance Summary		
Activity	CO ₂ e in pounds	CO ₂ e in metric tons
Diesel		
Gasoline		
Total Operations and Maintenance		