HM ☑ = Reviewed by Heather Maiefski, Associate Planner, City of Shoreline, 10/10/2024

SEPA ENVIRONMENTAL CHECKLIST

Purpose of checklist

Governmental agencies use this checklist to help determine whether the environmental impacts of your proposal are significant. This information is also helpful to determine if available avoidance, minimization, or compensatory mitigation measures will address the probable significant impacts or if an environmental impact statement will be prepared to further analyze the proposal.

Instructions for applicants

This environmental checklist asks you to describe some basic information about your proposal. Please answer each question accurately and carefully, to the best of your knowledge. You may need to consult with an agency specialist or private consultant for some questions. **You may use "not applicable" or "does not apply" only when you can explain why it does not apply and not when the answer is unknown.** You may also attach or incorporate by reference additional studies reports. Complete and accurate answers to these questions often avoid delays with the SEPA process as well as later in the decision-making process.

The checklist questions apply to **all parts of your proposal,** even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

Instructions for lead agencies

Please adjust the format of this template as needed. Additional information may be necessary to evaluate the existing environment, all interrelated aspects of the proposal and an analysis of adverse impacts. The checklist is considered the first but not necessarily the only source of information needed to make an adequate threshold determination. Once a threshold determination is made, the lead agency is responsible for the completeness and accuracy of the checklist and other supporting documents.

Use of checklist for nonproject proposals

For nonproject proposals (such as ordinances, regulations, plans and programs), complete the applicable parts of sections A and B, plus the Supplemental Sheet for Nonproject Actions (Part D). Please completely answer all questions that apply and note that the words "project," "applicant," and "property or site" should be read as "proposal," "proponent," and "affected geographic area," respectively. The lead agency may exclude (for non-projects) questions in "Part B: Environmental Elements" that do not contribute meaningfully to the analysis of the proposal.

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A. Background [Find help answering background questions]

1. Name of proposed project, if applicable:

HM ☑

City of Shoreline (City) Pump Station 30 (PS-30) Replacement, including SCADA.

2. Name of applicant:

HM ☑

City of Shoreline: Public Works

HM - Zachary Evans, P.E.
Engineer III - Lead Project Manager

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

HM ☑

City of Shoreline

17500 Midvale Avenue North,

Shoreline, WA 98133

Contact: Zachary Evans

Phone: 206-801-2428

4. Date checklist prepared:

HM ☑

August 6, 2024.

5. Agency requesting checklist:

HM ☑

City of Shoreline: Planning and Community Development

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

HM ☑

End of February 2025 until end of November 2025.

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

HM ☑

None anticipated.

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

HM ☑

- Reports:
  - Geotechnical Engineering Report: Stormwater Pump Stations 26 and 30 Upgrades (Landau Associates, 2021). HM - dated March 22, 2021
  - Geologically Hazardous Area Memorandum (Landau Associates, 2023). HM - dated October 26, 2023

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HM - This SEPA Checklist, SWPPP, Hydraulic Project Approval (HPA), Surface Water Report, Arborist Report

- Wetland/Waterway Critical Areas Report – Pump Station 30 Improvements Project (Landau Associated, 2023). HM - dated October 19, 2023

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.**

HM ☑

None known.

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

HM ☑

- Hydraulic Permit Approval (HPA) with Washington Department of Fish & Wildlife (WDFW)
- City of Shoreline Site Development Permit.
- Construction Stormwater General Permit.
- Building Electrical Construction Permit.

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. (Lead agencies may modify this form to include additional specific information on project description.)**

HM ☑

Pump Station 30 (PS-30) is one of the eight operated stormwater pump stations owned by the City. The objective of this project is to improve PS-30 by removing the existing baffle wall and pump station manhole and installing a new pump station wet well, pre-treatment structure, piping, and force main to connect to the existing gravity system on NE 169th Street. These changes will result in the improvement of the safety and reliability of the pump station, storage capacity and infiltration potential, and the overall infrastructure.

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.**

HM ☑

This project site is located at 1243 NE 170th Street in Shoreline as Parcel Numbers 254810003007 and 254810003502. The site is within Township 26 North, Range 04

HM - Parcel No.'s 254810-0030 and 254810-0035

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East, Section 8.The abbreviated legal description is: FIR GROVE ADD. . See Figures 1 and 2 in Appendix A for a site vicinity map and a site plan.

B. Environmental Elements

1. Earth [Find help answering earth questions]

a. General description of the site:

HM ☑ The PS-30 is located in a residential development with some commercial buildings southwest of NE 170th Street and 15th Avenue NE. The pond that will receive improvements is approximately 9-feet deep. Based on the survey data both southern and eastern pond slopes have an average slope of approximately 46% and a maximum height of 12-feet. The existing slopes will be maintained as-is, with minor modifications to strengthen the slope for an access ramp. The majority of the improvements will not impact the slopes.

Circle or highlight one: Flat, rolling, hilly, steep slopes, mountainous, other:

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

HM ☑ The steepest slopes form the southern and eastern sides of the pond, at approximately 46%.

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 any of these soils.

HM ☑ According to the Geotechnical Engineering Report prepared by Landau Associates, Inc in 2021, attached as Appendix B, the site consisted of approximately 5 feet of loose, very silty sand underlain by medium dense to very dense silty sand with variable gravel content. The soils anticipated within the trench zone is classified as Type C soil.

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

HM ☑ During LAI's field investigation for PS-30, no loose and saturated soils were observed, therefore the site was concluded to be low risk for soil liquefaction. The eastern and southern pond slopes are classified as a moderate to high risk landslide area. LAI indicated that the proposed improvements would not increase the risk of landslide hazards at the PS-30 or at adjacent properties.

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

HM ☑ Certain portions of the pond will be regraded via excavation and filling. These areas are located on the west, northwest, and east sides of the pond. The approximate total quantity of excavation is 310 cubic yards (CY) and for fill is 180 CY. All fill will be imported and no native backfill is proposed for the project. Other material quantities that will be placed are as followed: 55 tons of coarse sand for the pond bottom, 240 CY of bioretention soil mix on the pond bottom, 150 CY of quarry spalls for the pond side slopes, 25 CY of gravel below new hot mix asphalt (HMA), 9 CY of HMA, and 310 square feet (SF) of grasspave.

The approximate total affected area is 1,400 square yards (SY).

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

HM ☑ Yes. There will be some open excavations where soils will be exposed during construction. The project construction documents include an erosion and sediment control Best Management Practices (BMPs) that will be implemented during project implementation.

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

HM ☑ Approximately 10% of the site will be covered with impervious surfaces after the project is complete.

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

HM ☑ Appropriate BMPs including a stabilized construction entrance, silt fence, wattles, and plastic coverings will be employed during construction to avoid or reduce erosion, as indicated in the attached Temporary Erosion and Sediment Control (TESC) plans and the projects Stormwater Pollution and Prevention Plan (SWPPP).

2. Air Find help answering air questions

a. What types of emissions to the air would result from the proposal during construction, operation, and maintenance when the project is completed? If any, generally describe and give approximate quantities if known.

HM ☑ Emissions will be consistent with typical construction projects including those from equipment, automobiles, and trucks. The approximate emission quantities are not known. No further emissions will occur once the project is complete except in the rare instance when the portable generator is operating during electrical power outages and significant rainfall events.

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

HM ☑ None.

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

HM ☑ Construction equipment will be required to have exhaust systems to minimize vehicle exhaust odors.

3. Water Find help answering water questions

a. Surface Water: Find help answering surface water questions

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.

A Wetland/Waterway Critical Areas Report was completed for this project by Landau Associates and is dated October 19, 2023. The report is attached as Appendix C. The information provided below pertains to the Wetland/Waterway Critical Areas Report.

The United States Geological Survey (USGS) topographic map (Appendix A, Figure A-1), National Wetland Inventory (Appendix A, Figure A-2), and Forest Practices Application Mapping Tool (Appendix A, Figure A-6) do not identify any waterways within the study area. The City Property Information Interactive Map (City of Shoreline; accessed September 5, 2023) (Appendix A, Figure A-4) identifies one piped segment of Littles Creek within and adjacent to the project area. The mapped segment of stream north of the project area originates on the opposite side of NE 170th Street.

In accordance with Section 20.80.270.B.5 of the (Shoreline Municipal Code (SMC), streams do not include storm or surface water runoff devices unless they are used by fish or are used to convey streams naturally occurring prior to construction. Based on the City's Shoreline Surface Water Assets mapping tool, the piped section of Littles Creek shown on the City Property Information Interactive Map originates in the vicinity of a catch basin north of NE 170th Street. All flow upgradient of PS 30 is generated by roadside storm or surface water runoff devices, conveyed in

the City's drainage network, and does not follow a previously existing stream channel (Appendix A, Figure A-5). Therefore, the City's drainage network upstream of PS-30 does not meet regulated stream criteria. As a result, it is assumed that PS-30 is the headwaters of the mapped section of Littles Creek. The piped section of Littles Creek is mapped following one consolidated path daylighting from NE 158th Street and NE 155th Street approximately ¾ mile south of the project area. The piped section of Littles Creek from the pipe inlet within the stormwater pond (labelled "PI-116" by City GIS) to the south meets piped stream criteria per the SMC 20.80.280.C.1 and is provided a standard buffer of 10 feet per SMA 20.80.280(C)(1).

HM ☑

The conclusion of this report states that the report meets City requirements, as outlined in the SMC. Since the project will replace a segment of piped stream, the proposed project will result in no net loss of critical areas or buffer functions. No compensatory mitigation is proposed or required.

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.**

HM ☑

As mentioned above, the replacement of a portion of the piped stream will occur within the 10-foot buffer. Work includes the installation of a new piped force main and the removal of the existing segment. Available plans and maps can be found in the Wetland/Waterway Critical Areas Report (LAI, 2023).

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.**

HM ☑

None.

HM - Approximately 315 CY of silt will be excavated/removed from the bottom of the surface water pond. Approximately 175 CY of sand and approximately 140 CY of bioretention soil will be placed at the bottom of the pond.

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

HM ☑

No.

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

HM ☑

No.

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.**

HM ☑

No.

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b. Ground Water: Find help answering ground water questions

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 a general description, purpose, and approximate quantities if known.

HM ☑ No.

2. Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (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.

Not Applicable (N/A). HM - Waste material will not be discharged into the ground

c. Water Runoff (including stormwater):

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.

HM ☑ During construction, a bypass system will be in place prior to the removal of any conveyance or pond infrastructure. This project will be constructed during dry season to limit the amount of stormwater that needs to be bypassed. The bypass system shall provide suspended solids removal to match existing and proposed pond improvements. All bypass water will go around the pond and discharge into the same system further downstream. No bypass or water will flow into other waters.

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

HM ☑ No. All water will be bypassed. HM - All water will be bypassed during construction. No waste material will be discharged into the ground as part of this project.

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

HM ☑ No.

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

HM ☑ N/A. HM - Project is to comply with TESC plan and BMP's.

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4. Plants [Find help answering plants questions]

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

☐ **deciduous tree: alder, maple, aspen, other**

HM ☑ ☒ **evergreen tree: fir, cedar, pine, other**

☒ **shrubs**

☒ **grass**

☐ **pasture**

☐ **crop or grain**

☐ **orchards, vineyards, or other permanent crops.**

☐ **wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other**

☐ **water plants: water lily, eelgrass, milfoil, other**

☐ **other types of vegetation**

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

HM ☑ One (1) cedar tree and five (5) arborvitaes will be removed.

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

HM ☑ No threatened or endangered plant species are known to be on or near the site. During the site visits, no evidence of threatened or endangered plant species was noted.

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

HM ☑ All proposed trees, shrubs, and pond bottom plants are categorized as northwest native or cultivar, with the exception of 'Emerald Green' Arborvitae that will be planted on the west side of the project site.HM - Thirteen Western Red Cedars of the total fourteen are proposed to be retained. Three replacement trees are proposed in compliance with SMC 20.50. 360(C).

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

HM ☑ No noxious weeds or invasive species are known to be on or near the site and have not been observed.

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5. Animals [Find help answering animal questions]

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.

Examples include:

HM ☑

- **Birds: hawk, heron, eagle, songbirds, other:**
- **Mammals: deer, bear, elk, beaver, other:**
- **Fish: bass, salmon, trout, herring, shellfish, other:**

Birds: songbirds.

Mammals: small mammals such as raccoon, squirrels, etc.

Fish: None.

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

HM ☑ Per the Priority Habitat and Species (PHS) map on the Washington Department of Fish and Wildlife (WDFW) website, the project site is located within a rectangular area, about 6 miles by 6 miles, that has records of Little brown bats or habitat occurrence.

HM - Washington State Dept of Fish & Wildlife Priority Habitat and Species Map indicates no threatened and endangered species.

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

HM ☑ The U.S. Fish and Wildlife Service, Information for Planning and Consultation (IPaC) Resource List, reported 16 migratory bird species within the project area (USFWS, 2024). IPaC Resource List can be accessed at:

https://ipac.ecosphere.fws.gov/location/XIS3OAS6MVA4FDFYI2NCDHDFYM/resources#migratory-birds

The proposed project does not include activities with the potential to affect migratory birds. Therefore, the proposed project does not affect birds protected by the Migratory Bird Treaty Act.

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

HM ☑ Native plant species will be planted within the project site.

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

HM ☑ No invasive species are known to be on or near the site and have not been observed.

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6. Energy and Natural Resources Find help answering energy and natural resource questions

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.

HM ☑ N/A. This project includes performing maintenance (rehabilitation or replacement) of existing stormwater pipes, structures, and pump station.

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

HM ☑ No.

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.

HM ☑ N/A. HM - Electricity will be used to operate the pumps. A new electrical service will be provided, replacing the existing electrical service onsite. The pumps are on variable frequency drives, which can be used to reduce the pump output and power consumption.

7. Environmental Health Find help with answering environmental health questions

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

HM ☑ No.

b. Describe any known or possible contamination at the site from present or past uses.

HM ☑ None.

c. 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.

HM ☑ None.

d. 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.

HM ☑ None. HM - Gasoline, diesel, oil, and hydraulic fluid may be used in construction equipment. Project is to comply with BMP's.

e. Describe special emergency services that might be required.

HM ☑ None.

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f. Proposed measures to reduce or control environmental health hazards, if any.

HM

None. HM - Project to comply with BMP's

g. Noise

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

HM

There is no existing noise in the area that may 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)?

HM

The project requires the use of heavy equipment to excavate, place structures and backfill materials for the pump station and conveyance upgrades. This noise is expected to be short term. There will be no change in long-term noise.

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

HM

Work will only occur during daytime hours. HM - Project to comply with City's noise ordinance SMC 9.05.060(B)(2)

8. Land and Shoreline Use Find help answering land and shoreline use questions

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.

HM

The current use of the site is a stormwater pond and pump station. No changes to land use on this site or nearby properties area proposed due to this project.

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 because 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?

HM

No.

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?

HM

No.

c. Describe any structures on the site.

HM ☑ The site contains a below ground wet well/pump station. There are also a couple additional below ground maintenance structures.

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

HM ☑ The existing wet well and a catch basin will be demolished on the site.

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

HM ☑ The current zoning of the site is R-6; Residential, 6 units/acre, per City of Shoreline Zoning Maps.

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

HM ☑ The Land Use Designation is Public Facility per the City of Shoreline 2012 Comprehensive Plan.

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

HM ☑ N/A. HM - Subject site is not located with in the Shoreline Jurisdiction

h. Has any part of the site been classified as a critical area by the city or county? If so, specify.

HM ☑ No. HM - According to City GIS maps a piped stream and geologic hazard areas are mapped on the subject site.

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

HM ☑ None.

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

HM ☑ None.

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

HM ☑ N/A. HM - This project does not result in displacement impacts.

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

HM ☑ The project will not affect or impact the land use for the site.

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

HM ☑ N/A. HM - There are no impacts to agricultural and forest lands.

9. Housing Find help answering housing questions

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

HM ☑ N/A. HM - No housing units are proposed.

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

HM ☑ N/A. HM - No housing units will be demolished.

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

HM ☑ N/A. HM - There are no housing impacts.

10. Aesthetics Find help answering aesthetics questions

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

HM ☑ N/A. HM - There are no buildings. With the exception of the new control panel, all new equipment will be below grade. The control panel will stand approximately 4-feet tall and two light fixtures will be 15-feet tall.

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

HM ☑ N/A. HM - Views will not be altered or obstructed.

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

HM ☑ N/A. HM - Views will not be altered or obstructed.

11. Light and Glare Find help answering light and glare questions

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

HM ☑ None. HM - Two 15-foot tall light fixtures are proposed. They will be shielded to reduce glare onto the neighboring house. The fixtures will be dimmable and off the vast majority of the time, and only turned on if needed for emergency maintenance at night. If the City does decide to keep the lights on at night, they will be at 30% brightness unless motion is detected and will use a light sensor to only turn on at night.

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

HM ☑ No.

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

HM ☑ None.

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

HM ☑ N/A. HM - No light or glare impacts are associated with this project.

12. Recreation Find help answering recreation questions

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

HM ☑

None.

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

HM ☑ No.

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

HM ☑ N/A. HM - This project does not result in any recreation impacts.

13. Historic and Cultural Preservation Find help answering historic and cultural preservation questions

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.

HM ☑ No.

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.

HM ☑ No. HM - According to WISAARD mapping the project site area is mapped within the low to moderately low risk area for cultural resource artifacts.

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 archeology and historic preservation, archaeological surveys, historic maps, GIS data, etc.

HM ☑ No historic or cultural places/resources have been found within or near the project jobsite per the Department of Archaeology and Historic Preservation (DAHP) and National Park, National Register of Historic Places online maps. The site consists of previously disturbed soil, so not archeological artefacts are anticipated to be found during construction.

HM - An Inadvertent Discovery Plan is required to be on site at all times during construction.

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.

HM ☑ N/A. HM - In the event that ground disturbance or other activities result in inadvertent discover of archaeological deposits, work will be halted immediately and contact will be made with all agencies according to the IDP.

14. Transportation Find help with answering transportation questions

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.

HM ☑ The project site entrance is located on a residential street. No public streets or highways will be affected by this project.

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?

HM ☑ There is a public bus stop located on the west side of the project site about 300 feet from the project site entrance.

c. 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).

HM ☑ No.

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

HM ☑ No.

e. 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 nonpassenger vehicles). What data or transportation models were used to make these estimates?

HM ☑ No vehicular trips will be generated by this project.

f. 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.

HM ☑ No.

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

HM ☑ N/A. HM - No transportation impacts will be associated with this project.

15. Public Services Find help answering public service questions

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.

HM ☑ No.

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

HM ☑ N/A. HM - This project will result in no impacts on public services.

16. Utilities Find help answering utilities questions

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

HM ☑ Stormwater.

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.

HM ☑ The project includes proposed upgrades to the current stormwater system including pipes, pumps, structures, and onsite electrical upgrades. Electrical service to the site is by Seattle City Light (SCL).

C. Signature Find help about who should sign

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.

X Zachary Evans

I am approving this document
2024.08.06 15:47:07-07'00'
C=US, E=zevans@shorelinewa.gov,
O="City of Shoreline, Public Works",
OU=Engineer II - Capital Projects,
CN=Zachary Evans

Type name of signee: Zachary Evans

Position and agency/organization: City of Shoreline: Public Works

Date submitted: 8/6/2024

DEV24-2035

D. Supplemental sheet for nonproject actions Find help for the nonproject actions worksheet

IT IS NOT REQUIRED to use this section for project actions.

Because these questions are very general, it may be helpful to read them in conjunction with the list of the elements of the environment.

When answering these questions, be aware of the extent the proposal, or the types of activities likely to result from the proposal, would affect the item at a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

1. **How would the proposal be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise?**
    - **Proposed measures to avoid or reduce such increases are:**
2. **How would the proposal be likely to affect plants, animals, fish, or marine life?**
    - **Proposed measures to protect or conserve plants, animals, fish, or marine life are:**
3. **How would the proposal be likely to deplete energy or natural resources?**
    - **Proposed measures to protect or conserve energy and natural resources are:**
4. **How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection, such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands?**
    - **Proposed measures to protect such resources or to avoid or reduce impacts are:**
5. **How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?**
    - **Proposed measures to avoid or reduce shoreline and land use impacts are:**
6. **How would the proposal be likely to increase demands on transportation or public services and utilities?**
    - **Proposed measures to reduce or respond to such demand(s) are:**
7. **Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.**

APPENDICES

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APPENDIX A

SITE FIGURES

Legend

- PS30
- Type 1 Catch Basin
- Type 2 Catch Basin
- Gravity
- Ditch
- Streams
- 2ft Contours
- Retention Pond
- Site Parcels
- Parcels

bhc CONSULTANTS

N

0 60 120 Feet

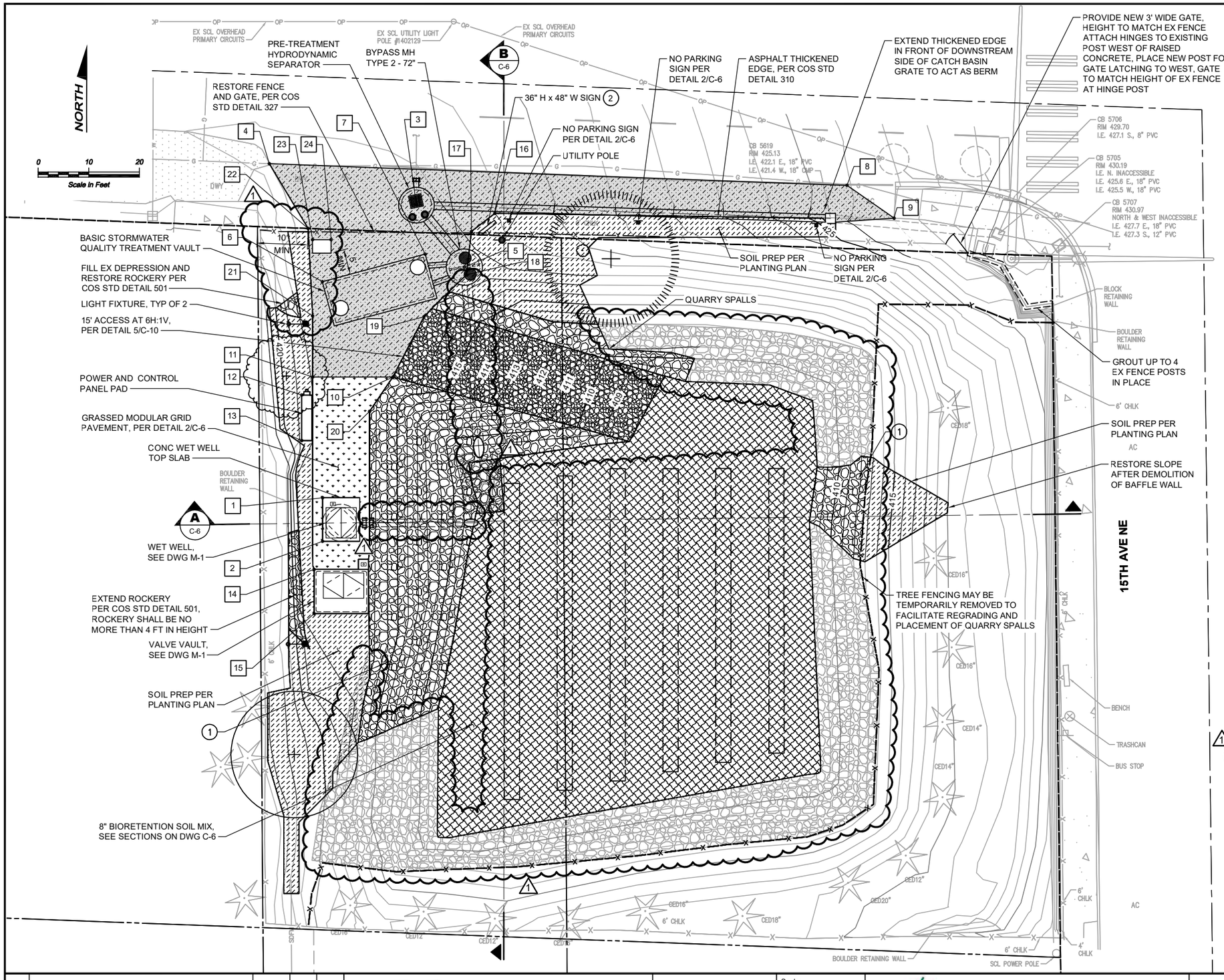
CITY OF SHORELINE

Vicinity Map

PS-30 Improvements Surface Water Report
City of Shoreline
October 2023

Figure **1**

~~DEV24-2035~~



NOTES:

1. EXISTING UTILITIES NOT SHOWN, SEE SURVEY.
2. ALL DISTURBED AREAS SHALL BE RESTORED AS INDICATED ON DWG. IF DISTURBED AREA SHOWS NO RESTORATION REQUIREMENT, TOPSOIL SHALL BE PLACED UNLESS OTHERWISE DIRECTED BY ENGINEER.

CONSTRUCTION NOTES:

(1) ADD NEW QUARRY SPALLS AS NEEDED WHEN REGRADING SIDE SLOPES.

(2) INSTALL "STANDARD UPRIGHT MOUNT" CONFIGURATION SIGN PROVIDED BY VACKERSIGN.COM. INSTALL SIGN PER MANUFACTURER'S WRITTEN INSTRUCTIONS, USING 8" DIA CONCRETE POST-HOLE FOOTINGS. SET BOTTOM OF SIGN AT 30" ABOVE FINISHED GRADE.

LEGEND:

- BIORETENTION MEDIA
- SOIL PREPARATION PER LANDSCAPE
- GRASSED MODULAR GRID PAVEMENT
- QUARRY SPALLS
- ASPHALT
- (1) EXISTING QUARRY SPALLS

COORDINATE CONTROL

PT #	NORTHING	EASTING	ELEV	DESCRIPTION
1	277767.75	1276199.12	417.4	TOC, WET WELL, CORNER NW
2	277759.13	1276199.12	417.4	TOC, WET WELL, CORNER SW
3	277825.56	1276217.67	417.9	FL, RIM CB
4	277833.74	1276188.60	417.9	AC, MATCH EX
5	277813.30	1276227.12	417.9	RIM, VAULT
6	277810.43	1276199.08	417.8	AC OVER VAULT, CORNER NW
7	277815.88	1276219.40	417.8	AC OVER VAULT, CORNER NE
8	277829.47	1276302.70	425.9	AC, MATCH EX
9	277822.97	1276312.02	427.0	AC, MATCH EX
10	277791.59	1276213.01	417.0	AC
11	277791.59	1276197.16	418.6	AC
12	277788.03	1276195.01	418.5	TOC, NW
13	277779.03	1276195.01	418.5	TOC, SW
14	277753.59	1276197.45	417.3	TOC, VAULT, CORNER NW
15	277744.86	1276197.45	417.3	TOC, VAULT, CORNER SW
16	277823.93	1276233.15	419.0	AC
17	277820.36	1276228.52	418.3	AC
18	277811.79	1276227.52	417.9	AC
19	277803.50	1276219.16	417.0	AC
20	277784.80	1276208.41	417.1	GRASSPAVE
21	277809.66	1276197.16	417.7	AC
22	277820.95	1276196.27	417.9	AC MATCH EX
23	277818.74	1276197.15	x	ELEC VAULT, CORNER NW
24	277818.74	1276200.81	x	ELEC VAULT, CORNER SW

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06/07/2024

No.	Revision	Date	By	App'd
1	RESPONSE TO PERMIT REVIEW	06-2024	CAB	CRO
	PERMIT SUBMITTAL	09-2023	CAB	CRO

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Designed: C. Bryant, P.E.
Drawn: S. Olsoe
Checked: C. Ochiltree, P.E.

Scale: 1" = 10'-0"
One Inch at Full Scale
If Not One Inch Scale Accordingly

CITY OF SHORELINE
City of Shoreline
Public Works - Surface Water Utility
17500 Midvale Avenue North
Shoreline, WA 98133
Phone: 206-801-2400 Fax: 206-801-2785

FIGURE 2
GRADING, DRAINAGE, AND SITE FINISH PLAN

Drawing: C-5
Sheet: 10 of 40
File: P20-10647_PS-30_C-5
Date: September 2023

DEV24-2035

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APPENDIX B

GEOTECHNICAL REPORT

Geotechnical Engineering Report
Stormwater Pump Stations 26 and 30 Upgrades
Shoreline, Washington

March 22, 2021

Prepared for

BHC Consultants, LLC
1601 Fifth Avenue, Suite 500
Seattle, Washington 98101

LANDAU ASSOCIATES

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(425) 778-0907

Geotechnical Engineering Report
Stormwater Pump Stations 26 and 30 Upgrades
Shoreline, Washington

This document was prepared by, or under the direct supervision of, the undersigned, whose seal is affixed below.

Name: Sean Gertz, PE
Washington/No. 20100325

Date: March 22, 2021

Document prepared by: _____ Sean Gertz, PE
Project Manager

Document reviewed by: _____ Steven R. Wright, PE
Quality Reviewer

Date: March 22, 2021
Project No.: 1073034.010.011
File path: \\edmdata01\projects\1073\034.010\R\Geotech\Signature Page.docx
Project Coordinator: MCS

LANDAU ASSOCIATES

DEV24-2035

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LIST OF ABBREVIATIONS AND ACRONYMS

ASTM	ASTM International
bgs	below ground surface
BHC	BHC Consultants, LLC
City	City of Shoreline
ft	foot/feet
LAI	Landau Associates, Inc.
pcf	pounds per cubic foot
PIT	pilot infiltration test
PS	pump station
psf	pounds per square foot
SMC	Shoreline Municipal Code
WAC	Washington Administrative Code
WSDOT	Washington State Department of Transportation

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1.0 INTRODUCTION

This report summarizes the results of geotechnical engineering services provided by Landau Associates, Inc. (LAI) in support of the Stormwater Pump Stations 26 and 30 Upgrades project in Shoreline, Washington (sites; Figure 1).

This report has been prepared with information provided by BHC Consultants, Inc. (BHC; project civil engineer) and with data collected during LAI's field exploration and laboratory testing program.

1.1 Project Description

LAI understands that the City of Shoreline (City; project owner) plans to improve existing Pump Stations 26 (PS-26) and 30 (PS-30). Proposed improvements at PS-26 include excavating and removing the existing pump station; backfilling a portion of a stormwater pond that extends onto private property; and installing an underground infiltration gallery that consists of a 96-inch-diameter, perforated, corrugated metal pipe and a new wet well and pre-treatment system. Proposed improvements at PS-30 include removing the existing baffle wall and pump station manhole and installing a new pump station wet well, pre-treatment structure, piping, and force main along Northeast 170th Street and 12th Place Northeast.

1.2 Scope of Services

The following geotechnical services were provided in accordance with the scope outlined in the Subconsultant Services Agreement between BHC and LAI, dated September 10, 2020:

- Compiled and reviewed readily available geologic and geotechnical information for the sites.
- Coordinated the clearance of underground utilities at the proposed exploration locations.
- Advanced one exploratory boring at each site and collected representative soil samples at select intervals.
- Logged the exploratory borings and recorded pertinent subsurface data, including soil sample depths, stratigraphy, soil engineering characteristics, and groundwater occurrence.
- Installed monitoring wells in the borings so groundwater levels can be recorded over time.
- Conducted one large-scale pilot infiltration test (PIT) at the PS-26 site. The PIT was completed in general accordance with the requirements in the Washington State Department of Ecology's 2019 *Stormwater Management Manual for Western Washington.*
- Documented the PIT investigation and recorded pertinent subsurface data, including soil sample depths, stratigraphy, soil engineering characteristics, and groundwater occurrence.
- Completed geotechnical laboratory testing.
- Visited the sites three times between December 21, 2020 and March 21, 2021 to monitor wet season groundwater levels.

- Performed geotechnical engineering analyses and evaluated data derived from the subsurface explorations and laboratory testing program.
- Prepared this report, summarizing the results of the field exploration and laboratory testing programs and presenting geotechnical conclusions and recommendations to support design and construction of the proposed improvements. This report includes:
  - Site plans showing the exploration locations.
  - Summary logs of the exploratory borings and PIT investigation.
  - The results of LAI's geotechnical laboratory testing.
  - A discussion of near-surface soil and groundwater conditions observed at the sites.
  - A discussion of the anticipated depth to the seasonal high water table in the areas designated for improvement. The estimated depth will be based on groundwater data collected during wet season monitoring.
  - A discussion regarding hydraulic-restricting layers observed in the explorations, if any.
  - A brief discussion of geologic hazards at the sites.
  - Recommendations for earthwork, including criteria for reuse of site soils, wet weather earthwork, temporary construction dewatering, and temporary excavation support.
  - An assessment of the feasibility of infiltrating stormwater at each site.
  - Recommendations for utility trench construction, including criteria for pipe foundation support, pipe bedding, initial backfill materials, and trench backfill compaction.
  - Recommendations for resisting uplift and buoyancy forces acting on buried utility structures (if applicable).
  - Recommendations for testing and monitoring during construction.

2.0 SITE CONDITIONS

The following sections describe the geologic setting of the sites and the surface and subsurface conditions observed during LAI's field investigation. Interpretations of site conditions are based on LAI's review of available geologic and geotechnical information and on the results of the subsurface explorations.

2.1 Geologic Setting

Geologic information for the sites was obtained from the *Geologic Map of the Edmonds East and Part of the Edmonds West Quadrangles, Washington* (Minard 1983). Subsurface deposits at the sites are mapped as advance outwash, a unit that typically consists of clean sand with variable gravel content. Advance outwash may contain isolated, discrete deposits of fine-grained sand and silt. This unit is characterized as glacially overconsolidated and moderately permeable.

The soils encountered in LAI's explorations were generally consistent with the mapped geology for the sites. Though not included in the mapped geology, fill, associated with previous development, may be encountered at, or adjacent to, the sites.

2.2 Surface Conditions

The sites are surrounded by residential development and some commercial buildings. Both sites feature stormwater ponds and associated utility structures. The pond at PS-26 is 8 feet (ft) deep, and the pond at PS-30 is 9 ft deep.

2.3 Subsurface Soil Conditions

LAI explored subsurface conditions at the sites by advancing two exploratory borings (B-1 and B-2) and excavating one test pit (PIT-1). Borings B-1 and B-2 were advanced 71.5 and 66.5 ft below ground surface (bgs) on October 7 and 8, 2020. Test pit PIT-1 was excavated approximately 6 ft bgs on December 15, 2020. The approximate locations of the explorations are shown on Figures 2a and 2b.

LAI personnel monitored the field explorations, collected representative soil samples, and maintained a detailed record of the subsurface soil and groundwater conditions observed. LAI subcontracted the drill rig and operator.

Boring B-1 and test pit PIT-1 were conducted in the vicinity of PS-26. The subsurface conditions observed in boring B-1 included approximately 7.5 ft of medium dense, sandy gravel with silt underlain by loose to dense, silty sand with gravel. These soil units were underlain by dense to very dense sand, which extended to the maximum depth explored. The subsurface conditions observed in test pit PIT-1 included medium dense to dense, fine to medium sand with frequent 1- to 2-inch silt interbeds that extended to the maximum depth explored.

Boring B-2 was advanced in the vicinity of PS-30. LAI observed that subsurface conditions at this location consist of approximately 5 ft of loose, very silty sand underlain by medium dense to very dense, silty sand with variable gravel content. These soil units were underlain by very dense, gravelly sand with silt, which extended to the maximum depth explored.

Additional information about the field investigation, including summary exploration logs, is provided in Appendix A. Samples were transported to LAI's soils laboratory for further examination and testing. The results of LAI's geotechnical laboratory testing program and a discussion of the testing procedures are presented in Appendix B.

2.4 Groundwater Conditions

During LAI's October 2020 field investigation, groundwater was observed in boring B-1 at approximately 67.5 ft bgs. No groundwater was observed in boring B-2 at the time of drilling. Slow groundwater seepage was observed at 1 ft bgs in test pit PIT-1; however, this is likely water perched atop a thin silt lens and is not anticipated to be representative of the groundwater table at the site. To further define groundwater conditions at the project site LAI completed a wet season groundwater monitoring program that consisted of three site visits conducted between January 5, 2021 and March 1, 2021 during which manual groundwater readings were collected. The data from the LAI's wet season groundwater monitoring program is presented in Table 1.

Table 1. Wet Season Groundwater Monitoring

Date	PS-26 (B-1)	PS-30 (B-2)
	Depth to Groundwater (ft bgs)	
January 5, 2021	68.2	Groundwater Not Observed
February 3, 2021	67.5	Groundwater Not Observed
March 1, 2021	67.6	Groundwater Not Observed

bgs = below ground surface
ft = foot/feet

The groundwater conditions reported herein are for the specific locations and dates indicated and may not be representative of other locations and/or times. Groundwater conditions will vary depending on local subsurface conditions, weather conditions, and other factors. Furthermore, groundwater levels are expected to fluctuate seasonally, with maximum groundwater levels occurring during late winter and early spring.

3.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of LAI's field explorations and engineering analyses, subsurface conditions at the sites are suitable for the proposed improvements, provided the recommendations contained herein are incorporated into the project design.

The following sections include geotechnical conclusions and recommendations regarding geologic hazards, stormwater infiltration, reuse of site soils, wet weather earthwork, temporary construction dewatering, trenching and excavation support, pipe foundation support, pipe bedding and trench backfill, buried utility structures, and decommissioning of piezometers.

3.1 Geologic Hazards

The following sections include a discussion of geologic hazards that may be present at the sites.

3.1.1 Soil Liquefaction

Liquefaction occurs during earthquake-induced cyclic shaking, when a soil mass experiences a significant rise in pore water pressure and a progressive loss of shear strength. Liquefaction typically occurs in loose, granular soil deposits that are in a saturated or partially saturated condition. If not properly mitigated, soil liquefaction can result in widespread structural damage.

The City's *Generalized Liquefaction Susceptibility* map (2009) identifies moderate liquefaction hazards in the vicinity of PS-26 and PS-30. During the October 2020 field investigation, LAI did not observe any site soils that were both loose and saturated (Appendix A). Additionally, groundwater at both sites is anticipated to be relatively deep. In LAI's opinion, there is a low risk of soil liquefaction at the sites.

3.1.2 Landslides

Per Section 20.80.220 of the Shoreline Municipal Code (SMC), a landslide hazard area is classified as a 15 percent or steeper slope with a vertical elevation change of at least 10 ft or an area of previous landslide activity, regardless of slope inclination. Based on survey data provided by BHC for the PS-30 site, the southern and eastern pond slopes have an average inclination of approximately 46 percent and a maximum height of approximately 12 ft. Per the SMC, these slopes are classified as a moderate to high risk landslide area.

During LAI's October 2020 field investigation, no surficial groundwater seeps or evidence of previous slope instability was observed. LAI understands that the proposed PS-30 improvements do not include modification to the side slopes; furthermore, improvements are not planned at the top of the southern or eastern slopes. In LAI's opinion, the proposed improvements will not increase the risk of landslide hazards at the PS-30 site or at adjacent properties.

While pond side slopes at the PS-26 site include some localized steep slopes, none of the slopes are more than 10 ft in height. The slopes are not considered landslide hazard areas, per the SMC. In LAI's opinion, there is a low risk of landslide hazards at the PS-26 site.

3.2 Utility Construction

The following sections provide geotechnical recommendations for design and construction of new utility structures.

3.2.1 Moisture Sensitivity and Reuse of Site Soils

Excavated soils may be reused as trench backfill, provided the soils are free of organic matter, debris, and other deleterious materials. Additionally, native soils used as utility trench backfill should meet the gradation requirements in Section 9-03.19 of the Washington State Department of Transportation's *2020 Standard Specifications for Road, Bridge and Municipal Construction* (*2020 WSDOT Standard Specifications*). Though only small amounts of coarse gravel were encountered in LAI's October 2020 explorations, coarse gravel and cobbles may be present throughout the sites. Significant effort (i.e., screening or manual picking) may be required to process site soils and meet gradation requirements.

Near-surface soils at both sites exhibited a high fines content and are considered moisture sensitive. Without proper conditioning, moisture-sensitive soils may be difficult to compact and could limit the window of time in which work can be completed (i.e., uneconomical to work in wet weather). Some site soils may consist of sand with limited fines. This material may be segregated from other fines-rich materials to facilitate its reuse.

Site soils that cannot be reused as trench backfill should be disposed of at an appropriate offsite location.

3.2.2 Wet Weather Earthwork

As noted, some site soils are considered moisture sensitive. Wet weather earthwork may be difficult and could result in excessive soil disturbance and subgrade damage. The contractor should be responsible for preventing excessive soil erosion and ground destabilization during earthwork activities.

If earthwork is performed during a period of wet weather, the contractor may need to place granular fill to provide a stable working platform. Furthermore, during wet weather earthwork, the amount of fines (material passing a U.S. Standard No. 200 sieve) allowed in granular and structural fill should be limited to 5 percent or less, by dry weight, based on the fraction passing the ¾-inch sieve. If earthwork is performed in wet weather or under wet conditions, the contractor should:

- Limit earthwork to small areas to minimize subgrade disturbance and exposure to additional moisture.

- Place fill material immediately following excavation and subgrade preparation.
- Implement surface water-control measures to prevent run-on into excavations and fill soil stockpiles.
- Remove wet surficial soil before commencing fill placement each day.
- Seal the exposed ground surface with a plate compactor or other appropriate equipment at the end of each workday.

3.2.3 Temporary Construction Dewatering

During LAI's October 2020 field investigation, groundwater was observed in boring B-1 at approximately 67.5 ft bgs. No groundwater was observed in boring B-2. As a result, the need for temporary construction dewatering at the project sites is not anticipated. However, depending on the depth of the proposed utilities, groundwater fluctuations over time, and the water level in the ponds, temporary construction dewatering may be required to limit groundwater seepage into utility excavations.

Open sump pumping should be sufficient to control minor groundwater seepage during construction, provided the walls of the excavation remain stable. The use of wells or well points may be necessary if substantial pockets of groundwater are encountered and/or the excavation walls become unstable. Well points are viable to a depth of approximately 17 ft bgs. The contractor should be responsible for the design, installation, monitoring, and maintenance of required dewatering systems. If wells or well points are necessary, a registered professional engineer or hydrogeologist should prepare a dewatering plan. Prior to implementation, the contractor should submit the plan for the design team's review and comment.

3.2.4 Trenching and Excavation Support

Utility excavations likely will be made in medium dense, sandy gravel with silt; loose to very dense, silty sand with variable gravel content; or loose, very silty sand. A heavy-duty hydraulic excavator with sufficient reach should be able to excavate the trenches to the depths planned. Though not observed in LAI's explorations, cobbles and boulders may be present in site soils. Before bedding material is placed, a smooth-bladed bucket should be used to clean the trench bottom of loose and/or disturbed soil.

Trench excavation should conform to the requirements in Section 7-08.3(1)A of the *2020 WSDOT Standard Specifications.* The contractor should be responsible for actual trench configurations and maintenance of safe working conditions, including temporary excavation stability. All applicable local, state, and federal safety codes should be followed. Temporary excavations in excess of 4 ft should be shored or sloped in accordance with Safety Standards for Construction Work, Part N, Washington Administrative Code (WAC) 296-155-657. In the absence of groundwater seepage, the soils anticipated within the trench zone generally classify as Type B soil, per WAC Chapter 296-155. The prescriptive maximum allowable excavation slope for Type B soils is 1 horizontal to 1 vertical (1H:1V).

If groundwater seepage is present, flatter slopes, temporary shoring, and/or dewatering may be required.

Trench boxes are a worker safety device that provide some lateral support of adjacent soils. Where a trench box is used to support excavations, one or both sides of the trench may cave against the box, especially if the soil is not properly dewatered. Caving may extend along either side of the trench for a distance approximately equal to the depth of the trench box. The potential for caving can be reduced by routing stormwater away from the excavation and limiting vehicular traffic or vibrations next to the trench. When the trench box is moved, precautions should be taken to minimize disturbance of the pipe, underlying bedding material, and surrounding soil. Trench boxes should meet the requirements in Safety Standards for Construction Work, Part N, WAC Chapter 296-155. Additional bracing or sheeting should be used where the edge of the trench will be separated from settlement-sensitive structures and utilities by a distance less than 1.5 times the trench depth.

LAI understands that temporary shoring, up to 16 ft in height, may be necessary for the infiltration gallery excavation at PS-26. Soldier pile and sheet pile walls are appropriate shoring types for the excavation. Cantilever soldier pile and sheet pile shoring systems generally are considered feasible to a maximum exposed height of approximately 18 ft. Tiebacks typically are required to maintain the stability of walls more than about 18 ft tall or for walls where less embedment depth is desired. Where bracing or tiebacks are not used, soldier pile and sheet pile walls, without a backslope or large surcharge loads behind the wall, typically have an embedment depth equal to two times the exposed wall height (i.e., a wall with an exposed height of 16 ft would require approximately 48-ft-long piles). Depending on excavation geometry, embedment depth may be reduced with braced excavations.

If needed to support excavation walls, temporary shoring systems should be designed by a structural engineer licensed in the State of Washington. Unbraced shoring systems should be designed for an equivalent fluid density of 38 pcf. Braced shoring systems should be designed using a uniformly distributed lateral pressure of 25H, where H is the height of the wall in ft. When developing design recommendations, LAI assumed that soil conditions would be drained, and there would be no build-up of hydrostatic pressure. Surcharge loads from construction equipment, stockpiled material, and vehicular traffic should be included in the design. Uniformly distributed lateral pressures, 0.31 and 0.47 times the surcharge pressure, should be included for unbraced and braced shoring, respectively. Prior to construction, the temporary shoring design should be submitted for the design team's review and comment.

3.2.5 Pipe Foundation Support

Based on the subsurface conditions observed in LAI's explorations, soils at the bottom of the proposed utility trenches will consist primarily of medium dense, sandy gravel with silt; loose to very dense, silty sand with variable gravel content; or loose, very silty sand. These soil types should provide

adequate foundation support for the proposed utility improvements, provided the soil remains in a relatively undisturbed condition, and the excavations are properly dewatered.

Soil at the trench bottom could be disturbed by construction activities; if disturbed, the soil will provide poor foundation support for the utility improvements. If the trench bottom is disturbed during pipe installation, it may need to be overexcavated to expose undisturbed foundation soil. Unsuitable foundation material should be removed and replaced in accordance with the requirements in Section 7-08.3(1)A of the *2020 WSDOT Standard Specifications.* Vehicular traffic and soil compaction and stockpiling should be limited in the vicinity of the proposed stormwater infiltration facilities.

3.2.6 Pipe Bedding and Trench Backfill

To provide uniform support of buried utility pipes, piping should be bedded in accordance with the requirements in Section 7-08.3(1)C of the *2020 WSDOT Standard Specifications.* Bedding material should extend 6 inches below the invert of the pipe. Bedding material for buried utility pipes should consist of Gravel Backfill for Pipe Zone Bedding that meets the requirements in Section 9-03.12(3) of the *2020 WSDOT Standard Specifications.*

Excavated soils may be reused as trench backfill, provided they are free of organic matter, debris, or other deleterious materials. Additionally, native soils used as utility trench backfill should meet the gradation requirements in Section 9-03.19 of the *2020 WSDOT Standard Specifications.* Though only small amounts of coarse gravel were encountered in LAI's October 2020 explorations, coarse gravel and cobbles may be present throughout the sites. As a result, significant effort (i.e., screening or manual picking) may be required to process site soils and meet gradation requirements.

If insufficient site soil is available, LAI recommends using import fill consisting of Bank Run Gravel for Trench Backfill. The import fill should meet the requirements in Section 9-03.19 of the *2020 WSDOT Standard Specifications.*

Trench backfilling should be completed in accordance with the requirements in Section 7-08.3(3) of the *2020 WSDOT Standard Specifications.* The maximum dry density and optimum moisture content should be determined in accordance with the requirements in Section 2-03.3(14)D of the *2020 WSDOT Standard Specifications.* Alternatively, the maximum dry density may be determined using ASTM International standard test method D1557 (modified Proctor). Flooding and/or jetting should not be used to consolidate or compact trench backfill. Hand-operated compaction equipment, or other approved methods, should be used to compact the 18 inches of trench backfill placed directly above the pipe.

3.3 Buried Utility Structures

Impermeable buried utility structures that extend below the groundwater table (e.g., sealed concrete vaults) should be designed to resist buoyant forces. Groundwater was observed in boring B-1 at 67.5 ft bgs; groundwater was not observed in boring B-2. The groundwater table is not anticipated to cause buoyant forces to act on buried utility structures at the sites. Geotechnical recommendations may be modified, pending the results of wet season groundwater monitoring.

3.4 Stormwater Infiltration

To estimate stormwater infiltration rates at the PS-26 site, LAI performed a large-scale PIT investigation (PIT-1) within the proposed infiltration facility footprint. Test pit PIT-1 was excavated to 6 ft bgs with a base area of approximately 107 square feet. The approximate location of the exploration is shown on Figure 2a.

Based on the results of the PIT investigation, LAI recommends a short-term infiltration rate ($Ksat_{initial}$) of 0.1 inch per hour. No groundwater was observed in test pit PIT-1; however, hydraulically restricting silt lenses were observed in the side walls. Although silt lenses were not observed in nearby boring B-1, silty soils were observed to a depth of approximately 25 ft bgs. If feasible, higher infiltration rates may be achieved by extending the bottom elevation of the infiltration facility an additional 13 ft to less silty material.

A PIT investigation is typically concluded once all of the water has infiltrated, and the pit is empty; however, site soils were capable of only limited infiltration, and it was not feasible to allow the water to infiltrate fully in the available time. The falling head portion of the test was concluded after 2.5 hours.

To estimate infiltration rates for deeper soils at PS-26 and PS-30, grain size analyses were completed on soil samples obtained from boring B-1 at 25, 30, and 35 ft bgs and from boring B-2 at 20, 25, and 30 ft bgs. The short-term infiltration rates presented in Table 2 were estimated using the grain size method described in the 2019 *Stormwater Management Manual for Western Washington* (Ecology).

Table 2. Grain Size-Based Short-Term Infiltration Rates

Sample Location and Depth	Estimated Short-Term Infiltration Rate ($Ksat_{initial}$) (in/hr)
B-1, 25 ft bgs	7.4
B-1, 30 ft bgs	7.1
B-1, 35 ft bgs	7.6
B-2, 20 ft bgs	4.9
B-2, 25 ft bgs	6.4

Sample Location and Depth	Estimated Short-Term Infiltration Rate ($Ksat_{initial}$) (in/hr)
B-2, 30 ft bgs	6.9

B-1 = boring B-1
B-2 = boring B-2
bgs = below ground surface
ft = feet
in/hr = inches per hour

The grain size method is not recommended for soils that have been consolidated by glacial advance. Given the glacially consolidated nature of site soils, actual short-term infiltration rates may vary from those presented above by as much as an order of magnitude. If stormwater infiltration will be attempted at depths beyond the practical limits of a PIT investigation, LAI recommends that a borehole infiltration test is conducted to better estimate the infiltration rate of deep site soils.

To calculate design infiltration rates ($Ksat_{design}$), the short-term infiltration rate must be reduced through partial correction factors that account for site variability and number of tests conducted (CF_V), uncertainty of the test method (CF_T), and the potential for long-term clogging caused by siltation and bio-buildup (CF_M; Table 3). The following equation can be used to estimate $Ksat_{design}$.

$$\mathbf{Ksat_{design} = Ksat_{initial} \times CF_V \times CF_T \times CF_M}$$

Table 3. Partial Correction Factors

Partial Correction Factor	PIT	Grain Size Analysis
Site variability and number of locations tested (CF_V)	0.50	
Test method (CF_T)	0.75	0.40
Degree of influent control to prevent siltation and bio-buildup (CF_M)	0.9	

PIT = pilot infiltration test

When developing design infiltration rates, LAI recommends a correction factor of $CF_M = 0.9$, based on the assumption that sediment buildup would be removed when facility performance drops to 90 percent of the intended design. If this assumption is not consistent with the planned maintenance schedule, the design infiltration rates should be reduced.

3.5 Decommissioning of Piezometers

Piezometers were installed as part of this study and may be decommissioned at any time; however, it may be beneficial to leave the piezometers in place until construction has been completed. Decommissioning of piezometers should be performed in accordance with the requirements in WAC

Chapter 173-160-460 (2)(a), which specify that wells shall be decommissioned by filling from bottom to top with bentonite, bentonite slurry, neat cement grout, or neat cement. WAC Chapter 173-160-460 (2)(a) also specifies that well decommissioning shall be performed by a licensed well driller.

4.0 REVIEW OF DOCUMENTS AND CONSTRUCTION OBSERVATIONS

LAI should be asked to review geotechnical portions of the project plans and specifications in advance of project bidding. The purpose of the review is to verify that the recommendations in this report have been properly interpreted and implemented.

LAI recommends that monitoring, testing, and consultation be provided during construction to confirm that subsurface conditions are consistent with those indicated by the explorations, to provide revised recommendations should conditions differ from those anticipated, and to evaluate whether geotechnical construction activities comply with the project plans and specifications and the recommendations in this report. LAI would be pleased to provide construction support services.

5.0 USE OF THIS REPORT

Landau Associates has prepared this geotechnical report for the exclusive use of BHC Consultants, LLC and the City of Shoreline for specific application to the Stormwater Pump Stations 26 and 30 Upgrades project in Shoreline, Washington. No other party is entitled to rely on the information, conclusions, and recommendations included in this document without the express written consent of Landau Associates. Reuse of the information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by Landau Associates, shall be at the user's sole risk. Landau Associates warrants that, within the limitations of scope, schedule, and budget, its services have been provided in a manner consistent with that level of skill and care ordinarily exercised by members of the profession currently practicing in the same locality, under similar conditions as this project. Landau Associates makes no other warranty, either express or implied.

The conclusions and recommendations in this report are based, in part, on the subsurface data obtained from the field explorations. There may be some variation in subsurface soil and groundwater conditions, and the nature and extent of the variations may not become evident until construction. A contingency for unanticipated subsurface conditions should be included in the construction budget and schedule.

6.0 REFERENCES

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Minard, J.P. 1983. *Geologic Map of the Edmonds East and Part of the Edmonds West Quadrangles, Washington.* U.S. Geological Survey.

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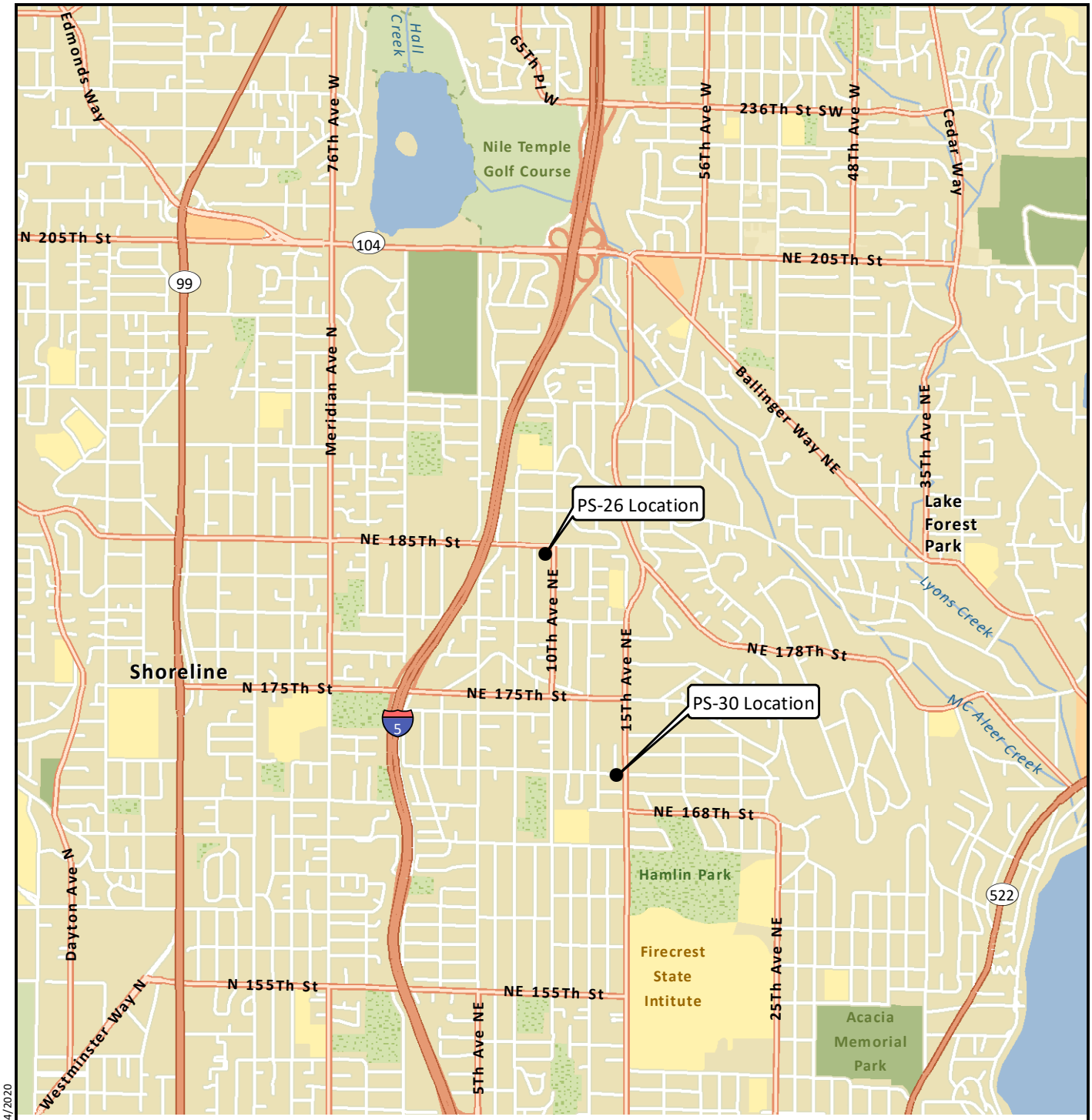


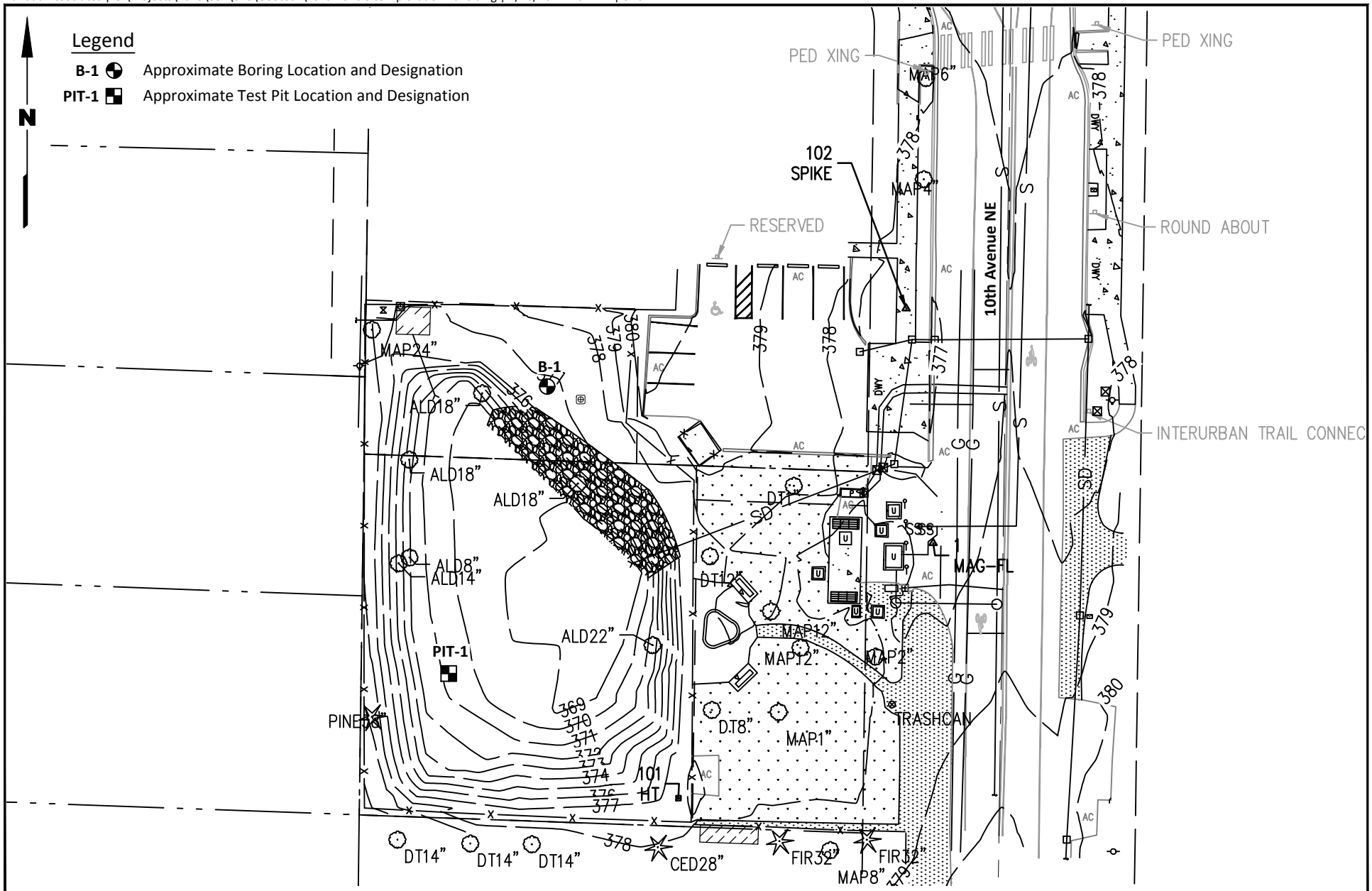
Data Source: Esri.

G:\Projects\1073\034\010\Geotech\F01VicMap.mxd 10/24/2020

LANDAU ASSOCIATES

Pump Stations 26 and 30 Upgrades Shoreline, Washington	**Vicinity Map**	Figure 1

DEV24-2035



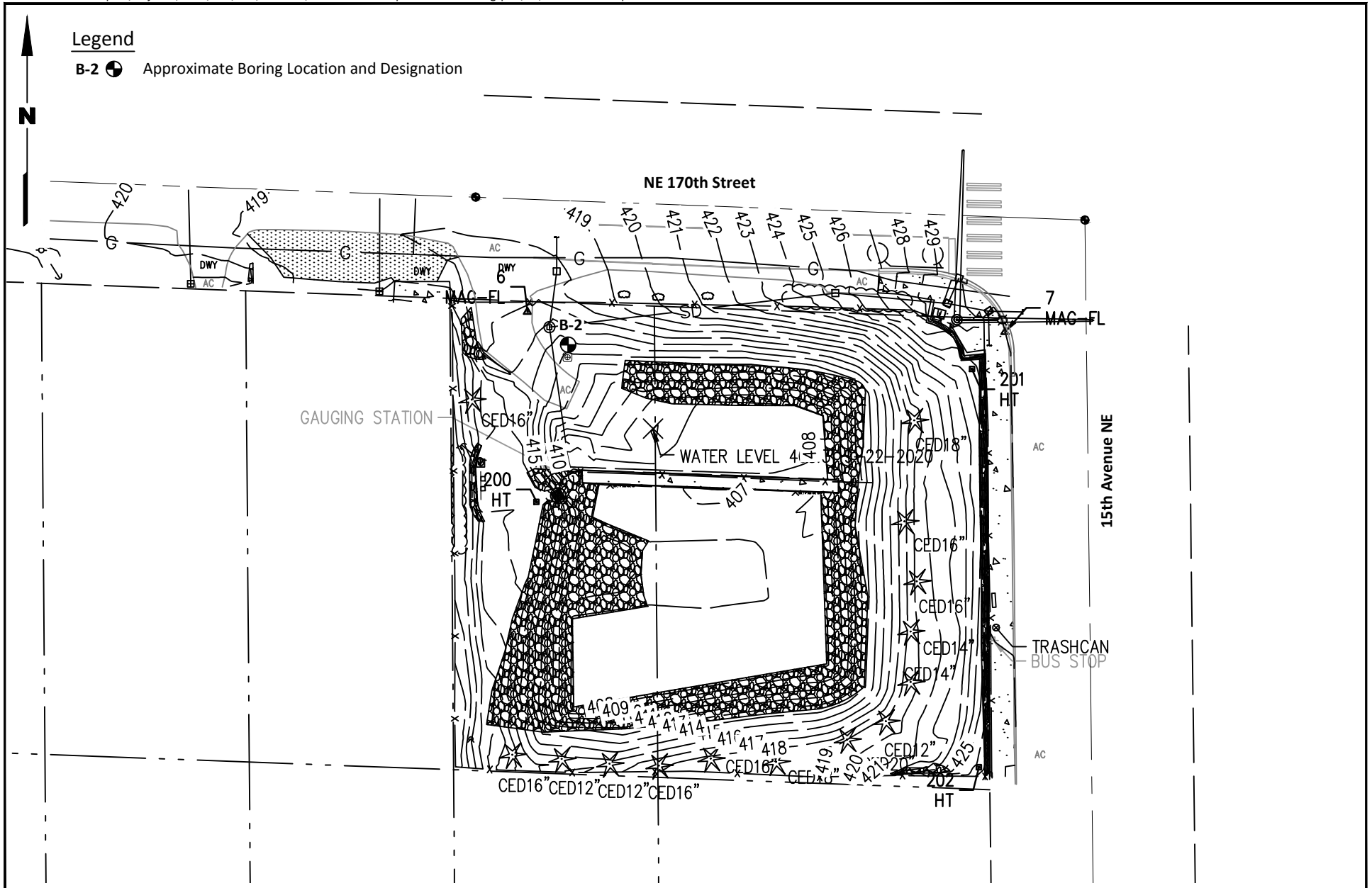
Source: BHC Consultants 2020

LANDAU ASSOCIATES

Pump Stations 26 and 30 Upgrades
Shoreline, Washington

Site and Exploration Plan – PS-26

Figure 2a



Source: BHC Consultants 2020

0 40 80
Scale in Feet

LANDAU ASSOCIATES

Pump Stations 26 and 30 Upgrades
Shoreline, Washington

Site and Exploration Plan – PS-30

Figure 2b

APPENDIX A

Field Explorations

APPENDIX A
FIELD EXPLORATIONS

Landau Associates, Inc. (LAI) explored subsurface conditions at the sites by advancing two hollow-stem auger borings (B-1 and B-2) and excavating one test pit (PIT-1). On October 7 and 8, 2020, Holocene Drilling, Inc., subcontracted by Landau Associates, Inc. (LAI), advanced boring B-1 71.5 feet (ft) below ground surface (bgs) and boring B-2 66.5 ft bgs. On December 15, 2020, Northwest Excavating and Trucking Company, Inc., also subcontracted by LAI, excavated test pit PIT-1 6 ft bgs. The approximate locations of the explorations are shown on Figures 2a and 2b. Site features were used to identify the exploration locations. Ground surface elevations at the exploration locations were not determined.

The field exploration program was coordinated and monitored by LAI personnel, who also obtained representative soil samples, maintained a detailed record of the subsurface soil and groundwater conditions observed, and described the soil encountered by visual and textural examination. Each representative soil type was described using the soil classification system shown on Figure A-1, in general accordance with ASTM International standard test method D2488, *Standard Practice for Description and Identification of Soils (Visual-Manual Procedures).*

Summary logs of the explorations are presented on Figures A-2 through A-4. The stratigraphic contacts shown on the summary logs represent the approximate boundaries between soil types; actual transitions may be more gradual. The soil and groundwater conditions depicted are for the specific dates and locations indicated and may not be representative of other locations and/or times.

Disturbed soil samples were obtained from the borings at select intervals using a 1.5-inch-inside-diameter split-spoon sampler. A 140-pound automatic hammer, falling approximately 30 inches, was used to drive the sampler 18 inches (or a portion thereof) into the undisturbed soil. The number of blows required to drive the sampler for the final 12 inches (or a portion thereof) of soil penetration is noted on the boring logs, adjacent to the appropriate sample notation. Upon completion of soil sampling, the boreholes were completed with groundwater monitoring wells.

Representative grab samples were obtained from the test pit. Upon completion of soil sampling, the test pit was backfilled with excavated soil.

Samples were transported to LAI's soils laboratory for further examination and testing. Test results and a discussion of the testing procedures are included in Appendix B.

Soil Classification System

MAJOR DIVISIONS			GRAPHIC SYMBOL	USCS LETTER SYMBOL[1]	TYPICAL DESCRIPTIONS[2][3]
COARSE-GRAINED SOIL (More than 50% of material is larger than No. 200 sieve size)	GRAVEL AND GRAVELLY SOIL (More than 50% of coarse fraction retained on No. 4 sieve)	CLEAN GRAVEL (Little or no fines)		GW	Well-graded gravel; gravel/sand mixture(s); little or no fines
				GP	Poorly graded gravel; gravel/sand mixture(s); little or no fines
		GRAVEL WITH FINES (Appreciable amount of fines)		GM	Silty gravel; gravel/sand/silt mixture(s)
				GC	Clayey gravel; gravel/sand/clay mixture(s)
	SAND AND SANDY SOIL (More than 50% of coarse fraction passed through No. 4 sieve)	CLEAN SAND (Little or no fines)		SW	Well-graded sand; gravelly sand; little or no fines
				SP	Poorly graded sand; gravelly sand; little or no fines
		SAND WITH FINES (Appreciable amount of fines)		SM	Silty sand; sand/silt mixture(s)
				SC	Clayey sand; sand/clay mixture(s)
FINE-GRAINED SOIL (More than 50% of material is smaller than No. 200 sieve size)	SILT AND CLAY (Liquid limit less than 50)			ML	Inorganic silt and very fine sand; rock flour; silty or clayey fine sand or clayey silt with slight plasticity
				CL	Inorganic clay of low to medium plasticity; gravelly clay; sandy clay; silty clay; lean clay
				OL	Organic silt; organic, silty clay of low plasticity
	SILT AND CLAY (Liquid limit greater than 50)			MH	Inorganic silt; micaceous or diatomaceous fine sand
				CH	Inorganic clay of high plasticity; fat clay
				OH	Organic clay of medium to high plasticity; organic silt
	HIGHLY ORGANIC SOIL			PT	Peat; humus; swamp soil with high organic content

OTHER MATERIALS	GRAPHIC SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
PAVEMENT		AC or PC	Asphalt concrete pavement or Portland cement pavement
ROCK		RK	Rock (See Rock Classification)
WOOD		WD	Wood, lumber, wood chips
DEBRIS		DB	Construction debris, garbage

Notes:
1. USCS letter symbols correspond to symbols used by the Unified Soil Classification System and ASTM classification methods. Dual letter symbols (e.g., SP-SM for sand or gravel) indicate soil with an estimated 5-15% fines. Multiple letter symbols (e.g., ML/CL) indicate borderline or multiple soil classifications.
2. Soil descriptions are based on the general approach presented in the Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), outlined in ASTM D 2488. Where laboratory index testing has been conducted, soil classifications are based on the Standard Test Method for Classification of Soils for Engineering Purposes, as outlined in ASTM D 2487.
3. Soil description terminology is based on visual estimates (in the absence of laboratory test data) of the percentages of each soil type and is defined as follows:

Primary Constituent:	> 50% - "GRAVEL," "SAND," "SILT," "CLAY," etc.
Secondary Constituents:	> 30% and ≤ 50% - "very gravelly," "very sandy," "very silty," etc.
	> 15% and ≤ 30% - "gravelly," "sandy," "silty," etc.
Additional Constituents:	> 5% and ≤ 15% - "with gravel," "with sand," "with silt," etc.
	≤ 5% - "with trace gravel," "with trace sand," "with trace silt," etc., or not noted.

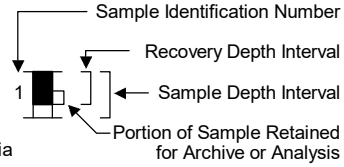
4. Soil density or consistency descriptions are based on judgement using a combination of sampler penetration blow counts, drilling or excavating conditions, field tests, and laboratory tests, as appropriate.

Drilling and Sampling Key

SAMPLER TYPE

Code	Description
a	3.25-inch O.D., 2.42-inch I.D. Split Spoon
b	2.00-inch O.D., 1.50-inch I.D. Split Spoon
c	Shelby Tube
d	Grab Sample
e	Single-Tube Core Barrel
f	Double-Tube Core Barrel
g	2.50-inch O.D., 2.00-inch I.D. WSDOT
h	3.00-inch O.D., 2.375-inch I.D. Mod. California
i	Other - See text if applicable
1	300-lb Hammer, 30-inch Drop
2	140-lb Hammer, 30-inch Drop
3	Pushed
4	Vibrocore (Rotosonic/Geoprobe)
5	Other - See text if applicable

SAMPLE NUMBER & INTERVAL



Field and Lab Test Data

Code	Description
PP = 1.0	Pocket Penetrometer, tsf
TV = 0.5	Torvane, tsf
PID = 100	Photoionization Detector VOC screening, ppm
W = 10	Moisture Content, %
D = 120	Dry Density, pcf
-200 = 60	Material smaller than No. 200 sieve, %
GS	Grain Size - See separate figure for data
AL	Atterberg Limits - See separate figure for data
GT	Other Geotechnical Testing
CA	Chemical Analysis

Groundwater

▽ Approximate water level at time of drilling (ATD)

▼ Approximate water level at time after drilling/excavation/well

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Pump Stations 26 and 30 Upgrades
Shoreline, Washington

Soil Classification System and Key

Figure A-1

DEV24-2035

B-1

LAI Project No: 1073034.010

SAMPLE DATA | **SOIL PROFILE** | **WELL DETAIL**

Drilling Method: Hollow-Stem Auger
Ground Elevation (ft): Not Determined
Logged By: BCS Date: 10/07/20

Moisture Content (%) — Plastic Limit — Liquid Limit — 20 40 60 80
▲ SPT N-Value ▲ △ Non-Standard N-Value △ — 20 40 60 80
× Fines Content (%) × — 20 40 60 80

Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Soil Description
0		S-1	b2	13			GP-GM	Brown, sandy GRAVEL with silt (medium dense, moist) **(ADVANCE OUTWASH)**
5		S-2	b2	20	W = 6 GS			
		S-3	b2	41	W = 13		SM	Brown, silty SAND with gravel (dense, moist)
10		S-4	b2	45	W = 11 GS			
15		S-5	b2	23				-medium dense
20		S-6	b2	10				-loose
25		S-7	b2	41	W = 10 GS		SP-SM	Brown, fine to medium SAND with silt (dense, moist)
30		S-8	b2	37	W = 11 GS			-grades coarser
35		S-9	b2	58	W = 9 GS			-very dense

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1073034.01 3/16/21 N:\PROJECTS\1073034.010.GPJ SOIL BORING LOG WITH GRAPH

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Pump Stations 26 and 30 Upgrades
Shoreline, Washington

Log of Boring B-1

Figure A-2 (1 of 2)

DEV24-2035

B-1

LAI Project No: 1073034.010

SAMPLE DATA | **SOIL PROFILE** | **WELL DETAIL**

Drilling Method: Hollow-Stem Auger
Ground Elevation (ft): Not Determined
Logged By: BCS Date: 10/07/20

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	USCS Symbol	Soil Description
					SP-SM	Brown, fine to medium SAND with silt (dense, moist)
40	S-10	b2	37			-dense
45	S-11	b2	63			-very dense
50	S-12	b2	66			-grades to gray
55	S-13	b2	68			
60	S-14	b2	50/ 6"			
65	S-15	b2	50/ 6"			
70	S-16	b2	40			-dense

WELL DETAIL: 10/7/2020

Moisture Content (%) — Plastic Limit — Liquid Limit
20 40 60 80

▲ SPT N-Value ▲
△ Non-Standard N-Value △
20 40 60 80

× Fines Content (%) ×
20 40 60 80

50/ 6"
50/ 6"

Boring Completed 10/07/20
Total Depth of Boring = 71.5 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1073034.01 3/16/21 N:\PROJECTS\1073034.010.GPJ SOIL BORING LOG WITH GRAPH

LANDAU ASSOCIATES

Pump Stations 26 and 30 Upgrades
Shoreline, Washington

Log of Boring B-1

Figure A-2 (2 of 2)

B-2

LAI Project No: 1073034.010

Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Soil Profile
								Drilling Method: Hollow-Stem Auger Ground Elevation (ft): Not Determined Logged By: BCS Date: 10/08/20
0							SM	Brown, very silty SAND (loose, moist) **(ADVANCE OUTWASH)**
		S-1	b2	5				
5		S-2	b2	19	W = 10 GS		SP-SM	Brownish-tan, gravelly SAND with silt (medium dense, moist)
		S-3	b2	48	W = 10			-dense
10		S-4	b2	50/6"				-very dense -gray
15		S-5	b2	47				-dense -grades to without gravel
20		S-6	b2	59	W = 15 GS		SM	Brownish-tan, silty SAND with trace gravel (very dense, moist)
25		S-7	b2	50/6"	W = 14 GS			
30		S-8	b2	57	W = 11 GS		SP-SM	Brownish-tan SAND with silt and trace gravel (very dense, moist)
35								

WELL DETAIL: Groundwater Not Observed

Moisture Content (%) — Plastic Limit — Liquid Limit — 20 40 60 80

▲ SPT N-Value ▲ △ Non-Standard N-Value △ — 20 40 60 80

× Fines Content (%) × — 20 40 60 80

50/6"

50/6"

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1073034.01 3/16/21 N:\PROJECTS\1073034.010.GPJ SOIL BORING LOG WITH GRAPH

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Pump Stations 26 and 30 Upgrades
Shoreline, Washington

Log of Boring B-2

Figure A-3 (1 of 2)

DEV24-2035

B-2

LAI Project No: 1073034.010

Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Soil Profile
35		S-9	b2	50/ 4"			SP-SM	Drilling Method: Hollow-Stem Auger Ground Elevation (ft): Not Determined Logged By: BCS Date: 10/08/20 Brownish-tan SAND with silt and trace gravel (very dense, moist)
40		S-10	b2	50/ 5"				
45		S-11	b2	69				
50		S-12	b2	83				-mottling
55		S-13	b2	57				
60		S-14	b2	56				
65		S-15	b2	50/ 6"				
70								

WELL DETAIL: Groundwater Not Observed

Moisture Content (%) — Plastic Limit / Liquid Limit — 20 40 60 80

▲ SPT N-Value ▲ △ Non-Standard N-Value △ — 20 40 60 80

× Fines Content (%) × — 20 40 60 80

50/ 4"

50/ 5"

50/ 6"

Boring Completed 10/08/20
Total Depth of Boring = 66.5 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1073034.01 3/16/21 N:\PROJECTS\1073034.010.GPJ SOIL BORING LOG WITH GRAPH

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Pump Stations 26 and 30 Upgrades
Shoreline, Washington

Log of Boring B-2

Figure A-3 (2 of 2)

PIT-1

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol		
0						SP/ SM	Excavation Method: Tracked Excavator Ground Elevation (ft): Not Determined Logged By: SMG Tan, fine to medium SAND with frequent 1- to 2-inch silt to sandy silt lenses (medium dense to dense, moist) **(ADVANCE OUTWASH)**	▽ Slow groundwater seepage encountered at 1.0 ft.
2								
4								
6		1	d				-becomes gray in eastern portion of test pit	
8								
10								
12								
14								

Test Pit Completed 12/15/20
Total Depth of Test Pit = 6.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1073034.01 3/16/21 N:\PROJECTS\1073034.010.GPJ TEST PIT LOG

LANDAU ASSOCIATES

Pump Stations 26 and 30 Upgrades Shoreline, Washington	Log of Test Pits	Figure A-4

APPENDIX B

Laboratory Soil Testing

APPENDIX B
LABORATORY SOIL TESTING

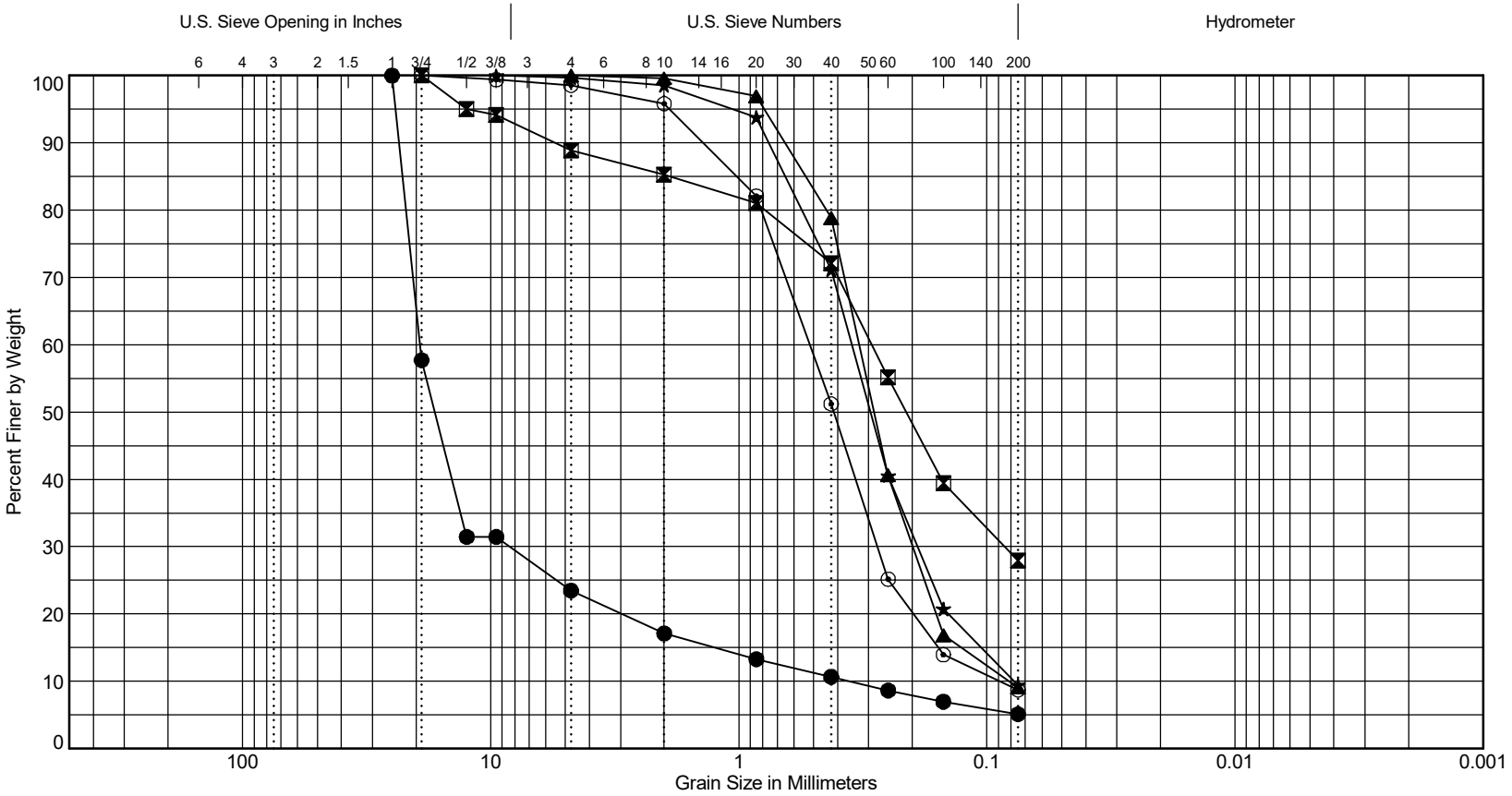
Natural moisture content determinations and grain size analyses were performed on select soil samples obtained from the explorations. Laboratory testing was performed in general accordance with the ASTM International (ASTM) standard test methods described below. Samples were checked against the field log descriptions, and the descriptions were updated, where appropriate, in accordance with ASTM standard test method D2487, *Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).*

Natural Moisture Content

Natural moisture content determinations were performed in general accordance with ASTM standard test method D2216, *Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.* The natural moisture content is shown as W = xx (i.e., percent of dry weight) in the "Test Data" column on the summary logs in Appendix A.

Grain Size Analysis

To provide an indication of the grain size distribution of site soils, grain size analyses or combined grain size and hydrometer analyses were conducted in general accordance with ASTM standard test method D422, *Standard Test Method for Particle-Size Analysis of Soils.* Samples selected for grain size analysis are designated with a "GS" on the summary logs in Appendix A. Results of the grain size analyses are presented on Figures B-1 and B-2.



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

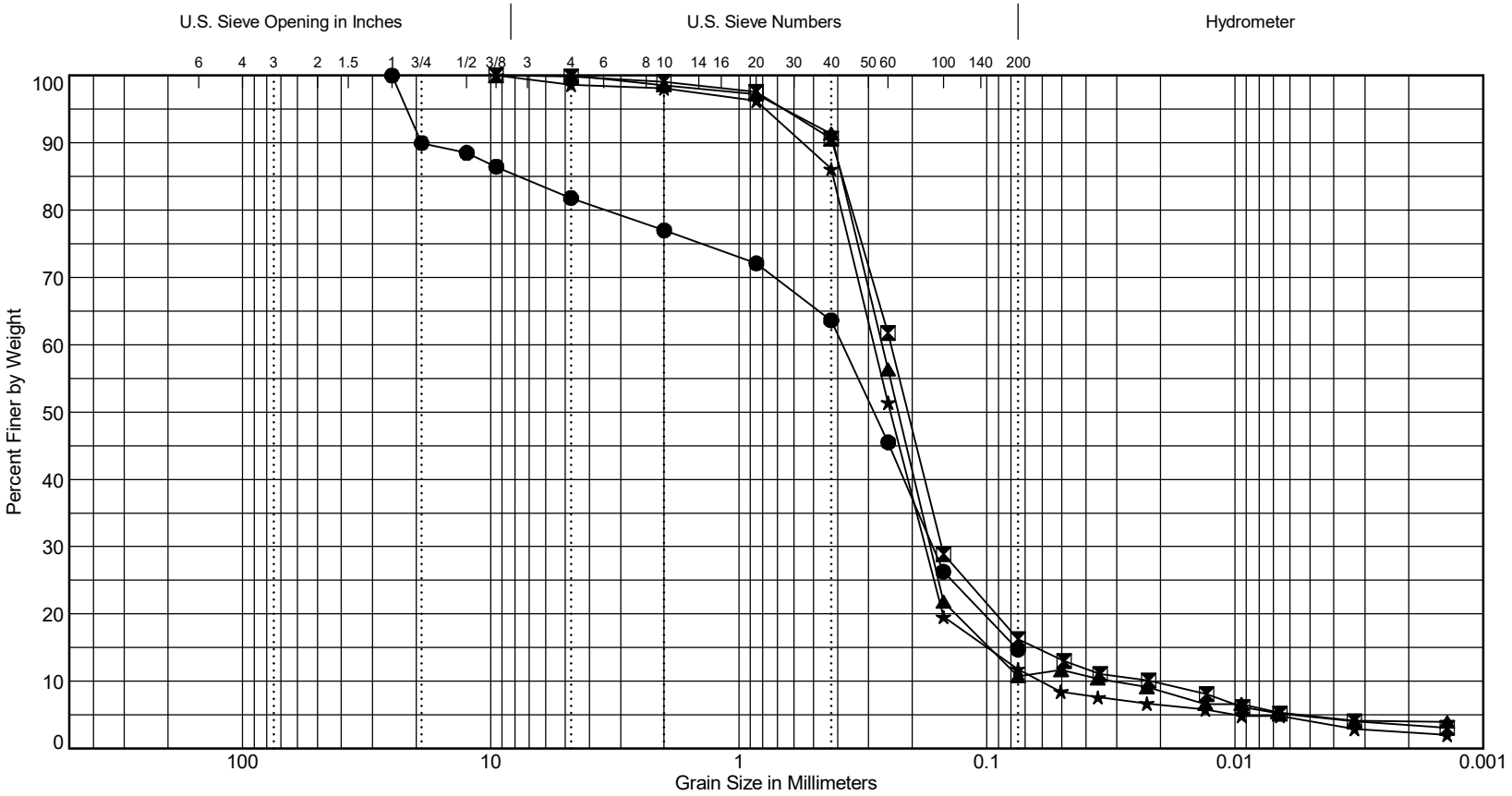
Symbol	Exploration Number	Sample Number	Depth (ft)	Natural Moisture (%)	Soil Description	Unified Soil Classification
●	B-1	S-2	5.0	6	Brown, sandy GRAVEL with silt	GP-GM
⊠	B-1	S-4	10.0	11	Brown, silty SAND with gravel	SM
▲	B-1	S-7	25.0	10	Fine to medium SAND with silt	SP-SM
★	B-1	S-8	30.0	11	Fine to coarse SAND with silt	SP-SM
⊙	B-1	S-9	35.0	9	Fine to coarse SAND with silt	SP-SM

LANDAU ASSOCIATES

Pump Stations 26 and 30 Upgrades
Shoreline, Washington

Grain Size Distribution

Figure
B-1



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

Symbol	Exploration Number	Sample Number	Depth (ft)	Natural Moisture (%)	Soil Description	Unified Soil Classification
●	B-2	S-2	5.0	10	Brown, gravelly SAND with silt	SP-SM
⊠	B-2	S-6	20.0	15	Brownish-tan, silty SAND	SM
▲	B-2	S-7	25.0	14	Brownish-tan SAND with silt	SP-SM
★	B-2	S-8	30.0	11	Brownish-tan SAND with silt	SP-SM

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Pump Stations 26 and 30 Upgrades
Shoreline, Washington

Grain Size Distribution

Figure
B-2

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APPENDIX C

WETLAND/WATERWAY CRITICAL AREAS REPORT

WETLAND/WATERWAY CRITICAL AREAS REPORT – PUMP STATION 30 IMPROVEMENTS PROJECT

Shoreline, Washington

October 19, 2023

Prepared for

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landauinc.com

WETLAND/WATERWAY CRITICAL AREAS REPORT
PUMP STATION 30 IMPROVEMENTS PROJECT
Shoreline, Washington

This document was prepared by, or under the direct supervision of, the technical professionals noted below.

Document prepared by: _____ Justin Kay
Project Manager

Document reviewed by: _____ Steven Quarterman
Quality Reviewer

Date:	October 19, 2023
Project No.:	1073034.010
File path:	\\edmdata01\projects\1073\034.010\R\CAR PH30\Sig Page.docx
Project Coordinator:	tmh

LANDAU ASSOCIATES

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EXECUTIVE SUMMARY

The City of Shoreline (City) is proposing improvements at the Stormwater Pump Station 30 (PS-30) site. Proposed improvements at PS-30 include removing the existing baffle wall, asphalt driveway, pump station manhole, and outflow structures; regrading pond slopes to increase capacity; and installing a new pump station wet well, pre-treatment structure, piping, and force main along Northeast 170th Street and 15th Avenue Northeast.

Wetlands, waterways, and their buffers can fall under the jurisdiction of the US Army Corps of Engineers under Section 404 of the Clean Water Act (CWA), the Washington State Department of Ecology (Ecology) under the State Water Pollution Control Act, the Washington Department of Fish & Wildlife (WDFW) under the State Hydraulic Code, and the City of Shoreline (City) under the Critical Areas regulations of the Shoreline Municipal Code (SMC).

At the request of BHC Consultants, LLC (BHC) on behalf of the City, Landau Associates, Inc. (Landau) completed an investigation of wetlands, waterway typing, and buffer widths in the project area. This report provides the results of the critical areas study, limited to a wetland/waterway investigation and evaluation of mitigation sequencing.

The results of the wetland/waterway critical areas study identify one mapped segment of piped waterway (Littles Creek) originating at PS-30. Proposed improvements to the project area include removing approximately 90 linear feet of the existing 6-inch outflow pipe and wet well and placing an approximate 105 linear foot section of 18-inch inlet pipe, wet well, valve vault, and 8-inch force main adjacent to the existing pipe alignment. Restoration of the stream flows in the proposed pipe will result in no net loss of stream critical area functions.

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TABLE OF CONTENTS

APPENDICES

LIST OF ABBREVIATIONS AND ACRONYMS

BHC	BHC Consultants, LLC
City	City of Shoreline
CWA	Clean Water Act
Ecology	Washington State Department of Ecology
FEMA	Federal Emergency Management Agency
ft	foot/feet
HPA	Hydraulic Project Approval
Landau	Landau Associates, Inc.
NWI	National Wetlands Inventory
PS-30	Pump Station 30
RCW	Revised Code of Washington
SMC	Shoreline Municipal Code
USFWS	US Fish & Wildlife Service
USGS	US Geological Survey
WA-DNR	Washington Department of Natural resources
WDFW	Washington Department of Fish & Wildlife

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1.0 INTRODUCTION

The City of Shoreline (City) is proposing improvements to the Stormwater Pump Station 30 (PS-30) located at 1243 NE 170th Street, in the City of Shoreline (Figure 1). The proposed improvements include removing the existing baffle wall, asphalt driveway, pump station manhole, and outflow structures; regrading pond slopes to increase capacity; and installing a new pump station wet well, pre-treatment structure, piping, and force main along NE 170th Street and 15th Avenue NE.

At the request of BHC Consultants, LLC (BHC) on behalf of the city, Landau Associates, Inc. (Landau) conducted an investigation to identify "waters of the US" and wetland/waterway critical areas regulated by the City in the project area. This report provides the results of the wetland/waterway critical areas study, including evaluation of mitigation sequencing.

The results of the wetland/waterway critical areas study identify one piped section of Littles Creek in the project area. Proposed improvements to the project area include removing the existing 6-inch outflow pipe and wet well and replacing it with an 18-inch inlet pipe, wet well, valve vault, and 8-inch force main adjacent to the existing pipe.

Landau completed this report in support of mitigation sequencing for waterways and their associated buffers. The mitigation sequence described in this report includes avoidance, minimization, and restoration.

1.1 Site Description

The project area consists of the two approximately 0.5-acre City properties (King County Parcel Nos. 2548100030 and 2548100035) located at southwest of the NE 170th Street and 15th Avenue NE intersection in Shoreline, Washington in Township 26 North, Range 4 East, Section 8, and the Thornton Creek sub-basin of Water Resources Inventory Area 8 – Cedar-Sammamish. The project area is currently developed with a stormwater pond, pump station controls, catch basins, and piped inlets and outfalls. The surrounding area is urban and dominated by residential and community business uses.

1.2 Regulatory Background

Certain waterways are regulated by federal, state, and local governmental agencies, and compliance with one agency does not necessarily fulfill permitting requirements of any other agency.

The federal Clean Water Act (CWA) requires authorization for the discharge of dredged or fill material into "waters of the US" under Section 404. The Washington State Department of Ecology (Ecology) requires compliance with the State Water Pollution Control Act (Chapter 90.48 of the Revised Code of Washington [RCW]), and it has administrative oversight of Section 401 of the CWA for state water quality certification in the case of impacts to US Army Corps of Engineers jurisdictional "waters of the US." Any work that will use, divert, obstruct, or change the bed or flow of state waters, including streams and rivers, must do so under the terms of a Hydraulic Project Approval (HPA) issued by the Washington Department of Fish & Wildlife (WDFW). WDFW HPA is administered under Chapter 77.55 RCW and rules set forth in Chapter 173-220-110 of the Washington Administrative Code. Chapter 20.80

of the Shoreline Municipal Code (SMC) has requirements for establishing waterway buffer widths and building setbacks, and for any alteration of waterways and their buffers.

2.0 METHODOLOGY

Due to the project area existing conditions developed as a stormwater facility and surrounded by private residential/commercial properties, no field evaluation for wetlands/waterways was deemed necessary. As such, this investigation utilizes public domain resources to evaluate wetland/waterway extent. The study area for this evaluation extends 300 feet (ft) beyond the project area (Figure 2).

2.1 Background Information Review

Landau reviewed the following public domain resources to evaluate historical and existing conditions, potential waterways within the study area:

- US Geological Survey (USGS) topographic map (Appendix A, Figure A-1)
- Aerial imagery (Figure 1)
- US Fish & Wildlife Service (USFWS) National Wetlands Inventory (NWI) map (USFWS; accessed September 5, 2023) (Appendix A, Figure A-2)
- Federal Emergency Management Agency (FEMA) flood data (Appendix A, Figure A-3)
- City Geographic Information System data (City of Shoreline; accessed September 5, 2023) (Appendix A, Figures A-4)
- Shoreline Surface Water Assets (City of Shoreline; accessed September 5, 2023) (Appendix A, Figure A-5)
- Forest Practice Application Mapping Tool (Washington Department of Natural Resources [WA-DNR]; Accessed September 5, 2023) (Appendix A, Figure A-6)
- Pump Station 30 Improvements Project: Basis of Design Report – DRAFT (BHC 2023).

2.2 Waterway Typing and Buffer Width Determination

The methodology focuses on examining existing hydrologic data including mapped streams, surface water assets, and fish use.

Stream typing is based on Section 20.80.270.B.5 of the SMC, which generally categorizes streams as:

- “Type S” – those streams identified as “Shorelines of the State” under Chapter 90.58 RCW
- “Type F” – those streams that contain existing or potential fish habitat, and are further distinguished as anadromous fish-bearing streams (Type F-Anadromous) and non-anadromous fish-bearing streams (Type F-Non-anadromous)
- “Type Np” – perennial non-fish habitat streams
- “Type Ns” – seasonal non-fish habitat streams
- “Piped stream segments” – those segments of streams, regardless of their type, that are fully enclosed in an underground pipe or culvert.

Stream buffers were determined according to Section 20.80.280.C.1 of the SMC.

2.3 Impact Assessment

Estimated clearing and grading limits were overlaid on the waterway and associated buffer boundaries using GIS software. Areas of impact were calculated using GIS.

Existing buffer functions were assessed with a narrative evaluation and best professional judgment.

2.4 Mitigation Sequencing

Impacts to wetlands, waterways, and their associated buffers were evaluated in accordance with the development standards in Section 20.80.053(A) of the SMC. The evaluation included avoidance, minimization, and mitigation of adverse impacts as well as requirements for waterways and waterway buffers in Fish and Wildlife Habitat Conservation Areas, per SMC Chapter 20.80, Subchapter 4.

3.0 WETLAND/WATERWAY INVESTIGATION RESULTS

This section provides a summary of the background information review and within the study area.

3.1 Public Domain Resource Review

This section summarizes information derived from USGS topographic mapping, City mapping, NWI map mapping, FEMA mapping, and WA-DNR mapping and other sources documenting conditions in and adjacent to the site. Steep slopes are mapped on-site but are addressed in a separate report.

3.1.1 Wetlands

The City Property Information Interactive Map (City of Shoreline; accessed September 5, 202; Appendix A, Figure A-4), topographic (USGS; accessed September 5, 2023; Appendix A, Figure A-1) and NWI (USFWS; accessed September 5, 2023; Appendix A, Figure A-2) maps do not identify wetlands in the study area.

3.1.2 Waterways

The USGS topographic map (Appendix A, Figure A-1), National Wetland Inventory (Appendix A, Figure A-2), and Forest Practices Application Mapping Tool (Appendix A, Figure A-6) do not identify any waterways within the study area. The City Property Information Interactive Map (City of Shoreline; accessed September 5, 2023) (Appendix A, Figure A-4) identifies one piped segment of Littles Creek within and adjacent to the project area. The mapped segment of stream north of the project area originates on the opposite side of NE 170th Street.

In accordance with Section 20.80.270.B.5 of the SMC, streams do not include storm or surface water runoff devices unless they are used by fish or are used to convey streams naturally occurring prior to construction. Based on the City's Shoreline Surface Water Assets mapping tool, the piped section of Littles Creek shown on the City Property Information Interactive Map originates in the vicinity of a catch basin north of NE 170th Street. All flow upgradient of PS-30 is generated by roadside storm or surface water runoff devices, conveyed in the City's drainage network, and does not follow a previously existing stream channel (Appendix A, Figure A-5). Therefore, the City's drainage network upstream of PS-30 does not meet regulated stream criteria. As a result, it is assumed that PS-30 is the headwaters of the mapped section of Littles Creek. The piped section of Littles Creek is mapped following one consolidated path daylighting from NE 158th Street and NE 155th Street approximately ¾ mile south of the project area. The piped section of Littles Creek from the pipe inlet within the stormwater pond (labelled "PI-116" by City GIS) to the south meets piped stream criteria per the SMC 20.80.280.C.1 and is provided a standard buffer of 10 feet per SMA 20.80.280(C)(1).

3.1.3 Floodplains

FEMA flood data does not show a 100-year floodplain within 300 ft of the project area (Appendix A, Figure A-3).

4.0 IMPACT ASSESSMENT

The proposed improvements will remove approximately 90 linear feet of 6-inch pipe and wet well conveying headwater drainage of Littles Creek within PS-30 (Appendix B). The pipe will be replaced with approximately 105 linear feet of pipe located adjacent to the existing pipe alignment (Appendix B). The 15 linear feet of additional pipe alignment extends within the pond at PS-30.

5.0 MITIGATION SEQUENCING

Section 20.80.053.A of the SMC outlines a mitigation sequence applicable to all critical areas. Before impacting any critical areas, an applicant shall demonstrate that the following actions have been taken in the following sequential order of preference:

1) Avoiding the impact altogether by not taking a certain action or parts of actions.
2) Minimizing impacts by limiting the degree or magnitude of the action and its implementation by using appropriate technology or by taking affirmative steps, such as project redesign, relocation, or timing, to avoid or reduce impacts.
3) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment or by restoring or stabilizing the hazard area through natural, engineering, or other methods.
4) Reducing or eliminating the impact over time through preservation and maintenance operations during the life of the action.
5) Compensating for the impact by replacing, enhancing, or providing substitute resources or environments.
6) Monitoring, measuring, and reporting the impact to the Director and taking appropriate corrective measures.

The mitigation sequencing details that focus on avoidance for the proposed project are described below.

5.1 Avoidance

Avoidance of impacts to the piped section of Littles Creek is not feasible. Littles Creek acts and the stormwater pond outlet and the utility of the stormwater pond is reliant upon a functional outlet.

Project activities will occur within the standard 10 ft buffer of Littles Creek; however, Section 20.80.090 of the SMC describes buffer areas, in part, as follows: “Buffers shall consist of an undisturbed area of native vegetation….” Further, SMC Section 20.20.012(B) defines a buffer as “a designated area contiguous to and for the protection of a critical area, which is required for the continued maintenance, functioning, and/or structural stability of a critical area.” Due to the depth and confined nature of a piped stream, the buffer does not provide habitat or water quality functions associated with native vegetation contiguous with the stream and impacts to these functions are avoided.

5.2 Minimization

Impact minimization includes work on the pipe system conveying Littles Creek during the dry season. The contractor will be required to maintain stormwater conveyance capacity and prevent upstream flooding during construction. Temporary pumps will be used to connect to the existing section of force main that is not being replaced. However, it is unlikely that the pumps bypass pumps will ever turn on unless a large storm event occurs.

5.3 Mitigation Requirement

Proposed mitigation of stream impacts includes restoration, in accordance with Section 20.80.053.A.3 of the SMC: “Rectifying the impact by repairing, rehabilitating, or restoring the affected environment or by restoring or stabilizing the hazard area through natural, engineering, or other methods.” While the existing 6-inch piped segment within PS-30 will be removed as part of the proposed project, a piped segment will be provided (i.e., restored) adjacent to the existing alignment. The new pipe will connect into existing infrastructure in the southwest corner of the project area. The proposed project will retain a 10-ft buffer on the proposed piped stream alignment in the project area to allow access for continued maintenance of this critical area, consistent with the definition of “buffer” in SMC 20.20.012, as needed during the life of the project.

6.0 CONCLUSIONS AND ASSESSMENT OF NO NET LOSS

The contents of this report meet City requirements, as outlined in the SMC. Since the project will replace a segment of piped stream, the proposed project will result in no net loss of critical areas or buffer functions. No compensatory mitigation is proposed or required.

7.0 USE OF THIS REPORT

The findings presented herein are based on our understanding of the SMC and reviews of background data. Within the limitations of scope, schedule, and budget, the findings presented in this report were prepared in accordance with generally accepted sensitive area investigation principles and practices in this locality at the time the report was prepared. We make no other warranty, either express or implied.

This report was prepared by Landau for the use of BHC, the City, and applicable regulatory agencies. No other parties are entitled to rely on the information, conclusions, and recommendations included in this document without the express written consent of Landau. Further, the reuse of information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by Landau, shall be at the user's sole risk.

8.0 REFERENCES

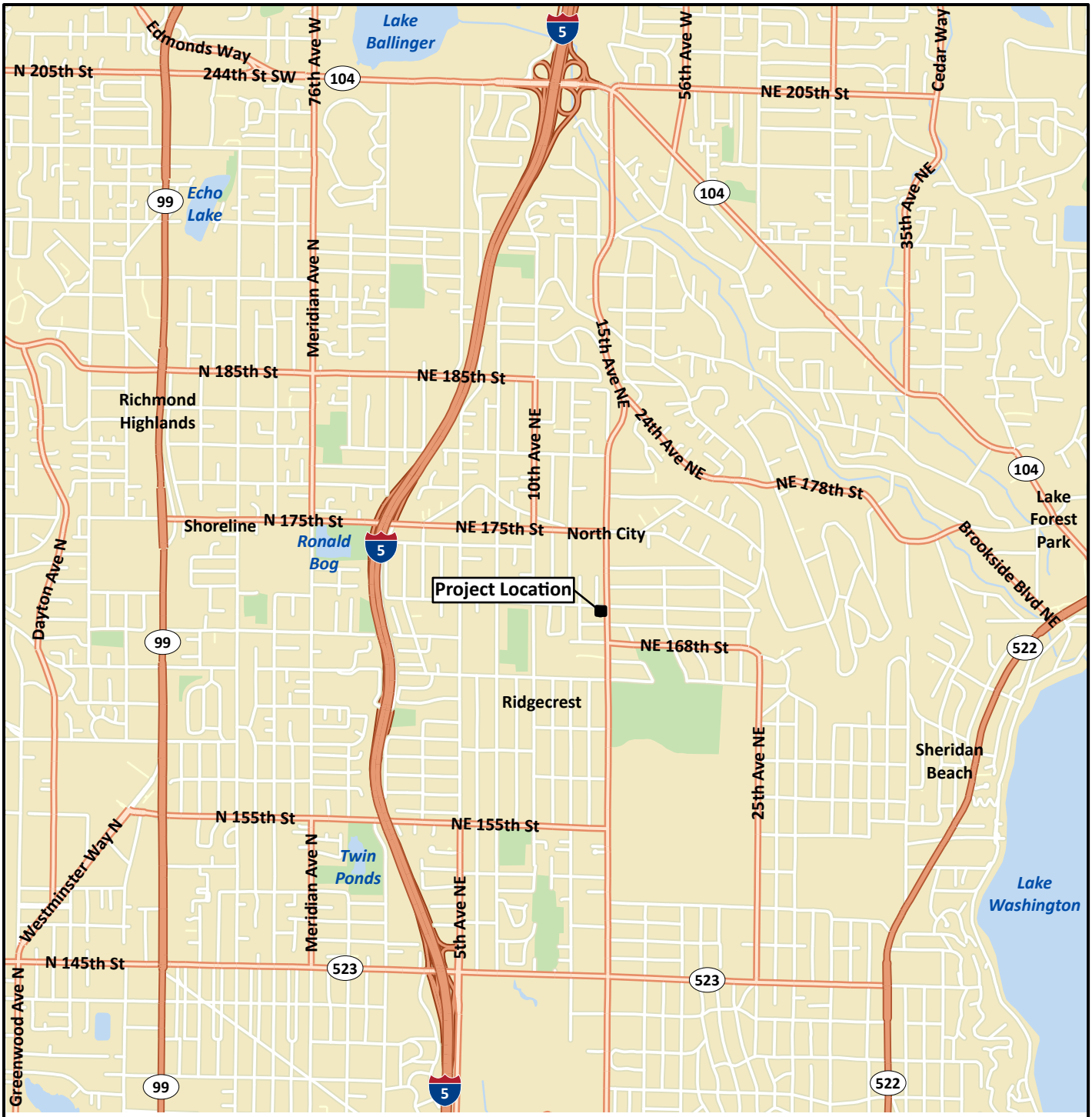
BHC Consultants, LLC (BHC). 2023. *Pump Station 30 Improvements Project: Basis of Design Report – ..* May.

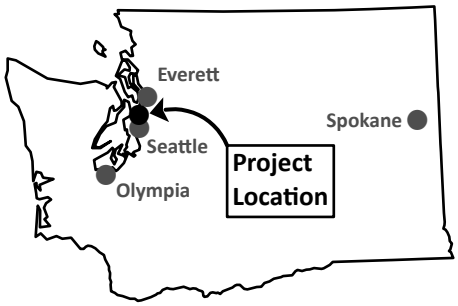
City of Shoreline. Property Information Interactive Map. City of Shoreline, Washington.

City of Shoreline. Shoreline Surface Water Assets Map. City of Shoreline, Washington.

APPENDIX A

Background Review Figures





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LANDAU ASSOCIATES

Pump Station 30 Improvements Shoreline, Washington	**Vicinity Map**	Figure 1

DEV24-2035

Legend

- Study Area
- Project Area

Note

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

0 200 400

Scale in Feet

Data Sources: City of Shoreline GIS; King County GIS; USGS.

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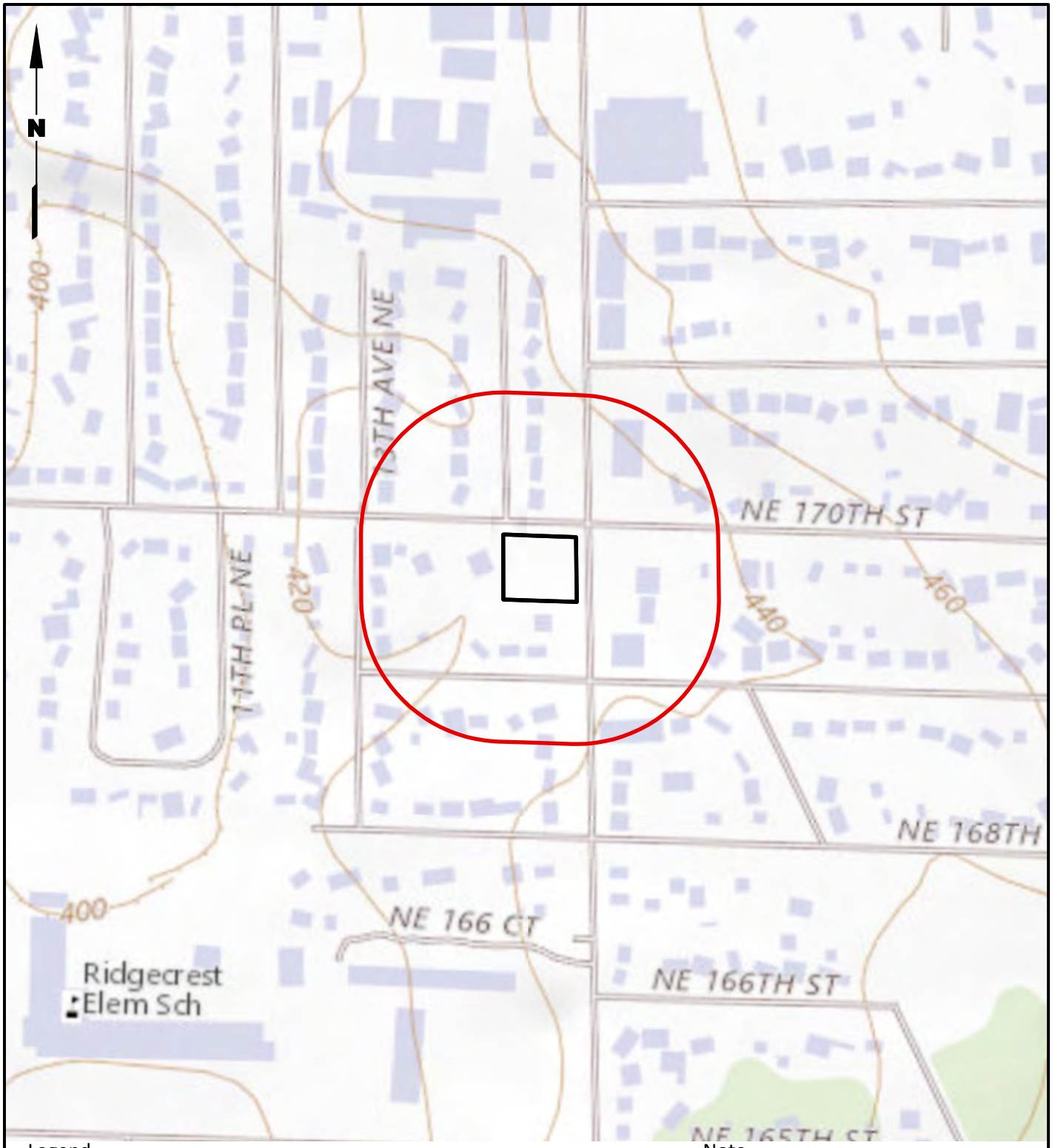
LANDAU ASSOCIATES

Pump Station 30 Improvements Shoreline, Washington	**Study Area**	Figure 2

DEV24-2035



Legend

- Project Area
- Study Area

Note

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

0 300 600

Scale in Feet

Data Sources: City of Shoreline GIS; King County GIS; USGS.

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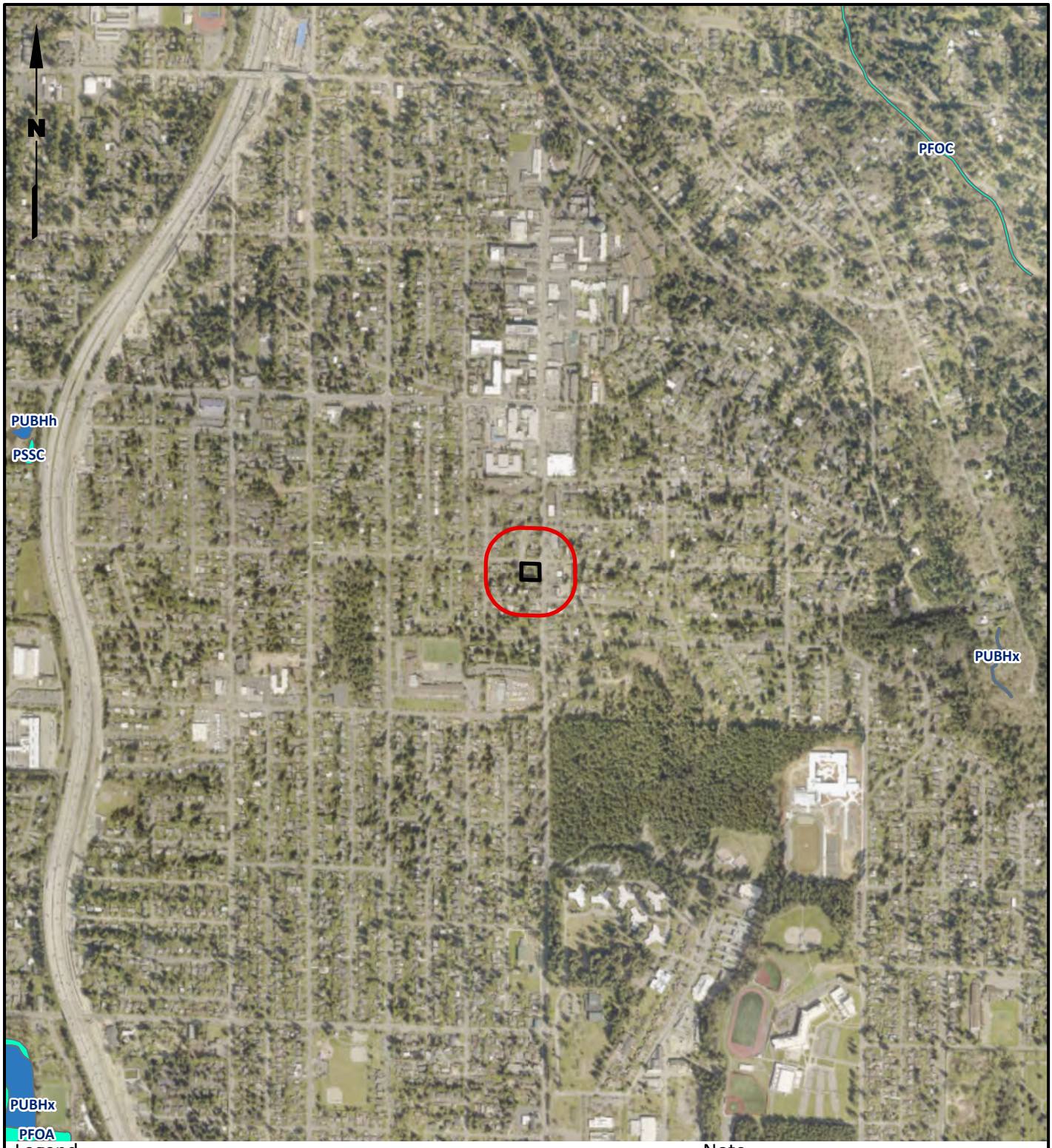
LANDAU ASSOCIATES

Pump Station 30 Improvements Shoreline, Washington	**USGS Topographic Map**	Figure A-1

DEV24-2035



Legend

- Project Area
- Study Area
- PFOA/PFOC/PSSC - Freshwater Forested/Shrub Wetland
- PUBHh/PUBHx Freshwater Pond

Note

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

0 1,200 2,400

Scale in Feet

Data Sources: City of Shoreline GIS; King County GIS; USFW.

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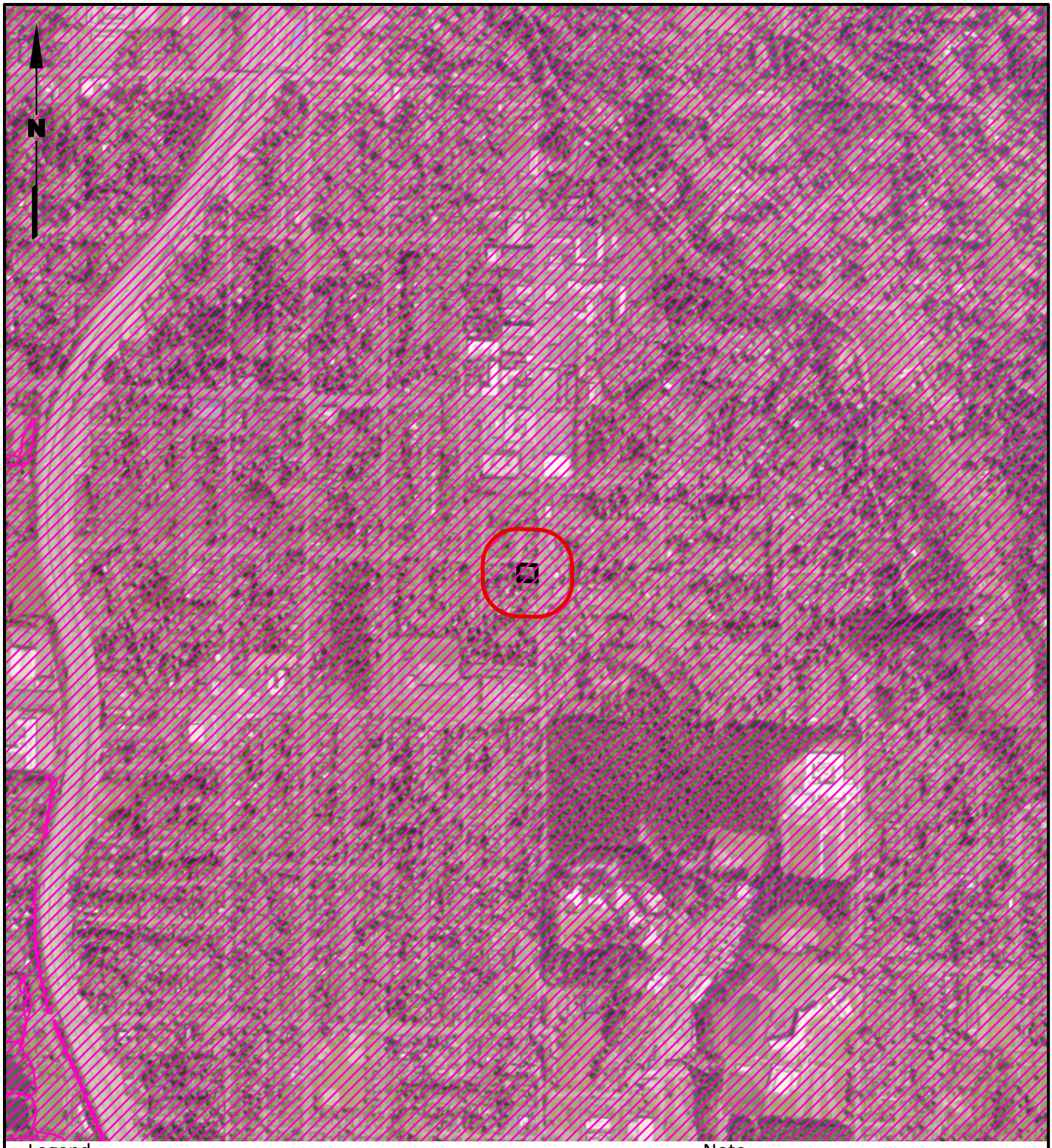
LANDAU ASSOCIATES

Pump Station 30 Improvements Shoreline, Washington	**US Fish and Wildlife National Wetland Inventory Map**	Figure A-2

DEV24-2035



Legend

- Project Area
- Study Area
- FEMA 100-Year Floodplain

Note

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

0 1,200 2,400

Scale in Feet

Data Sources: City of Shoreline GIS; King County GIS; FEMA.

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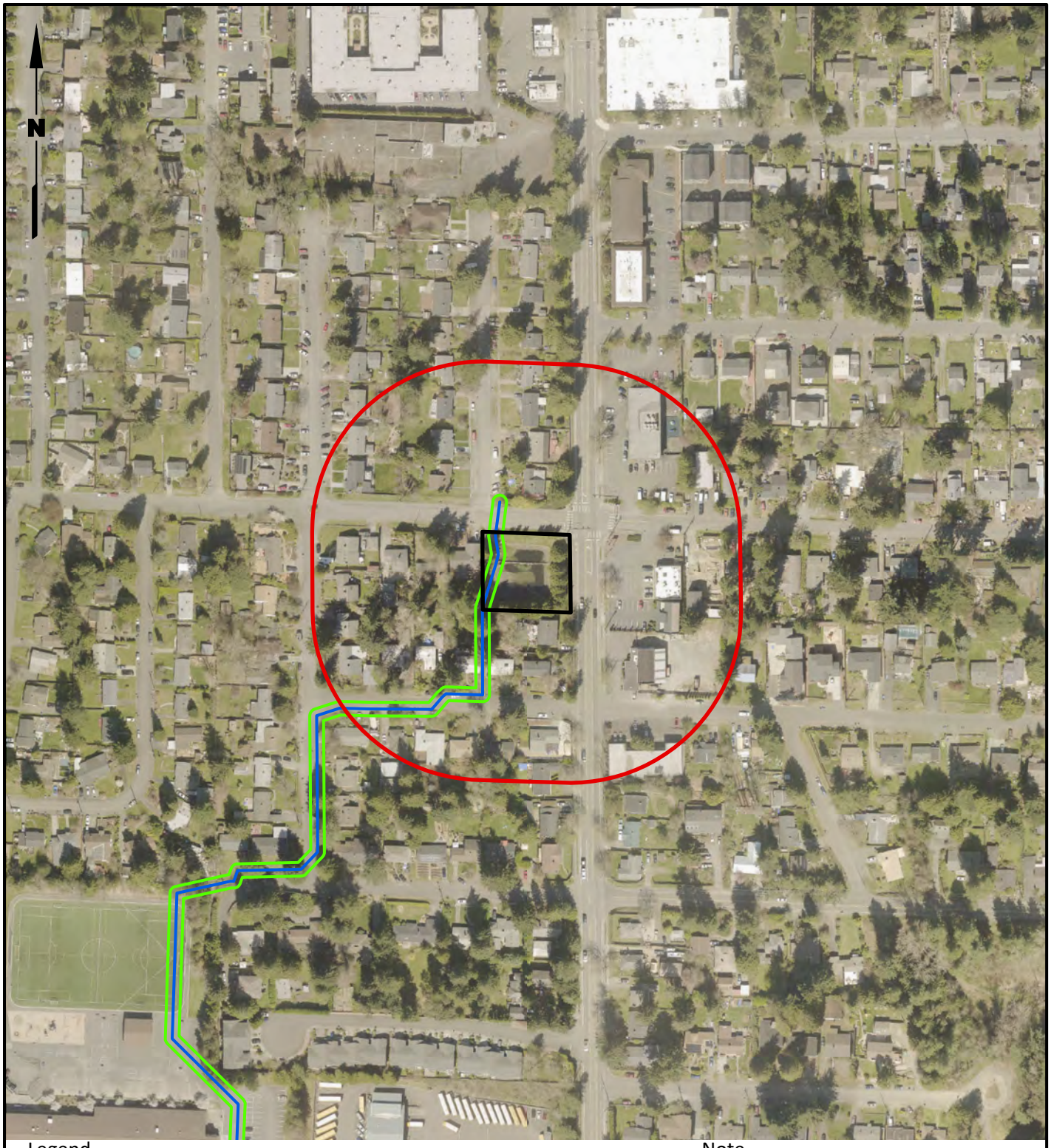
LANDAU ASSOCIATES

Pump Station 30 Improvements Shoreline, Washington	**FEMA 100-Year Floodplain**	Figure A-3

DEV24-2035



Legend

- Project Area
- Study Area
- Streams
- Stream Buffers

Note

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

0 250 500

Scale in Feet

Data Sources: City of Shoreline GIS; King County GIS.

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LANDAU ASSOCIATES

Pump Station 30 Improvements Shoreline, Washington	**City of Shoreline** **Streams and Buffers**	Figure A-4

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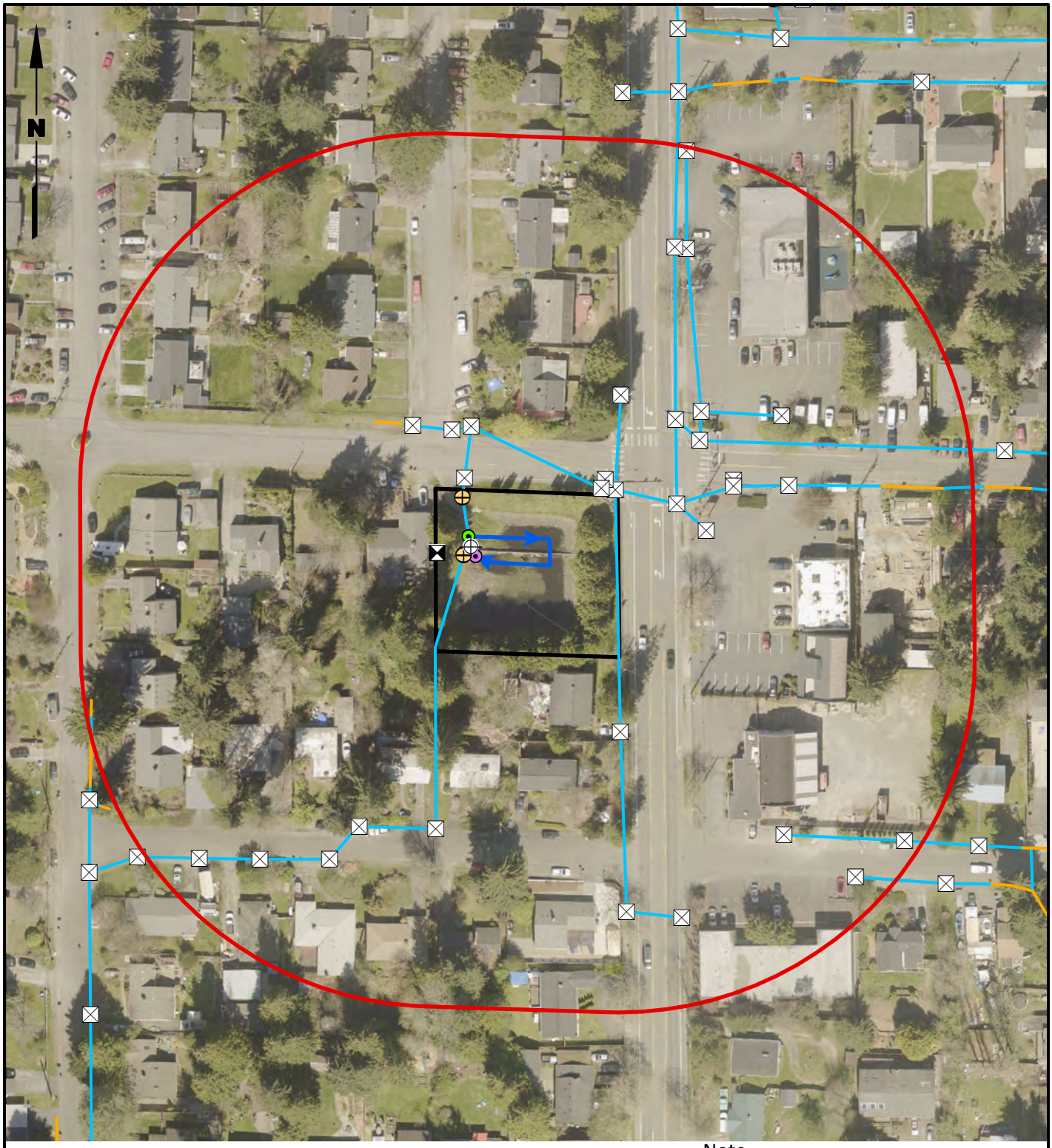

Legend

- Project Area
- Study Area
- Catch Basin
- Control Panel
- Gauge
- Manhole
- Outfall
- Pipe Inlet
- Pipe
- Ditch
- Flow Direction

Note

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

0 120 240

Scale in Feet

Data Sources: City of Shoreline GIS; King County GIS; USGS.

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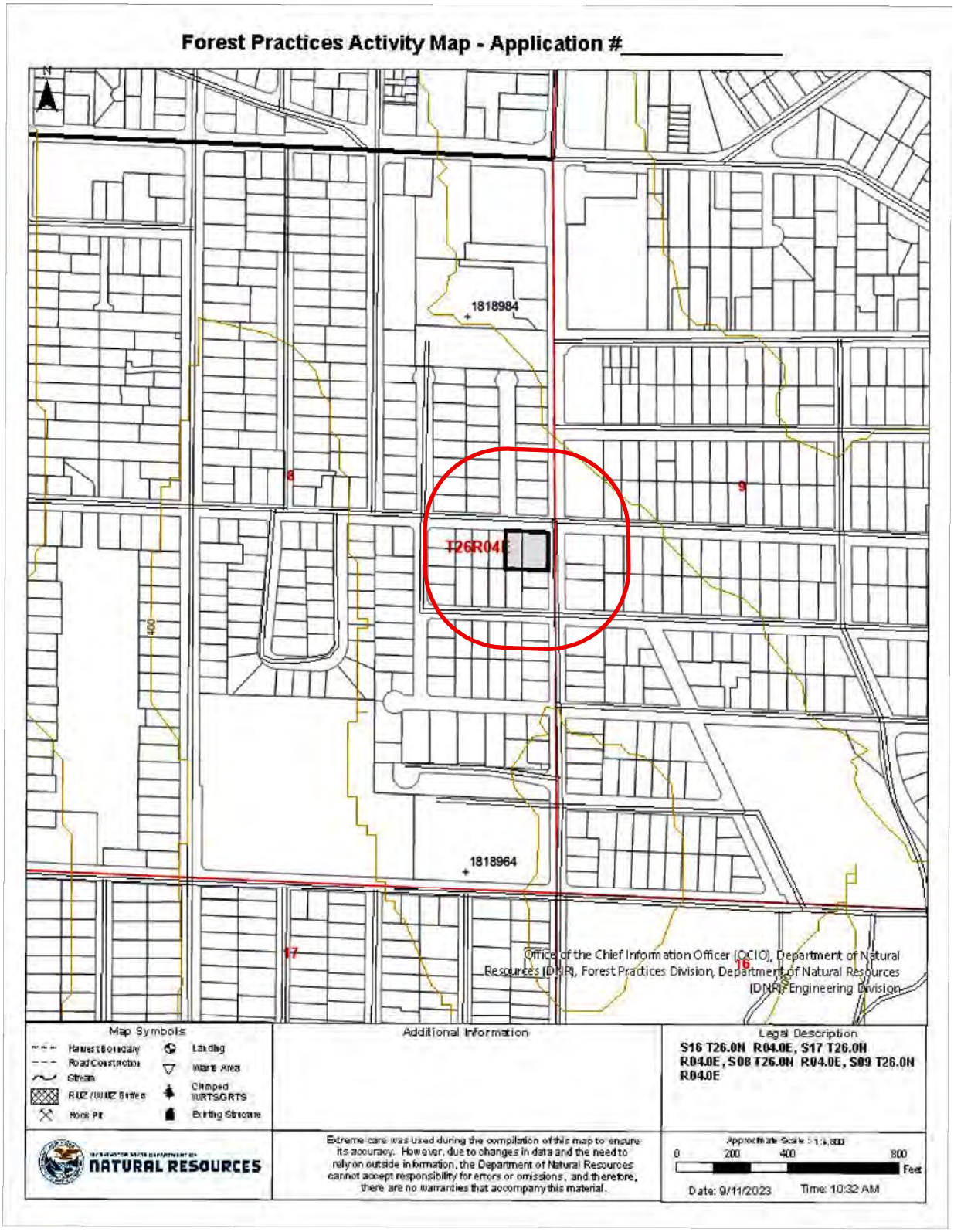
LANDAU ASSOCIATES

Pump Station 30 Improvements Shoreline, Washington	**City of Shoreline** **Surface Water Assets**	Figure A-5

DEV24-2035



Legend

- Project Area
- Study Area

Note

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

Data Sources: City of Shoreline GIS; King County GIS; USGS.

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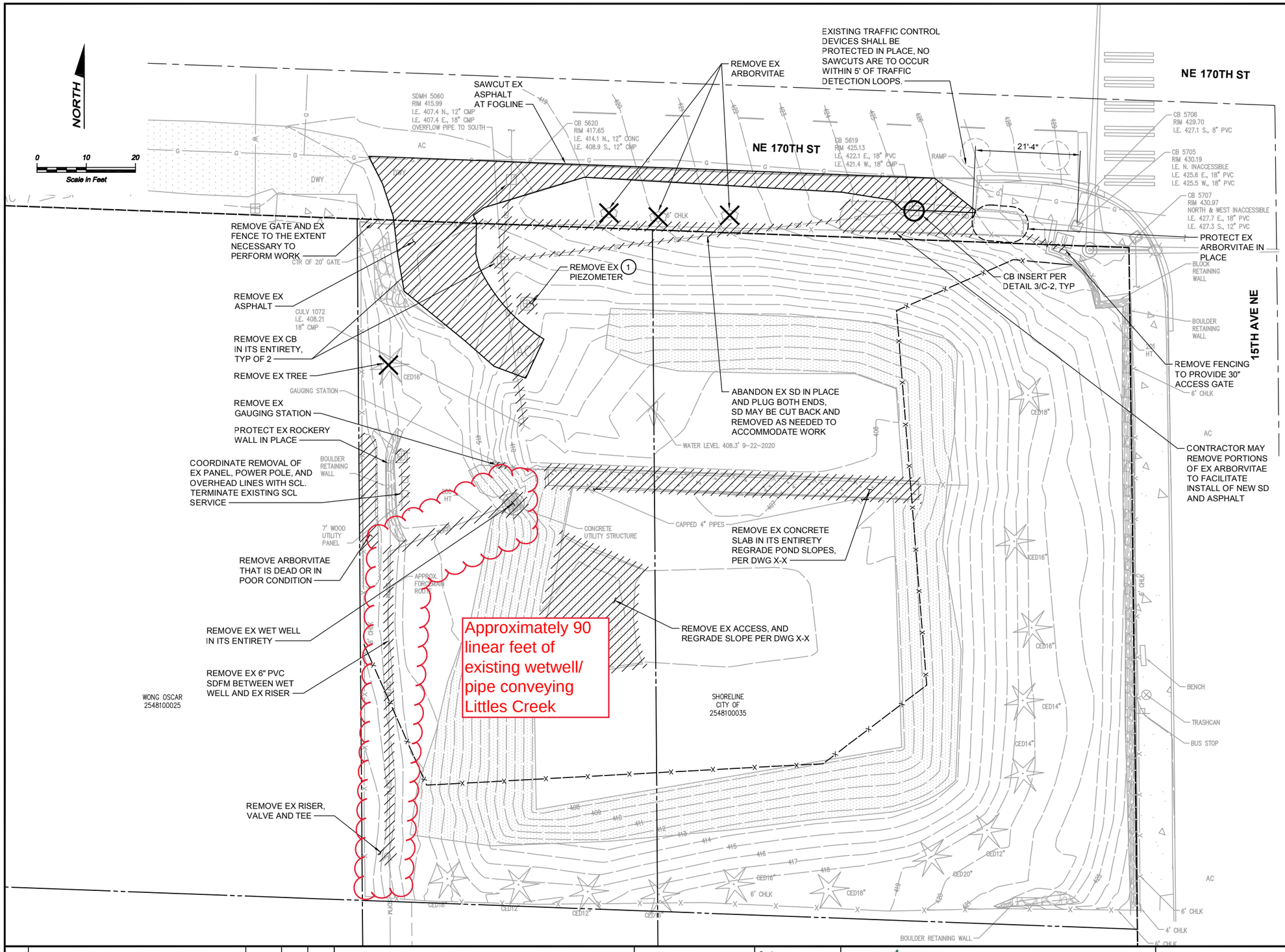
LANDAU ASSOCIATES

Pump Station 30 Improvements Shoreline, Washington	**Forest Practices Activity Map (DNR)**	Figure A-6

DEV24-2035

APPENDIX B

Plan Excerpts



CONSTRUCTION NOTES:

1. ABANDON OR REMOVE EXISTING PIEZOMETER, IN ACCORDANCE WITH CHAPTER 173-160 WAC. WORK SHALL BE PERFORMED BY A LICENSED DRILLER.
2. PLACE TWO ADDITIONAL CB INSERTS (NOT SHOWN) AT THE NE AND NW CORNERS OF INTERSECTION OF NE 170TH ST AN 14TH AVE NE (ONE PER CB)

Call 48 Hours Before You Dig
1-800-424-5555
UNDERGROUND SERVICE

Preliminary 30% Review Set
Not For Construction
08-2023

CASEY ANDREW BRYANT — STATE OF WASHINGTON — 22013661 — REGISTERED PROFESSIONAL ENGINEER

No.	Revision	Date	By	App'd

BHC Consultants, LLC
1601 Fifth Avenue, Suite 500
Seattle, Washington 98101
206.505.3400
206.505.3406 (fax)
www.bhcconsultants.com

Designed: C. Bryant, P.E.
Drawn: R. Nicolas
Checked: C. Ochiltree, P.E.

Scale: 1" = 10'-0"
One Inch at Full Scale
If Not One Inch Scale Accordingly

City of Shoreline
Public Works - Surface Water Utility
17500 Midvale Avenue North
Shoreline, WA 98133
Phone: 206-801-2400 Fax: 206-801-2785

PUMP STATION 30

TESC AND DEMOLITION PLAN

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Sheet: X of X
File: P20-10647_PS-30_C-2
Date: August 2023

DEV24-2035

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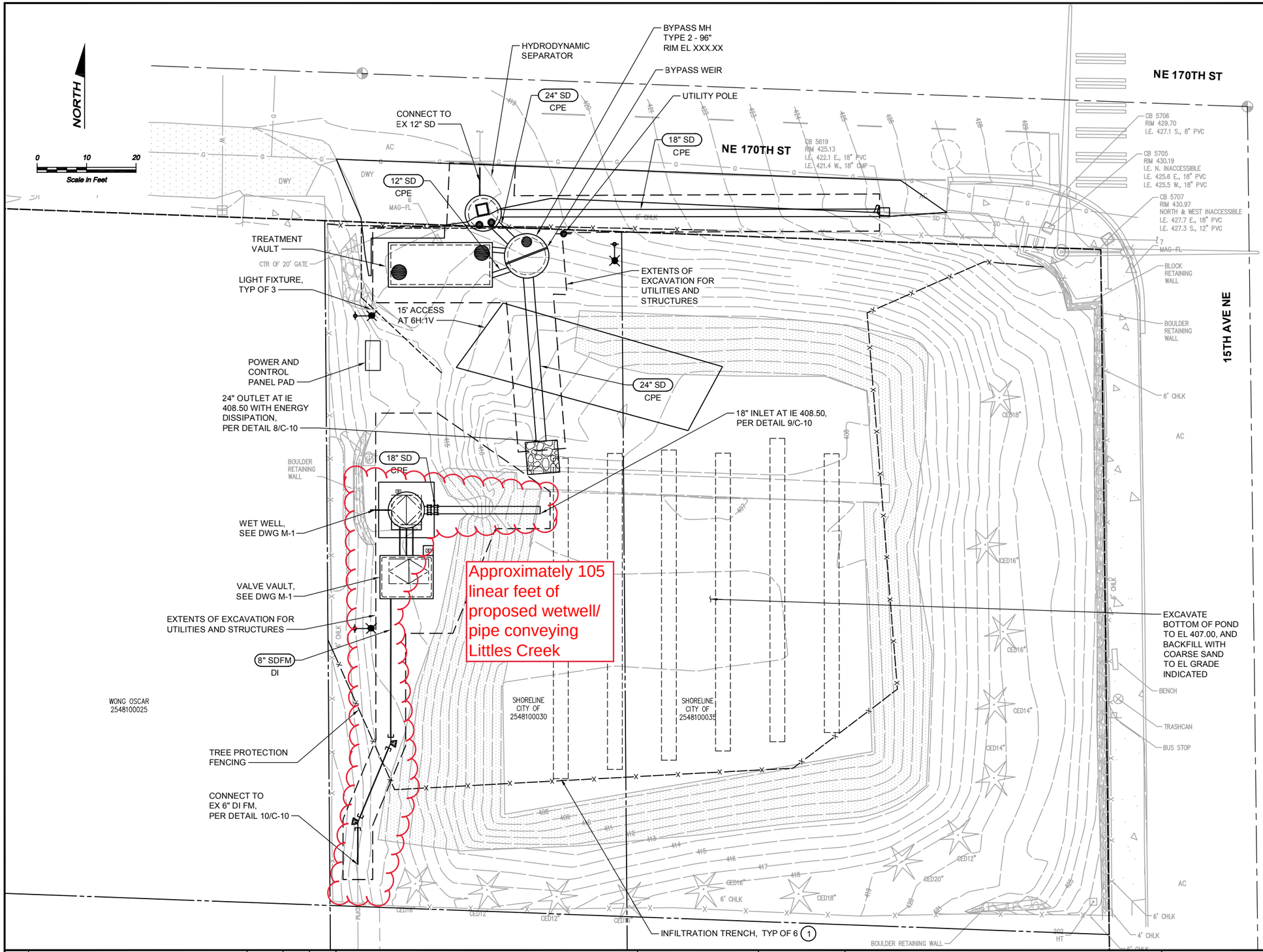

CONSTRUCTION NOTES:

(1) INFILTRATION TRENCHES SHALL BE PLACED A MINIMUM OF 5' FROM THE TOE OF SLOPE, WITH A MINIMUM SPACING OF 8' BETWEEN INFILTRATION TRENCHES, INSTALL PER DETAIL X/X-XX.

Call 48 Hours Before You Dig
1-800-424-5555
UNDERGROUND SERVICE

Preliminary
30% Review Set
Not For Construction
08-2023

CASEY ANDREW BRYANT — STATE OF WASHINGTON — 22013661 — REGISTERED PROFESSIONAL ENGINEER

No.	Revision	Date	By	App'd

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If Not One Inch Scale Accordingly

City of Shoreline
Public Works - Surface Water Utility
17500 Midvale Avenue North
Shoreline, WA 98133
Phone: 206-801-2400 Fax: 206-801-2785

PUMP STATION 30

PIPING AND EXCAVATION PLAN

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DEV24-2035

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