



LAKE FOREST PARK
Washington

17425 Ballinger Way NE
Lake Forest Park, WA 98155
206-368-5440

Critical Area Work Permit Checklist

ENVIRONMENTALLY CRITICAL AREAS

[Lake Forest Park Municipal Code 16.16](#) regulates development in or near environmentally critical areas. Refer to specific critical areas information bulletins or read the code for more detailed information on specific critical areas and their requirements. Major and minor activities are defined in LFPMP 16.16.080- check one below:

Minor Critical Area Permit

- ☐ Major Critical Area Permit

It is the applicant's responsibility to disclose the presence of critical areas to the Planning Department.

Critical Areas are defined as:

Wetlands	Streams
Fish and wildlife habitat conservation areas	Areas with a critical recharging effect on aquifers (CARA)
Steep-slope hazard areas	Erosion hazard areas
Landslide hazard areas	Seismic hazard areas

All buffers associated with critical areas are included in the definition of critical areas.

Along with your application, please provide **(2) hard copies and (1) electronic copy** of the following components:

- ☐ **APPLICATION FORM** See Attachment A
- ☐ **SITE PLAN -1"=20' Scale Including:** See Attachment B

- ☐ All existing structures on the site, and an indication of whether they will be removed or retained
- ☐ Existing and/or proposed property lines of the site
- ☐ Proposed access to each proposed lot on the site, including vehicular, emergency and utility access
- ☐ Existing and proposed easements and rights-of-way across the site
- ☐ The location of all property lines abutting or connecting to the site, and the owners of adjacent land
- ☐ Location of all public and/or private utility service lines, including water, sewer, storm, and underground telephone or cable service lines

N/A ☐ Identification of the source of water supply for each lot, including water line and fire hydrant locations

N/A ☐ Identification of the method of sanitary sewage disposal, including sewer lines

N/A ☐ Location of existing and proposed stormwater control/conveyance on or across the site

No water, sewer or stormwater involvement

- ☐ All environmentally critical areas and their buffers, and /or building setbacks
- ☐ The location, ownership, width and name, where applicable, of all existing and proposed access drives, streets, public ways, easements, or other rights-of-way and watercourses within the plat and within two hundred feet of the plat
- ☐ Name, address, telephone number and official seal of the licensed professional engineer
- ☐ Contour lines in areas to be developed shall be at two-foot intervals, or as specified by the city engineer. Five-foot intervals may be used in areas not to be developed. (see WAC 332-130-145)
- ☐ All contour lines shall be extended into adjacent property at least 100 feet to show the topographical relationship of adjacent property to the proposed development
- ☒ ~~Typical cross-sections of the proposed grading~~ **N/A: Grading not proposed.**
- ☐ A legend identifying all existing and proposed boundary lines, drainage facilities, utilities, roadway sections, erosion control facilities, grading, critical areas, buffers, and other required items specified above
- ☐ Topographical information must be created within one year of submittal date
- ☐ Provide detailed studies, as required
- ☐ Indicate the presence or absence of fish and wildlife habitat (see page 2)
- ☐ Critical area studies shall incorporate the best available science and include a Statement of Qualification

- ☐ **GRADING AND EXCAVATION PLAN- 1"=20' Scale Including:** See Attachment B

In addition to the above, you must provide the following information (some plans may be required to be prepared by professional engineer licensed in the State of Washington):

- ☐ Topographical map with contour lines at five (5) foot intervals
- ☐ Designate areas involving land clearing, filling, land cuts or excavation



Critical Area Work Permit Checklist

ENVIRONMENTALLY CRITICAL AREAS

- ☐ Identify the amount of excavation, fill, and removal of material in cubic yards
- ☐ Locate all significant trees (6" diameter or greater) and identify type and size
- ☐ Designate those trees to be removed and those to be protected
- ☐ Identify areas to be revegetated and/or restored. Provide plant types and methods
- ☐ **EROSION CONTROL PLAN (IF APPLICABLE)- 1"=20' Scale Including: See Attachment C (TESC Plan)**
This may include erosion and sedimentation control, vegetation management plan, landscape plan, restoration plan, etc.(some plans may be required to be prepared by a licensed professional engineer in the State of Washington):
 - ☐ Locate areas that erosion and sedimentation control devices are to be installed
 - ☐ Include details for silt fence or any other mechanisms
 - ☐ Identify areas to be revegetated or restored, types of vegetation and timing for implementation
- ☐ **DRAINAGE PLAN-1"=20' Scale Including:**
 - ☐ This should be prepared by a professional engineer licensed in the State of Washington
 - ☐ Drainage requirements, systems and techniques must comply with the King County Surface Water Design Manual, as adopted by the City of Lake Forest Park.
- ☐ **MITIGATION & MONITORING PLAN- 1"=20' Scale Including: No mitigation or monitoring required.**
Mitigation of impacts to critical areas shall be conducted according to an approved mitigation plan that describes:
 - ☐ Existing functions and values of the affected critical areas
 - ☐ The nature and extent of impacts to those areas
 - ☐ Proposed mitigation measures to offset those impacts
 - ☐ Plant materials and other habitat features to be installedIt should also include:
 - ☐ A drawing that illustrates the compensatory mitigation elementsThe applicant shall submit a monitoring and maintenance program prepared by a qualified professional that shall, at a minimum, include the following:
 - ☐ The goals and objectives for the mitigation plan
 - ☐ The criteria for assessing the mitigationAs well as a monitoring plan that includes:
 - ☐ A contingency plan
 - ☐ A signed copy of the written contract with a qualified professional who will perform the monitoring program, which incorporates the terms of the monitoring program
- ☐ **TREES AND ON-SITE VEGETATION (LFPMC 16.14). 1"=20' Scale Including: See Attachment D (Arborist Report)**
 - ☐ Tree Inventory. A tree inventory prepared by a qualified arborist that includes the following information, at minimum, for all on-site significant trees and any off-site significant trees that may be impacted by proposed development: information on tree species, diameter at breast height, critical root zone, interior critical root zone, condition (health), risk level, existing and proposed canopy coverage.
 - ☐ A scaled (1"=20') site plan detailing the location of property lines, critical areas and buffers, critical and interior critical root zones of all trees, existing and proposed utilities, 2 foot contours, and existing and proposed structures
 - ☐ Arborist Report. An arborist report to include, at minimum, trees in the vicinity of construction that could be impacted by the proposed development activity, trees to be removed and protected, tree protection fence location, timeline for tree protection activities, list of protection measures and conditions to be taken during all development activities to ensure code compliance during development activities.
- ☐ **CRITICAL AREA REPORT (SEE BELOW FOR SPECIFIC TYPE) See Attachment E**
Critical area studies must be in writing and:
 - ☐ Identify and characterize the critical area(s) as part of a larger development proposal site
 - ☐ Assess all hazards posed by the development proposal to any critical areas or critical area buffers on or adjacent to the proposed site

Critical Area Work Permit Checklist

ENVIRONMENTALLY CRITICAL AREAS

- ☐ Propose adequate mitigation, maintenance, monitoring and contingency plans and bonding measures, if necessary
- ☐ Provide a to-scale map of the development proposal site

See Attachment E (CAR)

FISH & WILDLIFE HABITAT CONSERVATION AREAS

If the presence of fish & wildlife habitat has been noted, a critical area work study for a fish & wildlife habitat area is required and must include:

- ☐ Identification of any fish and wildlife habitat conservation areas and assessment of potential project impacts to the area
- N/A ☐ A discussion of any federal, state, or local special management recommendations, including Washington Department of Fish and Wildlife habitat management recommendations, that have been developed for species or habitats located on or adjacent to the project area
- N/A ☐ A discussion of any ongoing management practices that will protect habitat after the project site has been developed, including any proposed monitoring, maintenance, and adaptive management programs
- N/A ☐ When appropriate, because of the type of habitat or species present or the project area conditions, the Planning Director may also require the habitat management plan to include an evaluation by the Washington Department of Fish and Wildlife or other qualified professional regarding the applicant's analysis and the effectiveness of any proposed mitigating measures or programs, to include any recommendations as appropriate
- N/A ☐ Such other information that is required in the judgment of the Planning Director

N/A **WETLANDS** No activities proposed in wetlands or buffers.

If the presence of wetland habitat has been noted, a critical area work study for wetland areas is required and must include:

- ☐ A wetlands delineation and categorization report from a qualified professional that classifies the wetland area, and depicts its location and buffer graphically. The report shall contain information on proposed project impacts, performance standards, and mitigation and monitoring (if required). See LFPMC 16.16.110)

STREAMS See Attachment E (CAR)

If the presence of stream habitat has been noted, a critical area work study for stream areas is required and must include:

- ☐ A stream delineation and categorization report from a qualified professional that classifies the stream area, and depicts its location and buffer graphically. The report shall contain information on proposed project impacts, performance standards, and mitigation and monitoring (if required). See LFPMC 16.16.110)

GEOTECHNICAL See Attachment F for Geotech Report

If the presence of geological critical habitat has been noted, a critical area work study for geological areas is required and must include:

- ☐ A geotechnical report from a Washington State licensed geotechnical engineer that classifies the critical area pursuant to LFPMC 16.16.040 (G), (J), (W), and/or LFPMC 16.16.300. The report shall also discuss and analyze the proposed project impacts, analyze each specific alteration criteria, and discuss mitigation and monitoring provisions

N/A **AQUIFER RECHARGE AREAS** No activities proposed in CARAs

If the presence of aquifer recharge habitat has been noted, a critical area report for aquifer recharge areas is required and must include:

- ☐ A critical area report that designates and provides development standards for all aquifer recharge areas per LFPMC 16.16.410-420.
- ☐ (2) sets of the names and mailing addresses in written and electronic format of the owners and residents of adjacent property within 300 feet along with pre-stamped, addressed envelopes

The Planning Director may require information from the applicant in addition to the critical area study as necessary to ensure compliance with Environmentally Critical Area code

The envelopes for adjacent properties will be delivered to the LFP Planning Department. Electronic format of names and mailing addresses is attached to the email that accompanied this submittal.

For more information, please contact the Planning Department
aplanner@cityofflp.com
206-957-2837



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Sound Transit Major Critical Area Permit Application Attachments

Attachment A	Application Form
Attachment B	Site Plans
Attachment C	TESC Plan
Attachment D	Arborist Report
Attachment E	Critical Areas Report
Attachment F	Geotech Report

ATTACHMENT A: APPLICATION FORM

Critical Area Work Permit Application

Permit # *Staff use*

Project Description:	Sound Transit SR522/145th BRT Geotech Borings BH-32, BH-33, BH-34, BH-44		
Property Owner:	WSDOT - Dane Logen, Property Acquisition Specialist		
Project Address:	WSDOT parcels adjacent SR 522 ROW		
Phone:	(206) 464-1246	Email:	LogenDJ@WSDOT.WA.GOV

Authorized Agent:	Sound Transit - Dangelei Fox		
Address:	401 S Jackson St Seattle, WA 98104		
Phone:	(206) 665-8523	Fax:	

General Contractor:	HWA GeoSciences Inc.		
Address:	21312 30th Dr SE Ste 110, Bothell WA 98021		
Contact:			
Phone:	(425) 774-0106	Fax:	
State License #:		Exp:	
City License #:		Exp:	

PERMIT APPLICATION FEES

Fees must be paid at time of application

Major Permit -----	\$550	
Tree-Related -----	\$125	
Public Notice Signage Fee		\$ 200
\$25 addtl. Signage fee if property abuts 2 streets		

Minor Permit*-----	\$85	
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*For projects performed only by light equipment
and authorized by an exception listed in [LFPMC 16.16.230](#) or setback
exceptions of [16.16.240](#)

Drainage Review Fee	
Projects with an engineering plan -----	\$300
Projects w/o an engineering plan -----	\$600
SUBTOTAL	
Technology Fee 5% of Subtotal	
TOTAL DUE	\$

Staff use.

Date Stamp.

Paid Stamp.

Describe the nature of the proposal. Indicate as much specific information as possible. What is proposed? How much are you proposing? How long will the work take? How will the use of the property be changed? Future plans?

Work will involve borehole drilling with a limited-access drill rig using hollow stem augers and soil sampling at intervals to the depth explored. Disturbance will be minimized to less than 300 square feet. Excavation quantity of each location will be under 75 cubic feet. The property will not change and disturbed work areas will be restored to the condition prior to work. The drilling contractor will be under the supervision of a geotechnical engineer or geologist.

- **BH-32, BH-33 and BH-34**

Work proposed east of SR 522 between NE 153rd Street and NE 155th Place. Borings BH-33 and BH-34 are located on steep sloped areas within the ravine (see Site Plans, Attachment B). Activities will take up to 10 days to complete. The drill rig will be disassembled and lowered down slope from a crane truck over a cleared aerial pathway. Access for personnel into the Bsche'tla Creek ravine will be completed along an existing path extending on the side slope from the southwestern corner of the ravine. The path is relatively clear of vegetation. Boring BH-32 is proposed on a gently sloped bench directly outside of the ROW beyond the sidewalk and pedestrian wall.

- **BH-44**

Work is proposed on an unimproved parcel adjacent to stairs at NE 160th Street and 38th Avenue NE. The drill rig and workers will access the work area from the existing stairs. An access path may need to be cleared extending from the stairs to the work area. Work will take up to one day to complete.

What is/are the environmentally critical areas on or near the site? (steep slopes, erosion hazard, landslide hazard, wetland, stream corridor, seismic hazard, flood hazard, shorelines)

See Site Plans, Attachment B.

- **BH-32, BH-33 and BH-34**

Drilling will occur within a mapped environmentally critical area for stream buffer, and landslide hazard.

- **BH-44**

Drilling will occur within a mapped ECA for steep slopes (>40%) in a wooded, vegetated area.

Describe the character of the site. Is the site sloped or flat? Is the site wooded and vegetated, cleared or landscaped? What is the current use of the site? Describe the surrounding areas (undeveloped, residential, commercial)

See the Critical Areas Report (Attachment E) for details on how the proposed activities will not impact the ECA. The current use of both locations is an unimproved parcel.

- **BH-32, BH-33 and BH-34**

Drilling is proposed in the Bsche'tla Creek ravine (15-40% slope) in a wooded and vegetated area.

- **BH-44**

Drilling will occur within a mapped ECA for steep slopes (>40%) in a wooded, vegetated area.

How close to environmentally critical areas will the work be being done?

- **BH-32, BH-33 and BH-34**

The work will be done within the limits of LFP-mapped environmentally critical area for stream buffer, and landslide hazard. The work will not impact the stream. No trees will be removed.

- **BH-44**

The work will be done within the limits of LFP-mapped environmentally critical area for steep slopes.
How will the proposal impact the environmentally critical areas on or off site?
<p>The proposal will not have permanent impacts to the environmentally critical area. No trees will be impacted by trimming and ground cover removal will be minimized. No trees will be removed. Removal of obstructing vegetation (surficial brush and some limbs of small trees) at each location will be less than 300 square feet.</p> <ul style="list-style-type: none"> • <u>BH-32, BH-33 and BH-34</u> <p>Access for workers into the ravine will be on an existing path needing limited vegetation removal using brush trimmers. Drill equipment access will be from the right-of-way at the top of the slope, perpendicularly down to the work area on the WSDOT parcel. See the Critical Areas Report (Attachment E) for details on how the work will not destabilize the slope or affect the Bsche'tla Creek buffer.</p> <ul style="list-style-type: none"> • <u>BH-44</u> <p>Access for workers will be on the existing stairs. Limited vegetation removal is needed adjacent to the stairs using brush trimmers to allow for drill equipment access. See the Critical Areas Report (Attachment E) for details on how the proposed activities will not impact the critical area.</p>
Describe any mitigating factors. How do you propose to accommodate drainage? How do you propose to reduce erosion? Are there any measures for reducing impacts, such as erosion control, drainage retention, revegetation, restoration, noise, etc.?
<p>Borings will be temporary and work area disturbance will be minimized to less than 300 square feet at each boring location. Temporary erosion control measures (see TESC Plan, Attachment C) will be implemented in accordance with the Stormwater Management Program (LFP 2020). Plywood sheets or plastic mats may be used as necessary to minimize ground disturbance. Use of limited temporary erosion control measures (e.g., straw waddles and silt fences) will be employed, as appropriate (see Site Plans, Attachment B). Work areas will be restored to existing condition and ruts will be repaired. The boreholes will be backfilled in accordance with Department of Ecology requirements. Revegetation will use native seed mix.</p>
Is the site within 200 feet of the shoreline of Lake Washington?
No

Release / Hold Harmless Agreement

I, the undersigned, his/her heirs and assigns, in consideration for City processing the application agrees to release, indemnify, defend and hold the City of Lake Forest Park harmless from any and all damages and/or claims for damages, including reasonable attorney's fees, arising from any action or inaction as based in whole or in part upon false, misleading or incomplete information furnished by the applicant, his agents or employees.

The undersigned acknowledges that this application is for a permit from the City of Lake Forest Park; that any permit issued by the City as a result of this application establishes only that the applicant's project complies with City ordinances and regulations; and that other State and Federal laws and regulations, particularly the Endangered Species Act, U.S.C. 16.31, et. seq., may apply to this project. The undersigned further acknowledges and accepts responsibility for complying with such other laws and regulations and agrees to release the City of Lake Forest Park, indemnify and defend it from any claim, damages, injuries, or judgments, including reasonable attorney's fees, arising from or related to violations of such other laws or regulations.

Qualified Professional Requirements

For each section of this application that was required to be prepared by a professional, please include a Statement of Qualification along with this application.

Permission to Enter Subject Property

I, the undersigned, grant his/her or its permission for public officials and staff of the City of Lake Forest Park to enter the subject property for the purpose of inspection and posting attendant to this application.

Date: 2/7/2023

Signature of Applicant,
Owner, or Representative: Danglei Fox
Sound Transit, Applicant

Questions?

For more information, please contact the Planning Department
aplanner@cityoflfp.com
206-957-2837

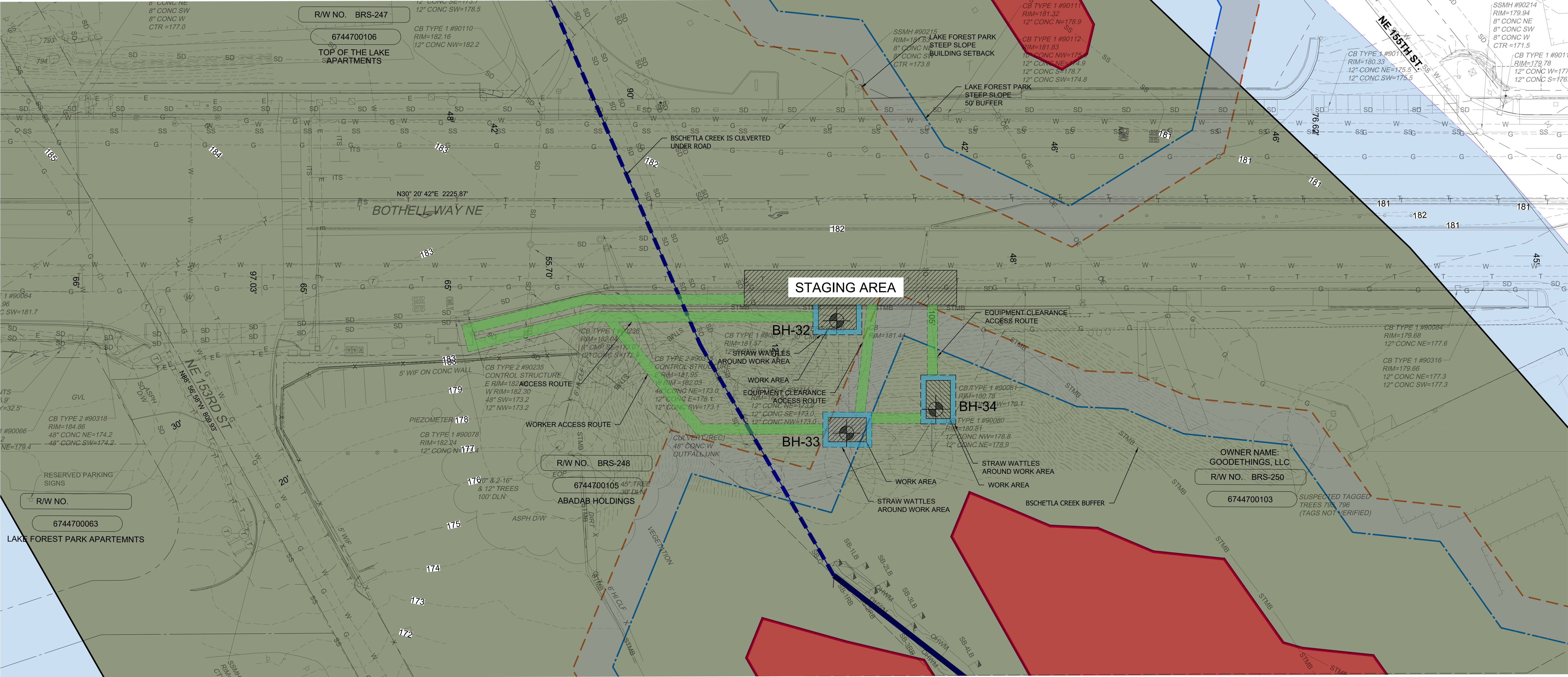
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ATTACHMENT B: DETAILED SITE PLANS

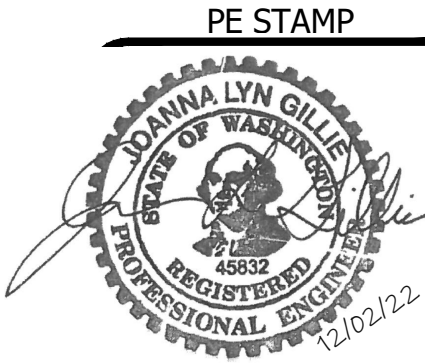
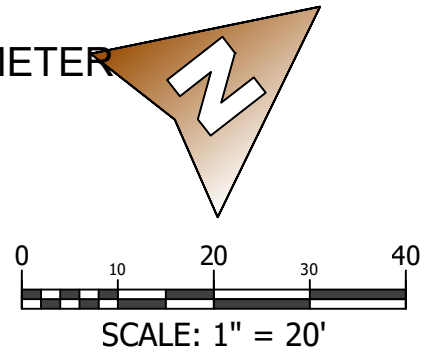


LEGEND:

	PROPOSED BOREHOLE DESIGNATION AND APPROXIMATE LOCATION		SLOPE AND DRAINAGE EASEMENT
	WORK AREA		EXISTING STORM
	ACCESS ROUTE		EXISTING SANITARY SEWER
	MAPPED LANDSLIDE HAZARD AREA w/ 50-FOOT BUFFER		EXISTING WATER
	MAPPED EROSION HAZARD AREA		EXISTING ELECTRICAL (BURIED)
	SLOPES GREATER THAN 40% IN LAKE FOREST PARK		EXISTING TELEPHONE (BURIED)
	50-FOOT BUFFER / 15-FOOT SETBACK FROM MAPPED SLOPES GREATER THAN 40% IN LAKE FOREST PARK		EXISTING TELEPHONE (OVERHEAD)
	STRAW WATTLES AND SILT FENCE		EXISTING TELEPHONE POLE
	EASEMENT LINE		STORM/SEWER MANHOLE
	EXISTING ROW / PROPERTY LINE		EXISTING POWER POLE
	EXISTING STREAM BUFFER		TREE CRITICAL ROOT ZONE
	EXISTING STREAM		
	CREEK / STREAM BUFFER		

NOTES:

- BORINGS LOCATED WITHIN A MAPPED LANDSLIDE HAZARD AREA AND STREAM BUFFER.
- ALL STRUCTURES SHOWN ARE TO REMAIN.
- EXCAVATION QUANTITY OF BORINGS BH-32, BH-33 AND BH-34 ARE 71 CUBIC FEET EACH.
- TEMPORARY EROSION AND SEDIMENT CONTROL BMP'S TO CONSIST OF STRAW WATTLES AND SILT FENCE PLACED AROUND WORK AREA.
- CLEARING FOR ACCESS AND WORK AREA WILL CUT VEGETATION TO GROUND SURFACE AND NOT REQUIRE GRUBBING IN CRITICAL ROOT ZONES. BOREHOLE TO CONSIST OF AN APPROXIMATELY 8 INCH DIAMETER HOLE FOR FULL DEPTH OF THE BORING.



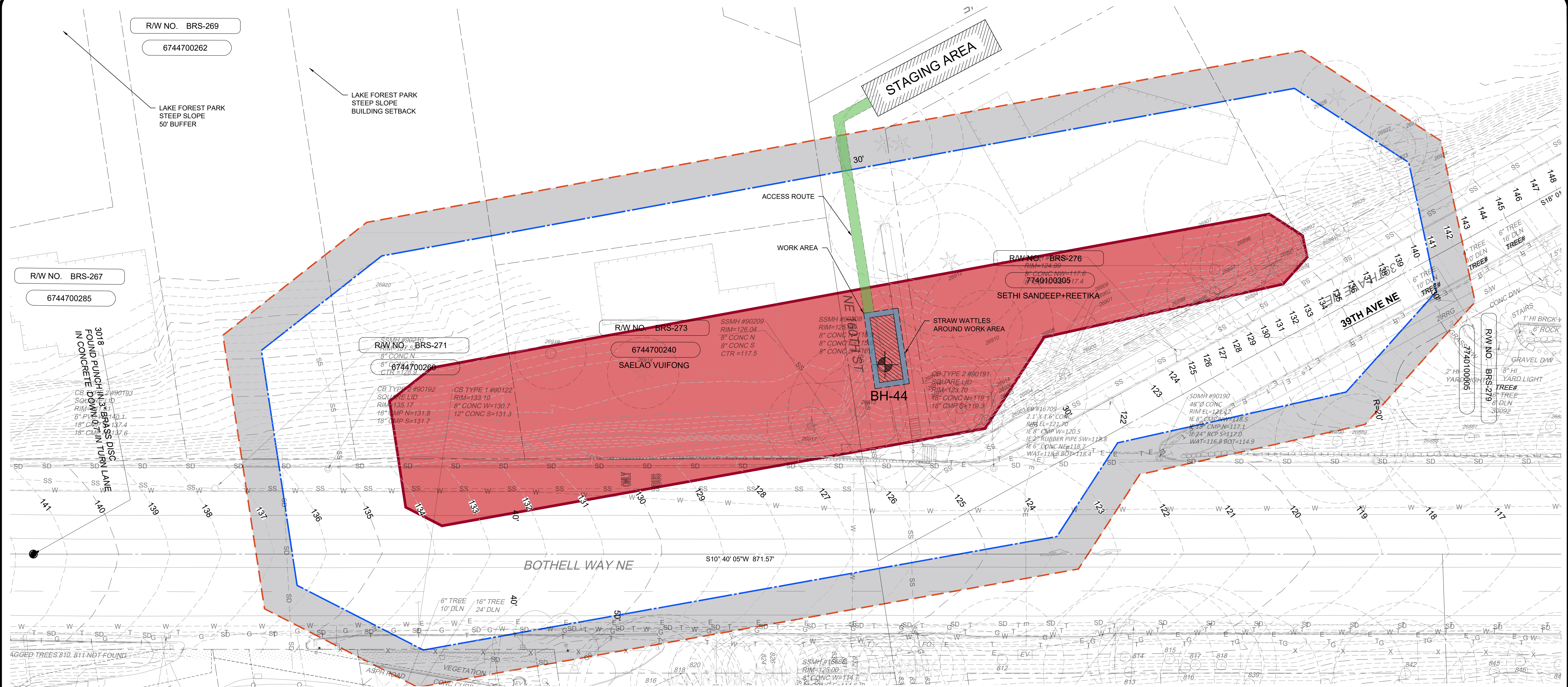
HWA GEOSCIENCES INC.
DBE/MWBE
21312 30th Dr. SE, Suite 110
Bothell, WA. 98021
425-774-0106

SR 522 / NE 145TH ST. BUS RAPID TRANSIT
KING COUNTY, WASHINGTON

**CRITICAL AREA
SITE PLAN
(BH-32, BH-33 & BH-34)**

DRAWN BY:
CF
CHECK BY:
SKS/JLG

FIGURE NO.:
BH-32, -33, -34
PROJECT NO.:
2021-133-21

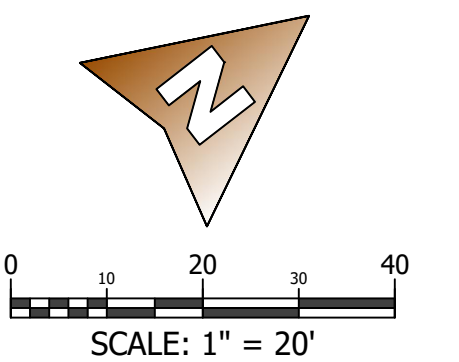


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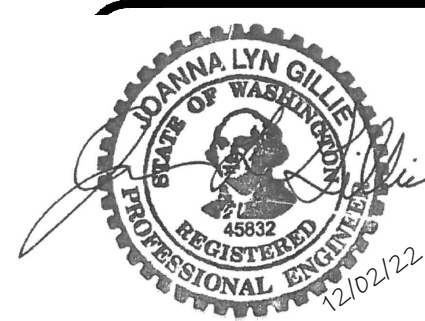
- BH-44
- PROPOSED BOREHOLE DESIGNATION AND APPROXIMATE LOCATION
- WORK AREA
- ACCESS ROUTE
- MAPPED LANDSLIDE HAZARD AREA w/ 50-FOOT BUFFER
- MAPPED EROSION HAZARD AREA
- SLOPES GREATER THAN 40% IN LAKE FOREST PARK
- 50-FOOT BUFFER / 15-FOOT SETBACK FROM MAPPED SLOPES GREATER THAN 40% IN LAKE FOREST PARK
- STRAW WATTLES AND SILT FENCE
- EASEMENT LINE
- EXISTING ROW / PROPERTY LINE
- EXISTING STREAM BUFFER
- EXISTING STREAM
- CREEK / STREAM BUFFER
- SLOPE AND DRAINAGE EASEMENT
- EXISTING BUILDING
- EXISTING STORM
- EXISTING SANITARY SEWER
- EXISTING WATER
- EXISTING ELECTRICAL (BURIED)
- EXISTING TELEPHONE (BURIED)
- EXISTING TELEPHONE (OVERHEAD)
- EXISTING TELEPHONE POLE
- STORM/SEWER MANHOLE
- EXISTING POWER POLE
- TREE CRITICAL ROOT ZONE

NOTES:

- BORING LOCATED WITHIN A MAPPED STEEP SLOPE >40% AREA.
- ALL STRUCTURES SHOWN ARE TO REMAIN.
- EXCAVATION QUANTITY OF BORING BH-44 IS 40 CUBIC FEET.
- TEMPORARY EROSION AND SEDIMENT CONTROL BMP'S TO CONSIST OF STRAW WATTLES PLACED AROUND WORK AREA.
- CLEARING FOR ACCESS AND WORK AREA WILL CUT VEGETATION TO GROUND SURFACE AND NOT REQUIRE GRUBBING IN CRITICAL ROOT ZONES. BOREHOLE TO CONSIST OF AN APPROXIMATELY 8 INCH DIAMETER HOLE FOR FULL DEPTH OF THE BORING.



PE STAMP



HWAGEOSCIENCES INC.
DBE/MWBE
21312 30th Dr. SE, Suite 110
Bothell, WA. 98021
425-774-0106

SR 522 / NE 145TH ST. BUS RAPID TRANSIT
KING COUNTY, WASHINGTON

**CRITICAL AREA
SITE PLAN
(BH-44)**

DRAWN BY:

CF

CHECK BY:

SKS/JLG

FIGURE NO.:

BH-44

PROJECT NO.:

2021-133-21

BASE MAP PROVIDED BY: JACOBS

F:\HWA\SR-522 BRT (LFP) SITE\SR-522 BRT (LFP) SITES 10.28.2022.DWG -BH-44> Plotted: 12/2/2022 4:13 PM

ATTACHMENT C: TEMPORARY EROSION AND SEDIMENT CONTROL PLAN

ATTACHMENT C – TEMPORARY EROSION AND SEDIMENT CONTROL PLAN

This Temporary Erosion and Sediment Control (TESC) plan has been developed to support the planned geotechnical boring program. Soil from the drilling activities will be collected in bags or hard plastic liners and taken off site for analysis. Soil cuttings produced through drill activities will be drummed and transported off site. Care will be used by drillers and site personnel to prevent tracking soil outside of the work zone. Soil will be immediately swept if it is tracked out onto the paved ROW. Each site will be restored to the extent possible to the pre-drilled condition at the completion of each boring.

Detailed elements describing the temporary Best Management Practices (BMPs) selected for erosion and sediment control during drilling are presented below.

TESC Element #1: Establish Construction Access

The access to the boring locations for this project will be from existing paved roadways. If applicable, plywood or plastic mats will be used to access drilling locations if soil is wet or soft to reduce rutting and ground disturbance. There is a potential for soil on the drill rig to be tracked onto road surfaces. The drilling crews will immediately sweep the roadway to prevent soil from migrating off site.

PHYSICAL BMPs:

- Stabilize construction entrance and roads (temporary mats)
- Street cleaning

TESC Element #2: Establish Construction Limits

To protect adjacent improvements and to reduce the area of soil exposed during drilling, the limits of work areas will be clearly identified with cones or high visibility markers prior to moving the drill rig into position.

PHYSICAL BMPs:

- Flag work area limits (cones and/or high visibility markers)

TESC Element #3: Control Flow Rates

Not applicable because runoff will not increase above normal conditions. Any drilling water or mud will be contained during drilling activities and transported off-site for disposal.

TESC Element #4: Install Sediment Controls

Install applicable sediment control BMPs prior to drilling. Sediment-laden runoff is not allowed to discharge from the work area without passing through BMPs. Silt fence, straw wattles, and/or filter berms will be deployed downslope of work areas, as appropriate.

PHYSICAL BMPs:

- Silt fence
- Straw wattles
- Street cleaning
- Preserving natural vegetation
- Filter berm (gravel, wood chips, or compost)

TESC Element #5: Stabilize Soils and Surface Restoration

Exposed soils will be stabilized with the application of effective BMPs to prevent erosion from wind, raindrops, and flowing water. Selected soil stabilization measures must be appropriate for the time of year, site conditions, and estimated duration of use. On sites with existing vegetation, the vegetation will be retained in an undisturbed state to the maximum extent possible. No trees will be removed, although branches or brush (such as blackberry vines) may be trimmed. Any disturbed areas will be restored to their original condition. Seeding and mulching may be used to stabilize disturbed areas once work has been completed.

PHYSICAL BMPs:

- Preserve vegetation
- Dust control
- Plastic sheeting
- Seeding and planting
- Rake disturbed areas and repair ruts, as necessary.
- Spread topsoil and seed with a native upland seed mix, as needed.
- Cover disturbed and seeded areas with compost or mulch, as needed.

TESC Element #6: Protect Drain Inlets

Runoff is not expected to reach the roadway from vegetated areas. Work areas will be kept clean during drilling activities. If necessary, check dams or straw wattles will be used to provide secondary containment around work areas.

PHYSICAL BMPs:

- Check dams
- Straw wattles

TESC Element #7: Control Pollutants

All pollutants, including waste materials and drilling debris that occur during drilling, will be handled and disposed of in a manner that is consistent with practices that do not cause contamination of stormwater, surface water or groundwater. Good housekeeping and preventative measures will be taken to ensure that the site will be kept clean, well-organized, and free of debris.

A spill response kit will be located on the drill rig or supply truck for rapid and easy access. Any equipment leaks from a fuel tank, equipment seal, or hydraulic line will be contained within a spill pad placed beneath potential leak sources. The spill response kit will include plastic sheeting, absorbent pads, kitty litter, and shovels. The contractor will be prepared to excavate and remove impacted soil if a spill occurs.

Maintenance and repair of drilling equipment and vehicles will be performed to the extent practical at off-site locations. Maintenance and repair at on-site locations must be conducted using spill prevention measures such as drip pans, temporary impermeable liners, absorbent pads, and other appropriate methods. Contaminated surfaces will be cleaned immediately following any discharge or spill incident. Emergency repairs may be performed on-site using temporary plastic placed beneath, and if raining, over the vehicle.

PHYSICAL BMPs:

- All vehicles, equipment, and petroleum product storage/dispensing areas will be inspected regularly to detect any leaks or spills, and to identify maintenance needs to prevent leaks or spills.

TESC Element #8: Control Dewatering

Not applicable because no dewatering will occur during drilling. Water needed for drilling will be recirculated and collected in drums and transported off-site for permitted disposal.

TESC Element #9: Maintain BMPs

All temporary and permanent erosion and sediment control BMPs will be maintained for the duration of the drilling at each work area. The driller and field inspector will inspect the containment daily, and make repairs as needed. Maintenance and repair will be conducted in accordance with each particular BMP specification.

All temporary erosion and sediment control BMPs will be removed within 30 days after the final site stabilization is achieved or after the temporary BMPs are no longer needed. Disturbed soil resulting from removal of BMPs or vegetation will be permanently stabilized.

TESC Element #10: Project Management

Temporary erosion and sediment control BMPs for this project have been designed based on the following principles:

- Confine the work area to the improved ROW or road surface, when possible.
- Preserve vegetation and minimize disturbance and compaction of native soil.
- Emphasize erosion control rather than sediment control.
- Minimize the extent and duration of the area exposed.

- The TESC plans will be kept on-site or within reasonable access to the site.

ATTACHMENT D: ARBORIST REPORTS

To: City of Lake Forest Park Community Development

From: Jacobs Engineering
Tyson Goeppinger, PN-7491AUM

Date: December 2022

Subject: **Critical Areas Permit Arborist Memorandum, BH-32, 33, and 34**
BT306 SR 522 / NE 145th Bus Rapid Transit (BRT)

Introduction

Jacobs Engineering, Inc. (Jacobs) has reviewed the locations of the proposed BH-32, 33, and 34, which are required to support final design of retaining walls, utilities, stormwater infrastructure, signal pole foundations, and other road improvements associated with the BRT project. There are trees in the vicinity of the BH-32, 33, and 34, therefore a tree inventory, site plan, and arborist plan have been created. The boreholes and work areas are located on an unimproved parcel just north of 15300 Bothell Way NE (parcel ID 6744700105) (**Attachment 1**). Trees along the proposed access route may see minor soil compaction by worker foot traffic and light equipment access through the critical root zones (CRZ). Boring activities in the work area will not drill through the CRZ and are not expected to affect the long-term health of the adjacent trees. Anticipated effects may include temporary root loss due to work area benching, limited removal of branches or minor trunk impacts; however, no long-term effects to trees are anticipated to the point of recommending removal.

Arborist Report and Tree Inventory

The tree inventory (**Table 1**) summarizes information for all significant trees within the vicinity of the proposed work that may be temporarily affected by the proposed exploration activities.

Table 1. Tree Inventory Table

TREE TAG	SPECIES COMMON	SPECIES BOTANICAL	AGGREGATED DBH (IN.)	CRZ ¹ RAD. (FT.)	ICRZ ² RAD. (FT.)	CONDITION	SIGNIFICANCE	RISK LEVEL	EXISTING & PROPOSED CANOPY COVERAGE (SQFT.)	DETERMINATION ³
2791	Big leaf maple	Acer macrophyllum	16.4	16.4	8.2	Fair	SIG	Low	NA	PIP*
2792	Big leaf maple	Acer macrophyllum	19.9	19.9	9.9	Fair	SIG	Low	NA	PIP*
2793	Big leaf maple	Acer macrophyllum	8.5	8.5	4.3	Fair	SIG	Low	NA	PIP*
2794	Big leaf maple	Acer macrophyllum	7.2	7.2	3.6	Poor	SIG	Mod.	NA	PIP*
2795	Big leaf maple	Acer macrophyllum	14.5	14.5	7.3	Good	SIG	Low	NA	PIP*
2796	Big leaf maple	Acer macrophyllum	8.8	8.8	4.4	Fair	SIG	Low	NA	PIP*
2797	Big leaf maple	Acer macrophyllum	16.0	16.0	8.0	Fair	SIG	Low	NA	PIP*
2798	Big leaf maple	Acer macrophyllum	16.0	16.0	8.0	Fair	SIG	Low	NA	PIP*
2799	Big leaf maple	Acer macrophyllum	16.8	16.8	8.4	Poor	SIG	Mod.	NA	PIP*
2800	Big leaf maple	Acer macrophyllum	20.5	20.5	10.3	Poor	SIG	Mod.	NA	PIP*
2801	Big leaf maple	Acer macrophyllum	9.0	9.0	4.5	Poor	SIG	Low	NA	PIP*
2802	Big leaf maple	Acer macrophyllum	12.9	12.9	6.4	Poor	SIG	Low	NA	PIP*
2803	Big leaf maple	Acer macrophyllum	23.3	23.3	11.6	Poor	SIG	Mod.	NA	PIP*
2804	Big leaf maple	Acer macrophyllum	9.4	9.4	4.7	Poor	SIG	Low	NA	PIP*
2805	Big leaf maple	Acer macrophyllum	15.7	15.7	7.8	Fair	SIG	Mod.	NA	PIP*
2806	Big leaf maple	Acer macrophyllum	6.5	6.5	3.3	Fair	SIG	Low	NA	PIP*
2807	Big leaf maple	Acer macrophyllum	13.8	13.8	6.9	Good	SIG	Low	NA	PIP
2808	Big leaf maple	Acer macrophyllum	13.1	13.1	6.6	Fair	SIG	Low	NA	PIP*
2809	Big leaf maple	Acer macrophyllum	4.4	4.4	2.2	Poor	Non-Sig	Low	NA	PIP*
2810	Big leaf maple	Acer macrophyllum	7.7	7.7	3.8	Poor	SIG	Low	NA	PIP*
2811	Black cottonwood	Populus trichocarpa	28.5	28.5	14.3	Good	Landmark	Mod.	NA	PIP*
2812	Big leaf maple	Acer macrophyllum	4.4	4.4	2.2	Poor	Non-Sig	Low	NA	PIP*
2813	Big leaf maple	Acer macrophyllum	5.8	5.8	2.9	Fair	Non-Sig	Low	NA	PIP*

2814	Big leaf maple	Acer macrophyllum	4.5	4.5	2.3	Poor	Non-Sig	Low	NA	PIP*
2815	Big leaf maple	Acer macrophyllum	10.7	10.7	5.3	Poor	SIG	Mod.	NA	PIP*
2816	Big leaf maple	Acer macrophyllum	22.2	22.2	11.1	Fair	SIG	Mod.	NA	PIP*
2817	Big leaf maple	Acer macrophyllum	5.2	5.2	2.6	Poor	Non-Sig	Low	NA	PIP*
2818	Big leaf maple	Acer macrophyllum	8.1	8.1	4.1	Poor	SIG	Low	NA	PIP*
2819	Big leaf maple	Acer macrophyllum	5.6	5.6	2.8	Poor	Non-Sig	Low	NA	PIP*
2820	Black locust	Robinia pseudoacacia	10.5	10.5	5.3	Fair	SIG	Low	NA	PIP*
250-1R	Black locust	Robinia pseudoacacia	8.1	8.1	4.1	Fair	SIG	Low	NA	PIP
250-2R	Big leaf maple	Acer macrophyllum	14.0	14.0	7.0	Fair	SIG	Low	NA	PIP
2851	Big leaf maple	Acer macrophyllum	17.3	17.3	8.7	Fair	SIG	Mod.	NA	PIP
2852	Big leaf maple	Acer macrophyllum	16.6	16.6	8.3	Fair	SIG	Mod.	NA	PIP
2853	Big leaf maple	Acer macrophyllum	13.3	13.3	6.7	Fair	SIG	Low	NA	PIP
2854	Big leaf maple	Acer macrophyllum	19.6	19.6	9.8	Fair	SIG	Low	NA	PIP
2855	Big leaf maple	Acer macrophyllum	6.3	6.3	3.2	Poor	SIG	Low	NA	PIP
2856	English holly	Ilex aquifolium	5.6	5.6	2.8	Good	Non-sig	Low	NA	PIP
2857	Big leaf maple	Acer macrophyllum	7.0	7.0	3.5	Fair	SIG	Low	NA	PIP
2858	Big leaf maple	Acer macrophyllum	10.2	10.2	5.1	Fair	SIG	Low	NA	PIP
2859	Big leaf maple	Acer macrophyllum	22.6	22.6	11.3	Fair	SIG	Mod.	NA	PIP
2860	Big leaf maple	Acer macrophyllum	18.0	18.0	9.0	Fair	SIG	Mod.	NA	PIP
248-1	Big leaf maple	Acer macrophyllum	11.2	11.2	5.6	Poor	SIG	Mod.	NA	Not Impacted
248-2	Big leaf maple	Acer macrophyllum	35.3	35.3	17.7	Fair	Landmark	Mod.	NA	Not Impacted

¹CRZ is the critical root zone

²ICRZ is the inner critical root zone

³PIP = protect in place

*Denotes proposed removal based on the 60% design plans

Tree Removal and Replacement Summary

As part of the above-mentioned project, no trees will be removed; therefore, no replacement trees are planned. Additionally, as noted in **Table 1**, there are no proposed changes to the canopy coverage provided by the surrounding significant trees. Some trees may require minor branch pruning on lower limbs during equipment transfer from the roadway to the work area. This will not alter the existing canopy coverage due to the presence of additional canopy at height throughout the site.

Project Timeline

Project work for the proposed BH-32, 33, and 34 will be completed on a weekday (Mon-Fri) during daylight hours (approximately 9am to 3pm). Work sequencing will be completed as follows:

- Set up traffic control and tree protection measures
- Mobilization to site
- Drill boring
- Restore site

Tree Protection

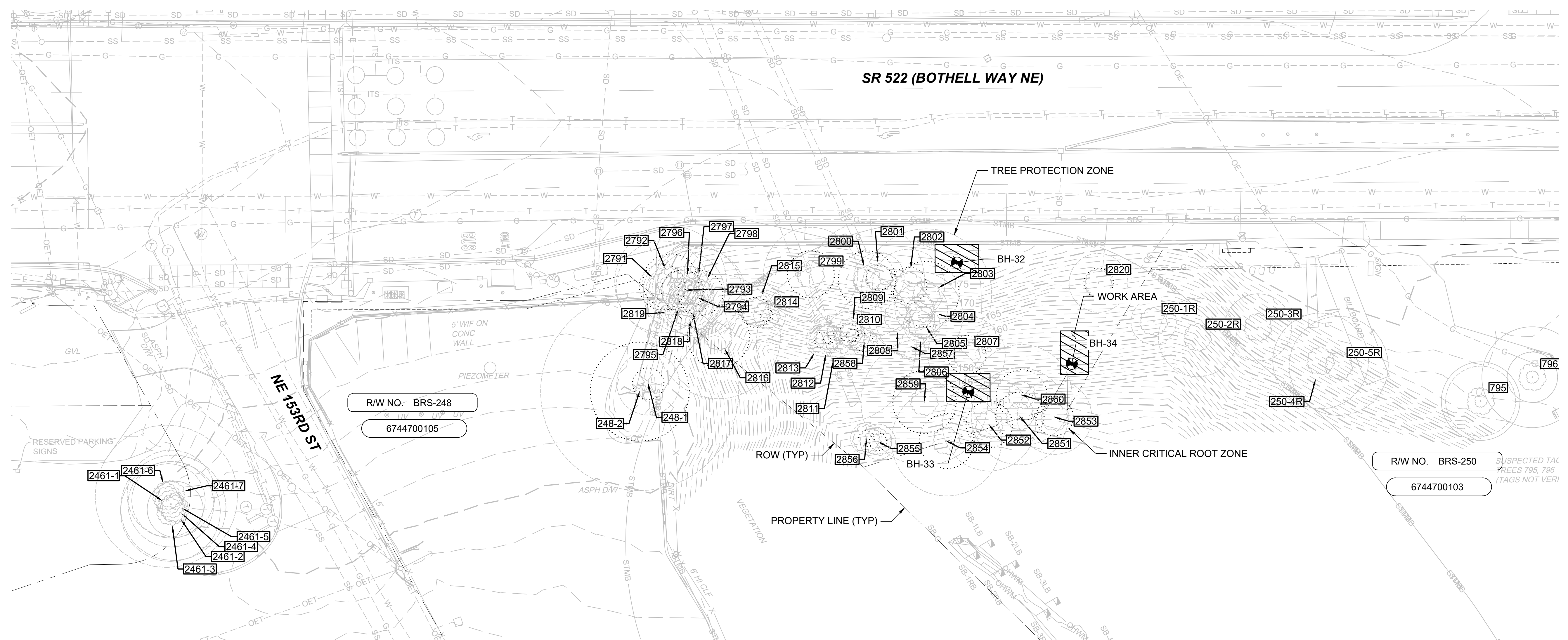
Tree protection measures will be implemented so no permanent tree impacts will occur. To maintain tree viability and health during the proposed activities, tree protection measures will be put into place. Avoidance techniques should be employed to prevent impacts within the CRZ and associated aerial canopy. Soil compaction and degradation of feeder roots from equipment and personnel access will be avoided through the CRZ using mitigation measures summarized in **Table 2**. Changes in long-term health of the adjacent trees are not anticipated. Branches and main tree trunks near the equipment access routes will be protected when transporting equipment through the canopy. To prevent damage, this aerial operation will either avoid, tie back, or prune branches, and adequate distance between equipment and the main trunks will be maintained. **Table 2** explains the potential impacts and mitigation measures to prioritize tree health and retention.

Table 2. Potential Tree Impacts and Mitigation Measures











POTENTIAL IMPACT	MITIGATION MEASURES
Trunk/branch cambium damage or branch breaking/tearing	Carefully select a path where few substantial branches are in the vicinity. If branches cannot be avoided, enlist the services of a Certified Arborist to properly tie back or proactively prune branches which may be in the route for equipment transportation. Install trunk protection if heavy equipment is expected to maneuver in close proximity (within 3 feet) to tree trunks.
Soil compaction via light equipment or foot traffic within the CRZ	If equipment or foot traffic is anticipated to be repeated several times, utilize ground protection measures to avoid soil compaction and root damage during equipment transport and foot traffic access to the work site. For example, this could include 6-12 inches of mulch, ground protection mats, a combination of the two or something similar.
Soil compaction and root loss via work activities	Utilize ground protection measures to reduce soil compaction in areas of CRZ or erect hi-visibility fencing at limits of the CRZ within the work area.
Disposal of unnatural fluids or excess soil	All fluids and excess soil produced as part of this project shall be properly contained, collected and removed from the site. Do not dump excess soil or fluids into the CRZ.

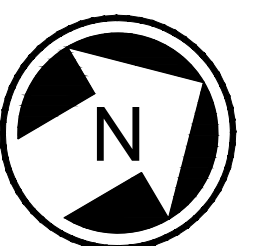
Attachment 1. Site Plan

Xrefs:
xS3-BT522-BNP101
xS3-BT522-LXP101
xS3-BT522-VCN102
xS3-BT522-VSF100
xS3-BT522-VRX101
xS3-BT522-CSN101
xS3-BT522-BNP101-new



LEGEND

-
-  CONIFER
 DECIDUOUS
 SIGNIFICANT TREE
 NON-SIGNIFICANT TREE
 TREE PROTECTION ZONE (TPZ)
 TREE PROTECTION FENCING
 INNER CRITICAL ROOT ZONE
 TREE TAG NUMBER
 GROUND PROTECTION
 WORK AREA



NOT FOR CONSTRUCTION

DESIGNED BY:

DRAWN BY:

CHECKED BY:

APPROVED BY:

Jacobs

STRIDE
BRT General Engineering Consultant

LINE IS 1" AT FULL SCALE



SOUNDTRANSIT

SCALE:
1" = 20'

FILENAME:
EXHIBIT BH-32

CONTRACT No.:
RTA/LR AE 0055-17

DATE:

SR 522 / NE 145TH BRT
SR 522 (BOTHELL WAY NE)

CUD6

PERMITTING
TREES AND ON-SITE VEGETATION
BH-32, BH-33, & BH-34

DRAWING No.:
BH-32-33-34

FACILITY ID:
BT324

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To: City of Lake Forest Park Community Development

From: Jacobs Engineering
Tyson Goeppinger, PN-7491AUM

Date: December 2022

Subject: **Critical Areas Permit Arborist Memorandum, BH-44**
BT306 SR 522 / NE 145th Bus Rapid Transit (BRT)

Introduction

Jacobs Engineering, Inc. (Jacobs) has reviewed the location of proposed BH-44, which is required to support final design of retaining walls, utilities, stormwater infrastructure, signal pole foundations, and other road improvements associated with the BRT project. There are trees in the vicinity of the BH-44, therefore a tree inventory, site plan, and arborist plan have been created. The borehole and work area are located on an unimproved parcel between the two private properties of address 15630 38th Ave NE on the south side (parcel ID 6744700240) and 16002 38TH AVE NE on the north side (parcel ID 7740100305) (**Attachment 1**). Trees along the proposed access route may see minor soil compaction by worker and equipment access through the critical root zones (CRZ). Boring activities in the work area will not drill through the CRZ and are not expected to affect the long-term health of the adjacent trees. Potential effects may include temporary feeder root loss due to soil compaction and limited removal of branches during equipment access and use; however, no long-term effects to tree health are anticipated to the point of recommending removal.

Arborist Report and Tree Inventory

The tree inventory (**Table 1**) summarizes information for all significant trees within the vicinity of the proposed work that may be temporarily affected by the proposed exploration activities.

Table 1. Tree Inventory Table

TREE TAG	SPECIES COMMON	SPECIES BOTANICAL	AGGREGATED DBH (IN.)	CRZ ¹ RAD. (FT.)	ICRZ ² RAD. (FT.)	CONDITION	SIGNIFICANCE	RISK LEVEL	EXISTING & PROPOSED CANOPY COVERAGE (SQFT.)	DETERMINATION ³
26910	Douglas-fir	<i>Pseudotsuga menziesii</i>	28.0	28.0	14.0	Good Condition	Landmark	Low	N/A	Not Impacted
26911	Douglas-fir	<i>Pseudotsuga menziesii</i>	24.2	24.2	12.1	Good Condition	Landmark	Low	N/A	PIP*
26912	Western red cedar	<i>Thuja plicata</i>	32.4	32.4	16.2	Fair Condition	Landmark	Low	N/A	PIP
26913	Black Cottonwood	<i>Populus trichocarpa</i>	30.0	30.0	15.0	Fair Condition	Landmark	Mod.	N/A	PIP*
273-1	Cherry laurel	<i>Prunus laurocerasus</i>	7.2	7.2	3.6	Good Condition	SIG	Low	N/A	PIP
273-2	Big leaf maple	<i>Acer macrophyllum</i>	8.4	8.4	4.2	Fair Condition	SIG	Low	N/A	PIP
276-1	Douglas fir	<i>Pseudotsuga menziesii</i>	26.0	26.0	13.0	Good	Landmark	Low	N/A	PIP
276-22	Japanese cedar	<i>Cryptomeria japonica</i>	20.3	20.3	10.2	Good	SIG	Low	N/A	PIP
276-23	Big leaf maple	<i>Acer macrophyllum</i>	23.3	23.3	11.7	Good	SIG	Low	N/A	PIP
276-24	English holly	<i>Ilex aquifolium</i>	10.0	10.0	5.0	Good	SIG	Low	N/A	PIP

¹CRZ is the critical root zone

²ICRZ is the inner critical root zone

³PIP = protect in place

*Denotes proposed removal based on the 60% design plans

Tree Removal and Replacement Summary

As part of the above-mentioned project, no trees will be removed. Additionally, as noted in **Table 1**, there are no proposed changes to the canopy coverage provided by the surrounding significant trees. Some trees may require minor branch pruning on lower limbs during equipment access to the work area. This will not alter the existing canopy coverage due to the presence of additional canopy at height across the access route.

Project Timeline

Project work for the proposed BH-44 will be completed on a weekday (Mon-Fri) during daylight hours (approximately 8am to 5pm). Work sequencing will be completed as follows:

- Set up traffic control and tree protection measures

- Mobilization to site
- Drill boring
- Restore site

Tree Protection


To maintain tree viability and health during the proposed activities, tree protection measures will be put into place. Avoidance techniques will be employed to prevent impacts within the CRZ and associated aerial canopy. Soil compaction and degradation of feeder roots from equipment and personnel access will be minimal through the CRZ and changes in long-term health of the adjacent trees are not anticipated. **Table 2** explains the potential impacts and mitigation measures to prioritize tree health and retention.

Table 2. Potential Tree Impacts and Mitigation Measures

POTENTIAL IMPACT	MITIGATION MEASURES
Trunk/branch cambium damage or branch breaking/tearing	Carefully select a path where few substantial branches are in the vicinity. If branches cannot be avoided, enlist the services of a Certified Arborist to properly tie back or proactively prune branches which may be in the route for equipment transportation. Install trunk protection if heavy equipment is expected to maneuver in close proximity (within 3 feet) to tree trunks.
Soil compaction via equipment or foot traffic within the CRZ	Avoid use of the CRZ where feasible. If heavy equipment use or foot traffic is anticipated to be repeated several times within the CRZ, utilize ground protection measures to avoid soil compaction and root damage. This could be 6-12 inches of mulch, ground protection mats, a combination of the two or something similar.
Soil compaction and root loss via work activities	Utilize ground protection measures to reduce soil compaction in areas of CRZ or erect hi-visibility fencing at limits of the CRZ within the work area.
Disposal of unnatural fluids or excess soil	All fluids and excess soil produced as part of this project shall be properly contained, collected and removed from the site. Do not dump excess soil or fluids into the CRZ.

Attachment 1. Site Plan

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Jacobs

LINE IS 1" AT
FULL SCALE

SCALE:	1" = 20'
FILENAME:	EXHIBIT_BH-44
CONTRACT No.:	RTA/LR AE 0055-17
DATE:	

DRAWING No.:	
BH-44	
FACILITY ID:	
BT322	
SHEET No.:	REV:
1	0

ATTACHMENT E: CRITICAL AREAS REPORT

To: Steve Bennett, Director of Community Development, City of Lake Forest Park

From: Sound Transit

Date: November 22, 2022

Subject: Geotechnical Investigation and Exploration - SR 522/145th Bus-Rapid Transit

Sound Transit proposes to conduct geotechnical site investigation fieldwork to support the SR 522/145th Bus-Rapid Transit project design activities. Proposed fieldwork includes four geotechnical boreholes (**Table 1**) in the City of Lake Forest Park (LFP) that are within mapped Environmentally Critical Areas (LFP Municipal Code [LFPMC] 16.16). The proposed borings (BH-32, BH-33, BH-34, and BH-44) are intended to support final design of retaining walls, utilities, stormwater infrastructure, signal pole foundations, and other project-related roadway improvements. This application for a Major Critical Areas Work Permit is provided for activities on WSDOT parcels. The purpose of this technical memorandum is to describe any alterations to critical areas resulting from these fieldwork activities. Work activities will not permanently impact critical areas or associated buffers. Temporary vegetation impacts will be minor and limited to brush clearing.

Table 1. Locations Proposed in this Application Package

Work Location	Ownership Type
BH-32	WSDOT parcel
BH-33	WSDOT parcel
BH-34	WSDOT parcel
BH-44	WSDOT parcel

WORK ACTIVITIES AND EQUIPMENT

At each proposed boring location, soil samples will be obtained using Standard Penetration Tests at 2.5- or 5- foot intervals to the depth explored. For all work a drill rig with a hollow-stem auger will be utilized for each boring about 4 to 8 inches in diameter to a target depth between 10 to 90 feet, depending on the location. The site access and work area preparation for each location are summarized in the following sections.

Borings BH-32, BH-33, and BH-34

Three borings referred to as BH-32, BH-33, and BH-34 are proposed southeast of State Route (SR) 522, between NE 153rd Street and NE 155th Place within the Bsche'tla Creek ravine.

- BH-32 is located on a Washington State Department of Transportation (WSDOT)-owned parcel on a gently sloped bench directly outside of the SR 522 right-of-way (ROW) beyond the pedestrian wall. BH-32 is located within the stream buffer of Bsche'tla Creek and a landslide hazard area.
-

- BH-33 and BH-34 are located on a WSDOT-owned parcel on a sloped area within the ravine within the stream buffer of Bsche'tla Creek and a landslide hazard area.

Worker access to locations in the Bsche'tla Creek ravine will be via an existing path, which is sufficiently clear of vegetation. Equipment access will be from above the ravine using a crane truck parked on the adjacent SR 522 ROW. A limited access drill rig will be disassembled and lowered from the top of the slope perpendicularly down to a work area.

The disturbance area within the work area will be less than 300 square feet. The existing paths will be cleared of obstructing vegetation, limited to trimming tree limbs and cutting the shrub and herbaceous layer at or above ground level. No tree trunks or critical root zones will be impacted and ground cover removal will not be significant. Brush clearing will be completed with brush trimmers and other light equipment for removing smaller branches. Ground disturbance will be minimized. Any disturbed vegetated areas in critical area buffers will be restored immediately using a native upland seed mix.

Boring BH-44

Borehole BH-44 will require moderate preparation of the site for the work area and for access. The work area will be centered around the borehole location, with an approximate disturbance area of less than 300 square feet. BH-44 will be drilled on WSDOT-owned property adjacent to a staircase. The limited-access drill rig will be disassembled and manually transported to the location using the existing staircase. The boring will be advanced adjacent to the staircase. BH-44 is located on a steep slope. See the detailed Site Plan (**Attachment B**) included with this application package.

CRITICAL AREAS

In accordance with LFPMC 16.16.230.A, work activities such as this geotechnical investigation require a Critical Areas Work Permit. Authorization of work under this permit is allowed if there is no construction of new access roads and if excavation activities are limited to no more than 10 cubic yards of material. The work in critical areas requires that impacts to critical areas and buffers be minimized and disturbed areas be immediately restored. A major permit, as defined in LFPMC 16.16.080, requires a critical areas study. Per LFPMC 16.16.110, critical areas studies are to identify and characterize critical areas or buffers on or adjacent to the proposed work and to demonstrate that all reasonable efforts have been made to avoid, minimize, and restore temporary impacts. The site plans (**Attachment B**) for each location provide the required detail for a vegetation management plan (LFPMC 16.16.160.A) as clearing limits and methods of field marking are indicated.

This critical areas study was prepared under the direction of Emily Drew, who exceeds the requirements for a qualified professional as defined by LFPMC 16.16.040. Emily Drew is a trained wetlands professional and a WSDOT-certified biological assessment writer. She has 25 years of experience, including 8 years of permitting work in wetlands and streams.

Wetlands

LFP defines wetlands in LFPMC 16.16.040 as follows:

Areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

Methodology and Findings

As part of the State Environmental Policy Act (SEPA) process, David Evans and Associates, Inc. (DEA) biologists conducted a desktop analysis and a wetland reconnaissance and formal delineation in 2019 and 2020, documented in the Ecosystems Technical Report (DEA 2021). Wetlands were rated based on the Washington State Department of Ecology's (Ecology) 2014 wetland rating system (Hruby 2014).

In the LFP jurisdiction, four Category III wetlands within 300 feet of the project's corridor or project elements were identified, formally delineated and rated. Buffers were mapped around the wetland boundaries based on their Ecology ratings and LFPMC 16.16.320. These wetlands are Category III under the Ecology 2014 rating system; LFP regulates 105-foot standard buffers around Category III wetlands.

Wetlands Impact Avoidance and Minimization

No impacts to wetlands or wetland buffers are proposed as a result of geotechnical borings for the project.

Streams

LFP defines streams in LFPMC 16.16. 040 as follows:

An area where open surface water produces a defined channel or bed, not including irrigation ditches, canals, storm or surface water runoff devices, or other entirely artificial watercourses, unless they are used by salmonids or are used to convey a watercourse naturally occurring prior to construction. A channel or bed need not contain water year-round, provided there is evidence of at least intermittent flow during years of normal rainfall.

Methodology and Findings

As part of the SEPA process, DEA biologists conducted a desktop analysis and a stream reconnaissance in 2019 and 2020 (DEA 2021). During the reconnaissance, information was collected about the condition of instream and riparian habitats and the ordinary high water mark of stream reaches that occurred within the study area were identified.

Proposed borings BH-32, BH-33, and BH-34 are located within the stream buffer of Bsche'tla Creek, which drains from an area of seeps west of SR 522 and adjacent to the Acacia Memorial Park and Funeral Home (**Figure 1**). The stream is classified as Type F (fish-bearing) (DEA 2021). F-type streams have a 115-foot standard buffer in Lake Forest Park (LFPMC 16.16.355).

The SR 522 roadway prism is substantial and approximately 75 feet in height. The roadway prism contains native trees and shrubs; however, the ground cover includes more than 50 percent cover of English ivy (*Hedera helix*). Bsche'tla Creek's channel width averages 6 feet wide downstream of SR 522. The slope is 1 to 5 percent, the channel depth is 6 to 12 inches, and the substrate includes cobble and gravels with much wood and debris (DEA 2021). Flow

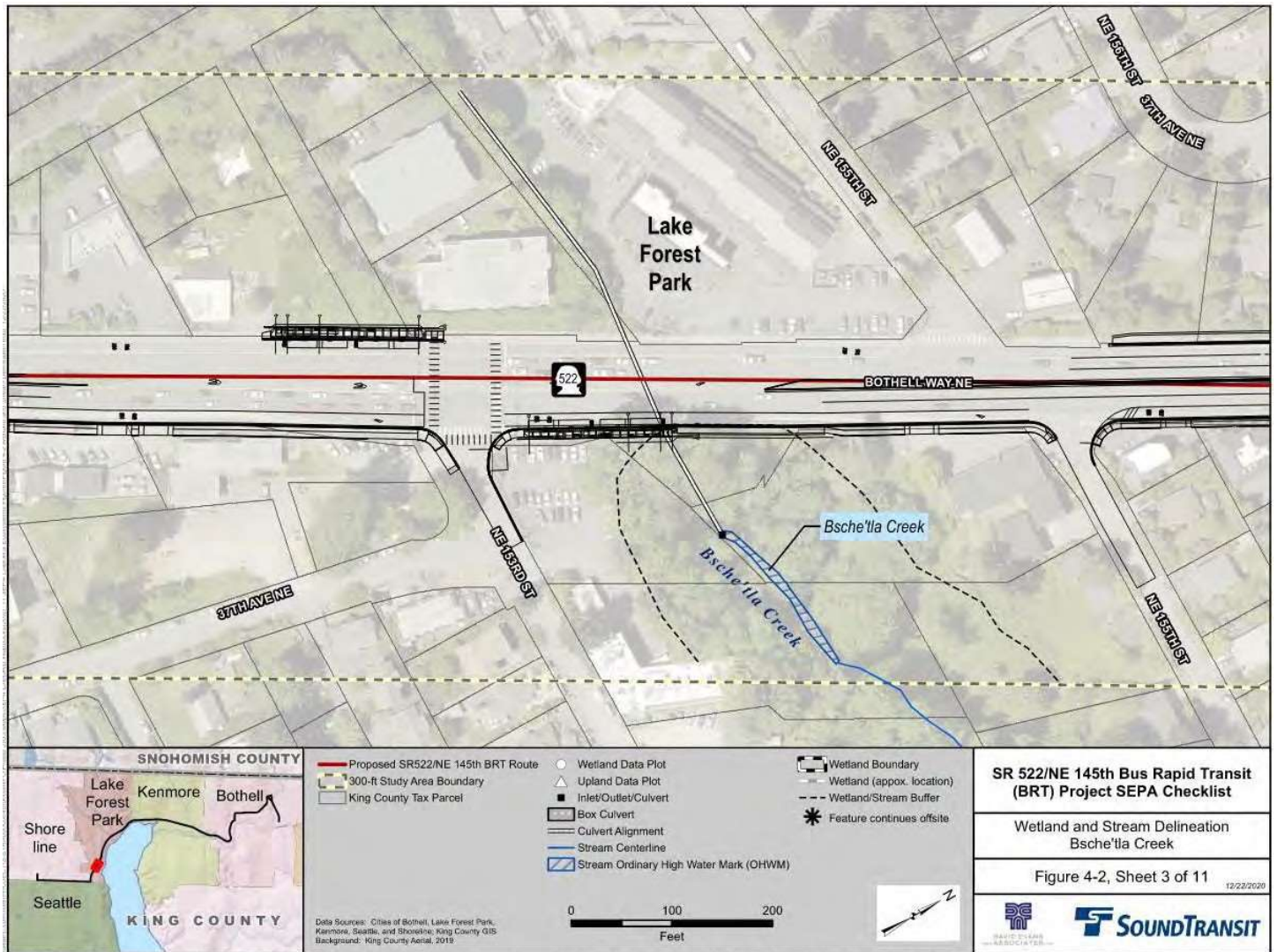


Figure 1. Wetland and stream delineation map – Bscche'tla Creek

was observed during DEA's reconnaissance site visit, and the stream is assumed to have perennial flow. The buffers are steep slopes to the north and south with the steep roadway prism extending to SR 522. The forest includes bigleaf maple (*Acer macrophyllum*), red alder (*Alnus rubra*), and western red cedar (*Thuja plicata*) (DEA 2021).

Stream Impact Avoidance and Minimization

No long-term impacts to Bsche'tla Creek are anticipated due to borings BH-32, BH-33, and BH-34, none of which will require significant vegetation removal. The stream buffer will be temporarily impacted by limited vegetation removal as part of the work activities. Avoidance is not possible because the boreholes are required to evaluate the slope stability, and the slope is located within the buffer of Bsche'tla Creek. Boring BH-32 is proposed on a gently sloped bench directly outside of the ROW. Borings BH-33 and BH-34 are located on steep sloped areas within the ravine. Personnel access and drill rig mobilization to the work areas for BH-33 and BH-34 will be along existing pathways, which may require obstructing vegetation to be cleared of limited surficial brush and small tree limbs. Impacts to vegetation in the stream buffer will be minimized as follows:

- Drill rigs will be lowered to the work areas from SR 522 using a crane and boom, and some branches may need to be cleared for equipment access.
- Vegetation management will be accomplished using light equipment.
- Limited vegetation removal for the work areas will cut the herbaceous and shrub layers at or above ground level.
- No trees will be removed, but some limbs will be trimmed.
- Ground disturbance will be minimized and will be reseeded with native upland species.

Consistency with Applicable Stream Buffer Code Requirements

LFPMP 16.16.360 states that alterations to streams and buffers may be allowed only as follows (the applicable standards for development are described below in italics followed by underlined text that describes how the Project would meet these standards):

A. In accordance with a critical area study.

This critical areas technical memorandum and supporting documentation meet this requirement.

3. Introduction of nonnative plant material or wildlife into any stream or buffer is prohibited unless authorized by a city-approved nonnative plant list or a state or federal permit or approval.

No non-native plant material or wildlife will be introduced into the stream buffer as part of the proposed project. Best management practices will be implemented.

D. LFPMP 16.16.330(B) applies to streams and buffers.

LFPMP 16.16.330(B) states "Alterations to wetlands and their buffers may only be allowed for the following activities, in addition to any established in LFPMP 16.16.220 and 16.16.230, if the city determines that there is no practical alternative location for the proposed activity with less adverse impacts on the wetlands or its buffer, subject to mitigation requirements set forth in this chapter."

No practical alternative locations exist for the proposed geotechnical activities with less adverse impacts to the stream buffer. The work activities are proposed to assess the slope conditions and ultimately inform project design.

Critical Aquifer Recharge Areas

LFP regulates designated critical aquifer recharge areas, which are defined as those areas within the 10-year, time-of-travel zones for Group A public water supply wells. These areas are identified in LFP's critical aquifer recharge area map (LFPMC 16.16.050). These areas are also visible in King County's iMap GIS database (n.d.) on LFP water district data. None of the boreholes proposed in critical aquifer recharge areas are located within known areas of contamination and therefore will not adversely affect recharging of the aquifer or cause contaminants to enter the aquifer, consistent with LFPMC 16.16.420.

Frequently Flooded Areas

LFP regulates flood hazard areas under LFPMC 16.20. Based on King County's iMap database (n.d.), a regulated floodplain is present along McAleer Creek and Lyons Creek in the project corridor. None of the proposed boreholes are located within these mapped floodplains.

Fish and Wildlife Conservation Areas

LFP defines fish and wildlife habitat conservation areas in LFPMC 16.16.040 as follows:

An area that is managed for maintaining populations of species in suitable habitats within their natural geographic distribution so that the habitat available is sufficient to support viable populations over the long term and isolated subpopulations are not created, as defined in WAC 365-190-130 and RCW 36.70A.030. Fish and wildlife habitat conservation areas also include nonaquatic areas that serve a critical role in sustaining needed habitats and species for the functional integrity of the ecosystem, and which, if altered, may reduce the likelihood that the species will persist over the long term. These areas may include, but are not limited to, rare or vulnerable ecological systems, communities, and habitat or habitat elements including seasonal ranges, breeding habitat, winter range, and movement corridors; and areas with high relative population density or species richness.

Methodology and Findings

The Ecosystems Technical Report (DEA 2021) prepared for the SEPA effort included analysis of fish and wildlife habitat. The report identified that most of the project corridor in Lake Forest Park is developed. There are forested patches in specific areas, such as the buffers of Bsche'tla Creek, McAleer Creek, and Lyon Creek. Forested area is also present along 41st Avenue NE along the Burke-Gilman Trail. Fish habitat is also present in these creeks. The City of Lake Forest Park does not identify nor map any specific habitats or species of local importance.

Borings BH-32, BH-33 and BH-34 are located in forested buffer along Bsche'tla Creek, as described in the stream discussion above. No borings will be conducted within the stream itself. No occurrences of PHS wildlife species are mapped in the proposed boring locations (DEA 2021).

Fish and Wildlife Conservation Areas Impact Avoidance and Minimization

The streams section above provides the details for BH-32, BH-33 and BH-34 avoidance and minimization measures to limit impacts to the vegetation in the Bsche'tla Creek buffer, such as the temporary impacts to the shrub and herbaceous layer and limited removal of tree limbs. Using these minimization measures, the boreholes are not expected to degrade the functions that this forested stream buffer provides to wildlife and will have no permanent impacts. Thus, the project will meet the general requirements for fish and habitat conservation areas listed in LFPMC 16.16.380.B.

Geologic Hazard Areas

LFP defines erosion hazard areas in LFPMC 16.16.040.G as follows:

An area with soil characteristics that, according to the USDA Soil Conservation Service Soil Classification System, may experience severe to very severe erosion hazard, including slopes greater than 15 percent with erodible soils that are exposed. Any activity which exposes erodible soils to rainfall or running water will create erosion hazard conditions on slopes greater than 15 percent. Soils which are particularly susceptible to erosion include fill constructed of virtually all soil types, loose sandy native soils such as Vashon recessional outwash (Qvr), Esperance sand (Qe), Vashon till (weathered Qvt), and the dense fine-grained clay (Qcl). Improper fill methods, especially near flowing water, can produce an erosion hazard in areas not identified as hazard areas.

LFP defines **steep slope hazard areas** in LFPMC 16.16.040.W as follows:

Slopes that are not composed of consolidated rock with slope gradients of 40 percent or greater within a vertical elevation change of at least 10 feet.

LFP defines **landslide hazard areas** as in LFPMC 16.16.040.J as follows:

Slopes that are potentially subject to landslides. All landslide hazard areas are classified as: "Class I": a slope that is less than 15 percent and is considered relatively stable; "Class II": a slope that is greater than 15 percent and is underlain by permeable soils that are relatively stable in their natural state but may become unstable if slope configurations or draining conditions are modified; "Class III": a slope that is greater than 15 percent and is underlain by impermeable soils, and may be characterized by springs or seeping groundwater during the wet season.

"Landslide hazard areas" include Class II and Class III if any of the following are present: a. Any area that has shown movement during the Holocene epoch (from 10,000 years ago to present) or which is underlain by significant waste debris of that epoch; or b. An area potentially unstable as a result of rapid stream incision, stream bank erosion or undercutting; or c. Any area located on an alluvial fan or delta potentially subject to inundation by debris flows; or d. Any area with a slope of 40 percent or greater and with a vertical relief of 10 or more feet except any area composed of consolidated rock.

LFP regulates the following buffer areas around geological hazard areas:

- **Erosion hazard areas** do not have a specified standard buffer (LFPMC 16.16.280).
- **Steep slope hazard areas** are to have a minimum buffer established at a horizontal distance of 50 feet from the top, toe, and sides of any slope 40 percent or greater. The buffer may be reduced to a minimum of 25 feet “when a qualified professional demonstrates to the planning director’s satisfaction that the reduction will adequately protect the proposed development, adjacent developments, uses and the steep slope hazard area” (LFPMC 16.16.310).
- **Landslide hazard areas** are to have a minimum buffer of 50 feet from all edges of the area. These can be reduced to a minimum of 25 feet “when a qualified professional demonstrates to the planning director’s satisfaction that the reduction will adequately protect the proposed development, adjacent developments, and uses and the landslide hazard area” (LFPMC 16.16.290).

Methodology and Findings

Jacobs reviewed the following sources to determine the presence of geologically hazardous areas within the Lake Forest Park project area:

- LFP GIS data (n.d.)
- Ecosystems Technical Report (DEA 2021)
- U.S. Department of Agriculture, Natural Resources Conservation Service soils data (n.d.)

The proposed borehole drilling locations in **Table 2** meet the definition of geologic hazard areas and are summarized in **Table 2**.

Table 2. Proposed Drilling Locations in Geologic Hazard Areas

Borehole No.	Geologic Hazard Area
None	Erosion Hazard Area
BH-44	Steep Slope Hazard Area
BH-32, BH-33, BH-34	Landslide Hazard Area

Geologic Hazard Areas Avoidance and Minimization of Impacts

The landslide hazard areas and steep slope hazard areas will be temporarily altered by limited vegetation removal and drilling of a 4- to 8-inch-wide borehole up to 10 to 90 feet deep.

- **Steep Slope Hazard Areas:** Work proposed at BH-44 will have limited temporary impacts to vegetation but will not have temporary or permanent impacts to slope stability. Tree impacts will be limited to minor branch trimming, and ground cover will be trimmed to the surface as needed with no grubbing. No trees will be removed (see Arborist Report, **Attachment D**).
- **Landslide Hazard Areas:** Work proposed at BH-32, BH-33, and BH-34 will have temporary impacts to vegetation but will not have temporary or permanent impacts to slope stability. Temporary impacts will include trimming of vegetation on work area and access paths. No trees will be removed (see Arborist Report, **Attachment D**). Disturbance will be less than 300 sq. ft.

Avoidance is not possible because the boreholes are required to evaluate the slope stability. Impacts to vegetation in the geologic hazard areas will be minimized as follows:

- A licensed engineering geologist will observe the operation.
- Drill rigs will be lowered into place from SR 522 using a crane and boom.
- Clearing activity will be accomplished using light equipment.
- Slope stability will be maintained by limiting vegetation removal and ground disturbance and limiting alteration of the slope to the minimum necessary for the borehole.
- No trees will be removed, and temporary slope alteration will be limited to the small area of the borehole itself.
- Any disturbed areas will be reseeded with native upland species.

Consistency with Applicable Geologic Hazard Areas Code Requirements

The applicable standards for development are described below in italics, followed by underlined text, describing how the Project would meet these standards.

Steep Slope Hazard Areas: LFPMC 16.16.310 outlines specific standards related to the alteration of steep slope hazard areas.

C. The following may be permitted:

- 1. Alteration of slopes that are 40 percent or steeper with a vertical elevation change of up to 20 feet; provided, that a soils report prepared by a qualified professional satisfies the planning director that no adverse impact will result from the exception;*

The slopes that are 40 percent or steeper do not exceed a vertical elevation change of up to 20 feet and will not have an adverse impact on soils.

D. When steep slope alterations are allowed by this section, the proposal shall:

- 1. Not decrease slope stability on the site or on adjoining properties; and*
- 2. Be subject to certification by a qualified professional that the landslide hazard area can be modified safely or that the development proposal eliminates or mitigates the landslide hazard risk to the property or adjacent property; and*
- 3. Not adversely impact other critical areas, such as streams;*
- 4. Not result in an increase in peak surface water flows or sedimentation to adjacent properties. (Ord. 1150 § 1, 2017; Ord. 930 § 2, 2005)*

Attachment F contains a technical memorandum from a qualified geologist professional indicating the landslide hazard area can be safely modified and that any landslide hazard risk to property will be mitigated. Other critical areas, such as streams, will not be impacted.

Landslide Hazard Areas: LFPMC 16.16.290(D)(2) outlines specific standards related to the alteration of landslide hazard areas.

Alteration of landslide hazard areas located on slopes of less than 40 percent are permitted only under the following conditions or circumstances:

- a. *The development proposal will not decrease slope stability on the site or on adjoining properties;*

Borings will have no temporary or permanent impacts to slope stability.

- b. *A licensed geologist or geotechnical engineer certifies that the landslide hazard area can be safely modified or the development proposal designed so the landslide hazard risk to the property or adjacent property is eliminated or mitigated;*

Attachment F contains certification that the landslide hazard area can be safely modified and that any landslide hazard risk to property will be mitigated.

- c. *The alteration will not adversely impact other critical areas, such as streams; and*

The proposed work activities will not decrease slope stability onsite and will not result in an increased risk of landslides in the stream buffer.

- d. *The alteration will not result in an increase in peak surface water flows or sedimentation to adjacent properties;*

The proposed work activities will not increase peak surface water flows or sedimentation to adjacent properties.

CONCLUSION

There are 4 drilling locations in critical areas in Lake Forest Park evaluated in this report: one within steep slope areas, and three within landslide hazard areas. The three of the locations in landslide hazard areas are also located within Type F stream buffer, which may also be considered a fish and wildlife habitat conservation area. Only temporary impacts to allow geotechnical drilling are proposed. No permanent impacts to critical areas are anticipated. There is no tree removal or grubbing proposed in critical areas and associated buffers. Work will be completed to minimize work area disturbance and vegetation removal will use lightweight equipment whenever possible. In conclusion, the proposed geotechnical investigations will not impact critical areas.

REFERENCES

- David Evans and Associates, Inc. (DEA). 2021. *Bus Rapid Transit SR522 Corridor Ecosystem Resources Technical Report*. Prepared for Sound Transit. March 2021.
- Hruby, T. 2014. Washington State Wetland Rating System for Western Washington – 2014 Update. Publication #14-06-029. Olympia, WA: Washington State Department of Ecology.
- King County. n.d. iMap Application, LFP water district data. Website.
<https://kingcounty.gov/services/gis/Maps/imap.aspx>. Accessed March 2022.
- U.S. Department of Agriculture, Natural Resources Conservation Service. n.d. Website.
<https://websoilsurvey.sc.egov.usda.gov>. Accessed March 2022.

ATTACHMENT F: GEOTECHNICAL REPORT



November 1, 2022
HWA Project No. 2021-133-21

Jacobs
1100 112th Ave NE, Suite 500
Bellevue, WA 98004

Attn: **City of Lake Forest Park Community Development**
Subject: **CRITICAL AREA PERMIT JUSTIFICATION MEMORANDUM**
CUD #6 (NE 145th/SR 522 Road Improvements) 60% Design
Task Order Number: 007

HWA GeoSciences (HWA) has reviewed the following proposed alterations to steep slopes and landslide hazard areas for geotechnical investigations. Twelve proposed exploration borings and one pavement core location along the project route within the City of Lake Forest Park meet the definition of geologic hazard areas and are summarized in **Table 1**.

Table 1. Proposed drilling locations in geologic hazard areas

Borehole #	Geologic Hazard Area
BH-78	Erosion Hazard Area
BH-38, BH-44, BH-68	Steep Slope Hazard Area
C-13, BH-28, BH-29, BH-30, BH-31, BH-32, BH-33, BH-34, BH-35	Landslide Hazard Area

Alterations to Geologic Hazard Areas

The erosion hazard, landslide hazard, and steep slopes will be altered by limited vegetation removal and by drilling of 4 - 8 inch boreholes up to 50-90 feet in depth.

Erosion Hazard Areas: Work proposed at **BH-78** will have minor temporary impacts to vegetation but will not require removal of substantial amounts of vegetation and is considered extremely unlikely to result in temporary or permanent impacts to slope stability. Native vegetation will remain mostly intact and best management practices will be implemented as appropriate. Additionally, the work will occur after April 1, when clearing and grading operation are allowed by the City of Lake Forest Park as stated in the Lake Forest Park Municipal Code. HWA will be onsite at the time to monitor the work as it progresses and confirm that the work follows the recommendations for maintaining the stability of the work area and surrounding slopes.

Steep Slope Hazard Areas: Work proposed at **BH-38, BH-44, and BH-68** will have temporary impacts to vegetation but will not require removal of substantial amounts of vegetation and are considered extremely unlikely to result in temporary or permanent impacts to slope stability.

Tree impacts will be limited to minor branch trimming and ground cover will be trimmed to the surface as needed with no grubbing required. Out of an abundance of caution, **BH-68** has been included as falling within a Geologic Hazard Area. It was not identified as a steep slope hazard according to LFP hazard maps but, based on site reconnaissance, an existing retaining wall appears to meet the steep slope definition. Typically, retaining walls do not classify as a steep slope hazard.

Explorations in the steep slope hazard areas will require only temporary access to the exploration locations and HWA will be onsite to monitor the work as it progresses and confirm that the work follows the recommendations for maintaining the stability of the work areas and surrounding slopes.

Landslide Hazard Areas: Temporary or permanent impacts to landslide hazard areas are unlikely in the vicinity of **BH-30** and **BH-35** because they are in a paved parking lot. Likewise, the impact to the landslide hazard areas in the vicinity of **C-13**, **BH-28**, **BH-29**, and **BH-31** are unlikely because they are located in existing paved travel lanes or shoulders. Work proposed at **BH-32**, **BH-33** and **BH-34** will have temporary impacts to vegetation but are unlikely to have temporary or permanent impacts to slope stability. Temporary impacts will include trimming of vegetation within work zones and for personnel access paths. Once the borings are completed, the impacts will be mitigated by installing erosion control jute netting over the exposed areas to stabilize them as the vegetation reestablishes itself on the slope.

Avoidance and Minimization of Impacts to Geologic Hazard Areas

- Avoidance is not possible because the boreholes are required in order to evaluate the stability of the slopes and design the proposed improvements. Impacts to vegetation in the geologic hazard areas will be minimized as follows:
 - Drill rigs and equipment will be lowered into the ravine adjacent to Bsches'tla Creek from SR 522 using a crane and boom truck;
 - Clearing activity will be accomplished using light equipment and will not substantially impact the root structures of local vegetation;
 - Slope stability will be maintained by limiting vegetation removal and ground disturbance and limiting alteration of the slope to the minimum necessary for the borehole;
 - No trees will be removed, and slope alteration will be limited to the very small area of the borehole itself; and,
 - Any disturbed areas will be re-seeded with native upland species.

Considerations for Drilling on the Slope at Bsche'tla Creek

The slopes southeast of SR 522 between NE 153rd Street and NE 155th Street are adjacent to an area with documented slope instability in several geotechnical engineering studies as well as anecdotal observations of settlement of the soil around the structures by the owners and tenants of the property to the north of the site. The proposed alternations will consist of limited clearing and assembly of the drill rig on the slope with limited grading for the work pads; we conclude that it is unlikely that the proposed work will increase landslide hazard risk on the adjacent properties. We recommend that pre-exploration photo surveys be performed of the structures on the properties to the north and south of the property before the three borings (BH-32, BH-33, and BH-34) are drilled to document the existing conditions of the structures. These surveys should include taking pictures of the foundations, as well as exterior and interior walls, windows, and doorways to identify the presence/absence of pre-existing cracks, or differential settlement. Upon completion of the explorations, an additional phase of photo surveys will be performed to determine if the exploration work resulted in any impact on the properties.

Conclusion

The slope and landslide hazard alterations necessary for the proposed limited geotechnical investigations can be completed safely and are unlikely to result in an increase in hazard risk to the property or adjacent properties. Provided the explorations follow the work plan and are conducted in accordance with the critical area documentation for the work, the alternations will be in compliance with Lake Forest Park Municipal Code subsections 16.16.290.D.2A and 16.16.310.D.2. HWA will be onsite to monitor these operations and confirm that the work is performed in a manner consistent with the approved work plans.

Sincerely,

HWA GEOSCIENCES INC.



Sean Schlitt, P.E.
Geotechnical Engineer



JoLyn Gillie, P.E.
Geotechnical Engineer, Principal