Operations and Maintenance Facility South

NEPA Draft / SEPA Supplemental Draft Environmental Impact Statement

Appendix G3: Ecosystem Resources Technical Report

Attachments

Federal Transit Administration

SOUNDTRANSIT

September 2023

Operations and Maintenance Facility South

ATTACHMENT G3-1

Wetland Delineation Methodology

Federal Transit Administration

SOUNDTRANSIT

1. WETLAND IDENTIFICATION AND DELINEATION

Parametrix biologists used the methods specified in the U.S. Army Corps of Engineers Wetland Delineation Manual (Environmental Laboratory 1987) and the indicators described in the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (U.S. Army Corps of Engineers [Corps] 2010) to delineate on-site wetlands.

Wetlands are defined as those 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. An area must meet these three criteria or exhibit at least one positive field indicator of wetland vegetation, soils, and hydrology to be considered a wetland. Wetland determination data forms from the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Corps 2010) were recorded for each wetland.

1.1 Vegetation

During the field investigations, the biologists observed the dominant plant species and recorded each on data forms for each sample plot. They evaluated dominant plants and their wetland indicator status to determine whether the vegetation was hydrophytic. Hydrophytic vegetation is generally defined as vegetation adapted to prolonged saturated soil conditions. To meet the hydrophytic vegetation criterion, more than 50 percent of the dominant plants must be Facultative, Facultative Wetland, or Obligate, based on the plant indicator status category assigned to each plant species by the Corps (Lichvar et al. 2016).

Scientific and common plant names follow currently accepted nomenclature. Most names are consistent with Flora of the Pacific Northwest (Hitchcock and Cronquist, 2nd Edition 2018), Plants of the Pacific Northwest Coast (Pojar and MacKinnon 2004), and the U.S. Department of Agriculture (USDA) PLANTS Database (USDA 2020). However, scientific names listed in the 2016 National Wetland Plant List (Lichvar et al. 2016) were used as the final authority in preparing determination forms and determining species indicator status.

1.2 Soils

Generally, an area must have hydric soils to be a wetland. Hydric soil forms when soils are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper layers. Biological activities in saturated soil result in reduced oxygen concentrations that create a preponderance of organisms using anaerobic processes for metabolism. Over time, anaerobic biological processes produce certain color patterns in mineral soils and/or enhance accumulation of organic soils (e.g., peat), which are used as field indicators of hydric soil. Typically, low-chroma colors are formed in the soil matrix. Bright-colored redoximorphic features form within the matrix under a fluctuating water table. Other important hydric soil indicators include organic matter accumulations in the surface horizon, reduced sulfur odors, and organic matter staining in the subsurface. Soils were examined by excavating sample plots to a depth of 16 inches or more, wherever feasible, to observe soil profiles, colors, and textures. Munsell® color charts (Munsell® Color 2015) were used to describe soil colors and the Field Book for Describing and Sampling Soils (Schoenebergerm et al. 2012) was used to describe the soil texture class.

1.3 Hydrology

The study area was examined for evidence of hydrology. An area is considered to have wetland hydrology when soils are ponded or saturated consecutively for 12.5 percent of the growing season (Environmental Laboratory 1987). The growing season generally occurs from late February (February 27) to late November (November 21) (based on SeaTac Airport weather station climate data). Therefore, ponding or saturation must be present for approximately 33 consecutive days within the growing season. Wetland hydrology is determined by the identification of specific indicators described in the regional supplement (Corps 2010). The observation of one primary indicator or two secondary indicators is a positive indication of wetland hydrology. The project is located in Major Land Use Area 2, within Land Resource Region A (Corps 2010; NRCS 2006). Within these regions, primary and secondary indicators of hydrology are described by group and comprise:

- Group A (Observation of Surface Water or Saturated Soils): Surface inundation, high water table, and saturated soils
- Group B (Evidence of Recent Saturation): Water marks, sediment and drift deposits, algal mats, iron deposits, surface soil cracks, inundation visible on aerial imagery, sparsely vegetated concave surfaces, salt crusts, and aquatic invertebrates. *Secondary*: Water-stained leaves and drainage patterns
- Group C (Evidence of Current or Recent Soil Saturation): Hydrogen sulfide odor, oxidized rhizospheres along living roots, presence of reduced iron, and recent iron reduction in tilled soils. *Secondary*: Dry-season water table and saturation evident on aerial imagery.
- Group D (Evidence from Other Site Conditions or Data): Stunted or stressed plants. *Secondary*: geomorphic position, shallow aquitard, vegetation Facultative-neutral test, raised ant mounds, and frost-heave hummocks

Operations and Maintenance Facility South

ATTACHMENT G3-2

Stream Habitat Assessment Guidelines

Federal Transit Administration

SoundTransit

STREAM HABITAT ASSESSMENT GUIDELINES

January 2016

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SOUND TRANSIT STREAM HABITAT ASSESSMENT GUIDELINES

1. Introduction

Sound Transit projects often intersect with and affect streams. To comply with local, state, and federal rules and regulations, Sound Transit assesses stream conditions, determines stream impacts that will occur as a result of a project, and mitigates those impacts as appropriate. The analytical methodologies used and level of detail needed to meet these requirements depends on a variety of factors including: 1) the stage of project development and complexity of the project, 2) the extent to which Sound Transit has property access to streams, and 3) the magnitude of impact. Less detailed information is typically collected during planning and early design stages such as during SEPA/NEPA environmental review and preliminary engineering because rights-of-entry are not granted onto privately owned properties, thus restricting access to streams. Also, at this stage, multiple alternative alignments may be under consideration, making more labor-intensive field investigations less feasible from the standpoint of cost and time. At later stages of project development, once the project to be built is selected or final design is underway, more detailed analyses may be appropriate depending on access, the magnitude of potential impacts, and the types of environmental permits that may be necessary to construct the project.

Various methodologies exist on how to approach stream assessments in Washington and no one methodology is required, or is applicable to all projects or to all stages of project development. In addition, Native American tribes with fishing rights often request specific information about the effects of a project on both existing fish use and potential fish use of a stream. In this context, Sound Transit seeks to achieve greater consistency in how it approaches the assessment of streams at various stages of project development and under various conditions. The purpose of this document is to establish general guidelines for applying various stream assessment methods to Sound Transit projects based on the most commonly used methodologies in Washington. The information presented herein is for guidance only and is based on some of the most common scenarios encountered on Sound Transit projects. Sound Transit recognizes that other scenarios are possible and that professional judgment will be necessary when considering the best approach for specific projects. Proper application of professional judgment may reduce the collection of extraneous information, and reduce project effort and expense. The intent of these guidelines is to provide some level of consistency in Sound Transit's approach to assessing streams so that local, state, and federal regulators generally know what to expect during project reviews.

For the purposes of this document, project development is categorized into two phases: the initial environmental review and preliminary engineering phase (Phase 1) and the permitting/final design phase (Phase 2). These are further described below:

- **Phase 1 Projects** – Planning stage that includes environmental review under SEPA/NEPA and conceptual and preliminary design. At this stage, various alignments or sites may initially be under consideration, and Sound Transit may or may not have rights-of-entry to the properties being evaluated. In general, objectives at this stage of project development are to:

1) Identify streams within the study area
2) Characterize in-stream and riparian conditions (including fish use and barriers to fish use of the stream) based on readily available information and visual observations as possible
3) Determine potential impacts to streams for the alternative(s) under consideration during the environmental review process, and
4) Identify conceptual-level mitigation opportunities for impacts to streams (aquatic and riparian habitats).

Phase 1 projects may include Endangered Species Act consultation, with the overall objective of being able to make and support accurate effect determinations for federally listed aquatic species potentially occurring in affected streams. Phase 1 of Sound Transit's project development culminates with completion of the NEPA/SEPA environmental review process and Sound Transit's selection of a specific project alternative to build.

- **Phase 2 Projects** – Final project design stage that includes environmental permitting and detailed mitigation to address project-related impacts to streams. At this stage, full access is typically available for the project. The overall objective is to secure necessary environmental permits/approvals including but not limited to local critical areas permits, a Hydraulic Project Approval (HPA) from the Washington Department of Fish and Wildlife (WDFW), a Clean Water Act Section 404 permit from the United States Army Corps of Engineers (Corps), and a 401 Water Quality Certification or Coastal Zone Management Consistency Determination from the Washington State Department of Ecology (Ecology).

Section 2 of this guidance document, **Using the Stream Assessment Flowcharts**, helps guide the reader in determining the appropriate level of data collection during the two project phases described above. To do this, a flowchart has been created for Phase 1 and Phase 2 projects, taking into account various project variables. The flowcharts and overview of how to use them are provided in Section 2. The flowcharts in Section 2 are supported by additional tools and more detailed information on various methodologies described in **Section 3 - Data Collection for Key Aquatic Habitat Elements**. Both Section 2 and Section 3 are organized around five stream features, referred to as Key Aquatic Habitat Elements and described below.

General recommendations for the appropriate use of these guidelines, as well as a discussion of their limitations, are provided in **Section 4 - Considerations and Limitations**.

2. Using the Stream Assessment Flowcharts

The flowcharts should be used to determine the appropriate data needs and level of field assessment that will be required for a project. Working through the flowcharts with site specific information will require the collection of qualitative and/or quantitative information on various Key Aquatic Habitat Elements. These elements are the key habitats and stream features that may be impacted by a project and are directly related to ecological functions that support a stream ecosystem. The Key Aquatic Habitat Elements are:

- ***riparian vegetation,***
- ***physical in-stream habitat,***
- ***biological connectivity,***

- ***water quality and quantity, and***
- ***fish presence, fish habitat use, and stream typing***.

Information would be gathered during site visits or collected using specific survey techniques. The various "levels" of data collection for each Key Aquatic Habitat Element have been classified into one of three categories, or "Tracks". Tracks A, B, and C represent an increasing level of detail for data collection and generally correlate to the phase of the project, the extent to which access is available, and/or the magnitude of stream impact.

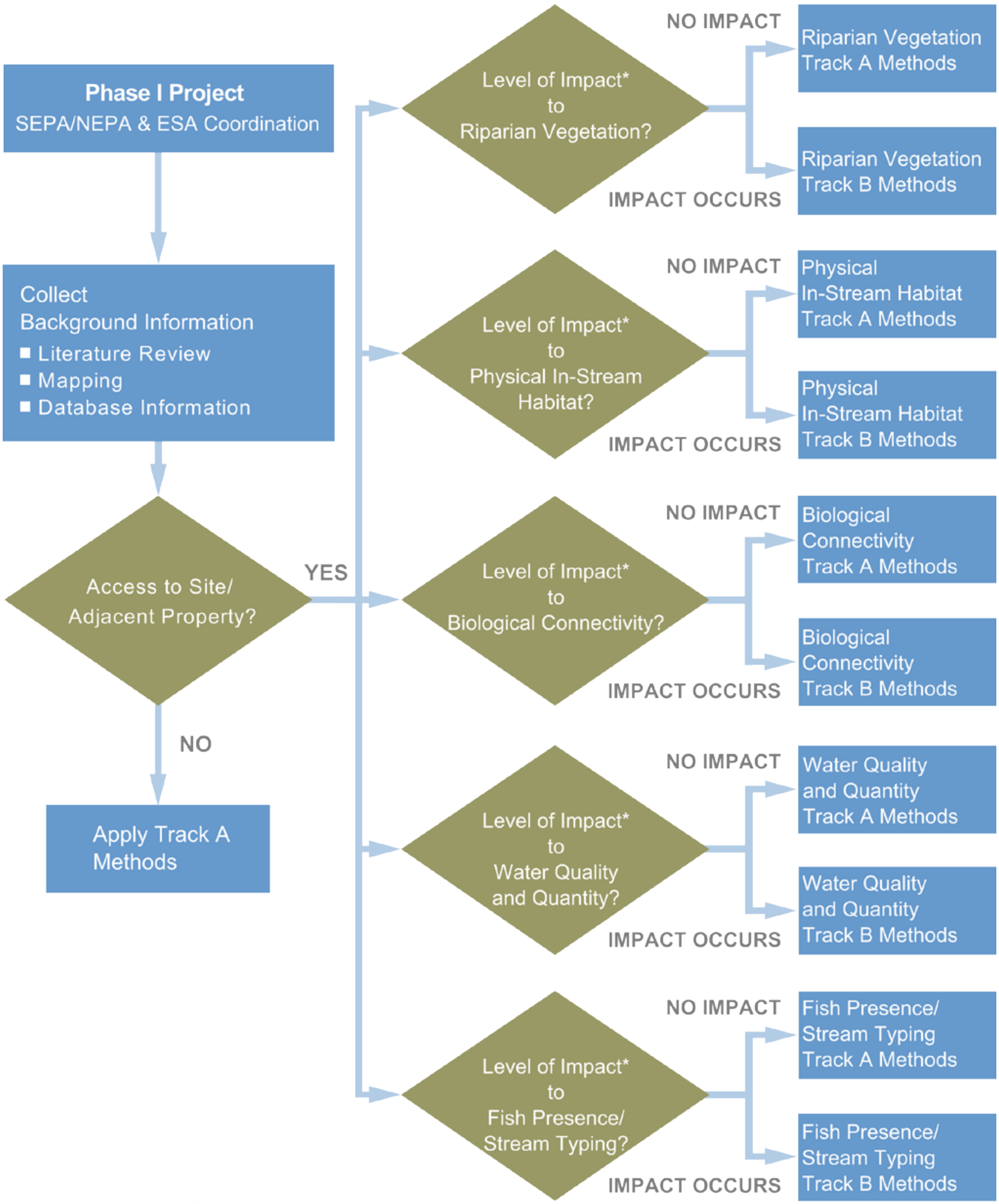
2.1 Phase I Projects

Figure 1 on page 4 is the stream assessment flowchart for planning-level projects. It shows the general process to follow when considering potential stream impacts associated with Phase 1 projects. For all Phase 1 projects that include stream habitats, regardless of access or impact level, the first step is to collect background information on each of the Key Aquatic Habitat Elements associated with each stream in the study area. To help guide these efforts, see **Section 3 – Data Collection for Key Aquatic Habitat Elements**. Section 3 includes more detailed information on specific data sources to consult when collecting this information. The information gathered will help form the basis of the *Existing Conditions* or *Affected Environment* section of the environmental document being prepared for the project.

After collecting background information, some level of data should also be collected in the field. The data collected and the stream assessment methods used will vary for Phase 1 projects depending on 1) whether or not impacts are anticipated impact, and 2) whether or not the project team has right-of-entry to parcels that contain streams.

If access is limited, Track A Methods should be used for each Key Aquatic Habitat Element to the extent feasible. Areas where access to streams is not limited include existing Sound Transit right-of-way, WSDOT right-of-way, or other publicly-owned rights-of-way such as parks. In these areas, the project team should consider the anticipated level of impact to each Key Aquatic Habitat Element. The level of analysis required for a given Key Aquatic Habitat Element should be commensurate with the potential for impacts at a given site. In order to appropriately size the analysis, the flowchart requires consideration of whether or not impacts are expected to occur within the stream environment, looking in turn at each of the Key Aquatic Habitat Elements. For Phase 1 projects, a simple determination of either "Impact" or "No Impact" should be made for each Key Aquatic Habitat Element as presented in Table 1 (see page 5). The results of this analysis will help determine the level of data collection and analysis appropriate for each ecological function. If impacts are anticipated, the project study team should coordinate with Sound Transit environmental staff before initiating Track B data collection efforts as the data may already have been gathered by others or a shift in the project footprint may occur that negates the need to do more detailed surveys.

Depending on the outcomes from using the stream assessment flowchart for Phase 1 projects, various levels of data collection (either Track A or Track B) will need to be conducted. For information on specific stream habitat assessment methods to use under Track A or Track B, refer to **Section 3 – Data Collection for Key Aquatic Habitat Elements.** Tables 3 and 4 in that section outline pertinent assessment methods for each Key Aquatic Habitat Element, including detailed information on specific analysis metrics and survey methods that may be appropriate under Tracks A and B.



*See Table 1 in *Sound Transit Stream Habitat Assessment Guidelines* document to assess level of impact

Figure 1
Stream Assessment Flowchart for Sound Transit Phase 1 Projects

Table 1 Impact Classification for Phase I Projects Based on Impacts to Key Aquatic Habitats

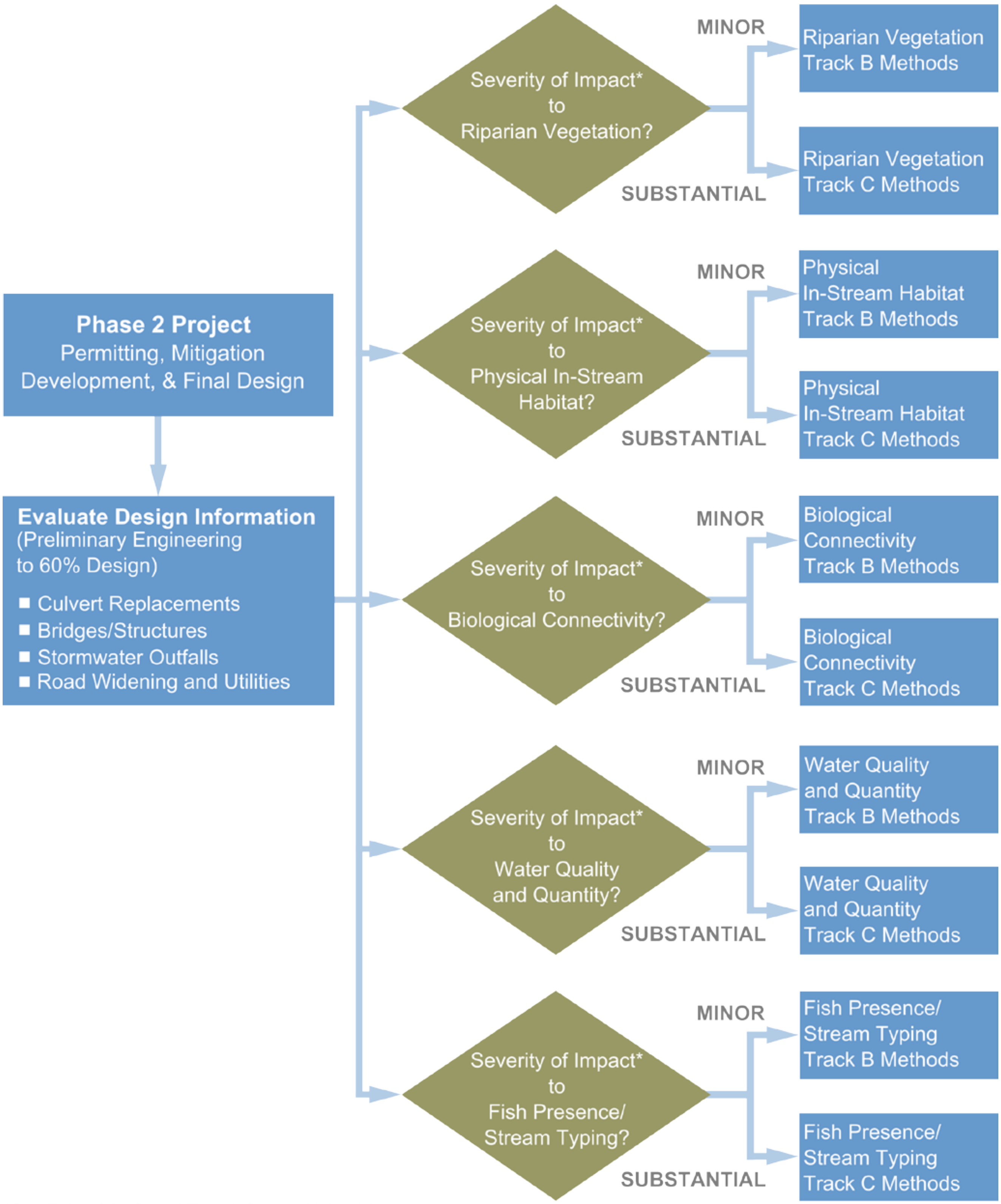
Key Aquatic Habitat Element	Impact Classification	
	No Impact	**Impact**
Riparian Vegetation	No clearing within riparian zone	Clearing riparian vegetation, OR Removing significant trees[1]
Physical In-Stream Habitat	No in-water work or disturbance to bed and streambank below OHWM[2]	Working in-water involving bank hardening, OR Installing fish habitat features (e.g., LWD[3] or boulders), OR Altering substrate
Biological Connectivity	No installation, removal, or alteration of culverts, bridges, weirs, or other potential passage barriers	Replacing or installing culverts, weirs, or bridges in non-fish bearing waters
Water Quality and Quantity	No new stormwater discharges or increases in impervious surface	Adding new stormwater discharges or increasing impervious surface
Fish Presence, Fish Habitat Use, and Stream Typing	No in-water or riparian impacts	In-water or riparian impacts occur

[1] Significant trees should be defined using the local jurisdiction's Critical Areas and/or Urban Forestry code sections. If significant trees are not defined by local code, assume significant trees are those trees 6-inches or greater dbh (diameter breast height).
[2] OHWM – ordinary high watermark
[3] LWD – large woody debris

2.2 Phase 2 Projects

Figure 2 on page 6 is the stream assessment flowchart for projects in final design. It shows the general process to follow when assessing streams in greater detail for Phase 2 projects that involve stream impacts. For Phase 2 projects, access to all riparian areas is assumed for purposes of conducting field work using either Track B or Track C methods. In the unusual event that access to all parcels is not available during Phase 2, Track A methods should be used to the extent feasible.

Using more detailed project design drawings, the level of data collection for Phase 2 projects will vary depending on the severity of impacts to Key Aquatic Habitat Elements. For each stream impact area, impacts should be classified as either a "Minor Impact" or "Substantial Impact". Table 2 on page 7 should be utilized to help classify potential Phase 2 project impacts on each Key Aquatic Habitat Element, based on specific project activities and quantification of expected impacts to each habitat element. However, it should be noted that the criteria may be adjusted based on the relative severity of project impacts within each project area. The project study team should coordinate with Sound Transit environmental staff to confirm the impact classification and intended data collection track before initiating data collection, as some or all of the data may already have been gathered by others, or a shift in alignment may occur that negates the need to do more detailed survey.



*See Table 2 in *Sound Transit Stream Habitat Assessment* Guidelines document to assess level of impact

Figure 2
Stream Assessment Flowchart for Sound Transit Phase 2 Projects

Table 2 Impact Classification for Phase 2 Projects Based on Impacts to Key Aquatic Habitats

Key Aquatic Habitat Element	Impact Classification	
	Minor Impact	**Substantial Impact**
Riparian Vegetation	Clearing less than 5,000 square feet of riparian vegetation, OR Removing 1 to 5 significant trees[a]	Clearing riparian vegetation in amounts exceeding minor impacts[1]
Physical In-Stream Habitat	In-water work involving bank hardening of <20 linear feet, OR Installing fish habitat features (e.g., LWD[2] or boulders), OR Altering substrate < 100 square feet	In-water work exceeding thresholds for minor impacts, OR stream straightening (meander loss) OR Site will be used as a compensatory mitigation site
Biological Connectivity	Replacing or installing culverts or weirs in non-fish bearing waters	Replacing or installing culverts, fishways, or weirs in fish-bearing waters
Water Quality and Quantity	Adding new stormwater discharges or increasing impervious surface where all stormwater is treated and detained and no 303(d) listed or TMDL[3] reaches	Adding new stormwater discharges or increasing impervious surfaces where discharge to 303(d)/TMDL[3] reach occurs, OR where full treatment and detention does not occur
Fish Presence, Fish Habitat Use, and Stream Typing	Minor impacts to one or more key aquatic habitats listed above	Substantial impacts to physical habitat or riparian vegetation aquatic habitat elements, OR project involves any changes (negative or positive) in fish passage conditions, OR where stream diversions/fish removal activities occur

[1] Significant trees should be defined using the local jurisdiction's Critical Areas and/or Urban Forestry code sections. If significant trees are not defined by local code, assume significant trees are those trees 6-inches or greater dbh (diameter breast height).
[2] LWD – large woody debris
[3] TMDL – total maximum daily load

Depending on the outcomes from using the stream assessment flowchart for Phase2 projects, various levels of data collection (either Track B or Track C) will need to be conducted for each Key Aquatic Habitat Element as appropriate. For information on specific stream habitat assessment methods to use under Track B or Track C, refer to **Section 3 - Data Collection for Key Aquatic Habitat Elements.** Tables 3 and 4 in that section outline pertinent assessment methods for each Key Aquatic Habitat Element, including detailed information on specific analysis metrics and survey methods that may be appropriate under Tracks B and C.

3. Data Collection For Key Aquatic Habitat Elements

Once the user has taken their Phase 1 or Phase 2 project through the appropriate flowchart in Section 2, Section 3 should be consulted to obtain more detailed information on specific data sources and stream assessment methodologies. Table 3 summarizes the recommended data to be collected for streams during all stages of project development. This includes background information, which should be collected in all cases, as well as field data collection for Tracks A, B, and C, which will depend on the anticipated level of impact to each Key Aquatic Habitat Element. The information in Table 3 is organized by Key Aquatic Habitat Element. Collection and assessment techniques for each Key Aquatic Habitat Element are described in more detail below. These data needs and assessment procedures have been selected to be generally applicable over the wide range of project types and permitting scenarios encountered by Sound Transit. During project development, the recommendations provided below may need to be adjusted based on project-specific input from regulatory agencies and Tribal entities.

3.1 Riparian Vegetation

For detailed information on specific riparian habitat assessment techniques and methods, see the *Oregon Riparian Assessment Framework* (Clarke, 2004) or Winward (2000). A common method for estimating canopy coverage is presented in (Daubenmire, 1959).

3.1.1 Background Information

1) Review existing literature –Reports or data sources that may contain information for reach or sub-basin scale riparian conditions include:

- The Washington State Conservation Commission Limiting Factors Analysis, organized by Water Resource Inventory area (http://scc.wa.gov/directory/ or http://www.eopugetsound.org/articles/water-resource-inventory-areas-puget-sound)
- Information on rare plants distribution from the Washington Department of Natural Resources Natural Heritage Program Database at: http://www.dnr.wa.gov/ResearchScience/HowTo/ConservationRestoration/Pages/amp_nh_data_instructions.aspx
- Local watershed analysis or stream assessment reports
- Local Shoreline Master Program Inventory reports Shoreline Master Program Inventory reports http://www.ecy.wa.gov/programs/sea/shorelines/smp/citizen.html

2) Review aerial photographs and any available site photos.

- Google Earth – also view past riparian conditions using historic photos on site
- Bing Maps – Birds Eye View feature is useful for assessing riparian conditions
- Digital or hardcopy orthophotos

3) Based on the results of steps 1) and 2) above, summarize the following:

- General vegetation type (forested, shrub, herbaceous, none (bare earth/built)),
- Tree canopy type (deciduous, coniferous, or mixed)
- Approximate density of vegetation types (dense or sparse),
- Approximate width of buffer on each streambank at project site (based on aerial photos), and
- Estimated average riparian buffer width upstream and downstream of project site.

Table 3. Overview of Data Collection Needs For Key Aquatic Habitat Elements

Key Aquatic Habitat Element[1]	Background Information[2]	Track A[3] – Limited Site Access or No Impact	Track B – Site Access and Minor Impacts	Track C – Site Access and Substantial Impacts OR Site to be Used as Compensatory Mitigation
Riparian Vegetation	1) Review existing literature 2) Review aerial photographs and existing site photos 3) Characterization should include: • vegetation type (i.e., forested, shrub, herbaceous, built, coniferous, deciduous, genus and species if possible), • relative vegetation densities	1) Site visit with qualitative description of riparian conditions: • vegetation type, height, and relative density • width/length of riparian zone • presence of overhanging or fallen vegetation/stream cover • presence of invasive plant species (estimate percent cover if possible)	1) Collect qualitative and quantitative field data from riparian zone including: • approximate height for each vegetation layer • approximate tree/shrub densities • identify invasive species and observed snags/dead and down trees • width, length, and area of functioning riparian zone • stream banks vegetation type, height, and density • percent vegetation that covers the stream • qualitative evaluation of known limiting riparian factors such LWD[3] or shade limitations	Collect Track B data, supplemented by tree counts, GPS survey, or professional land survey within forested riparian impact area to include: • tree species • tree diameters • estimated tree heights • locations of snags/dead and down
Physical In-Stream Habitat	1) Review existing literature 2) Review aerial photographs, topographic maps and site photos 3) Characterization should include: • stream width • dominant in-stream sediment • LWD[4] presence • channel morphology • streambank condition	1) Site visit to qualitatively assess the following through visual observations: • stream width • LWD presence • general channel morphology • general bank condition • dominant stream substrate • relative amount of instream cover and refuge **ALSO SEE TABLE 4 FOR MORE DETAILS**	1) Site visit to quantitatively assess the following conditions within, upstream, and downstream of project site: • wetted and OHWM[5] stream width • LWD size, location, and type • channel morphology - pool, riffle, run, glide • bank condition - stability/armoring • stream substrate - dominant/subdominant and particle distribution **ALSO SEE TABLE 4 FOR MORE DETAILS**	Same as Track B, but specific habitat impacts or intended use for mitigation may require: 1) Track B data collection over a wider area 2) GPS/professional survey of habitat elements delineated in Track B, or 3) detailed quantitative analysis of habitat elements (e.g., bulk substrate analysis, micro-channel morphology) **ALSO SEE TABLE 4 FOR MORE DETAILS**
Biological Connectivity	1) Review existing literature on existing fish passage conditions/barriers and check the WDFW Fish Passage Barrier Map 2) If no barriers are recorded online, Track B/C methods may be required regardless of impact level 3) Review aerial photographs to identify potential barriers at site, upstream, or downstream 4) Review topographic maps and watershed analyses	1) Site visit to qualitatively assess the following information on man-made fish passage structures: • type/material of structure • approximate size/configuration of structure • condition of structure (i.e. wear, damage, etc.)	1) Site visit to quantitatively assess man-made structures: • relative inlet and outlet elevations • stream channel bankfull width 2) If necessary, conduct WDFW Level A Culvert analysis per WDFW (2009) to assess status as fish passage barrier. Check with WDFW prior to conducting the analysis; they may already have that information, particularly if the culvert is on WSDOT right-of-way	Same as Track B, but in some cases coordination with design team on conducting a WDFW Level B culvert analysis per WDFW (2009) may be necessary to accurately assess barrier status
Water Quality and Quantity	1) Review existing literature/databases for information on: • water quality/contaminants, • stream temperatures, • flow data • water quality/quantity limiting factors	1) Site visit with qualitative description of: • type/material of outfall/drainage structure • approximate size/configuration/condition of outfall/drainage structure • visual estimate of streamflow and stream velocity • stream temperature • presence of septic systems within the project area • Water source (stormwater, other?)	No additional effort	No additional effort
Fish Presence, Fish Habitat Use, and Stream Typing	1) Review existing literature/databases for information on: • fish presence and fish habitat use • stream typing • contributing basin area • natural/manmade barriers downstream	If result of background information does not provide complete or definitive results, conduct site visit and make preliminary determination based on WAC 222-16-031. Qualitatively assess the following: • stream width/OHWM, • flow conditions, • fish observations	If result of background information does not provide complete or definitive results proceed with one or more of the following options, as appropriate: 1) Request government/Tribal fish use/stream typing assistance 2) Utilize a qualified biologist to estimate fish presence/absence based on habitat conditions within, upstream, and downstream of site Conduct reconnaissance site visit to identify natural downstream barriers	Same as Track B, but in extraordinary circumstances, fish sampling by a qualified biologist may be appropriate[6]. Sampling techniques could potentially include: • snorkel surveys • minnow traps • electrofishing

[1] See text in Section 3 – Data Collection for Key Aquatic Habitat Elements for more specific information on each habitat element
[2] Background information should be compiled regardless of access situation or level of impacts
[3] If lack of access, the information for Track A should be collected in the field from adjacent publicly accessible properties or right of way to the extent possible/practical
[4] LWD – large woody debris
[5] OHWM – ordinary high water mark
[6] If information collected as part of Track A or Track B does not provide the required level of certainty on fish presence and stream typing, and no natural barrier exists downstream, generally assume fish presence and consult with ST environmental staff. These activities will require a Scientific Collection Permit from WDFW, and in accordance with WAC 220-20-045. Electrofishing, per requirements in WAC 220-20-045, should only be used to assess fish presence under extraordinary circumstances where such actions are pre-approved by ST (e.g., this information is tied to a permit condition or the information is crucial for design of a substantial design element such as road or culvert)

3.1.2 Track A Information

After collecting and synthesizing relevant background information on riparian vegetation conditions within the project area, conduct a reconnaissance-level site visit within existing Sound Transit or public right-of-way/easement areas. Provide qualitative description of riparian conditions including the following:

- Note buffer vegetation type – e.g., forested, shrub, herbaceous, none (bare earth/built). Identify shrub and/or tree species if possible, including any observed invasive species.
- Note relative buffer vegetation density (e.g., sparse, moderately dense, dense) and approximate height of each vegetation layer, particularly the tree layer
- Note observable width/length of riparian zone
- Note extent and type of overhanging vegetation and any observed any observed LWD originating in riparian zone. Estimate percent overhead cover in stream thalweg.
- Note and describe extent of vegetation overhanging stream channel, fallen vegetation
- Qualitative evaluation of potential limiting riparian factors such (LWD or shade limitations)

3.1.3 Track B Information

Collect similar information as listed in Track A; however site access will allow for on-site evaluation of the riparian condition based on qualitative and quantitative field data gathered from within the riparian zone.

- Identify shrub or tree species within the riparian zone, including any observed invasive species.
- Estimate or measure canopy cover and ground cover within the riparian zone (Daubenmire, 1959) for dominant species. If measuring, use plots or intercept along a measuring tape.
- Approximate average diameter (diameter breast height – DBH) of trees within riparian zone using representative measurements
- Width and length of functioning riparian zone and
- Riparian interaction with stream banks (e.g., overhanging vegetation, bank stabilization by roots),
- Measure average in-stream riparian cover in the stream thalweg using a densitometer (average riparian cover measured facing upstream, downstream, left bank, and right bank).
- Observations or qualitative evaluation of reach or basin scale limiting riparian factors (such as large-scale LWD or shade limitations).

3.1.4 Track C Information

If the project involves substantial impacts to the riparian corridor, particularly forested riparian areas, it may be necessary to supplement the data collection efforts from above with a more accurate tree survey conducted with GPS survey or professional land survey. Within forested buffer impact areas, detailed survey of the following parameters may be appropriate:

- Tree locations
- Tree species
- Tree diameters
- Estimated tree heights
- Locations of snags and dead/ down woody debris

3.2 Physical In-Stream Habitat

There are literally hundreds of formal assessment protocols prepared for the evaluation of stream environments and habitats. Assessment methods to assess physical in-stream habitat for Pacific Northwest streams are also numerous (e.g. Overton et al. 1997, Pleus and Schuett-Hames 1998, Barbour et al. 1999). In addition, several agencies in the region have developed their own protocols that use unique suites of channel features and channel feature definitions. These protocols generally address measurement of the same in-stream habitat parameters (e.g., woody debris, channel morphology, streambank condition) with varying levels of detail. In order to cover the range of data requirements for both Phase 1 and Phase 2 Sound Transit projects, the discussion of field methods (Tracks A, B and C) for an assessment of this Key Aquatic Habitat Element is focused on these in-stream habitat parameters. Table 4 on page 13 details the specific metrics/measurements that may be applicable for each parameter under Tracks A, B, and C, with recommendations for specific methods or protocols, where appropriate. Table 5 summarizes the methodological references noted in Table 4 for various in-stream habitat parameters.

In addition, other authors have compared and contrasted various protocols and assessments from a nation-wide perspective (Somerville, 2010), with a focus on those assessments prepared for application in the Pacific Northwest region (Johnson et al., 2001; Stolnack et al. 2005). These review documents are excellent sources to consult prior to undertaking a detailed physical habitat assessment, especially in cases where the assessment is focused on specific in-stream habitat parameters.

3.2.1 Background Information

1) Review existing literature on physical in-stream habitat conditions, including stream size (width), presence of LWD and complex habitat features, approximate stream gradient/channel morphology, stream substrate and sediment condition, and bank condition. Reports that may contain information reach or sub-basin scale physical conditions include:
   - The Washington State Conservation Commission Limiting Factors Analysis, organized by Water Resource Inventory area (http://scc.wa.gov/directory/ or http://www.eopugetsound.org/articles/water-resource-inventory-areas-puget-sound)
   - Salmon recovery plans – Puget Sound: http://www.psp.wa.gov/SR_map.php King County: http://www.kingcounty.gov/environment/animalsAndPlants/salmon-and-trout.aspx
   - Shoreline Master Program Inventory reports for local jurisdictions http://www.ecy.wa.gov/programs/sea/shorelines/smp/citizen.html
   - Williams et al. (1975)
   - Local watershed analysis or stream assessment reports

2) Review aerial photographs, topographic maps, and any available site photos.
   - Google Earth – also view past stream habitat conditions using historic photos on site
   - Bing Maps – Birds Eye View feature is useful for assessing some in-stream conditions
   - Digital or hardcopy orthophotos
   - Topographic maps (LIDAR data if available) to determine stream gradients. LIDAR data can be obtained from the Puget Sound LIDAR Consortium at http://pugetsoundlidar.ess.washington.edu/

3) Use the results of 1) and 2) above to describe the following in-stream habitat conditions at the site/stream reach to the extent feasible:
   - general horizontal and vertical channel form (stream gradient and channel morphology) including the presence and quality of pools and riffles and channel confinement/entrenchment
   - dominant in-stream substrates (cobble, gravel, fines, etc.) and general sediment transport dynamics (source, transport, or response reach),
   - presence/absence of LWD, or frequency of LWD (if available),
   - streambanks condition, including bank stability and presence of bank hardening/revetments

3.2.2 Track A Information

After collecting and synthesizing relevant background information on in-stream physical habitat conditions within the project area, conduct a site visit within existing Sound Transit or public right-of-way/easement areas. Provide qualitative descriptions, based on visual observations, of on-site in-stream habitat conditions as detailed in Table 4 on the following page. The primary Channel Geomorphological Units (CGU) used for the assessment will likely be limited to fast/slow habitat types, as the evaluation will be based on visual observations only.

3.2.3 Track B Information

Collect similar information as listed in Track A; however site access will allow for better evaluation of in-stream physical habitat conditions, based on qualitative and quantitative field data gathered from within the stream. Information on specific recommended measurements, including appropriate references, is presented in Table 4. The primary Channel Geomorphological Units (CGU) used for the assessment will likely include a moderate detail (pools, riffles, and runs/glides at a minimum). Pools may be further classified into the type of pool (e.g., lateral scour, medial scour, boulder-formed pocket pool).

3.2.4 Track C Information

If the project involves substantial impacts to in-stream habitat, particularly impacts to the stream bed, stream banks, or local hydraulics, or if the site is to be used for compensatory mitigation, it may be necessary to supplement the data collection efforts from above with more detailed measurements as listed in Table 4.

Table 4. Specific Metrics for Assessment of Physical In-Stream Habitat Parameters

Parameter	Metric/Measurement	Track A – Limited Site Access and Low Impact	Track B – Site Access and Moderate Impacts	Track C– Site Access and Substantial Impacts OR Site to be Used as Compensatory Mitigation
Channel Form and Profile	Macrohabitat - habitat type	Visual characterization of Channel Geomorphological Units (CGUs) into slow/fast water habitats.	Classify and measure macrohabitat unit length using classification including pools, riffles, runs, and/or glides. Depending on specific impacts, additional detail may be appropriate (Arend 1999).	Same as Track B. If substantial alteration of stream hydraulics, may be useful to classify and measure CGUs using detailed classification system (Arend 1999).
	Macrohabitat - pool characteristics	Visual observation of water depths of slow/fast water habitat approximate depth.	Measure maximum pool depths and residual pool depths. Classifying pools based on minimum functional pool width/depth (Pleus et al., 1999).	Same as Track B
	Stream Reach Classification	N/A	N/A	If substantial alteration of stream hydraulics, may be useful to use existing geomorphic classification system to classify project reach - Montgomery and Buffington (1998).
	Stream Slope	Estimate stream slope using topographic maps or LIDAR data if available.	Measure using clinometer or auto-level.	Same as Track B. If substantial alteration of stream hydraulics, may be useful to conduct longitudinal profile study.
	Stream Patterns	Visual observation of channel patterns (e.g., sinuous versus straight channel).	Visual observation of channel patterns (e.g., sinuous versus straight channel).	Same as Track B. If substantial alteration of stream hydraulics, may be useful to measure meander length, radius of curvature, sinuosity, and meander belt width.
	Confinement	Visual assessment of channel confinement and entrenchment.	Measure channel confinement/entrenchment. The entrenchment ratio is the ratio of the width of the flood-prone area to the surface width of the bankfull channel. The flood-prone area width is measured at the elevation that corresponds to twice the maximum depth of the bankfull channel.	Same as Track B. If substantial alteration of stream hydraulics, may be useful to survey complete stream cross-section.
	Channel Dimension/Shape	Visual estimation of bankfull width.	Measure average bankfull width and depth in project area.	Same as Track B. If substantial alteration of stream hydraulics, may be useful to survey complete stream cross-section.
Streambank Condition	Stability	Visual observation of nature and extent of unstable banks.	Measure extent of and location of unstable banks with type of instability (slide, slump, slough, etc.).	Same as Track B. If substantial specific impact to this habitat element or the element is crucial to a key design feature, may be useful to use GPS or PLS to survey location of features.
	Bank Hardening/Revetments	Visual observation of nature and extent of bank hardening/revetments.	Measure extent and location of bank hardening/revetments with type of hardening (riprap, earthen, structural, etc.).	Same as Track B. If substantial specific impact to this habitat element or the element is crucial to a key design feature, may be useful to use GPS or PLS to survey location of features.
Substrate/Sediment	Particle Frequency	Visual estimate of dominant and subdominant substrate over project area.	Visually estimate dominant and subdominant substrate within each CGU. Supplement data with pebble counts at representative pool tail outs (Bunte and Abt 2001).	Same as Track B. If substantial alteration of stream hydraulics, may be useful to use grid surface sampling or sub-surface volumetric sampling (Bunte and Abt 2001).
	Percentage of Fine Sediments/Embeddedness	Visual estimate of amount of surface fines in pools.	Visually estimate percentage of surface fines in each pool CGU. Estimate substrate embeddedness in riffles and pools.	Same as Track B. If substantial alteration of stream hydraulics, may be useful to use grid surface sampling or sub-surface volumetric sampling (Bunte and Abt 2001).
Large Woody Debris	LWD Presence, Frequency, and Location	Visual count of observed pieces of woody debris (>6 feet in length and 0.5 feet in diameter).	Measure location and presence of each piece of LWD (>6 feet in length and 0.5 feet in diameter) and debris jams. Relative position of LWD (thalweg center, thalweg edge, bankfull, bankfull edge).	Same as Track B. If substantial alteration of stream hydraulics or LWD composition, may be useful to measure additional parameters, including mapping/GPS of LWD orientation.
	Debris Jams	Visual observations of presence/absence of LWD jams, including approximate location and size of jam.	Measure location and orientation of each LWD jam, including number of pieces of debris in jam.	Same as Track B. If substantial specific impact to this habitat element or the element is crucial to a key design feature, may be useful to use GPS or PLS to survey location of features.
	LWD Size	Visual estimate of LWD size (length and width).	Measure LWD size (length and width) for each piece of LWD.	Same as Track B. If substantial specific impact to this habitat element or the element is crucial to a key design feature, may be useful to use GPS or PLS to survey location of features.
	Age and Type	Visual estimate of LWD age and composition (deciduous or coniferous).	Measure LWD species (coniferous, deciduous, or unknown) and LWD age class (Shuett-Hames et.al., 1999a).	Same as Track B. If substantial specific impact to this habitat element or the element is crucial to a key design feature, may be useful to use GPS or PLS to survey location of features.
Cover and Refuge	Pool quality	Visual observation of relative pool size, location, depth, and cover.	Assess pool quality using a Pool Quality Index (Platts et al. 1983).	Same as Track B
	Undercut banks	Visual observations of presence/absence of undercut banks.	Measure location and presence of undercut banks.	Same as Track B. If substantial specific impact to this habitat element or the element is crucial to a key design feature, may be useful to use GPS or PLS to survey location of features.
	Off-channel/side-channel habitat	Visual observations of presence/absence of off-channel/side-channel habitat, including associated wetlands. Indicate presence of beaver dams or beaver activity within project area.	Include side-channel habitat in channel form and profile, LWD, streambank condition, and sediment measurements. Measure location, area, and water depth of off-channel areas. Record features of beaver dams and associated habitat.	Same as Track B. If substantial specific impact to this habitat element or the element is crucial to a key design feature, may be useful to use GPS or PLS to survey location of features.
	In-stream cover/protection	Visual observation of aquatic macrophytes, habitat boulders, and other in-stream structures providing cover.	Measure location and presence of aquatic macrophytes, habitat boulders, and other in-stream structures providing cover.	Same as Track B

Table 5 below summarizes the methodologies Sound Transit recommends for assessing in-stream habitat parameters.

Table 5. Methodological References for Physical In-Stream Habitat Parameters

Metric/Measurement	Methodology Reference
Habitat Unit Classification and Measurement	Arend, K.K. 1999. Macrohabitat Identification. Pages 75-93 *in* M.B. Bain and N.J. Stevenson, editors. Aquatic habitat assessment; common methods. American Fisheries Society. Bethesda, Maryland.
Pool Characteristics • measurement of maximum pool depths and residual pool depths • classification of pools based on minimum functional pool width/depth	Pleus, A. E., D. Shuett-Hames, and L. Bullchild. 1999. TFW Monitoring Program method manual for the habitat unit survey. Prepared for the WA State Dept. of Natural Resources under the Timber, Fish, and Wildlife Agreement. TFW-AM9-99-003. DNR #105. June. 31 pp.
Stream Reach Classification	Montgomery DR, Buffington JM. 1998. Channel Processes, Classification and Response. *In* Naiman, R. and Bilby, R. (Eds) River Ecology and Management: Lessons from the Pacific Coastal Ecoregion, New York, NY: Springer-Verlag.
Sediment Characteristics • Particle Frequency • Percentage of Fine Sediments/Embeddedness	Bunte, K. and Abt. S.R. 2001. Sampling surface and subsurface particle size distributions in wadeable gravel and cobble bed streams for analyses in sediment transport, hydraulics and streambed monitoring. General Technical Report RMRS-GRT-74. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 428 pp.
Large Woody Debris • LWD Presence, Frequency, and Location • Location, orientation, and number of pieces in each LWD jam • LWD size (length and diameter) • LWD species and age class	Shuett-Hames, D., A. E. Pleus, J. Ward, M. Fox, and J. Light. 1999a. TFW Monitoring Program method manual for the large woody debris survey. Prepared for the Washington State Dept. of Natural Resources under the Timber, Fish, and Wildlife Agreement. TFW-AM9-99-004. DNR #106. March. 33 pp.
Pool Quality Index	Platts, W. S., W. F. Megahan, and G. W Minshall. 1983. Methods for evaluating stream, riparian, and biotic conditions. Gen. Tech. Rep. INT-138. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. 70 p. http://www.fs.fed.us/rm/pubs_int/int_gtr138.pdf

3.3 Biological Connectivity

An analysis of biological connectivity and associated fish passage conditions may be a key element of Sound Transit projects, particularly for the creation, reconstruction, or removal of stream crossings (roads or bridges). Fish passage structures are regulated under the Washington State Hydraulic Code (WAC 220-110-170). Therefore, where such actions may occur, it is important to have early coordination with the project design team to determine and coordinate on overall project design and permitting needs.

Any definitive evaluation of fish passage conditions should be conducted using the *Fish Passage Barrier and Surface Water Diversion Screening Assessment and Prioritization Manual* (WDFW, 2009). Likewise, design of stream crossings should utilize the standards and procedures in the WDFW *Water Crossing Design Guidelines* document (Barnard, et al. 2013).

3.3.1 Background Information

Review existing literature on biological connectivity and fish passage conditions, including the presence of any known or potential man-made or natural barriers to fish passage, including type, size, and location of such features. Data sources that may contain information reach or sub-basin scale biological connectivity and fish passage conditions include:

- WDFW Fish Passage Program: Data and Maps
  http://wdfw.wa.gov/conservation/habitat/fish_passage/data_maps.html
- WSDOT Fish Passage Reports
  http://www.wsdot.wa.gov/environment/biology/fp/fishpassage.htm#reports
- Topographic maps of stream for assessment of steep downstream reach gradients /natural barriers
- Local watershed analysis or stream assessment reports

3.3.2 Track A Information

After collecting and synthesizing relevant background information on biological connectivity habitat conditions within the project area, conduct a site visit within existing Sound Transit or public right-of-way/easement areas. Provide qualitative descriptions, based on visual observations, of biological connectivity habitat and fish passage conditions, including the following:

- Location and approximate dimensions of structures including length, width, and height
- Type of structures – Culvert, bridge, fishway, weir structure, etc.
- Material of structures - Concrete, stone/rip-rap, aluminum, PVC, etc. Note presence of culvert corrugation and liners
- Approximate size/configuration of structures – For culverts note type of structure (round, box, bottomless box, squash, arch, elliptical, etc.) and whether structure is countersunk
- Approximate condition of structure – Note any deterioration or damage to structure
- Presence of natural streambed material within culvert and estimate of percent of culvert opening affected by sedimentation
- Presence and relative extent of any backwater at culvert inlet
- Presence and height of any perch at culvert outlet
- Presence of any plunge pool at culvert outlet and estimated depth of pool

3.3.3 Track B Information

Collect similar information as listed in Track A, however site access will allow for better evaluation of connectivity and fish passage condition based on qualitative and quantitative field data gathered from within the stream. The use of the Level A Methodology and Field Form from WDFW (2009) is highly recommended for assessment purposes as it will ensure all essential information is captured. In addition to information collected in the Track A analysis on culvert shape, the following data should be recorded per WDFW (2009):

- Measure relative inlet and outlet elevations (preferable) or measured slope of culvert
- Measure culvert dimensions
- Measure stream channel width (bankfull width)
- Measure water surface drop at outfall
- Measure maximum plunge pool depth

3.3.4 Track C Information

If the project involves substantial impacts fish passage structures, particularly the alteration of an existing potential barrier and the Level A Analysis (WDFW, 2009) is not conclusive on barrier status (Level A does not provide conclusive barrier status in all cases), it may be necessary to coordinate with the design team to determine if a Level B analysis is required. This analysis is usually completed by a hydrologist, geomorphologist, or engineer and requires measurement of additional upstream and downstream parameters including channel width, depth, slope, and characterization of bed material. For specific methods, data requirements, and analysis tools, see WDFW (2009).

3.4 Water Quality and Quantity

3.4.1 Background Information

Review existing literature on water quality and flow conditions, including known impairments of water quality and temperature, and stream flow characteristics. Include any information on impairments or limiting factors from the literature or databases. Data sources that may contain information reach or sub-basin scale water quality and flow conditions include:

- Washington Streamflow Data - USGS
  Historic data = http://wa.water.usgs.gov/data/realtime/adr/interactive/
  Realtime data= http://waterdata.usgs.gov/wa/nwis/current?type=flow
- 303(d) list - Washington State Department of Ecology http://www.ecy.wa.gov/programs/wq/303d/
- King County Hydrologic Information Center
  http://green.kingcounty.gov/WLR/Waterres/hydrology/default.aspx
- Streams Water Quality Monitoring Data
  http://green.kingcounty.gov/WLR/Waterres/StreamsData/StreamList.aspx
- Local watershed analysis or stream assessment reports

3.4.2 Track A Information

After collecting and synthesizing relevant background information on water quality and quantity conditions within the project area, conduct a site visit within existing Sound Transit or public right-of-way/easement areas. Provide qualitative description of water quality and flow conditions including the following:

- Note any drainage outfalls, including type/size/location of structure, possible source and volume of outflow during time of site visit.
- Visually estimate streamflow (in cubic feet per second) and stream velocity (feet/second).

3.4.3 Track B and C Information

In almost all cases, the information gathered during the Background Information and Track A investigations will be sufficient to effectively characterize water quality and flow. However, in certain rare circumstances, additional site-specific water quality and flow measurements may be appropriate. As these circumstances are rare, and any such measurements should be tailored to specific project requirements (e.g., permit conditions), such additional measurements are not discussed in this document.

3.5 Fish Presence, Fish Habitat Use, and Stream Typing

There is a difference between fish presence and fish habitat use, and just because fish may not be present at a given time of the year does not mean that a particular stream or stream habitat is not used by fish. Fish presence may respond to seasonal use of a given stream or habitat type as well as a particular life stage of a given fish species. For these reasons, the general best approach is to assume fish habitat use wherever suitable fish habitat exists, and consult with Sound Transit environmental staff before collecting additional data on fish presence.

The determinations of fish habitat use, and the related element of stream typing, are key in determining the potential severity of project impacts, the width of regulated stream buffers, and the requirements for ensuring fish passage at crossing structures. Although for rivers and larger streams, extensive information exists on fish habitat use and stream type, this information is often times lacking for smaller first and second order tributary streams. The following methods utilize an extensive search of background information coupled with measurements of a stream's physical characteristics to evaluate the potential for fish habitat use based on the presence of suitable fish habitat.

3.5.1 Background Information

Review existing literature on fish habitat use and stream typing conditions, including any documented presence of fish species potentially or known to be present. It should also include documented or potentially present suitable fish habitat within the project area. Include any existing stream typing information from the literature or databases. Data sources that may contain information reach or sub-basin scale biological connectivity and fish passage conditions include:

- WDFW Priority Habitats and Species Online Mapper http://apps2.dfw.wa.gov/prodphsontheweb/viewer.aspx?auth=dchBC3QPoGho84hRndFNAyiX2awipVxGmK5mj/T0HbP429kXX73bzQ==
- WDFW SalmonScape Database http://apps.wdfw.wa.gov/salmonscape/
- DNR Water Typing Online Mapper http://www.dnr.wa.gov/businesspermits/topics/forestpracticesapplications/pages/fp_watertyping.aspx
- The Washington State Conservation Commission Limiting Factors Analysis, organized by Water Resource Inventory area (http://scc.wa.gov/directory/ or http://www.eopugetsound.org/articles/water-resource-inventory-areas-puget-sound)
- Wild Fish Conservancy Water Type Assessments and Interactive Maps http://wildfishconservancy.org/resources/maps
- Fish distribution in WRIA 8: http://www.govlink.org/watersheds/8/reports/fish-maps/default.aspx
- A Catalog of Washington Streams and Salmon Utilization (Williams et al., 1975)
- Local jurisdiction Critical/Sensitive Area maps
- Local watershed analysis or stream assessment reports

3.5.2 Track A Information

After collecting and synthesizing relevant background information on fish habitat use and stream typing within the project area, conduct a site visit within existing Sound Transit or public right-of-way/easement areas. Visually observe for the presence of fish. If the background information or visual observation does not clearly indicate fish use status of a particular stream, it may be difficult to determine fish use and therefore stream typing) at a site based upon the direct observation of salmonids. Due to poor visibility, low escapement levels, the existence of human-made barriers, or other factors, fish may not be observed during the field visit.

The Forest Practices Rule (WAC 222-16-031) is used to define water types. Based on the WAC, there are a number of methods to determine if a site has the potential to provide fish habitat. Satisfaction of one or more of the following criteria qualifies a water body as fish bearing or potential fish habitat:

- Watercourses shown by DNR as containing fish on DNR stream typing maps, the WDFW Priority Habitats and Species database, or the WDFW SalmonScape database.
- Watercourses with documented salmonid use determined by visual observation, electrofishing, or verification by local biologists.
- Estimate scour line width. Watercourses having average scour line widths (bankfull widths) in excess of 0.6 meters (2 feet) in Western Washington, provided the stream gradient is less than 20 percent.

Note that seasonally dry streams (ephemeral or intermittent) can provide fish habitat during periods of flow. When evaluating dry stream channels, consider the physical characteristics of the channel and proximity to known fish-bearing water. Also, consider the timing of fish presence for species in the area that may enter the habitat when flow is present. For example, chum salmon often use streams that may only flow for a few months out of the year; they will spawn in the channel during the fall when flow is present and fry will out-migrate in the spring immediately after emergence. In another example, off-channel rearing habitat and floodplain habitat may be used by juvenile salmonids during winter months, even though the channel is dry during the summer.

3.5.3 Track B Information

Better site access will allow for a more comprehensive analysis of evaluation of bankfull width, and greater opportunity to visually observe for fish presence. However, increased site access will not necessarily provide definitive results. If the result of background information and Track A does not provide complete or definitive results, the following options may be considered, as appropriate:

- Request fish use/stream typing assistance from WDFW, Tribal entities, or local government agencies. Assistance may consist of local knowledge of fish distribution or technical assistance with fish presence studies.

- Utilize a qualified fisheries biologist to estimate fish habitat use based on habitat conditions, within, upstream, and downstream of site, noting that absence of fish during a site investigation does not by itself confirm perennial absence.

- If background information indicates a potentially natural downstream fish barrier, conduct downstream reconnaissance to locate and assess natural barrier. Note that lack of fish access for anadromous species does not indicate absence of resident fish species (e.g., resident cutthroat trout or sculpin).

- Watercourses with documented salmonid use determined by visual observation, electrofishing, or verification by local biologists.

3.5.4 Track C Information

In extraordinary circumstances (e.g., this information is tied to a permit condition or the information is crucial for design of a substantial design element such as road or culvert), electrofishing, per the requirements in WAC 220-20-045 can be used to establish fish presence and stream typing. This pathway should only be used under careful consideration and in consultation with WDFW. Electrofishing, or other fish sampling methods, should be pre-approved by Sound Transit environmental staff and conducted by experienced fisheries biologists.

4. Considerations and Limitations

The purpose of this report, including associated flowcharts and tables, is to serve as a guide for assessing streams that are potentially affected by Sound Transit projects. Due to variation in the specific type and severity of project impacts, coupled with property access issues and the unique requirements of multiple regulatory agencies that are commonly involved, it is difficult to craft a “one size fits all” survey protocol. This difficulty is illustrated by an analysis of the stream assessment methods used by two large governmental agencies involved in transportation projects: the Washington State Department of Transportation and the King County Road Services Division. Neither of these agencies has specific stream assessment protocols for determining project impacts. This is also common for most local governments, as a sufficiently broad, detailed, and inclusive stream assessment survey protocol to cover all available project permitting and design needs would be inherently detailed. This in turn can lead to the potential collection of a substantial amount of information, extraneous to the needs of the project, resulting in an increase in project effort and expense.

Therefore, one should consider some project-specific elements prior to assessing streams. This will allow the user to specifically tailor the stream assessment methods in order to both “right size” the analysis methods and to ensure that information is collected in an efficient way that anticipates current and future information needs. These elements can be assessed by asking and answering the following project-specific questions:

- **Which specific habitat elements and sub-elements will be affected (e.g., in-stream substrate, stream banks, riparian zone width, etc.)?** Think carefully about the specific project impacts or mitigation needs and the information that should be collected to compare or assess these impacts or evaluate appropriate mitigation.

- **What project stage or stages is data from the stream assessment to be used -- programmatic planning, alternative comparison, initial permitting, project design, or mitigation design?** The stream assessment should be tailored to a level of detail that addressed the current project planning, design, or permitting phase and that will support the related documents and plans.

- **If the general purpose of the stream assessment is to help compare project options, is this comparison for programmatic options, many specific design alternatives, a small number of design alternatives, or is the purpose to compare a single alternative with a no-build option?** Based on the specific answer, the stream assessment should be tailored to allow for adequate analysis of impacts, without collecting extraneous information. Conversely, if only one site/alignment is being evaluated and access is not limited, collecting more detailed information early on may be beneficial in the long-term, especially if mitigation is necessary.

- **If the purpose of the stream assessment is to compare among a limited number of specific design options, do the alternatives impact stream habitats in similar manners and locations?** If impacts to streams from most or all of the alternatives will occur in the same geographic area(s), more robust initial stream assessment methods may be appropriate in order to minimize multiple assessments during the project lifecycle, thereby maximizing efficiency and limiting costs.

- **What is the project timeframe for alternative comparison, design, and permitting**? Expedited time-frames may require a more robust initial stream assessment method, in order to quickly advance design and permitting, or to avoid the risk of unexpected delay at a late stage of the project.

- **Are other project staff collecting similar or ancillary field data on stream conditions**? It is important to coordinate with other project staff on their data acquisition needs prior to selecting final assessment methods. For example, structural or civil engineers may be performing detailed hydraulic or hydrological analyses within the same stream reaches, and potentially eliminating the need for some channel morphology or sediment data collection during the stream assessment.

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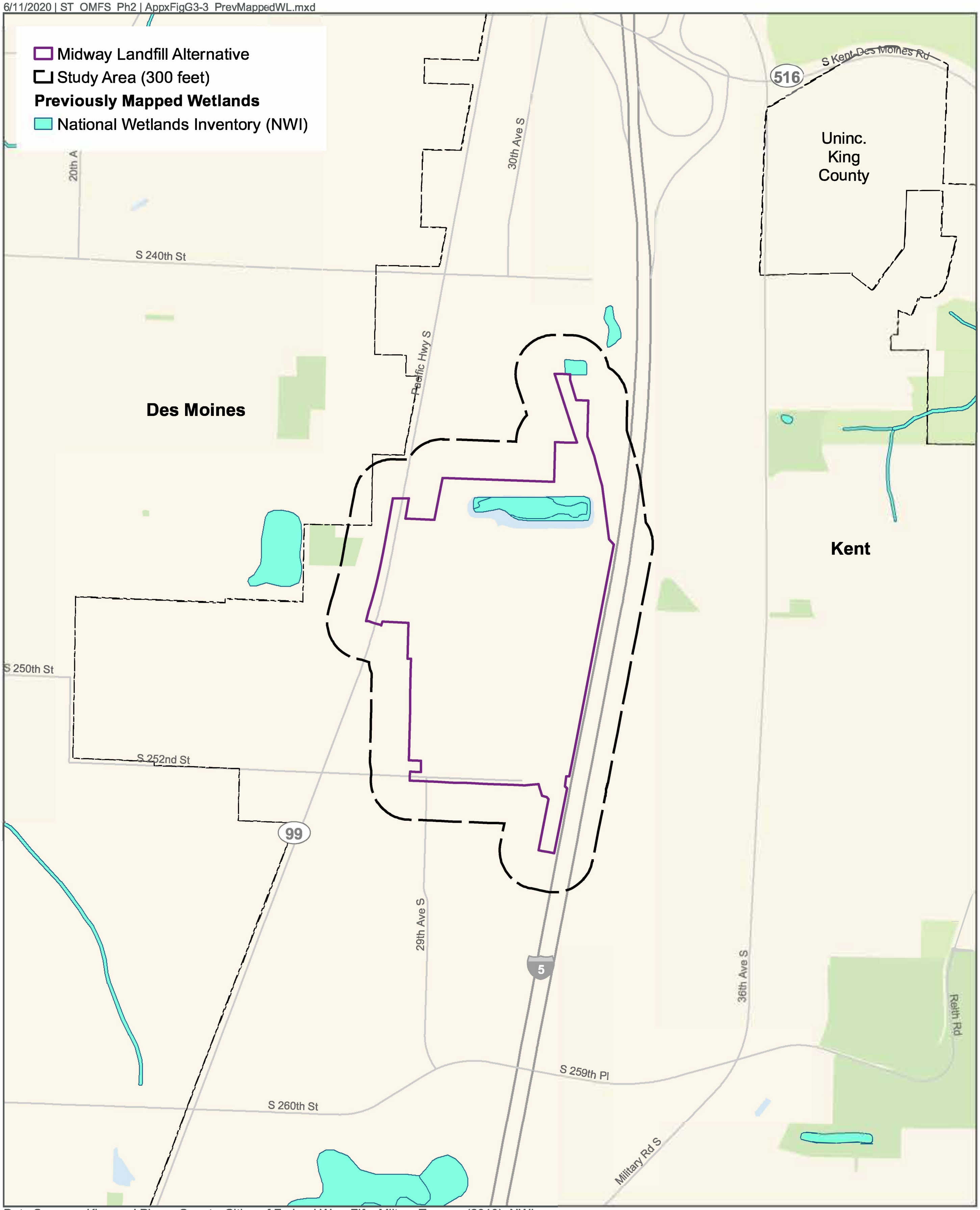
Operations and Maintenance Facility South

ATTACHMENT G3-3

Wetland and Stream Background Information

Federal Transit Administration

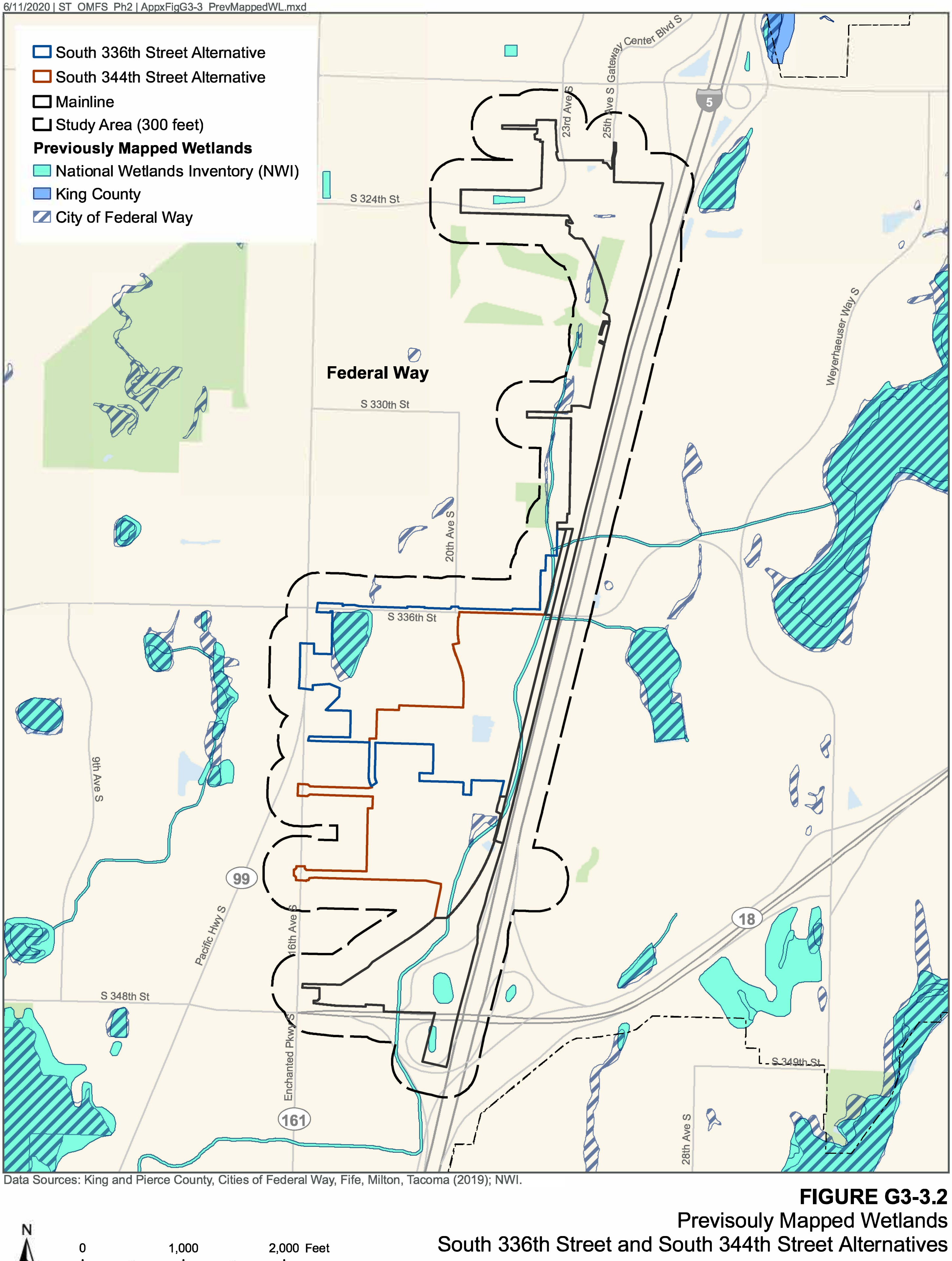
SoundTransit



Data Sources: King and Pierce County, Cities of Federal Way, Fife, Milton, Tacoma (2019); NWI.

FIGURE G3-3.1
Previsouly Mapped Wetlands
Midway Landfill Alternative
OMF South

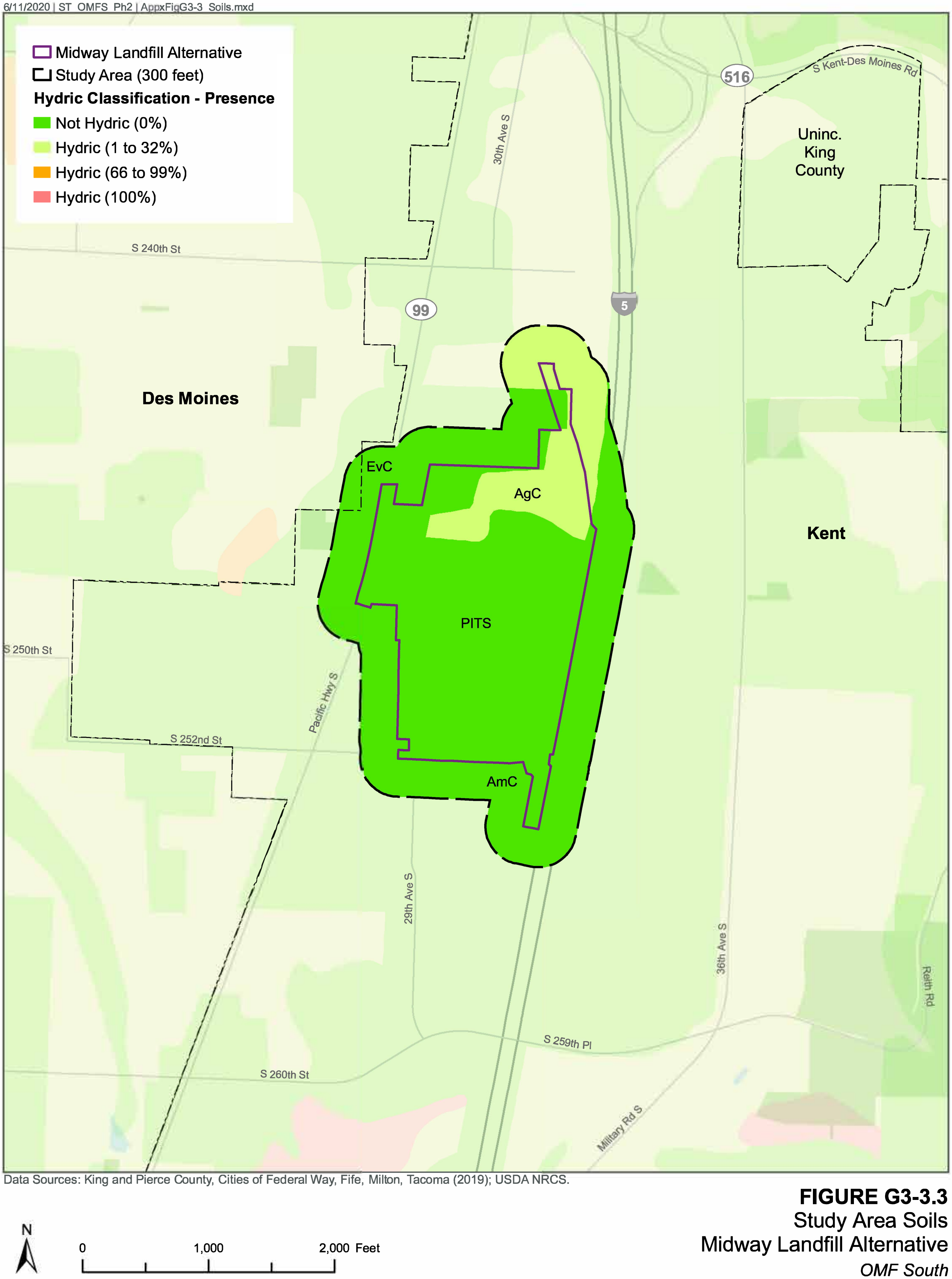
6/11/2020 | ST_OMFS_Ph2 | AppxFigG3-3_PrevMappedWL.mxd



Data Sources: King and Pierce County, Cities of Federal Way, Fife, Milton, Tacoma (2019); NWI.

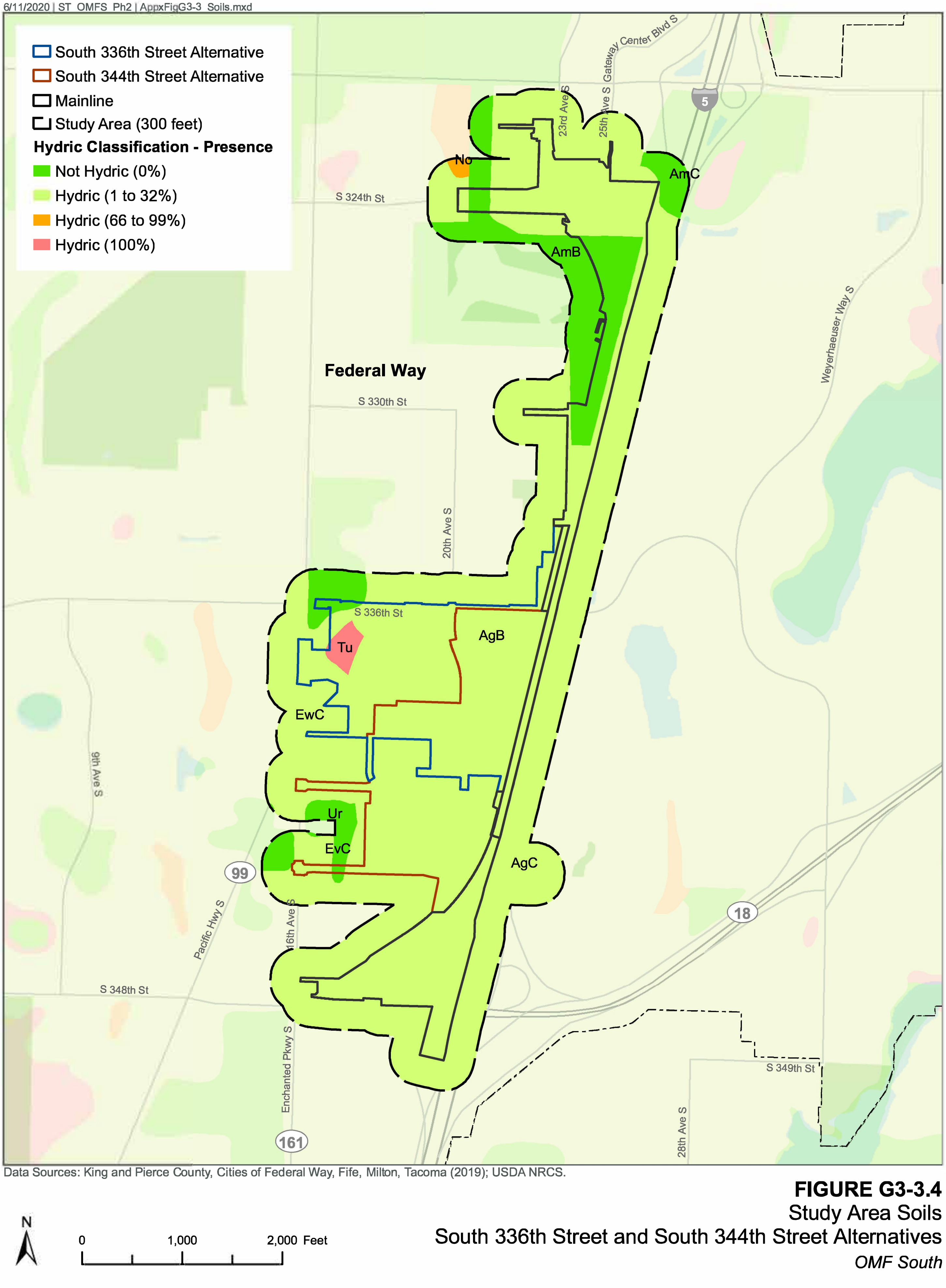
FIGURE G3-3.2
Previsouly Mapped Wetlands
South 336th Street and South 344th Street Alternatives
OMF South

6/11/2020 | ST_OMFS_Ph2 | AppxFigG3-3_Soils.mxd



Data Sources: King and Pierce County, Cities of Federal Way, Fife, Milton, Tacoma (2019); USDA NRCS.

FIGURE G3-3.3
Study Area Soils
Midway Landfill Alternative
OMF South



Data Sources: King and Pierce County, Cities of Federal Way, Fife, Milton, Tacoma (2019); USDA NRCS.

FIGURE G3-3.4
Study Area Soils
South 336th Street and South 344th Street Alternatives
OMF South

6/11/2020 | ST_OMFS_Ph2 | AppxFigG3-3_WaterQuality303d.mxd

Data Sources: DNR, King and Pierce County, Cities of Federal Way, Fife, Milton, Tacoma (2019).

FIGURE G3-3.5
Ecology 303(d) Listings
OMF South Alternatives

OMF South