Wetland 7 is classified as a palustrine forested/palustrine scrub-shrub (PFO/PSS) wetland under the USFWS system and a depressional wetland under the HGM system. This wetland is categorized a Category III according to Snohomish County and Ecology, and may require a 60-foot buffer.

Wetland 8

Wetland 8 is located in an overhead transmission line corridor northwest of the 20th Street SE and 88th Drive SE intersection (see Figure 30). Surface water enters this 0.04-acre wetland via a culvert from the north, providing the primary source of hydrology. Surface water exits this wetland to the south into a roadside ditch and is conveyed to Wetland 7. Wetland hydrology indicators observed at the time of the field investigation include ponding, soils saturated to the surface, and drainage patterns. Soils are a very dark grayish brown (10YR 3/2) loam over a greenish gray (5GY 5/1) gravelly sandy loam with strong brown (7.5YR 4/6) and dark yellowish brown (10YR 4/4) redoximorphic features. Vegetation in Wetland 8 consists of an emergent community dominated by reed canarygrass and common rush. The buffer consists of urban residences and maintained upland shrub vegetation in the overhead transmission line corridor.

Wetland 8 is classified as a palustrine emergent (PEM) wetland under the USFWS system and a depressional wetland under the HGM system. This wetland is categorized a Category III according to Snohomish County and Ecology, and may require a 60-foot buffer.

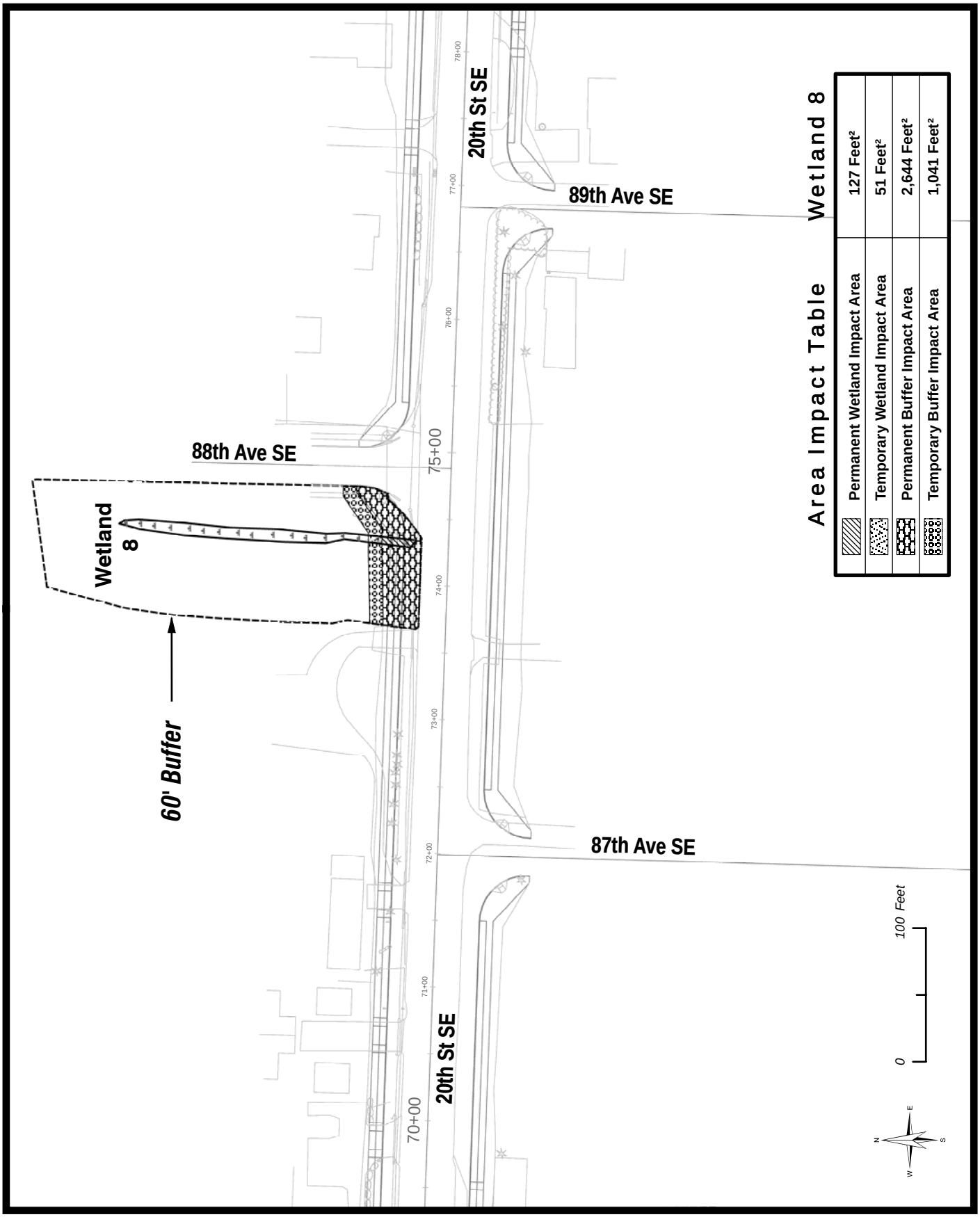
Wetland 9

Wetland 9 is located near the east terminus of the project corridor between 20th Street SE and 19th Place SE (see Figure 31). This 0.12-acre wetland is associated with Mosher Creek and Wetland 10 (via Mosher Creek). Hydrology is primarily supported by Mosher Creek and a shallow groundwater table. Wetland hydrology indicators observed at the time of the field investigation include ponding, soils saturated to the surface, drainage patterns, and sediment deposits. Soils are a dark grayish brown (2.5Y 4/2) gravelly sandy loam with yellowish brown (10YR 5/4) redoximorphic features over a black (10YR 2/1) silt loam. Woody debris and other organic matter were observed in the lower layer. Vegetation is comprised of a forest community dominated by red alder, western red cedar (*Thuja plicata*), salmonberry, and Himalayan blackberry. The wetland is bounded by 20th Street SE and residential development with a narrow vegetated buffer between the wetland and developed areas.

Wetland 9 is classified as a palustrine forested (PFO) wetland under the USFWS system and a depressional/riverine wetland under the HGM system. This wetland is categorized a Category III according to Snohomish County and Ecology, and may require a 60-foot buffer.

Wetland 10

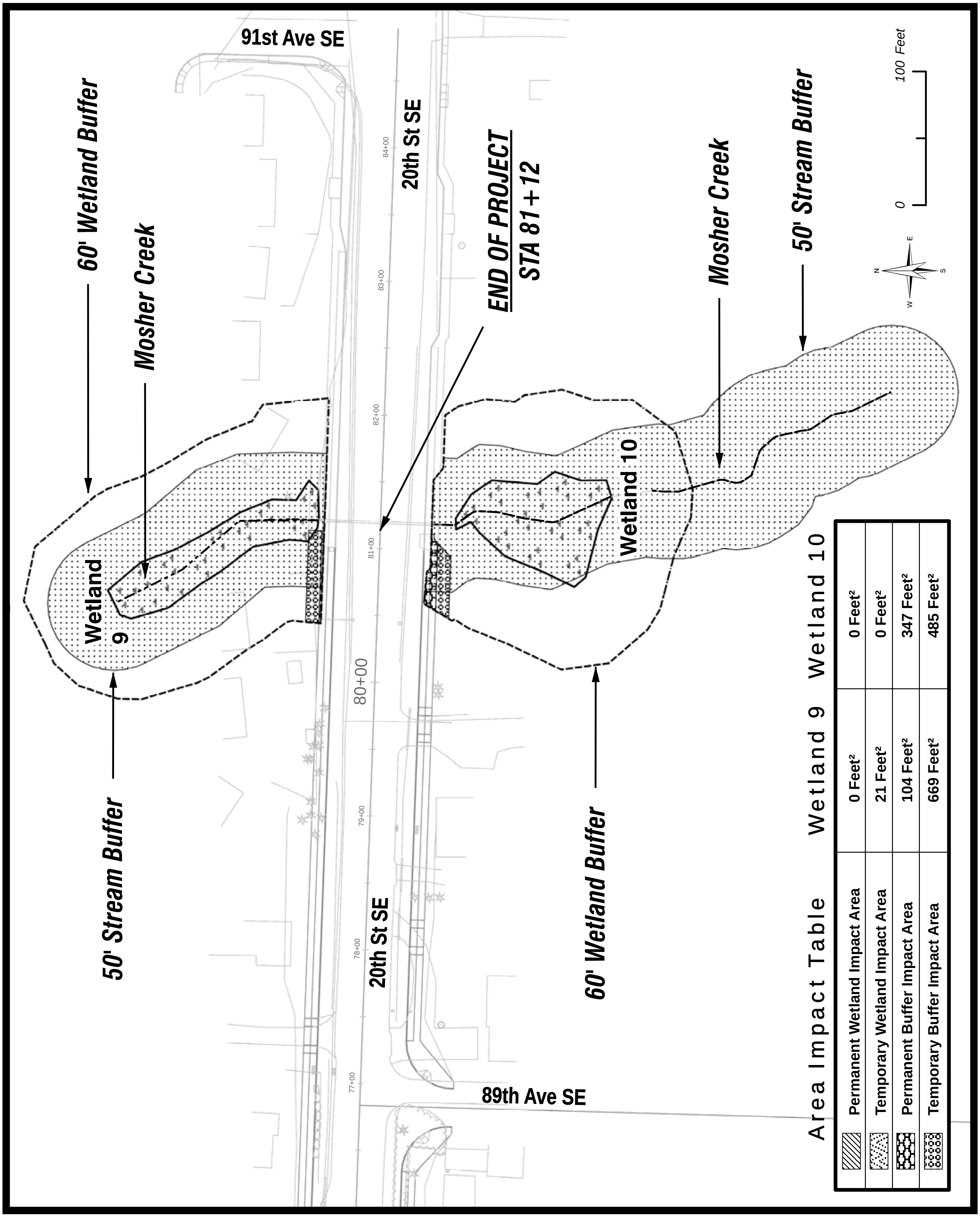
Wetland 10 is approximately 0.14 acre, and located near the east terminus of the project corridor and south of 20th Street SE adjacent to Mosher Creek (see Figure 31). Wetland 10 is connected to Wetland 9 via Mosher Creek. Hydrology is primarily supported by Mosher Creek and a shallow groundwater table. Wetland hydrology indicators observed at the time of the field investigation include ponding, soils saturated to the surface, and water stained leaves. Soils are a black (10YR 2/1) silt loam. Wetland 10 has two vegetation communities, forested and scrub-shrub. Dominant species include black cottonwood, red alder, Douglas spirea, red-osier dogwood, and reed canarygrass. The buffer is forest and maintained pipeline corridor.



The information depicted represents the results of survey's completed in May, 2006 and December, 2006 and can only be considered as indicating the general conditions existing at that time.

Figure 30: Wetland 8 Impacts

Snohomish County
Public Works



Area Impact Table

		Wetland 9	Wetland 10
(legend)	Permanent Wetland Impact Area	0 Feet^2	0 Feet^2
(legend)	Temporary Wetland Impact Area	21 Feet^2	0 Feet^2
(legend)	Permanent Buffer Impact Area	104 Feet^2	347 Feet^2
(legend)	Temporary Buffer Impact Area	669 Feet^2	485 Feet^2

The information depicted represents the results of survey's completed in May, 2006 and December, 2006 and can only be considered as indicating the general conditions existing at that time.

Figure 31: Wetland 9 and 10 Impacts

Snohomish County
Public Works

Wetland 10 is classified as a PFO/PSS wetland under the USFWS system and a depressional/riverine wetland under the HGM system. This wetland is categorized a Category III according to Snohomish County and Ecology, and may require a 60-foot buffer.

Impacts – Water Resources

During Construction

Preferred Alternative

The disturbance and exposure of soils during roadway construction could increase the amount of sediment discharged into Mosher Creek, Fox Creek, Ebey Slough, and adjacent wetlands during storm events. Construction activities associated with the clearing and removal of buffer vegetation of Mosher Creek and Fox Creek could also cause temporary turbidity impacts. Suspended sediment in the streams can clog fish gills, and sediment deposited on the stream bottom can harm plants and damage fish habitat. Fuel and other construction-related chemicals could accidentally spill and temporarily impact water quality in local streams and wetlands.

In-water work resulting from the proposed road widening only consists of the extension of a single culvert which crosses 20th Street SE, between 79th Avenue SE and 83rd Avenue SE. This culvert conveys Fox Creek under the roadway. During in-water work there is higher risk of temporary impacts to the stream due to sediments and/or spills. This culvert is located on a seasonal, non-fish bearing stream reach and is not considered to be a fish-passage barrier; therefore, it is anticipated that it would be extended and not replaced.

The Preferred Alternative would result in both permanent and temporary impacts to wetlands and wetland buffers (Table 13). Wetlands in the project area would be adversely affected by clearing, filling, grading, and excavation during road construction and, potentially, the installation of stormwater facilities.[2] A preliminary analysis indicates approximately 0.32 acre of wetland and 0.66 acre of buffer would be permanently eliminated. The majority of the wetland and buffer areas to be filled and/or cleared are adjacent to the existing road and are currently somewhat disturbed because of past or ongoing road maintenance and adjacent land uses. The Preferred Alternative would impact portions of buffers associated with wetlands and streams in the project corridor. Where wetland and stream buffers overlap, only aerial impacts to wetland buffers were calculated.

Physical changes to the wetlands, and their buffers and stream buffers, would also impact the ecological functions and values these areas provide. Filling wetlands would reduce the overall stormwater storage capacity in this portion of the basin. This in turn could affect groundwater and stream flows because wetlands typically store waters that infiltrate over time and maintain base flows during the dry season. It is assumed that proper stormwater management would mitigate for this lost function. Loss of buffers could also affect water quality functions by reducing biofiltration potential and making wetlands potentially more susceptible to erosion and sedimentation. Reducing wetland and wetland buffers through clearing and grading would

[2] Stormwater facilities site selection is not complete.

decrease wildlife habitat and the overall value of the area for wildlife (e.g. buffer vegetation provides visual and aural screening) (see Plants and Wildlife Section).

Table 13. Summary of Potential Permanent and Temporary Impacts to Wetlands and Buffers for the 20th Street SE Cavalero Road to 91st Avenue SE Project

		Permanent				Temporary			
		Wetland Fill		Buffer Fill[1]		Wetland Fill		Buffer Fill	
Wetland	Wetland Category	Acres	Square Feet	Acres	Square Feet	Acres	Square Feet	Acres	Square Feet
1	**III**	**0.06**	**2814**	**0.10**	**4472**	**0.02**	**877**	**0.04**	**1786**
2	**IV**	**0.01**	**635**	**0.18**	**7780**	**0.03**	**1417**	**0.04**	**1747**
3	**III**	**0.00**	**0**	**0.00**	**0**	**0.00**	**0**	**0.00**	**0**
4[2]	**II**	**0.23**	**10220**	**0.13**	**5567**	**0.09**	**4252**	**0.03**	**1436**
5	**III**	**0.01**	**188**	**0.09**	**4009**	**0.01**	**219**	**0.03**	**1328**
6	**III**	**0.00**	**0**	**0.00**	**0**	**0.00**	**0**	**0.00**	**0**
7	**III**	**0.01**	**232**	**0.09**	**3948**	**0.01**	**212**	**0.03**	**1344**
8	**III**	**0.00**	**127**	**0.06**	**2644**	**0.00**	**51**	**0.02**	**1041**
9	**III**	**0.00**	**0**	**0.00**	**104**	**0.00**	**21**	**0.02**	**669**
10	**III**	**0.00**	**0**	**0.01**	**347**	**0.00**	**0**	**0.01**	**485**
	TOTAL	0.32	14216	0.66	28871	0.16	7049	0.22	9836

[1] Buffer widths are preliminary. Final buffer widths are still to be confirmed. Buffer fill estimates are also preliminary and are dependent upon final buffer widths.

[2] Impacts are estimated. Wetland has not been delineated by County staff because the County has been unable to obtain a right-of-entry to the property. A section of it was previously delineated by a Lake Stevens School District #4 wetlands consultant as part of the new Cavelero Mid-High School construction project.

A preliminary analysis indicates approximately 0.16 acre of wetland and 0.21 acre of wetland buffer would be temporarily impacted. Temporary impacts to wetlands and their buffers would occur as a result of a 10-foot wide work area outside of the road footprint and the trenching and installation of stormwater pipe. Additional potential temporary effects associated with construction may include increased potential for erosion, sedimentation, spills of fuel or other hazardous material. BMPs would be employed during construction to minimize impacts. After construction is complete, wetlands and buffers affected by the temporary work areas and the stormwater pipe installation would be graded to the original ground profile and revegetated with native plants. Furthermore, although stream buffers may be impacted slightly, no substantial changes to riparian buffer functions and values would result from the project.

No Action Alternative

The road would not be widened and expanded under the No Action Alternative. Construction related impacts, similar to those described above, would not occur.

During Operation

Preferred Alternative

In addition to the potential temporary impacts that could occur during construction, wetland and stream functions could also be impacted during operation due to stormwater runoff and permanent loss of habitat area.

In general, streams and wetlands are impacted by stormwater runoff from roads and other impervious surfaces. Impacts generally include:

- Increased rate and volume of stormwater runoff within wetlands and streams, which usually results in erosion and sedimentation in streams and altered hydroperiods in wetlands.
- Decreased base flow into wetlands and streams due to filling areas of groundwater recharge and reduced soil storage capacity.
- Loss of infiltration and decreased stormwater storage in project area wetlands, which also increases the rate and volume of stormwater runoff.
- Loss of vegetative structure and diversity due to increased human accessibility, increased probability of invasion by weedy and invasive vegetation, and loss of plant species intolerant of pollutants and unstable hydrology.
- Increased pollutant load discharge into wetlands and streams, which can impact water quality.
- Reduction of sediment removal due to the reduction in vegetative structure.
- Reduction of organic production and export due to the reduction of vegetative structure.
- Reduction of some general wildlife and aquatic habitat from the removal of wetland vegetation (see Plants and Wildlife Section).

The Preferred Alterative would increase impervious surface by six total acres within the project area (Table 14).

Table 14. Preferred Alternative New Impervious Surface Area

Sub-basin	Existing	Proposed	Difference
Mosher Creek	**0.5 acres**	**0.7 acres**	**+0.2 acres**
Fox Creek	**3.7 acres**	**7.8 acres**	**+4.1 acres**
Ebey Slough	**2.7 acres**	**4.4 acres**	**+1.7 acres**
Total	6.9 acres	12.9 acres	+6.0 acres

In general, an increase in impervious surface area generally results in an increase in the rate and volume of stormwater runoff, which results in the impacts described above. However, the Preferred Alternative would retrofit existing impervious surface and it is likely that the net result would be a reduction in peak flow rates for the project area. This would benefit both Mosher and Fox Creeks by maintaining storm hydrographs more similar to natural conditions than pre-developed conditions. New impervious surface area within the Ebey Slough sub-basin is not

likely to impact Ebey Slough in terms of water quantity because it has been identified by Ecology as a receiving water, which means detention is not required and the resource is not likely to be impacted from an increase in either the volume or rate of runoff. However, increases in impervious surface area can reduce baseflows by reducing the amount of precipitation infiltrated to shallow groundwater and stored in the soil. It is possible that the proposed increase in impervious surface would affect baseflows in Fox and Mosher creeks; however, the magnitude is likely to be small. Baseflows in Ebey Slough are not likely to be affected by increased impervious surface in the project area because the hydrology of Ebey Slough is dominated by groundwater, the Snohomish River, and tidal fluctuations.

Potential increases in pollutant load were estimated using the WSDOT methodology for state highways. Estimated annual pollutant loads were calculated for the existing and proposed impervious areas in each basin, using the annual pollutant load values for untreated and treated highway runoff (Lbs/year-acre) reported in Table 1 of the Quantitative Procedures for Surface Water Impact Assessments Technical Guidance.

The Preferred Alternative is likely to result in a net decrease in the majority of pollutants discharged to Mosher Creek, Fox Creek, and Ebey Slough (Table 15). However, dissolved copper and dissolved zinc annual loading may slightly increase in the Fox Creek basin.

Table 15. Estimated Annual Pollutant Loads for Existing and Proposed Conditions

	Mosher Creek Basin			Fox Creek Basin			Ebey Slough Basin		
Annual Pollutant Loads	No Action (Untreated)	Preferred Alternative (Treated)	Δ	No Action (Untreated)	Preferred Alternative (Treated)	Δ	No Action (Untreated)	Preferred Alternative (Treated)	Δ
TSS (Lbs/year)	**412.5**	**40.6**	**-371.9**	**3052.5**	**452.4**	**-2600**	**2227.5**	**255.2**	**-1972.3**
Total Phosphorus (Lbs/year)	**0.60**	**0.21**	**-0.39**	**4.44**	**2.34**	**-2.1**	**3.24**	**1.32**	**-1.92**
Total Copper (Lbs/year)	**0.10**	**0.035**	**-0.065**	**0.74**	**0.39**	**-0.35**	**0.54**	**0.22**	**-0.32**
Dissolved Copper (Lbs/year)	**0.025**	**0.021**	**-0.004**	**0.185**	**0.234**	0.049	**0.135**	**0.132**	**-0.003**
Total Zinc (Lbs/year)	**0.55**	**0.175**	**-0.375**	**4.07**	**1.95**	**-2.12**	**2.97**	**1.1**	**-1.87**
Dissolved Zinc (Lbs/year)	**0.175**	**0.119**	**-0.056**	**1.295**	**1.326**	0.031	**0.945**	**0.748**	**-0.197**

There is one culvert that crosses 20th Street SE between 79th Avenue SE and 83rd Avenue SE, which conveys Fox Creek under the roadway. At this time, it is anticipated that it would be extended and not replaced as it is not a fish passage barrier. As appropriate, sediment and erosion control BMPs will be implemented to reduce or eliminate downstream sedimentation and all terms and conditions of the HPA, including timing restrictions, will be strictly adhered to. The culvert extension would not result in any long-term impacts to the water quality of Fox Creek since the culvert extension is not likely to increase erosion at this site.

No Action Alternative

The road would not be widened and expanded under the No Action Alternative and the full retrofit stormwater treatment facilities would not be built, resulting in continued runoff from 20th Street SE. Operation related impacts, similar to those described above, would continue to occur.

Mitigation – Water Resources

During Construction

Preferred Alternative

All work would be done in accordance with applicable environmental regulations and permit conditions. Best Management Practices (BMPs) and erosion control measures such as silt fences, straw wattles, and temporary detention facilities would be used during construction to minimize or prevent sediment from being discharged to wetlands, Mosher Creek, Fox Creek, and Ebey Slough. If construction takes place during the time of year when water may be flowing in these streams, monitoring would take place for turbidity and any other water quality parameters as required by the Construction NPDES permit. Vegetation removal would be minimized to the greatest extent possible, and exposed soils would be covered or revegetated throughout the construction corridor to minimize erosion and sedimentation.

A Construction Stormwater Pollution Prevention Plan (SWPPP) would be prepared in accordance with Volume II of the Washington Department of Ecology's 2005 Stormwater Management Manual for Western Washington (Ecology Manual), which would address how erosion control would be handled during construction. All management practices and control facilities used in the course of construction would be of sufficient size, strength, and durability to readily outlast the longest possible construction schedule and the worst anticipated rainfall conditions. Linear projects, such as roadway construction and utility installations, are special cases of construction activities and present their own, unique set of stormwater protection challenges. Relevant BMPs (e.g. install sediment controls, stabilize soils, and control de-watering) would be adapted and modified to provide the controls needed to adequately address these projects. It may by advantageous to segment long, linear projects into a series of separate units that can apply all necessary controls pertinent to that particular unit in a timely manner.

Snohomish County regulates clearing, grading, and drainage activities that are part of development projects. The filling of wetlands is also a regulated activity, and would require mitigation to offset the wetland impacts associated with the project. Mitigation is generally defined, in descending order of preference, as: avoiding, minimizing, rectifying, reducing, compensating, or monitoring/correcting for wetland impacts. The U.S. Army Corps of Engineers (Corps) and Ecology would be notified to determine the jurisdictional requirements associated with the proposed wetland fill activity. All potential secondary impacts to wetlands from this project (e.g. changes of flow and/or the discharge of pollutants) would be minimized through the establishment of wetland buffer zones and properly designed stormwater management facilities.

Construction staging and stockpiling areas would be kept away from wetlands as an avoidance measure. Retaining walls would be constructed in some areas to minimize fill in critical areas. Compensatory mitigation would be provided for unavoidable critical area and buffer impacts associated with the Preferred Alternative. Wetlands disturbed during construction and those

permanently altered (e.g., filled or drained) as part of the project would be compensated for in accordance with Snohomish County, the Corps, and Ecology mitigation requirements. The overall goal of the mitigation is to replace functions and values, including habitat, lost as a result of the Preferred Alternative. Compensation for unavoidable permanent impacts would be provided to achieve a no net loss of wetland, stream, or buffer area and function.

In determining the suitability of potential wetland mitigation sites, the County's site examination would include, but not be limited to, the following tasks:

1. Regional review of available undeveloped lands in the area, and selection of appropriate sites for further study.
2. Field review to see if the selected sites are suitable for wetland mitigation.
3. Determination if onsite, in-kind mitigation is possible.
4. Preparation of mitigation plans.

If no suitable onsite stream and wetland locations are found to compensate all the stream and wetland impacts, the County would look to mitigate impacts offsite. Mitigation may also include out-of-kind compensation (e.g., not the same type of wetland).

The specific location of mitigation sites would be shown on the final construction plans and would be described in a detailed mitigation plan prepared by the County. The mitigation design and location would be coordinated between the Snohomish County Public Works Department, the Corps, and Ecology.

No Action Alternative

No construction activities would take place under this alternative. Therefore, no impacts to water resources would occur that require mitigation.

During Operation

Preferred Alternative

Potential impacts from additional impervious surface during operation of the roadway would be minimized or avoided through the full retrofit of stormwater quantity and water quality treatment facilities within the 20th Street SE project area. The design guidance outlined in the Ecology Manual is proposed for improvements on 20th Street SE, in conjunction with the guidance outlined in the Snohomish County Code (Title 30). The full retrofit would provide detention for all existing and additional impervious surface, as required by the Ecology Manual.

The stormwater management design consists of a series of pipes and catch basins that collect runoff and convey it to detention facilities and water quality treatment facilities. Due to the topography of the project corridor and its location within three drainage basins, several stormwater quantity and water quality facilities will be required to handle stormwater runoff. Potential sites are being evaluated both north and south of the roadway, at the west end of the project near the base of Cavalero Hill, and between Cavalero Road and 83rd Avenue SE. It is anticipated that these facilities will range from smaller facilities such as bioswales and rain gardens to larger facilities such as detention ponds and constructed wetlands. The facility types and final locations will be dependent on environmental, right-of-way, geotechnical, maintenance, cost, and engineering considerations.

Enhanced water quality treatment systems would also be installed to treat runoff from all existing and added impervious surface, as required for runoff that discharges to fish-bearing waters.

The proposed system of stormwater management facilities would effectively capture and convey runoff within the project limits from onsite and offsite sources. Measures taken to control runoff rates to receiving waters and provisions for water quality treatment would minimize the impacts to the hydrologic basins in the project corridor. Figures 32 and 33 depict the location of the proposed detention and treatment facilities associated with the project.

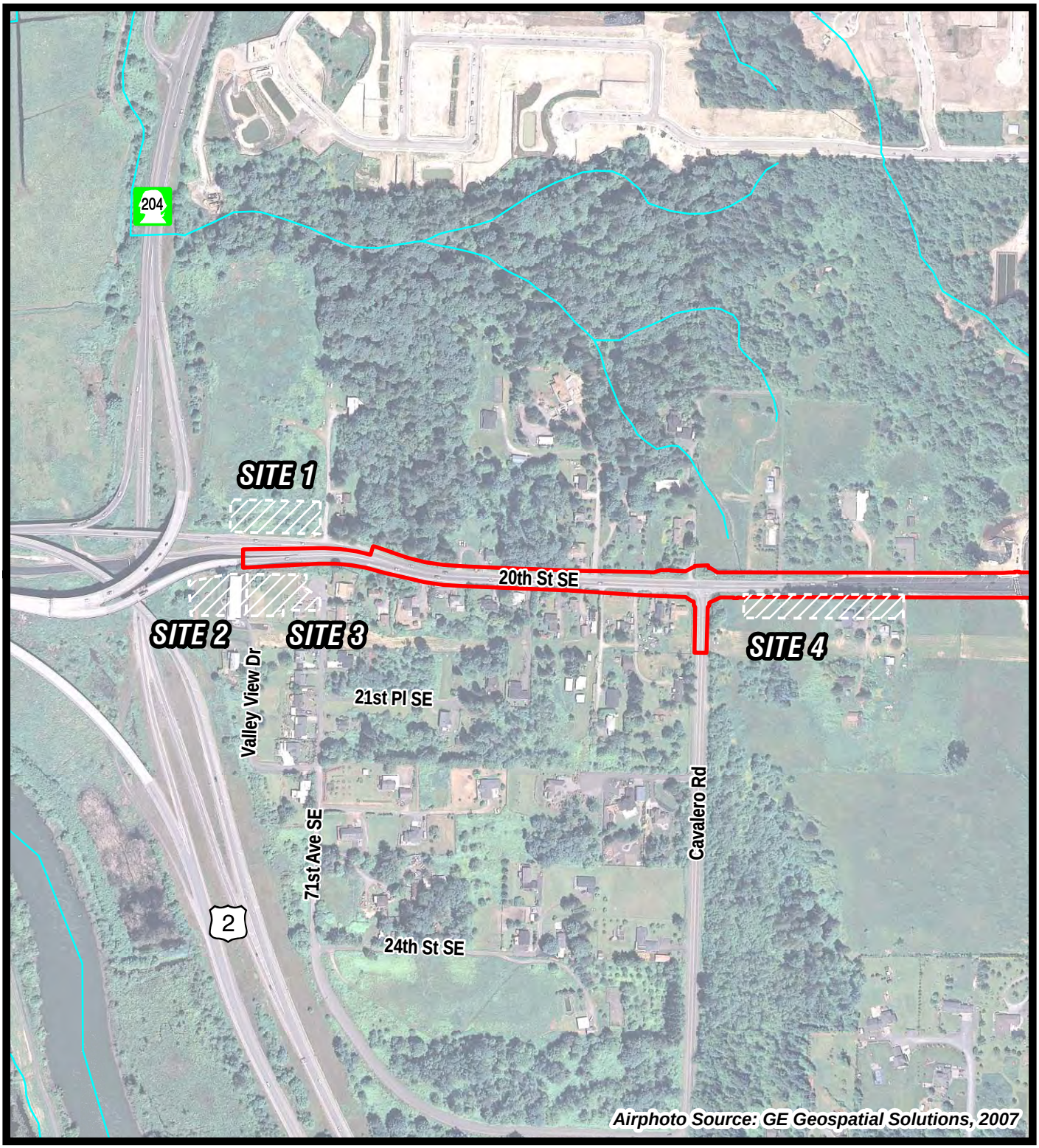
Wetland mitigation sites will be monitored and maintained.

No Action Alternative

Under this alternative, the proposed project would not take place. Therefore, the road would not be retrofitted with stormwater detention or treatment BMPs.

Significant Unavoidable Adverse Impacts

Permanent wetland fill and stream/wetlands buffer fill are unavoidable adverse impacts. However, these impacts are not expected to be significant because the amount of wetland and buffer impact is relatively minor. With the exception of Wetland 4, the impacts occur only to Category III and IV wetlands with limited functions and values. The wetlands are located in areas immediately adjacent to an existing roadway, where existing conditions are somewhat degraded. Likewise, impacts to stream buffers are minor and on non-fish-bearing streams. Furthermore, all impacts to streams, wetlands, and buffers will be fully mitigated.



Key to Features:

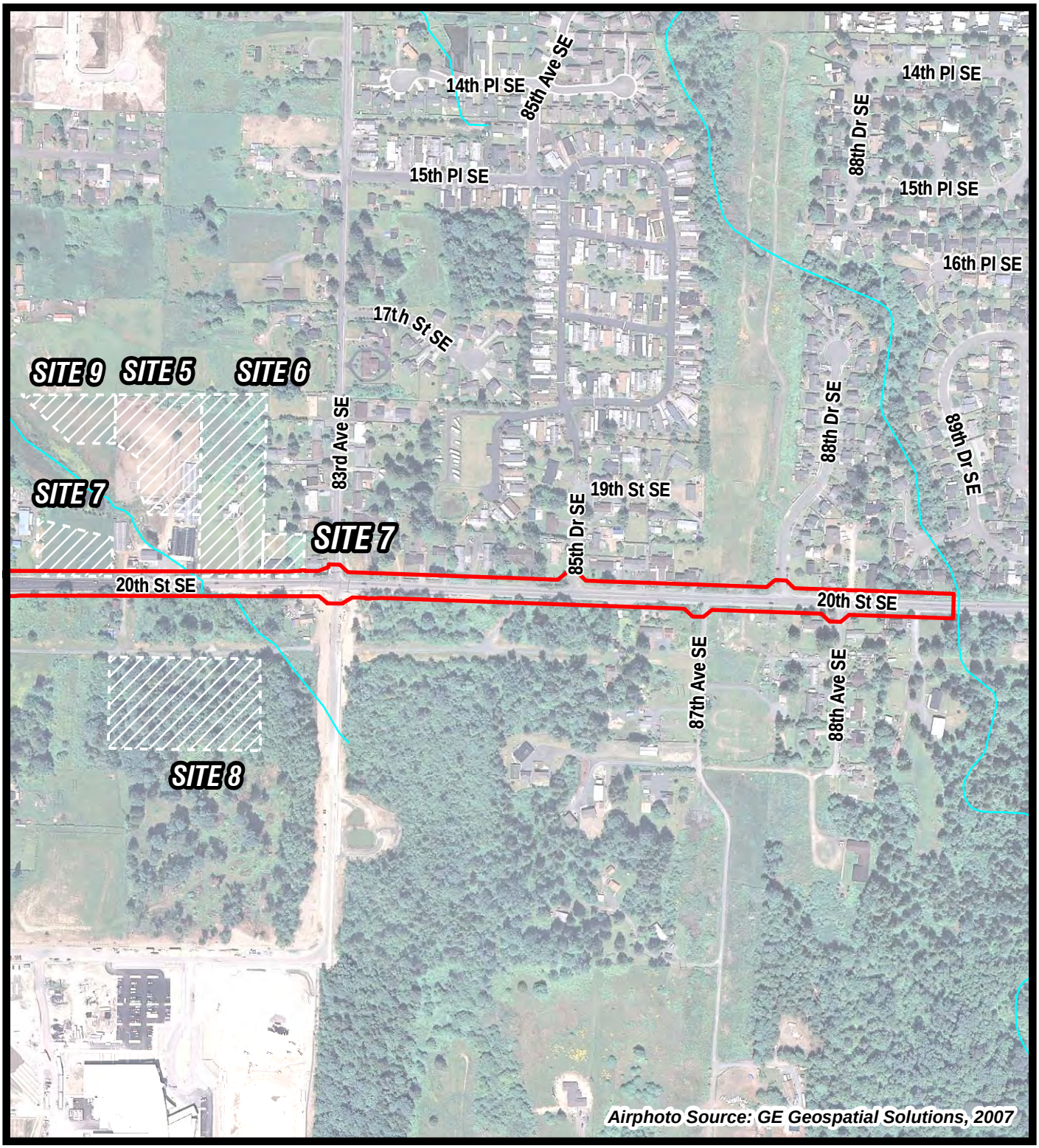
- Project Area
- Potential Stormwater Facility
- Streams

N
W E
S

0 500 Feet

Snohomish County
Public Works

Figure 32: Potential Stormwater Facility Locations (west)



Key to Features:

- Project Area
- Potential Stormwater Facility
- Streams

N W E S

0 500 Feet

Snohomish County
Public Works

Figure 33: Potential Stormwater Facility Locations (east)