Planning Commission Meeting Date: February 18, 2016 Agenda Item: 6a

PLANNING COMMISSION AGENDA ITEM

CITY OF SHORELINE, WASHINGTON

AGENDA TITLE: **Additional Technical Assessments for the 145th Street Station Subarea Plan Environmental Impact Statement**
DEPARTMENT: **Planning & Community Development**
PRESENTED BY: **Miranda Redinger, Senior Planner**
Mandi Roberts, AICP, PLA, Principal, OTAK Inc.
Jeff Gray, Senior Wetland Biologist, OTAK Inc.
Robert Metcalfe, PE, LEG, Principal Geotechnical Engineer, GeoEngineers

☐ **Public Hearing**	☐ **Study Session**	☐ **Recommendation Only**
☒ **Discussion**	☐ **Update**	☐ **Other**

INTRODUCTION AND BACKGROUND

On March 23, 2015, Council decided to follow the Planning Commission recommendation to postpone further discussion of the 145th Street Station Subarea Plan until completion of the 145th Street Corridor Study. At the time of the postponement, the Draft Environmental Impact Statement (Draft EIS) for the subarea plan had been published, and the public had submitted many comments. A number of comments focused on wetlands, streams, soils, trees, habitat, and surface and ground water in the subarea.

If the subarea were to be rezoned, individual redevelopment projects would be required to perform site-specific geotechnical analysis to determine feasibility, identifying critical areas as well as engineering solutions for buildings or mitigation to protect wetlands and streams. However, the City decided to undertake additional analysis of the natural systems, beyond what was required in the Draft EIS, in order to better understand existing conditions of two areas known to contain extensive critical areas: Paramount Open Space and Twin Ponds Park.

The main question was whether it would be better for the health of the wetlands and ecosystems for properties outside of City Park or Open Space boundaries to retain single-family (R-6) zoning or potentially redevelop under new zoning designations and regulations.

On April 6, 2015, the Council allocated funds for additional environmental analysis for the 145th Street Station Subarea Plan, specifically:

Approved By: **Planning Director ____** **Project Manager ____**

- Scientific reconnaissance of the wetlands/streams at Paramount Open Space and Twin Ponds to better understand the extent of the resources including an estimate of maximum buffer limits based on SMC 20.80;
- Preparation of a "white paper" on the impact to the functions and values of the wetlands under current and proposed zoning for areas determined to likely contain the wetlands/streams and associated buffers; and
- Preparation of a "white paper" regarding construction types and cost based feasibility of developing in areas that have a higher susceptibility for liquefaction.

Attachment A is a cover memo to introduce the two white papers, which are included as Attachment B (Wetland and Stream Assessment) and Attachment C (Geotechnical Considerations). Staff from OTAK and GeoEngineers will present their findings to the Commission and be available to answer questions at the meeting.

DISCUSSION

The cover memo (Attachment A) explains the purpose of the additional technical analysis, briefly summarizes some of the findings, lists considerations related to land use decisions, and draws some conclusions about potential impacts of various scenarios.

The Wetlands and Stream Assessment (Attachment B) is a technical memo, or white paper, that details the analysis of wetlands, hydrology, soils, vegetation, streams and stream characteristics, fisheries, and stream classification and buffers. This technical memo also discusses potential zoning changes and regulations contained in the City's newly revised Critical Areas Ordinance. It outlines implications of land use change, including single- as opposed to multi-family use and redevelopment opportunities to improve critical areas and buffer functions.

The Geotechnical Considerations for High Groundwater or Peat Conditions memo (Attachment C) identifies subsurface conditions specific to the area (but not to individual properties) and general engineering solutions that could be employed to keep buildings safe. The main question it attempted to answer was whether known conditions would preclude redevelopment in accordance with potentially new zoning standards. The memo essentially concludes that high groundwater or peat conditions exist in some of the areas near Paramount Open Space and Twin Ponds Park, but it will take site-specific evaluation of soil and hydrologic conditions for a property owner to determine if necessary engineering solutions are too expensive for a project to be feasible.

Many of the potential trade-offs that are discussed in the attached white papers were known concepts, but it may be helpful to articulate some of the assumptions substantiated in the memos:

- Public park and open space land would not be anticipated to change use if the subarea were to be rezoned, but surrounding private property that may contain

wetlands or streams and their buffers could be expected to redevelop from current single-family uses if rezoned.

- Regulations contained in the Critical Areas Ordinance would apply to properties with these conditions regardless of their zoning.
- Some of the structures and associated uses that currently exist in single-family zones would not be allowed if the properties were to be developed under existing regulations, but because more stringent standards were not in place when they were built, they are protected as non-conforming (or grandfathered).
- If single-family properties were not rezoned or did not redevelop, these non-conforming uses would remain indefinitely, neither posing significant new adverse impacts to wetlands and streams, nor providing opportunities for restoration.
- If single-family properties were rezoned, a percentage would redevelop over the next several decades, which could create adverse impacts to wetlands and streams that would need to be mitigated if construction were allowed and feasible.
- Under the Critical Areas Ordinance, if properties were aggregated, various tools including buffer averaging could be applied. Assuming there was enough buildable land to allow for construction of denser units on part of an aggregated site, existing structures could be removed from critical areas, thus restoring wetland function in the previously impacted area.
- Redevelopment under existing codes would also require low-impact development techniques and apply more stringent surface water standards. It may also provide opportunities for restoration or improvement of critical area function.

How could the technical memos be used to inform decision-making with regard to upcoming land use decisions?

Commissioners should draw their own conclusions from the information provided in the white papers, and discuss potential implications of various alternatives at upcoming meetings. The Commission could decide to amend one of the potential zoning scenarios to exclude land near Paramount Open Space or Twin Ponds Park from rezoning. The Commission could decide to phase (or overlay) zoning around these areas based on a timeline or certain conditions being met. The Commission could choose to make no changes to potential zoning scenarios based on these technical memos.

TIMING AND SCHEDULE

At the March 17 Planning Commission meeting, Commissioners will consider the zoning scenarios analyzed in the Draft EIS: No Action, Connecting Corridors, and Compact Communities. At the April 7 meeting, the Commission may recommend any of these scenarios to Council as the Preferred Alternative for further analysis in the Final EIS, in

their current form, as phased versions, or revised with regard to zoning designations or boundaries.

If the Commission is able to make a recommendation at that meeting, Council will discuss the Preferred Alternative zoning scenario at their May 2 meeting. Following their decision, OTAK will begin the Final EIS, and other work required for adoption, such as writing the Subarea Plan. Commission could expect to start discussing the Final EIS, draft Subarea Plan, and adopting ordinances this summer as the documents become available. A potential timeline for the remainder of the subarea planning process is included as Attachment D. This potential timeline could include a public hearing and Commission recommendation in August and Council discussion and adoption in September 2016.

RECOMMENDATION

No action is required as part of this discussion. However, the Commission should consider information analyzed in the white papers at the March 17 and April 7 meetings when making recommendations to Council about the Preferred Alternative zoning scenario to be studied in the Final EIS.

ATTACHMENTS

Attachment A– Summary of Additional Technical Assessments Memo
Attachment B– Paramount Open Space and Twin Ponds Park Wetlands and Streams Assessment
Attachment B, Figure 1- Wetlands Map, Paramount Open Space
Attachment B, Figure 2- Wetlands Map, Twin Ponds Park
Attachment C- Geotechnical Considerations for High Groundwater or Peat Conditions
Attachment D- Potential Timeline for 145th Street Station Subarea Plan

Memorandum

To:	City of Shoreline Planning Commission
From:	Mandi Roberts, AICP, PLA, Principal
Copies:	File
Date:	January 29, 2016
Subject:	Summary of Additional Technical Assessments for the NE 145th Street Station Subarea DEIS
Project No.:	32402

Purpose of Additional Technical Assessments

In response to comments and questions received as part of the public review process for the 145th Street Station Subarea Draft Environmental Impact Statement (DEIS), published in January 2015, the City of Shoreline procured additional technical work, including an assessment of known streams and wetlands in the Twin Ponds Park and Paramount Open Space areas based on field reconnaissance, and an assessment of existing subsurface soil and groundwater conditions and related geotechnical considerations.

These planning-level assessments were conducted in the summer and fall of 2015 to further evaluate potential environmental effects and potential impacts to ecosystem health of wetlands and streams related to the rezoning alternatives being considered by the City of Shoreline. The assessments were prepared to assist decision-making and explain important considerations and trade-offs related to the alternatives. Possible implications on redevelopment related to protecting and mitigating critical areas and addressing subsurface soil and groundwater conditions also were explored. Biologists from Otak, Inc. conducted the stream and wetland reconnaissance and assessment. GeoEngineers, Inc. prepared a general assessment of subsurface soil conditions and geotechnical considerations. See attached technical memorandums for more detail.

With any future redevelopment, the proponents would need to conduct due diligence and site investigation to support their financing, land use applications, and other permitting. As part of this future work, developers would be required to conduct detailed, site-specific analyses of critical areas, geotechnical conditions, stormwater drainage, traffic impact study, topographic survey, mapping of setbacks, and other areas to determine buffer dimensions, redevelopment capacity, and the architectural and engineering parameters of their projects. Wetland and stream

delineations meeting City of Shoreline and Washington State Department of Ecology regulations would be required for all properties undergoing development with wetlands and streams located within the property boundaries or in proximity to the property.

Summary of the Assessment of Wetlands, Streams, and Buffers

This work focused on providing a more in-depth understanding of wetlands, streams, and associated buffer requirements in the Paramount Open Space and Twin Ponds Park areas. Seven wetlands were identified in the Paramount Open Space area (see Figure AW-1), and two were identified in Twin Ponds Park (see Figure AW-2). Seven streams were also identified on the City-owned parcels—five on the Paramount Open Space parcels and two on the Twin Ponds parcels. Buffers for these critical areas are also depicted in the two Figures.

A number of privately held properties appear to be within the buffers for the wetlands and streams on both the Paramount Open Space and Twin Ponds Park areas. In the case of Twin Ponds Park, the wetland system is located within the boundary of the public park property with stream corridors extending outside the park. At Paramount Open Space, wetlands appear to exist both inside public park property and outside the park. Figures AW-1 and AW-2 depict the physical area of streams, wetlands, and associated buffers that would need to be protected with any future redevelopment.

Buffers for wetland and stream areas identified in the reconnaissance have been measured and mapped based on current adopted Department of Ecology standards and the City of Shoreline Critical Areas Ordinance (CAO). The assessment reflects updated regulations in the CAO adopted by City Council on December 7, 2015 and in effect on February 1, 2016.

Summary of the Assessment of Subsurface Soil and Groundwater Conditions and Geotechnical Considerations

This work focused on providing a more in-depth understanding of subsurface soil and groundwater conditions and related geotechnical considerations in the subarea and addresses the potential influence of these conditions on future redevelopment.

Based on available data, there are some areas with peat-laden soils and high groundwater in the subarea. These are fairly common conditions throughout the Puget Sound region, where glacial activity over thousands of years heavily influenced the area's geology. Liquefaction is a phenomenon where soils experience rapid loss of internal strength as a consequence of seismic activity. Available data and mapping indicate the presence of potentially liquefiable soils in some locations of the subarea. There are a variety of engineering treatments that address liquefaction, as noted in the attached memorandum. Because of the variety of mitigation techniques and highly

variable ground conditions, site-specific geotechnical engineering investigations must be completed in order to determine the risk of potential liquefaction and cost effective mitigation solutions.

Considerations Related to Rezoning Alternatives for the 145th Street Station Subarea

As the City continues to evaluate potential rezoning alternatives for the subarea, the following considerations may be helpful in the decision-making process.

- Regardless of the rezoning alternative adopted, critical areas (wetlands, stream, and associated buffers and other critical areas) located within and near redevelopment sites would be protected by City, state, and federal regulations, including the City of Shoreline's adopted Critical Areas Ordinance (CAO) provisions (Shoreline Municipal Code, Title 20 Development Code). The CAO includes regulations that apply to wetlands, streams, and related buffers (and related fish and wildlife habitat conservation), as well as geologic hazard areas. The Development Code also includes regulations related to tree conservation, land clearing, and site grading that would apply to future redevelopment.

- The wetlands and streams assessment and related mapping has helped to clarify the expected limits of streams, wetlands, and buffers in the Paramount Open Space and Twin Ponds Park areas. The City may determine, after review of the assessment, to either include these land areas in the rezoning alternatives or to retain these areas in their existing zoning of single family R6. Public park lands would be retained in open space/park use in both rezoning alternatives. As such, decision-making will focus on whether or not to rezone properties outside the publicly-owned park and open space lands that appear to contain portions of wetlands, streams, and associated buffer areas.

- If single family R6 zoning is retained in areas anticipated to contain wetlands, streams, and associated buffers, nonconforming structures and residential yard uses in these areas would continue to exist indefinitely. These nonconforming uses include residential structures within stream and wetland buffer areas, existing non-structural residential uses (lawns, non-native landscaping, pet activities, etc.) appear to exist in wetlands and in wetland and stream buffers, and these uses also would continue. Although they may be encumbered by wetlands, streams and buffers, properties would continue to be allowed to retain single family use in the future as a nonconforming use in accordance with the Development Code.

- If areas currently in single family R6 zoning are converted to mixed use residential zoning under either of the two rezoning alternatives, there would be opportunities to more clearly protect wetlands, streams, and buffers with redevelopment. Nonconforming uses could be

removed from critical areas. With delineated boundaries of the wetlands, streams and buffers, water quality treatment, flow control (stormwater management that reduces excess runoff and flooding), and other environmental mitigation, critical areas could be further protected and enhanced through future redevelopment under rezoning.

- At this time, it is not known how parcels might be aggregated for future redevelopment, so it is not possible to physically quantify how critical areas and buffers might affect redevelopment capacity on a site by site basis. This will depend on future site specific plans, and each developer would be required to delineate and survey streams, wetlands, and buffers associated with their sites prior to development. With future aggregation of properties, site plans for development would be required to show delineated streams, wetlands, and buffers per the CAO requirements.

- As discussed in the attached technical memorandum, if a developer aggregates a large scale area of property for redevelopment, the buffer areas could be averaged and mitigation may occur through dedicated open space as part of the project. Developers would be required to prepare master site plans indicating their proposals to protect streams and wetlands, and may propose mitigation in accordance with City, state, and federal requirements. As such redevelopment capacity within the buffer areas may be physically different than shown on the mapped figures.

- The extent of peat laden soils and high groundwater conditions on any given site could limit redevelopment potential. However, there are site engineering and structural design approaches that can address these conditions, so the presence of these conditions does not necessarily mean that property is not developable.

- Redevelopment of properties with peat-laden soils, high groundwater, and soils subject to liquefaction and the required engineering treatments and mitigations to address these conditions typically would be more expensive than redevelopment of property without these conditions. Site by site analysis would need to be conducted to determine specific redevelopment potential and capacity. The feasibility of redevelopment will depend on many factors, including the amount of land affected by these conditions, the overall configuration and size of the redevelopment parcel (likely aggregated from multiple properties), the type of development (building heights and densities) allowed at the particular property, parking requirements, and other factors. In many cases, redevelopment projects, especially those of multi-family densities and at larger scales, can afford to off-set the engineering and construction costs associated with these subsurface conditions, as has been evidenced in construction projects throughout the region.

- Redevelopment potential will need to be determined on a site-by-site basis as part of due diligence by property owners. At this time, it is not known how future redevelopment parcels will be configured. As part of future development projects, site-specific subsurface evaluations by licensed geotechnical engineers will need to be completed to determine existing conditions and appropriate design and construction of new development and improvements (buildings, roadways, bridges, utilities, etc.). The City's site development and building permit process (and application of International Building Code requirements) would include review of specific geotechnical and structural engineering design plans.

Conclusion

The Planning Commission will be considering how to move forward with the rezoning alternatives analyzed in the DEIS (and further evaluated in the FEIS) and identification of a preferred alternative for the subarea. As part of this ongoing decision-making process, the Planning Commission may recommend to either include land areas with potential wetlands, streams, and buffers in the rezoning alternatives or to retain these areas in their existing zoning of single family R6.

Based on the technical assessment, it is not anticipated that rezoning from single family use to mixed use residential would result in significant unavoidable adverse impacts to the ecological health of wetlands, streams, buffers and their related wildlife habitat values. Redevelopment would provide opportunities to improve and enhance critical areas through delineation of natural area protection boundaries, water quality and flow control management, and other environmental mitigation activities.

Regarding subsurface conditions related to soils that contain peat, high groundwater conditions, and liquefaction potential, individual site-by-site analyses will need to be completed as part of future redevelopment to determine potential effects. There are a variety of geotechnical and structural engineering treatments that can address these conditions as part of site development.

It is recommended that the Planning Commission continue to include the properties surrounding the Paramount Open Space and Twin Ponds Park areas in the two rezoning alternatives to be addressed in the FEIS. With the determination of a preferred alternative, these properties may be rezoned to mixed use residential as part of the adoption of the subarea plan for the 145th Street Station Subarea. Rezoning to mixed use residential would not be expected to result in significant unavoidable adverse impacts.

To:	City of Shoreline Planning Commission
From:	Jeff Gray, Senior Wetland Biologist Kevin O'Brien, Senior Wildlife Biologist Jesse Reynolds, Environmental Planner
Copies:	File
Date:	January 29, 2016
Subject:	Paramount Open Space and Twin Ponds Park Wetlands and Streams Assessment
Project No.:	32402

Introduction

To encourage transit oriented development in areas surrounding a future high-capacity transit network located at NE 145th St. and Interstate 5 (I-5), the City of Shoreline (City) is considering redevelopment alternatives in what is referred to as the 145th Street Light Rail Station Subarea (145th St. Subarea). A component of this redevelopment may involve rezoning lands surrounding the station to denser land uses. Critical areas such as wetlands, streams, and their buffers will affect the footprint of potential development. Wetland and stream reconnaissance and assessments have been conducted to help assess the opportunities and the limitations of development due to these critical areas and their buffers.

On behalf of the City, Otak, Inc. biologists conducted stream and wetland reconnaissance and assessments at Paramount Open Space (946 NE 147th St., Parcel #s 6632900640, 6632900591, 6632900570, and 6632900780) and Twin Ponds Park (15401 1st Ave NE, Parcel # 2881700590) adjacent to the 145th St. Subarea on August 25 and September 1, 2015. The purpose of the site visits was to: 1) determine whether wetlands and/or streams are present in City-owned areas next to the light-rail station that may see zoning changes, 2) determine the classification of any wetlands and /or streams occurring on City-owned properties, and 3) establish wetland and/or stream buffers and whether buffers extend on to other parcels.

Methodology

Wetlands on the site were assessed by Otak biologists using the methodology derived from the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region* (USACE 2010) and the *Corps of Engineers Wetland Delineation Manual* (Environmental

Laboratory 1987). Full wetland delineations were not conducted for this work. Work was conducted on the City-owned parcels identified above; no work was performed on privately-held parcels.

Data on vegetation, soils, and hydrology were collected in areas that appeared to have wetland characteristics. Data on soils, hydrology, and vegetation were collected for a number of wetland and upland plots, in order to characterize wetlands and to confirm wetland presence and the physical extent of wetland boundaries. Information on wetland edge location was recorded using a Trimble GeoXH 6000, a resource-grade GPS unit with sub-meter accuracy. Wetland flags were not deployed at wetland edges for this work, nor were wetland edges surveyed. Sizes of wetlands were estimated based on the GPS points taken. Wetlands were rated as required by the Shoreline Municipal Code (SMC) 20.80.320.B using the *Washington State Wetland Rating System for Western Washington 2014 Update* (Ecology Publication No. 014-06-029). Wetland buffer widths were determined based on wetland rating category per SMC 20.80.330.

Stream systems were qualitatively assessed for in-stream habitat units, substrate, large wood, riparian habitat, and potential fish presence/fish habitat. Full stream habitat surveys and/or fish surveys were not conducted for this work. Ordinary High Water was located using the Trimble GEOXH 6000 GPS unit. Streams were typed per SMC 20.80.270.B(5), and buffers were established based on stream type and presence of fish habitat per SMC 20.80.280.C.

Geologic hazard areas, flood hazard areas, and aquifer recharge areas were not evaluated as components of this work.

Results

Several wetlands and stream systems were identified on the City-owned parcels. Seven wetlands were identified in the Paramount Open Space area (see Figure AW-1), and two were identified in Twin Ponds Park (see Figure AW-2). Seven streams were also identified on the City-owned parcels—five on the Paramount Open Space parcels and two on the Twin Ponds parcels. Buffers for these critical areas are also depicted in the two Figures. A number of privately held properties are within the buffers for the wetlands and streams on both the Paramount Open Space and Twin Ponds Park areas.

Wetlands

Table 1 lists the wetlands, wetland classification, size, and buffers for the project wetlands. Information on hydrology, soils, vegetation, and wetland classification and wetland buffers follows, based on the City of Shoreline Critical Areas Ordinance, updated on December 7, 2015.

Table 1—Wetland Locations, Classifications, Categories, Size, and Buffers

Wetland	Cross-Referenced Wetland Designation[A]	Location	Wetland Classification and Categories			Wetland Size[E]		Habitat Score from Ecology Rating[F]	Buffer Width (feet)[G]
			Cowardin[B]	HGM[C]	City of Shoreline[D]	Square Feet	Acres		
A/B	WL-F	Paramount Open Space	PFO/OW	Depressional	III	30,179	0.693	6	165 ft.
C	WL-I	Paramount Open Space	PFO/PSS	Depressional	III	32,492	0.746	6	165 ft.
D	WL-I	Paramount Open Space	PFO	Depressional	III	3,165	0.073	5	105 ft.
E	WL-I	Paramount Open Space	PFO	Depressional	III	1,342	0.031	5	105 ft.
F	WL-I	Paramount Open Space	PFO/PEM	Depressional	III	17,036	0.391	6	165 ft.
G	WL-F	Paramount Open Space	PFO/PSS	Depressional	III	1,505	0.035	5	105 ft.
H	WL-F	Paramount Open Space	PEM	Slope	IV	>168	>0.004	5	40 ft.
I	WL-D	Twin Ponds Park	PFO/PEM/ OW	Depressional/ Riverine	III	211,167	4.848	6	165 ft.
J	WL-C	Twin Ponds Park	PEM	Riverine	III	9,384	0.215	5	105 ft.

Notes:

A. Cross-references based on wetland identification conventions established in the *Thornton Creek and West Lake Washington Basins Characterization Report* (TetraTech/KCM, 2004) and the *Thornton Creek Watershed Plan* (R.W. Beck, 2009)
B. Cowardin et al. (1979) or National Wetland Inventory (NWI). Class based on vegetation: PFO = Palustrine Forested; PSS = Palustrine Scrub-Shrub; PEM = Palustrine Emergent; OW = Open Water.
C. Hydrogeomorphic (HGM) classification according to Brinson (1993).
D. Wetland rating according to the Shoreline Municipal Code, Chapter 20.80.330 (City of Shoreline, 2016) and based on the Washington State Department of Ecology *Washington State Wetland Rating System for Western Washington 2014 Update.*
E. Wetlands sizes measured only within Study Area. ">" indicates that the wetland extends outside of Study Area.
F. Based on the Washington State Department of Ecology *Washington State Wetland Rating System for Western Washington 2014 Update*
G. Wetland buffer width according to the Shoreline Municipal Code, 20.80.330 (City of Shoreline, 2016) and habitat scores for the wetlands.

Hydrology

The Paramount Open Space wetlands and the Twin Ponds Park wetlands display hydrologic regimes that are largely supported by groundwater, although stream systems are associated with the wetlands and in close proximity to them. Most of the wetlands are depressional, and water in the various wetlands may pond either permanently or seasonally. Portions of Wetland I, associated with Twin Ponds Park, are permanently ponded and have an open water component. The slope and riverine wetlands displayed evidence of either groundwater expression (Wetland H), or also showed evidence of ponding and/or overbank inundation (Wetland J).

All of the wetlands showed high groundwater levels during the reconnaissance work, and soils were saturated to the surface. Many areas of the wetlands depicted in Figures AW-1 and AW-2 showed surface water at depths ranging from less than one inch to several feet in the Twin Ponds Parks wetlands. All wetlands in the Paramount Open Space and Twin Ponds Park areas showed one or more primary wetland hydrology indicators, thus meeting the criterion for wetland hydrology.

Soils

Soils in the Paramount Open Space and the Twin Ponds Park wetlands display dark soils, with low values (typically values of 2, occasionally 3), and low chroma (typically 1, occasionally 2). All sampled wetland soils had distinct hydrogen sulfide odors, and many of the soils had organic components such as decaying vegetative detritus. Although loamy soils were the dominant wetland soil type, significant components of clay and silt were often present as well. All wetlands in the Paramount Open Space and Twin Ponds Park areas showed one or more primary wetland hydric soil indicators, thus meeting the criterion for wetland soils.

Soils in both the Paramount Open Space and the Twin Ponds Park are generally derived from Vashon till. Dominant parent soils are mostly Everett gravelly loam soils, although Twin Pond Parks contains peat soils, as well (TetraTech/KCM, 2004).

Vegetation

Wetland plant communities at the Paramount Open Space and the Twin Ponds Park sites were mainly forested communities, with some emergent and scrub/shrub communities either interspersed within the wetland matrix or occurring beneath the forested canopy. Typically, red alder (*Alnus rubra*) was the dominant tree species in the forested wetland communities, with species such as black cottonwood (*Populus trichocarpa*) and western red cedar (*Thuja plicata*) occurring occasionally in and along the edges of the wetlands. Salmonberry (*Rubus spectabilis*) was the dominant shrub species, although willow species (*Salix* spp) occurred in small patches and/or locally dense thickets. Other, less common wetland shrub species included red osier dogwood (*Cornus sericea*) and beaked hazelnut (*Corylus cornuta*). Common herbaceous wetland species at both the Paramount and Twin Ponds sites included creeping buttercup (*Ranunculus repens*), lady fern (*Athyrium filix-feminina*), horsetail (*Equisetum* spp), false lily-of-the-valley (*Maianthemum dilatatum*), western skunk cabbage (*Lysichiton americanus*), and invasive species such as reed canary grass (*Phalaris arundinacea*) and bittersweet nightshade (*Solanum dulcamera*). More aquatic-adapted plants such as water parsley (*Oenanthe sarmentosa*), hardstem bulrush (*Scirpus acutus*), pondweed species (*Potamogeton* spp), and the invasive yellow flag iris (*Iris pseudacorus*) were associated with the open water areas.

Tree species surrounding the wetlands and associated with upland habitat included western hemlock (*Tsuga heterophylla*), big-leaf maple (*Acer macrophyllum*), and Douglas fir (*Pseudotsuga menziesii*). Common upland shrub species included common snowberry (*Symphiocarpus albus*), dull Oregon grape (*Mahonia nervosa*), vine maple (*Acer circinatum*), and osoberry (*Oemleria cerasiformis*). Common herbaceous species associated with upland conditions include sword fern (*Polystichum munitum*) and wood sorrel (*Oxalis oregana*), as well as non-native herbaceous species such as herb-Robert (*Geranium robertum*). Invasive non-native species were common at both sites, and include Himalayan blackberry (*Rubus armeniacus*), reed canary grass, English ivy (*Hedera helix*), English holly (*Ilex aquifolium*), and cherry laurel (*Prunus laurocerasus*). Twin Ponds Park, however, showed a high species richness of both native shrub and herbaceous species during the site visit.

City of Shoreline Wetland Classifications and Buffers: The City of Shoreline has recently updated its wetland rating classification system, per SMC 20.80.320. Wetlands are classified as Type I through Type IV wetlands, based on the following criteria excerpted from the SMC.

1. *Category I. Category I wetlands are those that represent unique or rare wetland types, are more sensitive to disturbance than most wetlands, are relatively undisturbed and contain ecological attributes that are impossible to replace within a human lifetime, or provide a high level of functions. The following types of wetlands are Category I:*

    a. *Relatively undisturbed estuarine wetlands larger than one acre;*

   b. *Wetlands of high conservation value that are identified by scientists of the Washington Natural Heritage Program/DNR;*
   c. *Bogs;*
   d. *Mature and old-growth forested wetlands larger than one acre;*
   e. *Wetlands in coastal lagoons; and*
   f. *Wetlands that perform many functions well (scoring 23 points or more based on functions).*

2. *Category II. Category II wetlands are those that are difficult, though not impossible to replace and provide high levels of some functions. The following types of wetlands are Category II:*
   a. *Estuarine wetlands smaller than one acre, or disturbed estuarine wetlands larger than one acre;*
   b. *Interdunal wetlands larger than one acre or those found in a mosaic of wetlands; and*
   c. *Wetlands with a moderately high level of functions (scoring between 20 and 22 points)*

3. *Category III. Category III wetlands are those with a moderate level of functions, generally have been disturbed in some ways, can often be adequately replaced with a well-planned mitigation project, and are often less diverse or more isolated from other natural resources in the landscape than Category II wetlands. The following types of wetlands are Category III:*

   a. *Wetlands with a moderate level of functions (scoring between 16 and 19 points); or*
   b. *Interdunal wetlands between 0.1 and one acre.*

4. *Category IV. Category IV wetlands are those with the lowest levels of functions (scoring below 16 points) and are often heavily disturbed. These are wetlands that should be able to replace, or in some cases to improve. However, experience has shown that replacement cannot be guaranteed in any specific case. These wetlands may provide some important functions, and also need to be protected.*

Most of the wetlands on the Paramount Open Space and the Twin Ponds Park sites are less than one-half acre in size, contain a forested wetland class, and score between 16 and 19 points per Washington State Department of Ecology (Ecology) wetland functions rating system. These wetlands are categorized as Category III wetlands per the SMC. Wetland H is a slope wetland with an emergent vegetation class, and is categorized as a Category IV wetlands per the SMC. Per SMC 20.80.330, wetland buffers are based on wetland categories and on habitat scores and associated functions—both higher wetland categories and higher habitat scores are reflected in a greater assigned buffer width. The majority of wetlands in both the Paramount Open Space and Twin Ponds

Park sites have habitat scores of either 5 or 6 points, and buffer widths are, respectively, either 105 feet or 165 feet. Wetland H, as a Category IV wetland, is afforded a 40 foot buffer and that buffer is not dependent upon habitat scores/functions per the SMC.

Per SMC 20.80.090, in all cases the standard buffer shall apply unless the Director determines that additional buffer width is necessary or reduced buffer is sufficient to protect the functions and values consistent with the provisions of this chapter and the recommendations of a qualified professional.

Streams

A total of seven stream reaches were identified in the Paramount Open Space and Twin Ponds Park areas. Table 2 lists the streams, stream classification, and buffers for the streams on the sites. Additional information on stream characterization follows.

Table 2—Stream Locations, Classifications, and Buffers

Stream	Cross-Referenced Stream Reach Designation[H]	Location	Stream Typing		Standard Buffer Width (feet)[M]
			DNR[I]	City of Shoreline[L]	
Littles Creek	TC14	Paramount Open Space	NA[J]	F, non-anadromous	75 ft.
Littles Creek Tributary 1A	TC14	Paramount Open Space	NA[J]	F, non-anadromous	75 ft.
Littles Creek Tributary 2A	TC14	Paramount Open Space	NA[J]	Ns/--	45 ft./no buffer
Littles Creek Tributary 3A	TC14	Paramount Open Space	NA[J]	Ns/--	45 ft./no buffer
Littles Creek Tributary 4A	TC14	Paramount Open Space	NA[J]	Ns/--	45 ft./no buffer
Thornton Creek	TC3 & TC7	Twin Ponds Park	Np/F[K]	F, non-anadromous	75 ft.
Meridian Creek	TC4	Twin Ponds Park	NA[J]	F, non-anadromous	75 ft.

Notes:

H. Cross-references based on wetland identification conventions established in the *Thornton Creek and West Lake Washington Basins Characterization Report* (TetraTech/KCM, 2004)

I. Stream typing based on Washington Department of Natural Resources (DNR). Type Ns: non fish-bearing seasonal stream; Type Np: non fish-bearing perennial stream; Type F: fish bearing stream; Type S: Shoreline of the State.
J. Not Available—stream is not mapped by DNR.
K. Thornton Creek is rated as Type N downstream of the ponds, Type F within the ponds themselves.
L. Littles Creek Tributaries 2A, 3A, and 4A may be provisionally rated as Ns, or as stormwater ditches and thus not considered Waters of the State (see below).
M. Stream rating according to the Shoreline Municipal Code, Chapter 20.80.270 (City of Shoreline, 2016). Littles Creek Tributaries 2A, 3A, and 4A may be provisionally rated as Ns with 45 foot buffers, or as stormwater ditches with no buffers.

Stream Characteristics

All of the streams on the Paramount Open Space and the Twin Ponds Park sites belong to the broader Thornton Creek drainage.

Thornton Creek and Meridian Creek at Twin Ponds Park: At the Twin Ponds Park site, Thornton Creek drains approximately 1,300 acres of largely residential land in the City of Shoreline. Thornton Creek flows into Twin Ponds Park from the north, passing through a residential neighborhood in a system of open channels, ditches, and pipes before discharging into the north pond in Twin Ponds Park. Thornton Creek then passes into the south pond prior to flowing through Peverly Pond and into a long culvert beneath I-5. Representative bankful width and bankful depth measurements taken for Thornton Creek were approximately 22 feet and 2 feet, respectively, taken at two locations downstream of the southern pond, and 8-10 feet and 2-3 feet, respectively, taken upstream of the northern pond. Riffles and glides were the dominant habitat units, and pool habitat was relatively scarce. Stream substrate consisted of stream gravels and fines, and embeddedness was high. Riparian vegetation is considered moderately disturbed due to the density of non-native invasives such as Himalayan blackberry, Japanese/giant knotweed (*Polygonum cuspidatum/sachalinenses*), and field bindweed (*Convovulus arvensis*), the nearby presence of human activities and land use, and the relatively young age of the tree canopy. Large woody debris associated with the system was scarce and tended to consist of smaller pieces that provide lower in-stream habitat complexity and function.

Meridian Creek flows into the Twin Ponds Park site from the west. Meridian Creek, also known as Evergreen Creek, is a poorly channelized system that is associated with a riparian wetland (Wetland J). Meridian Creek is likely an intermittent system, given that previous studies had indicated that the system dries up at times (TetraTech/KCM, 2004). Dominant substrate consisted of fines, particularly upstream of the point where the Meridian Creek system discharges into the southern pond. Bankful width and depth were estimated at 9-12 feet and 2-2.5 feet, respectively, at points in the system where channelization was more pronounced. Similar to Thornton Creek, riparian vegetation is moderately disturbed due to the presence of invasives, proximal land use and activities, and relatively young age of the canopy.

Littles Creek and Tributaries: The Littles Creek system consists of the mainstem Littles Creek and a number of tributaries (Figure AW-1). The system enters the Paramount Open Space area from the north and flows southward through the site, and is associated with a number of depressional wetlands. The Littles Creek subbasin drains approximately 466 acres.

The Littles Creek stream system on the Paramount Open Space area consists of the mainstem Littles Creek and four associated tributaries. Tributaries 1A and 3A confluence with the mainstem Littles Creek on the Paramount property, while Tributary 2A is culverted and discharges into Littles Creek to the south. Tributary 4A occurs on the Paramount property to the north (Figure AW-1) and may have linked Tributary 1A and the mainstem Littles Creek in the past.

Tributary 2A appears to be a constructed stormwater ditch, running along the toe of a slope behind several residential structures and receiving flow from a low point on the roadway of NE 147th St. The flow path for this tributary is approximately 3 feet in width and approximately 1 foot in depth. Flows are seasonal, with no flow observed in Tributary 2A during the site visits and willowherb rooted in the channel. Stream substrate consists of fines and organic soils. Tributary 2A has bank armoring that consists of concrete fragments and bed armoring consisting of quarry spalls, and discharges into a 16-inch CMP culvert for approximately 218 feet prior to confluencing with the mainstem Littles Creek off-site. The City of Shoreline maps Tributary 2A as a ditch in the surface water drainage mapping data.

Tributary 3A appears to have been straightened and ditched in the past, likely to improve conveyance during storm events. Representative bankful width and depth for the system is approximately 3 feet and approximately 1.2 feet, respectively. Flows are seasonal, and substrate consists of fines and organic soils that was saturated to the surface during the site visits. Riparian habitat for both Tributary 2A and 3A is highly disturbed, and consists of a mix of open and forested edge habitat, with a dominant invasive plant community comprised of Himalayan blackberry. Large woody debris is absent from both tributary systems. Similar to Tributary 2A, the City of Shoreline maps Tributary 3A as a ditch in the surface water drainage mapping data.

Tributary 4A has a representative bankful width and depth of 5-6 feet and 1.5-2 feet, respectively. Under existing conditions, a berm appears to separate Tributary 4A from Tributary 1A, although the City of Shoreline maps Tributary 4A and 1A as connected in the surface water drainage mapping data. Based on information from the Thornton Creek and West Lake Washington Basins Characterization Report (TetraTech/KCM, 2004), City of Shoreline GIS data, and the channel dimensions, Tributary 4A was very likely connected to Tributary 1A in the past. Currently it appears to be a backwater channel for the mainstem Littles Creek. Tributary 4A may be a considered as either a constructed surface water feature linking the mainstem Littles Creek and Tributary 1A, or as a seasonally active drainage.

The mainstem Littles Creek and Tributary 1A are larger than the above tributaries. As noted above, Tributary 1A appears at one time to have been a diversion flow path from the mainstem Littles Creek via Tributary 4A, reconnecting with the mainstem near the southern end of the Paramount Open Space area. Currently, Tributary 1A is associated with Wetlands C and A/B, showing poor channelization and sheet flow dynamics in portions of the wetlands, and relatively well-defined channels in other parts of the wetlands. Representative bankful widths and depths for Tributary 1A are 6-8 feet and 0.5 feet near the culvert shown in Figure AW-1, with a more incised condition to the north (bankful width and depth of approximately 5 feet and 2 feet, respectively). Stream habitat units consist of riffles and glides interspersed with poorly channelized wetland and ponded units. Substrate is dominated by fines in the lower energy areas, with gravels present in the riffle habitat units. Spalls and rounded cobbles appear to have been placed in reaches of the Tributary 1A system to dissipate streamflow energy. Although large wood is not abundant in the Tributary 1A system, smaller wood is present and relatively abundant. Riparian habitat is relatively abundant and shows a low to moderate disturbance regime, with abundant patches of dominant non-native invasive species such as Himalayan blackberry and English ivy.

Bankful width and bankful depth for the mainstem Littles Creek ranges from 5-7 feet and 1-1.3 feet, respectively. Gravels and fines are the dominant stream substrate, with quarry spalls scattered in portions of the stream reaches—particularly near trail culverts where erosive flows may be present. Stream habitat consists primarily of riffles, with very few pools. Although large wood is not abundant in the Tributary 1A system, smaller wood is present and relatively abundant. Similar to Tributary 1A, riparian habitat for the mainstem Littles Creek is relatively abundant and shows a low to moderate disturbance regime, and a relatively high diversity of native plant species. However, non-native invasive species such as Himalayan blackberry, Japanese/giant knotweed, and English ivy make up a dominant component of the vegetative community. Within the Paramount Open Space area, the banks of Littles Creek appear relatively stable, although there are areas where minor undercutting and erosional scarring were observed. Immediately to the south of the Paramount Open Space area, two culverts on privately held parcels impose a partial fish passage blockage and an unknown fish passage blockage, respectively. Somewhat further to the south, a culvert conveying Littles Creek beneath NE 145th Street imposes a complete fish passage blockage based on WDFW Salmonscape information.

Fisheries

A number of observations indicate that Thornton Creek in the vicinity of the Twin Ponds Park site contains salmonid species—primarily resident cutthroat trout (*Onchorhynchus clarkii*) (WDFW, 2015a; TetraTech/KCM, 2004). Although there is some anecdotal evidence that coho juveniles have been observed in Thornton Creek in the vicinity of Twin Ponds Park, this has been attributed to release of juveniles into the system through elementary school programs—downstream culverts

associated with I-5 are considered a complete fish passage barrier to anadromous salmonids. Meridian Creek is linked to the Thornton Creek and Twin Ponds system via a surface water connection during at least a portion of the year, with no fish passage barrier interposed between the two streams. Meridian Creek is also considered to provide habitat for cutthroat trout during a portion of the year. The Thornton Creek Watershed Plan concludes that resident (non-anadromous) salmonid use of the system from the mouth of Meridian Creek upstream for several hundred feet is a reasonable presumption (R. W. Beck, 2009).

Salmonid presence is not documented for Littles Creek and its tributaries (WDFW, 2015a; WDFW, 2015b). Previous studies indicated that salmonid presence was unlikely in the system or that salmonids were definitively absent (The Watershed Company, 2009; R. W. Beck, 2009), or resulted in no occurrence of fish during surveys (Tabor *et al*., 2010). Existing fish passage barriers downstream of the Paramount Open Space preclude the presence of anadromous salmonids (WDFW, 2015b). No cutthroat trout or any other fish species were observed during the fieldwork for the project. However, the presence of some fish species is likely in the two perennial reaches of the Littles Creek system in the Paramount Open Space—namely, Littles Creek mainstem and Littles Creek Tributary 1A. Perennial stream reaches typically provide habitat for non-salmonid species such as sculpin, three-spined stickleback, and assorted minnow species (e.g. red-sided shiners, dace, etc.). Based on the habitat in the mainstem Littles Creek and the Littles Creek Tributary 1A, and on the SMC, a provisional stream rating of Type F, non-anadromous is warranted.

The Littles Creek Tributaries 2A, 3A, and 4A appear to have an intermittent (seasonal) hydrologic regime and are unlikely to provided functional fish habitat. In addition, Tributaries 2A, 3A, and 4A may be considered as stormwater/drainage features that were established/installed. As such, these tributaries would warrant either a Type Ns designation and associated buffer, or would be considered as artificially constructed features that would receive no buffer (Table 2).

City of Shoreline Stream Classifications and Buffers

The City of Shoreline has its own stream classification system, per SMC 20.80.270 for classification of Fish and Wildlife Habitat Conservation Areas—specifically, Waters of the State. Streams are classified based on the following criteria excerpted from the SMC.

Waters of the State.

Waters of the state include lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, and all other surface waters and watercourses within the jurisdiction of the state of Washington, as classified in WAC 222-16-030.3. Streams and wetlands and their associated buffers that provide significant habitat for fish and wildlife are those areas where surface waters produce a defined channel or bed, not including irrigation ditches, canals, storm or surface water runoff devices or other entirely artificial watercourses, unless they are used by fish or are used to convey streams naturally occurring

prior to construction. A channel or bed need not contain water year-round; provided that there is evidence of at least intermittent flow during years of normal rainfall.

Streams shall be classified in accordance with the Washington Department of Natural Resources water typing system (WAC 222-16-030) hereby adopted in its entirety by reference and summarized as follows:

a. *Type S: streams inventoried as "shorelines of the state" under Chapter 90.58 RCW and the rules promulgated pursuant to Chapter 90.58 RCW;*

b. *Type F: streams which contain fish habitat. Not all streams that are known to exist with fish habitat support anadromous fish populations, or have the potential for anadromous fish occurrence because of obstructions, blockages or access restrictions resulting from existing conditions. Therefore, in order to provide special consideration of and increased protection for anadromous fish in the application of development standards, Shoreline streams shall be further classified as follows:*

    i. *Anadromous fishbearing streams (Type F-anadromous). These streams include:*

        1. *Fish bearing streams where naturally recurring use by anadromous fish populations has been documented by a government agency;*

        2. *Streams that are fish passable or have the potential to be fish passable by anadromous populations, including those from Lake Washington or Puget Sound, as determined by a qualified professional based on review of stream flow, gradient and natural barriers (i.e. natural features that exceed jumping height for salmonids), and criteria for fish passability established by the Washington Department of Fish and Wildlife; and*

        3. *Streams that are planned for restoration in a six-year capital improvement plan adopted by a government agency or planned for removal of the private dams that will result in a fish passable connection to Lake Washington or Puget Sound; and*

    ii. Non-anadromous fishbearing streams (Type F-non-anadromous). These include streams which contain existing or potential fish habitat, but do not have the potential for anadromous fish use due to natural barriers to fish passage, including streams that contain resident or isolated fish populations. The general areas and stream reaches with access for anadromous fish are indicated in the City of Shoreline Stream and Wetland Inventory and Assessment (2004) and basin plans. The potential for anadromous fish access shall be confirmed in the field by a qualified professional as part of a critical area report.;

c. Type Np: perennial nonfish habitat streams;

d. Type Ns: seasonal nonfish habitat streams; and

e. Piped stream segments: those segments of streams, regardless of their type, that are fully enclosed in an underground pipe or culvert. (Ord. 398 § 1, 2006; Ord. 238 Ch. VIII § 4(B), 2000)

Thornton Creek and Meridian Creek are categorized as Type F, non-anadromous streams, based on the documented presence of cutthroat trout and other fish in Thornton Creek and the Twin Ponds, the surface water connection and potential for use of the Meridian Creek system by cutthroat trout and other fish during some portion of the year, and the existing complete lack of accessibility to anadromous species.

The Littles Creek mainstem and the Littles Creek Tributary 1A are provisionally categorized as Type F, non-anadromous streams based on the perennial hydrologic regime of these two reaches, the available stream habitat for aquatic biota, and the relatively high likelihood of some species of fish utilizing this habitat. Per the SMC, Type F non-anadromous streams are defined as providing fish habitat for a variety of different species. As noted above, perennial stream reaches typically provide habitat for non-salmonid species such as sculpin, three-spined stickleback, and assorted minnow species (e.g. red-sided shiners, dace, etc.). Based on the habitat in the mainstem Littles Creek and the Littles Creek Tributary 1A, and on the SMC, a provisional stream rating of Type F, non-anadromous is warranted.

As noted above, the Littles Creek Tributaries 2A, 3A, and 4A appear to have an intermittent (seasonal) hydrologic regime and are unlikely to provide functional fish habitat. In addition, Tributaries 2A, 3A, and 4A may be considered as stormwater/drainage features that were established/installed. As such, these tributaries would warrant either a Type Ns designation and associated buffer, or would be considered as artificially constructed features that would receive no buffer (Table 2).

Zoning Changes and Code Review

Zoning Changes

The alternatives being considered for the 145th Street Station Subarea Plan include a no action alternative and two scenarios for rezoning lands surrounding the station to denser land uses. Currently, the buffers surrounding both the Paramount Open Space and Twin Ponds Park cover several parcels on lands that could be rezoned to a denser use. Parcels that are overlapped by wetland and stream buffers surrounding the Paramount Open Space are currently and primarily zoned residential at a density of six units per acre (zone R6). Depending on the zoning alternative selected these areas could be rezoned to allow a range of multi-family housing units up to 35 or 45 feet in height (zones MUR-35' to MUR-45'). Parcels that are overlapped by wetland and stream buffers surrounding Twin Ponds Park are currently zoned as residential at densities ranging from six

to twenty-four units per acre (zones R6 and R24). Depending on the zoning alternative selected these areas could remain zoned six units per acre in some areas, or be rezoned to mixed-use multi-family housing units up to 65 feet in height excluding the potential for additional height through a Development Agreement (MUR-65'). For more detail on the locations of existing zoning in areas surrounding the parks, please refer to Figure 3.1-4 in the Draft Environmental Impact Statement (DEIS). For proposed rezoning alternatives please refer to Figures 3.1-5 and 3.1-6 in the DEIS. For further detail on each of the alternatives, how they were shaped, associated growth, time frames of build-out, anticipated growth, and land use and transportation implications please refer to Section 2.3 in the DEIS.

Shoreline Municipal Code (SMC) Review

The City Critical Areas Ordinances (CAO), in its updated form dated December 7, 2015 and scheduled to take effect on February 1, 2016, was reviewed in the context of how zoning changes from the proposed alternatives could create additional buffers with building setbacks, or modify existing buffers. At the time this memorandum was prepared, zoning and land use changes as a result of rezoning from the proposed alternative will not create additional critical area buffers, nor are existing buffers anticipated to be modified as a result of zoning and land use changes. In addition, SMC 20.80.015(A)states the provisions of the CAO shall apply to all land uses and within all zoning designations in the City of Shoreline.

Potential development subsequent to rezoning may involve alteration of land use patterns and activities in rezoning, including removal or modification of existing structures, construction of new structures, and alteration in vegetative cover and vegetative management of the affected lots. The following SMC elements are potentially relevant to the proposed rezoning changes associated with the 145th Street Station Subarea Plan alternatives, if changes to the existing land use and activities take place.

- Per SMC 20.80.015, all land uses and proposed development must comply with the City's CAO. Proposed impacts to critical areas or critical area buffers must comply with critical areas standards and are subject to project review and approval by the Planning Director.
- Per SMC 20.50.020(D), lots divided by a residential zone boundary may transfer density from the lesser residential density portion of the lot to the greater residential portion.
    - Residential transfer from a greater residential portion to the lesser residential portion may be allowed when said transfer contributes to preservation of critical areas or other natural features.
- Per SMC 20.50.300(G), any disturbance to vegetation within critical areas and their corresponding buffers is subject to the procedures and standards contained within the critical areas chapter of the Shoreline Development Code, Chapter 20.80 SMC, Critical

Areas, in addition to the standards of the SMC 20.50.300(G) subchapter. The standards which result in the greatest protection of the critical areas shall apply.

- Removal of trees from MUR-70 zones, typically exempt from permit requirements of 20.50.300 per SMC 20.50.310, are not exempt if the activity takes place within a critical area or critical area buffer.
- Partial exemptions from the permit requirements of 20.50.300 do not pertain to development activities occurring within a critical area or critical area buffer. Disallowed partial exemptions include tree removal of significant trees, tree removals based on lot size, and landscape maintenance and alterations based on square footage limits.
- If tree removal is to occur on a site that includes critical area and critical area buffer, tree removal within the critical area and buffer must be consistent with the CAO standards, and retention of 30 percent of significant trees on the site vs. retention of 20 percent of significant trees on a site with no critical areas or critical area buffers is required (SMC 20.50.350).
    - Replacement of removed trees with appropriate native trees at a ratio determined by the Director will be required in critical areas.
- Per SMC 20.50.460, existing vegetated critical areas may substitute for required landscaping.
- Per SMC 20.50.520(K), new landscape material shall be indigenous (native) plant species within critical areas or their buffers.
    - Normal and routine maintenance and operation of existing landscaping and gardens within critical areas and critical areas buffers are exempt from the SMC CAO requirements, per SMC 20.80.030(J) and provided they comply with all other regulations in that chapter, including pruning of protected trees consistent with SMC 20.50.350(E)

A number of SMC exemptions may be relevant to the proposed rezoning and potentially subsequent redevelopment on privately held parcels in the vicinity of Paramount Open Space and Twin Ponds Park. These exemptions may allow for new utility activities and modification of existing structures and infrastructure to occur within critical areas and critical area buffers as redevelopment proceeds. However, per SMC 20.80.020, any otherwise exempt activities occurring in or near a critical area or critical area buffer should meet the purpose and intent of SMC 20.80.010 and should consider on-site alternatives that avoid or minimize impacts.

- Per SMC 20.80.030, exemptions to the CAO requirements are allowed for public water, electric and natural gas distribution, public sewer collection, cable communications, telephone, utility and related activities undertaken pursuant to City-approved best management practices. Per SMP 20.80.030, additional parameters concerning replacement and/or relocation of these facilities pertain.
    - Repair and maintenance of existing private connections to public utilities and private stormwater management facilities consistent with best management practices and best available science. Revegetation of disturbed areas is required to be native vegetation, unless the existing, non-native vegetation is re-established with no change to type or extent.
- Maintenance, operation, repair, modification or replacement of publicly improved roadways or City-authorized private roadways and associated stormwater drainage systems, as well as publicly improved recreation areas, as long as such activity does not involve the expansion of uses and/or facilities into previously unimproved rights of ways, portions of rights of ways, or previously unimproved areas in the case of recreation sites. In addition, such activities cannot alter a wetland or watercourse, such as culverts or bridges, or result in the transport of sediment or increased stormwater. Retention and replanting of native vegetation shall occur wherever possible along the right-of-way improvement and resulting disturbance.
- Activities such as recreational area operations, repair, maintenance, modification and/or replacement are exempt so long as any such activity does not involve the expansion of facilities and existing improvements into a previously unimproved portion of critical areas or required buffers.
- Emergencies; minor conservation and enhancement activities; removal of active and non-imminent hazard trees subject to the provisions of SMC 20.80.30(G); site investigations; passive outdoor activities; normal maintenance; and minor activities determined by the City to have minimal impacts to a critical area are all potentially exempt activities.
- The application of herbicides, pesticides, organic or mineral-derived fertilizers, or other hazardous substances, if necessary, provided that their use shall be restricted in accordance with state Department of Fish and Wildlife Management Recommendations and the regulations of the state Department of Agriculture and the U.S. Environmental Protection Agency.

A number of allowed activities may occur within critical areas and/or critical area buffers. Allowed activities shall be reviewed and permitted or approved by the City and any other agency with jurisdiction, but do not require submittal of a separate critical area report, unless such submittal was required previously for the underlying permit. The Director may apply conditions to the underlying permit or approval to ensure that the allowed activity is will sufficiently protect critical areas.

- Per SMC 20.80.040, allowed activities within critical areas or their buffers include structural modifications of, additions to, maintenance, repair, or replacement of legally non-conforming structures consistent with SMC 20.30.280, and which currently do not meet the setback or critical areas or critical buffer requirements, if the replacement or related activity does not increase the existing building footprint or area of hardscape within the critical area or the critical area buffer.
- Per SMC 20.80.040, allowed activities include demolition of structures located within critical areas or their buffers, excluding demolition of structures necessary to support or stabilize landslide hazard areas, and subject to approval of a stormwater pollution prevention plan consistent with the adopted stormwater manual and clearing limits that will adequately protect the critical area.
- Permit requests subsequent to previous critical area review by the City of Shoreline are considered allowed, subject to criteria established in SMC 20.80.040(C)(3).

The City has recently updated their CAO, adopting updates to the City Code on December 7, 2015 with the new regulations scheduled to go into effect on February 1, 2016. The goals of the update are to: 1) Update the regulations for consistency with Best Available Science as required by the State, 2) Provide predictability and clarity by adding standards for critical area report submittals, and 3) Modify problematic and unclear sections of the code.

Substantial changes in the updated City of Shoreline CAO include adoption of the Washington State Department of Ecology *Washington State Wetland Rating System for Western Washington: 2014 – Update*; changes to wetland categorization that reflect Ecology's rating system; significant increases in wetland buffer sizes; alterations to the City's stream typing methodology in accordance with Washington Department of Natural Resources water typing system (WAC 222-16-030); and small changes to stream buffers in the updated CAO. Standard wetland buffers under the updated City CAO show the largest increase, typically increasing an additional 50-60 feet compared to the wetland buffers under the previous CAO requirements. Increase in buffer widths on the Paramount Open Space and Twin Ponds Park sites will likely further encumber adjacent, privately owned properties as a result.

Standard buffer widths for stream systems associated with the Paramount Open Space and Twin Ponds Park sites change relatively little under the updated City of Shoreline CAO. In the case of Type F reaches (Thornton Creek, Meridian Creek, Littles Creek mainstem and Littles Creek Tributary 1A), buffer sizes either increase an additional 10 feet or actually are reduced based on lack of anadromous salmonids in the systems under the updated CAO. Under the updated CAO, other stream reaches in the Paramount Open Space and Twin Ponds Park sites generally retain similar buffer widths compared to the previous CAO requirements, or show an overall reduction in buffer width. Stream buffer widths on the Paramount Open Space and Twin Ponds Park sites will not further encumber adjacent, privately owned properties as a result.

Per the City SMC, buffer averaging is allowed under the updated CAO; however, buffer reductions allowable under the previous CAO no longer pertain. Buffer averaging for wetlands and streams is allowable as follows.

Per SMC 20.80.330, buffer averaging for wetlands is allowed if:

Buffer averaging to improve wetland protection may be permitted when all of the following conditions are met:

a. The wetland has significant differences in characteristics that affect its habitat functions, such as a wetland with a forested component adjacent to a degraded emergent component or is a "dual-rated" wetland with a Category I area adjacent to a lower rated area;
b. The buffer is increased adjacent to the higher functioning area of habitat or more sensitive portion of the wetland and decreased adjacent to the lower functioning or less sensitive portion as demonstrated by a critical areas report from a qualified wetland professional;
c. The total area of the buffer after averaging is equal to the area required without averaging; and
d. The buffer at its narrowest point is never less than either three-fourths of the required width or 75 feet for Category I and II, 50 feet for Category III, and 25 feet for Category IV, whichever is greater.

Per SMC 20.80.274, buffer averaging for stream systems is allowed if:

The Director may allow the recommended fish and wildlife habitat area buffer width to be reduced in accordance with a critical area report, the best available science, and the applicable management recommendations issued by the Washington Department of Fish and Wildlife, only if:

a. It will not reduce stream or habitat functions;
b. It will not adversely affect fish and wildlife habitat;
c. It will provide additional natural resource protection, such as buffer enhancement;
d. The total area contained in the buffer area after averaging is no less than that which would be contained within the standard buffer; and
e. The buffer area width is not reduced by more than twenty-five percent (25%) in any location.

Implications of Land Use Change

Potential impacts associated with zoning changes and due to potential alterations in land use and associated activities adjacent to the critical areas covered by the proposed Subarea Plan could be varied in outcome. However, rezoning from the proposed alternative will not create additional critical area buffers, nor are existing buffers under the updated City CAO anticipated to be modified as a result of zoning and land use changes.

Single Family Use vs. Multi-Family Use

Because all land uses and proposed development must comply with the City's CAO, systemic and significant differences to critical areas and buffer impacts associated with proposed changes to the residential zoning are not anticipated. Allowed development or other activities within critical areas and critical area buffers—and any potential exemptions for such alterations—would pertain to both single family and multi-family zoned lands. The City's CAO will pertain to all zoning areas, and is not anticipated to differ between single family, multi-family, or mixed use land uses.

As noted above, existing non-conforming structures located within critical areas or critical area buffers may be modified, added to, maintained, repaired, or replaced if no increase in the structural footprint or area of hardscape occurs within the critical area or critical area buffer. Additions to legally nonconforming structures that are partially located within critical areas or their buffers are allowed—provided that a critical area report delineating the critical area(s) and required buffers shows that the addition is located entirely outside the critical area or buffer. Any redevelopment and/or increase in residential density that may take place as a result of zoning changes will comply with the City of Shoreline CAO requirements, and would be required to document that no adverse impacts to critical areas and/or their buffers will occur as a result of the proposed activity.

Potential environmental impacts to wetland and stream critical areas related to converting land use from existing single family (R6) to higher density mixed use and/or multi-family are not anticipated to be significant or adverse with application of the City's CAO requirements. Although more people would be living and working in proximity to wetlands, streams, and their associated buffers under either of the rezoning scenarios, critical areas would be subject to additional protections and requirements that are not fully realized under the existing single family use. In the existing condition, there appear to be homes, sideyard and backyard structures, mown lawns, pet activities, and other uses within potential critical areas and buffers. These existing activities are allowed as legal and nonconforming uses (as described previously), given that they have been in place since before CAO requirements were adopted by the City. However, new development would be required to comply with CAO requirements. Wetland and stream areas and buffers would need to be clearly delineated and protected in compliance with the CAO. Opportunities to improve wetland and stream conditions with redevelopment are summarized on the following page.

Redevelopment Opportunities to Improve Critical Areas and Critical Area Buffer Functions

Redevelopment could create substantial opportunities for ecological improvements and enhancements that do not currently exist. Under new development proposals, existing legal and nonconforming land uses within the current wetland/stream areas and buffers could be removed, and new developments would be required to conform to CAO provisions that limit or do not allow development within critical areas or critical area buffers.

Redevelopment also may provide opportunities for mitigation and/or wetland and stream buffer enhancement in the formerly developed or disturbed buffer areas using best available science, with an anticipated improvement of ecological functions provided by the critical area and its buffer. Per SMC 20.80.053, proposed redevelopment or new development will require appropriate mitigation sequencing for maintaining or compensating for impacted functions and values of critical areas—to include compensatory mitigation planning, installation of mitigation elements, and subsequent monitoring and reporting per SMC 20.80.082. Additional requirements for compensatory mitigation, relevant to either wetlands or Fish and Wildlife Habitat (specifically, streams), may be found in SMC 20.80.350 and SMC 20.80.300, respectively.

With redevelopment, improvements to water quality and flow control would be expected as a result of compliance with stringent stormwater management requirements administered by the City, consistent with Washington State Department of Ecology regulations. This would in turn enhance critical areas and buffer ecological functions Redevelopment would be required to meet water quality treatment standards for pollution-generating impervious surfaces, which represents another opportunity to improve upon existing conditions in which untreated stormwater is discharged into City of Shoreline streams and subsequently may degrade water quality in those systems. Per Washington State Department of Ecology standards, water quality treatment requirements would pertain for new development in the vicinity of the Paramount Open Space and the Twin Ponds Park sites.

References

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Fish and Wildlife Service Publication FWS/OBS-79/31, Washington, D.C.

Hruby, T. 2004. Washington State Wetland Rating System for Western Washington – Revised. Washington State Department of Ecology Publication # 04-06-15. http://www.ecy.wa.gov/pubs/0406025.pdf

Hruby, T. 2014. Washington State Wetland Rating System for Western Washington: 2014 – Update. (Publication #14-06-029). Olympia, WA: Washington State Department of Ecology. https://fortress.wa.gov/ecy/publications/documents/1406029.pdf

R. W. Beck. 2009. Thornton Creek Watershed Plan. Prepared for the City of Shoreline.

Shoreline, City of, Critical Areas Ordinance Update, website accessed on October 1, 2015, http://www.shorelinewa.gov/government/departments/planning-community-development/planning-projects/critical-areas-ordinance-update

Shoreline, City of, DEIS for the 145th Street Station Subarea, website accessed on September 30, 2015, http://www.shorelinewa.gov/government/departments/planning-community-development/planning-projects/light-rail-station-area-planning/deis-145th-st-station-subarea

Shoreline, City of, Shoreline Municipal Code, Title 20 Development Code, Chapter 20.80 Critical Areas, website accessed on October 1, 2015, http://www.codepublishing.com/WA/Shoreline/#!/Shoreline20/Shoreline2080.html

Shoreline, City of, Map of Surface Water Facilities, website accessed January 5, 2016, http://cosweb.ci.shoreline.wa.us/uploads/attachments/gis/maps/CItyofShoreline42x66_SWM.pdf

Tabor, Roger A., Daniel W. Lantz, and Scott T. Sanders. 2010. Distribution and Habitat Use of Fish in Seattle's Streams: Final Report, 2005 and 2006. Prepared by U.S. Fish and Wildlife Service for Seattle Public Utilities.

Tetratech/KCM. 2004. Thornton Creek and West Lake Washington Basins Characterization Report. Prepared for City of Shoreline.

The Watershed Company. May 27, 2009. Letter Re: Wetland and Stream Delineation Report, Reference Number 090501. Prepared for Anthony and Mary Konichek.

U.S. Army Corps of Engineers. 1987. Corps of Engineers Wetland Delineation Manuel. Environmental Laboratory Wetlands Research Program Technical Report Y-87-1, U.S. Army Corps of Engineers, Engineer Waterways Experiment Station, Vicksburg, Mississippi.

U.S. Army Corps of Engineers. 2010. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0), ed. J.S. Wakely, R.W. Lichvar, and C.V. Noble. ERDC/EL TR-10-3. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

WDFW. 2015a. Priority Habitat and Species Mapping Tool. http://apps.wdfw.wa.gov/phsontheweb/

WDFW. 2015b. Salmonscape Mapping Tool. http://apps.wdfw.wa.gov/salmonscape/map.html

Figure AW-1
Critical Areas - Paramount Park

Critical Areas Memorandum
Draft Envrionmental Impact Statement
145th Street Station Subarea Plan
City of Shoreline, WA

CITY OF SHORELINE

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Paramount Open Space

Littles Creek Tributary 4A
Littles Creek
Littles Creek Tributary 1A
Littles Creek
Littles Creek Tributary 2A
Littles Creek Tributary 3A

A
B
C
D
E
F
G
H

1 inch = 100 feet
0 100 200 Feet
NORTH

Note:
-Basemap provided by ArcGIS Online.
-Critical areas data created by Otak, Inc.
-All other data provided by City of Shoreline

Legend

- GPS Point
- Stream
- Stream (approximate)
- Culvert
- Stream Buffer

Wetland

- Wetland
- Wetland (approximate)
- Wetland Buffer
- Parcel
- Park
- Shoreline City Limits
- Study Area Boundary

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Figure AW-2
Critical Areas - Twin Ponds Park

Critical Areas Memorandum
Draft Envrionmental Impact Statement
145th Street Station Subarea Plan
City of Shoreline, WA

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HanmiGlobal Partner

Thornton Creek

Meridian Park Drainage

J

I

Legend

- Stream
- Culvert
- Stream Buffer

Wetland

- Wetland
- Wetland (approximate)
- Wetland Buffer
- Parcel
- Park
- Shoreline City Limits
- Study Area Boundary

1 inch = 150 feet

0 150 300 Feet

NORTH

Note:
-Basemap provided by ArcGIS Online.
-Critical areas data created by Otak, Inc.
-All other data provided by City of Shoreline

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GeoEngineers

Memorandum

8410 154th Avenue NE, Redmond, WA 98052, Telephone: 425.861.6000, Fax: 425.861.6050 www.geoengineers.com

To:	City of Shoreline Planning Commission
From:	Robert C. Metcalfe, PE, LEG and Lindsay C. Flangas, PE
Date:	January 25, 2016
File:	0231-088-00
Subject:	City of Shoreline – Geotechnical Considerations for High Groundwater or Peat Conditions

This memorandum summarizes general subsurface conditions in the vicinity of Paramount Open Space and Twin Ponds Park in the City of Shoreline based on a review of available information, and addresses general geotechnical considerations for sites where high groundwater levels or peat soils are present. We understand that the City is considering upzoning the area surrounding the proposed 145th Street light rail station and is interested in understanding geotechnical design and construction considerations for high-groundwater, peat soil, and/or liquefaction conditions.

SUBSURFACE CONDITIONS

Our understanding of subsurface conditions in the Paramount Open Space and Twin Ponds Park areas is based on review of available geologic maps and available subsurface reports (see References). Surficial geologic units in the area of interest are a result of glacial and postglacial processes. Published geologic information for the area includes a geologic map prepared by Booth et. al. (2008) and information presented in a Thornton Creek Basin Characterization Report (2004). Mapped surficial geology indicates the presence of glacial till with a band of advance outwash along the I-5 corridor. Glacial till and advance outwash are glacially overridden. Glacial till typically consists of dense to very dense/hard silt, sand, and gravel of variable proportions. Advance outwash typically consists of dense to very dense sand and gravel, with variable silt content.

Also mapped in the area, but less predominant, are zones of recessional outwash and ice-contact deposits, and isolated deposits of peat. Recessional outwash and ice-contact deposits were deposited in the wake of the retreating glacier, and vary from loose to medium dense. Recessional outwash typically consists of stratified sand, with occasional lenses of silty sand, silt and gravel, and ice-contact deposits are similar, but less well-sorted and characterized by higher silt content and lenses of till. Peat consists of wood and other organic debris, and are typically encountered in wetlands, former lake bottom areas, or recessional outwash channels. Peat is typically very loose/soft and highly compressible.

Available groundwater information from boring and test pit logs reviewed for this project suggest the presence of perched water over dense glacial till and other dense and low permeable glacial soils.

DESIGN AND CONSTRUCTION CONSIDERATIONS

Site-specific subsurface evaluations by a licensed geotechnical engineer should be completed prior to design and construction of new development and other improvements (buildings, roadways, bridges, utilities, etc.). Among other geotechnical considerations, site-specific explorations and evaluations are important in identifying

and understanding the depth, extent and nature of groundwater, subsurface soil, and peat conditions in the vicinity of the planned improvements. The following sections include general geotechnical design and construction considerations for sites impacted by the presence of groundwater or peat.

Groundwater Considerations

Groundwater is an important consideration in the design and construction of infrastructure and development projects. The presence and depth of groundwater can be evaluated during site investigations by installing groundwater monitoring wells at locations and depths of interest. Planning by the project team will be required for excavations or drilled foundation elements extending below the perched or static groundwater table.

If temporary or permanent dewatering is required, the site and surrounding areas should be evaluated to determine whether dewatering may result in settlement of compressible soils (including peat) within the dewatering zone of influence. Groundwater flow rates and quantities, and appropriate dewatering systems, can vary significantly based on the porosity of the subsurface soils. Appropriate engineering study and design is necessary to address and prevent potential issues related to ground settlement in the project vicinity that can result from dewatering.

Structures extending below the design groundwater table should be waterproofed and designed to resist hydrostatic uplift pressures.

Peat Considerations

Based on available information, peat deposits are present in the vicinity of the proposed 145th Street light rail station. Peat is a somewhat fibrous material consisting of fragments of decayed organic matter. Peat compressibility characteristics can vary significantly, and can be evaluated during the site investigation phase with laboratory testing of selected samples. Peat will undergo two phases of settlement: relatively short-term primary consolidation and long-term secondary compression. Minimizing load increases from site grading, foundations, or dewatering will reduce potential short-term primary consolidation settlement. Long-term settlement of site grades underlain by peat should be expected regardless of whether additional fill is placed.

Several techniques are available for settlement mitigation of structures, roadways and embankments where peat is present. Some of these include:

- **Preloading and/or lightweight fill.** Depending on total and differential settlement tolerances, it may be feasible to use preloading and lightweight fill individually or in combination to reduce settlement of structures, roadways and embankments underlain by peat. Preloading a site, typically with a soil berm, can advance the short and long-term settlement prior to construction. The proportion of total settlement that occurs prior to construction will depend on the weight and duration of the preload and the compressibility and drainage characteristics of the underlying soil. Surcharging (adding additional weight on top of the preload), and/or installation of wick drains can accelerate the primary consolidation settlement duration. Lightweight fill consisting of Geofoam or other material can be used to reduce settlement by reducing the net load change on the compressible soil layer.

- **Rigid Inclusions.** Ground improvement consisting of stiff or rigid inclusions may be utilized to reduce total and differential settlement of structures, roadways, and embankments. Settlement reduction will depend on the type of ground improvement used and the improvement replacement ratio. Several ground improvement alternatives are available, including use of aggregate piers (grouted and ungrouted), grouted vertical elements, and vertical elements, such as timber or concrete piles.
- **Deep foundation support.** Structural loads may be transferred through deep foundation elements to competent layers underlying the compressible peat. Deep foundation support alternatives include driven piles, drilled shafts, augercast piles, among others, each of which have unique design and construction considerations. When structural loads are supported with deep foundations, long-term settlement of adjacent and connecting utilities and other improvements must be considered and accounted for in the design by such means as affixing below-slab utilities to the slab, and providing flexible connections between pile supported and non-pile supported elements.
- **Removal and replacement of peat with structural fill.** This alternative may be cost-effective depending on the depth and volume of peat to be removed below the project site. Removal and replacement eliminates settlement concerns for the planned structures constructed above, and will reduce the risk of potential differential settlement between structures (including roads or utilities) supported by deep foundations or by other ground improvement methods.

Considerations must also be made for utilities underlain by peat. Settlement-sensitive utilities, such as gravity sewers or storm drains should be designed with adequate grade to accommodate estimated long-term settlement, or designed to mitigate settlement using one of the approaches described above.

As peat decomposes over time, it generates methane vapors. Structures with enclosed space should be designed with provisions to mitigate methane vapor. Common methods include installation of methane barriers below floor slabs and/or methane collection pipes installed within a gravel layer below the slab and vented outside of the building.

Liquefaction Potential

Available data and mapping also indicate the presence of potentially liquefiable soils in the vicinity of the proposed 145th Street light rail station. Liquefaction is a phenomenon where soils experience a rapid loss of internal strength as a consequence of strong ground shaking. Ground settlement, lateral spreading and/or sand boils may result from soil liquefaction. Structures supported on liquefied soils could suffer foundation settlement or lateral movement that could be severely damaging to the structures. Conditions favorable to liquefaction occur in loose to medium dense, clean to moderately silty sand, which is below the groundwater level. Potential mitigation measures vary based on the risk for liquefaction at each site, as well as the actual subsurface conditions and planned site improvements. Mitigation measures may include, but are not limited to (1) ground improvement techniques such as vibro compaction, vibro replacement (e.g. stone columns), aggregate piers (e.g. Geopiers), soil mixing or compaction grouting, or (2) the support of structures on deep foundations designed to resist liquefaction-induced settlement and lateral movement. Because of the variety of mitigation techniques and highly variable ground conditions in the City, site-specific geotechnical engineering investigations must be completed in order to determine the risk of potential liquefaction and cost effective mitigation solutions.

REFERENCES

AGRA Earth & Environmental, Inc., 1998, "Geotechnical Engineering Report, Assisted Care Facility, 14910 and 15100 – 1st Avenue NE, Shoreline, Washington."

Booth, Derek B., Kathy Goetz Troost, and Scott A. Schimel, 2009, "Geologic Map of Northeastern Seattle (Part of the Seatthe North 7.5' x 15' Quadrangle), King County."

HWA Geosciences, Inc., 2000, "Geotechnical Investigation, Paramount School Park, Shoreline, Washington."

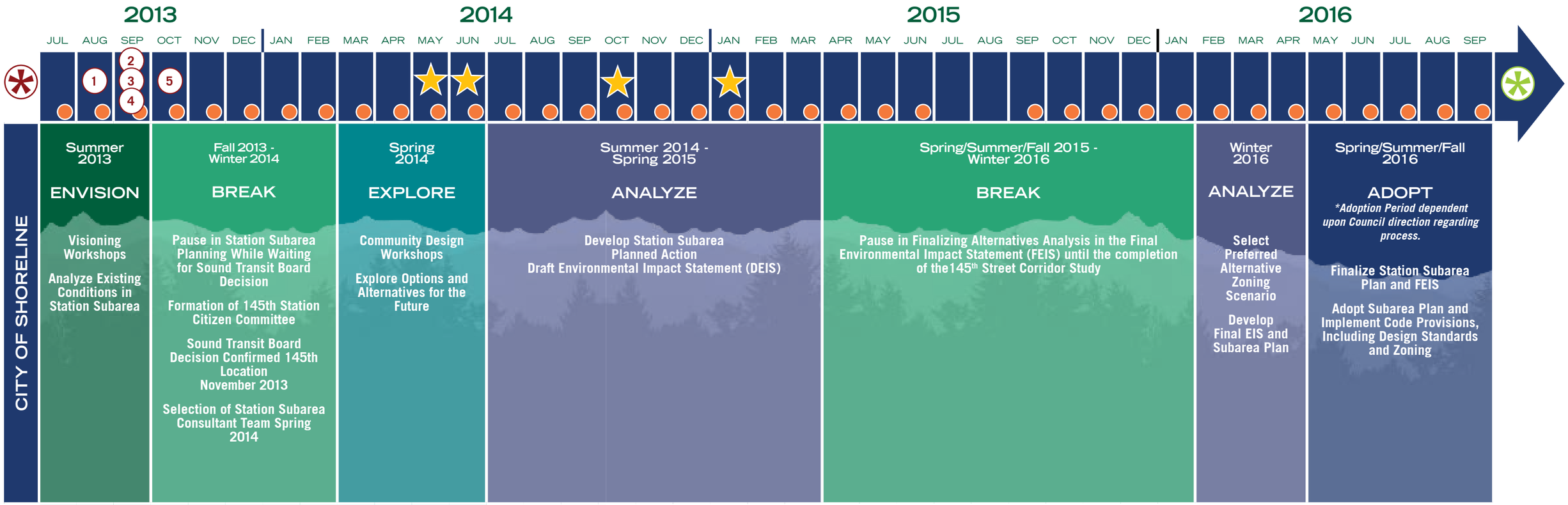
Seattle Public Utilities Materials Laboratory, 2000, "Memorandum. Geotechnical Reconnaissance NE 145th Street, Washington: NS00138."

Tetra Tech/KCM, 2004, "City of Shoreline, Thornton Creek and West lake Washington Basins Characterization Report."

Weber, Paul R. Consulting Soils Engineer, 1977, "Boring and Test Pit Logs. Foundation Investigation, Addition to Lakeside School, Seattle, Washington."

LCF:RCM:nld

145th Street Station Subarea Plan Schedule



Visioning Workshops, Meetings, and Events:

May 22nd, 2013 Kick-off/Informational Public Meeting

1) July 11th Korean Community Event
2) August 1st Visioning Workshop for 145th/155th
3) August 7th Event for Folks of Modest Means
4) August 22nd 185SCC Visioning Workshop for 185th
5) September 19th City of Shoreline Final Visioning Workshop

The 145th Station Citizen Committee (145SCC) Meetings:
Every 4th Thursday of the Month from 7:00-8:30 pm in Room 301 of City Hall

Station Subarea Design Workshops:
1) May 22, 2014: 145SCC Workshop
2) June 12, 2014: Design Workshops, Part I—Brainstorming Ideas
3) October 9, 2014: Design Workshops, Part II—Alternatives and Possibilities
4) January 22, 2015: Draft EIS Community Meeting

Through adoption of a subarea plan, which will include zoning and development regulations, the City will only set the stage for how the neighborhood could possibly transition over time. Market forces and homeowner decision-making about how/when to redevelop or sell properties will determine the pace and degree of transformation in the subarea.