Horseman's Trail/Frognaal Estates PRD
Draft EIS
Cover Memo

Environmental Review. This Draft Environmental Impact Statement (EIS) is being distributed to agencies, Tribes, public service providers, organizations, adjacent property owners, and individuals who have expressed an interest in the Horseman's Trail/Frognaal Estates Planned Residential Development (PRD) in southwest Snohomish County, Washington. The EIS analyzes the environmental impacts of the proposed action: residential development of 22.34 acres within and adjacent to the Harbour Pointe Master Planned community near Mukilteo.

Comments are invited regarding the proposed action and alternatives. The Draft EIS and technical reports prepared for the proposed project are available in electronic format, on a compact disc (CD), from Snohomish County Planning and Development Services. A 30-day comment period is provided for the Draft EIS. Comments are due no later than August 22, 2014, addressed to:

Paul MacCready, Senior Planner
Snohomish County Planning and Development Services
3000 Rockefeller Avenue, M/S 604
Everett, WA 98201-4046
425.388.3311, Extension 2943
paul.maccready@snoco.org

Availability of the Draft EIS. Copies of the Draft EIS in printed form and CD format are available from Snohomish County Planning and Development Services (PDS). A limited number of printed copies of the Draft EIS and Technical Appendices are available for review in the PDS Records Center on the second floor, and at three libraries: Everett Main, Evergreen Branch, and Mukilteo Library. CDs of electronic files of the Draft EIS and Technical Appendices are available to interested individuals at the Snohomish County PDS offices at no cost. The Draft EIS is also available for review on the Snohomish County PDS website:

http://snohomishcountywa.gov/2541/HorsemansTrail

Webpage directions:

1. Go to the Snohomish County Planning & Development Services home page.
2. Hover on the "Plans & Policies" tab at the top and click on the "Frognaal Estates" link below under "Proposed Major Developments."
3. Click on "Draft EIS" and "DEIS Technical Reports" links to the right to open these documents.
4. Alternatively: Enter "Frognaal Estates" in the "Search Snohomish County" box at the top of the PDS home page.
County Actions Required. County actions required to authorize the Horseman’s Trail/Maple Estates PRD include: Preliminary Plat approval, construction plan approvals, a Land Disturbing Activity Permit, right-of-way use permits, Building Permits for structural walls and vaults, Final Plan approval and recordation, Building Permits for homes, and occupancy permits for homes. Permits will also be required from other agencies. These are listed in the Draft EIS Fact Sheet that follows the Cover Memo. The EIS will be used by County decision makers, along with other relevant considerations and documents, prior to taking action on the proposal.

The Proposed Action and Alternatives. The Proposed Action (PRD proposal) would create 112 fee-simple lots for single-family detached homes, 28-ft wide residential streets, stormwater recharge using Low Impact Development (LID) techniques (e.g., bio-retention swales and raingardens), and 9.4 acres of landscaped common areas. Approximately 8 acres of open space would be preserved within the development, and approximately 5.1 acres of forest would remain on the site. The Multi-Family Alternative would create 112 multi-family dwelling units in 4-plex condominiums, 25-ft wide private access drive aisles, stormwater recharge by injection wells, and 3.12 acres of landscaped common areas. Approximately 16.06 acres of open space would be preserved within the development, and approximately 13.7 acres of forest would remain on the site. Under the No Action Alternative, there would be no development on the property at this time, and thus no change from existing conditions.

Key Environmental Issues. The Horseman’s Trail/Maple Estates PRD application was submitted to Snohomish County Planning and Development Services (PDS) on August 4, 2005, and was deemed complete on the date of submittal. A SEPA Checklist signed and dated August 4, 2005 accompanied the application. Upon reviewing the proposal and SEPA checklist, PDS determined that the grading proposal had the potential to cause significant adverse environmental impacts. PDS determined that a limited scope Environmental Impact Statement (EIS) would be required to address the Earth element of the environment; specifically to analyze the potential impacts of moving large amounts of earth (cuts and fills) on a site with steep slopes. Following receipt of comments during the EIS Scoping period, Snohomish County PDS expanded the scope of the EIS to include the Water element; specifically, to require a downstream analysis of the potential effects of Horseman’s Trail/Maple Estates stormwater runoff on Picnic Point Creek, from the site to Puget Sound.

Your interest in this proposal is appreciated by Snohomish County. If you would like more information about the Horseman's Trail/Maple Estates PRD proposal and/or the environmental review that has been conducted, please contact Paul MacCreary, Senior Planner. Additional information regarding the environmental review process and public involvement opportunities is provided in Draft EIS Chapter 1, Section 1.2.

Howard Knight, PDS Permitting Supervisor and
Designated SEPA Responsible Official

Date: 7-23-14
Fact Sheet

Project Title: Horseman’s Trail/Frognal Estates
Planned Residential Development (PRD)

Brief Description of the Proposal:
The proposal would provide 112 lots for single-family homes on an assemblage of parcels totaling 22.34 acres: undeveloped parcels within Sectors 22 and 23 of Harbour Pointe (7.46 acres total), and Lots 27 and 28 of the Hillman’s Meadowdale Addition (14.88 acres). A significant amount of grading would be required to recontour the site to develop grades suitable for housing, utilities, and road construction. The proposed action includes detailed mitigation measures as incorporated plan features for the grading proposal and for erosion control. The applicant will also comply with applicable local and State regulations and site-specific permit conditions.

Purpose and Objectives:
The purpose of the project is to provide single-family home sites in a livable and sustainable community on one of the last remaining large pieces of vacant land within Snohomish County’s Southwest Urban Growth Area (UGA). The objectives of the proposal include:

- Compliance with Growth Management Act (GMA) policies and density requirements within the Snohomish County Southwest UGA.
- Compliance with the Snohomish County General Policy Plan (GPP), Snohomish County Code (SCC), and Engineering Design and Development Standards (EDDS).
- Constructability and economic viability.
- Compatibility within the site-specific environment.
- Compatibility within the neighborhood as a whole.
- Ability of the site development plan to create a “sense of community.”

Principal Alternatives:
The PRD Proposal. The Proposed Action would create 112 fee-simple lots for single-family detached homes, 28-ft wide residential streets, stormwater recharge using Low Impact Development (LID) techniques (e.g., bio-retention swales and raingardens), and 9.4 acres of landscaped common areas. Approximately 8 acres of open space would be preserved within the development, and approximately 5.1 acres of forest would remain on the site.

The Multi-Family Alternative. The Multi-Family Alternative would create 112 multi-family dwelling...
units in 4-plex condominiums, 25-ft wide private access
drive aisles, stormwater recharge by injection wells, and
3.12 acres of landscaped common areas. Approximately
16.06 acres of open space would be preserved within the
development, and approximately 13.7 acres of forest
would remain on the site.

**The No Action Alternative.** Under the No Action
Alternative, there would be development on the property
at this time, and thus no change from existing
conditions.

**Project Proponent:**
Frognal Holdings, LLC
Pegasus Pacific, Inc., Controlling Member of the LLC
8115 Broadway, Suite 204
Everett, WA 98203

**Schedule for Implementation:**
Site development would commence as soon as the land
use approval process is complete. It is estimated that
construction would begin in Spring 2015, and that
occupancy of homes would occur between
approximately 2016 and 2018.

**Lead Agency:**
Snohomish County Planning & Development Services
3000 Rockefeller Avenue, Fifth Floor, M/S 604
Everett, WA 98201-4046

**Snohomish County File No.**
05-123050 SD

**Designated SEPA Responsible Official:**
Howard Knight, Designated SEPA Responsible Official
425.388.3311, Extension 2003

**Project Information Contact Person:**
Paul MacCready, Senior Planner
425.388.3311, Extension 2943

**Permits and Approvals Required:**
Snohomish County
Preliminary PRD Subdivision Approval
Construction Plan Approvals
Land Disturbing Activity Permit
Right-of-Way Use Permits
Building Permits for structural walls and vaults
Final Plat Approval and recordation
Building Permits for homes
Occupancy Permits for homes

Washington Dept of Natural Resources
Forest Practices Permit for tree removal

Washington Dept of Ecology
NPDES Construction Stormwater Permit

Alderwood Water and Wastewater District
Developer Extension Agreements
EIS Authors and Principal Contributors:  

Vicki Morris Consulting Services  
Vicki Morris, EIS Author and Editor

Anthony Burgess Consulting (ABC), Inc.  
Tony Burgess, PhD, PE, RPG  
Geotechnical and Surface Water Peer Reviewer.  
Author of the following Technical Appendices:  
Targeted Drainage Report (September 2013),  
Geotechnical Conditions Report (September 2013),  
Off Site Analysis Report (September 2013), and  
Groundwater Conditions Report (September 2013), and  
Author of the Earth and Water Resources Sections of  
Draft EIS Chapter 3 (Sections 3.1 and 3.2).

Merle Ash, Land Technologies  
Description of the Grading Proposal and Stormwater Management Proposal

Jim Miller, Jim Miller Planning Services  
Land Use and Development History

Draft EIS Date of Issue:  
July 23, 2014

Draft EIS Comment Period:  
July 23, 2014 through August 22, 2014

Availability of Copies of the Draft EIS and Technical Reports to the Public:  
Everyone on the Distribution List (Chapter 5) was sent a Notice of Availability of the Draft EIS and Technical Appendices. A limited number of printed copies of the Draft EIS and Technical Appendices are available for review in the Snohomish County Planning and Development Services (PDS) Records Center on the second floor (for which the address is provided above), and at three libraries: Everett Main, Evergreen Branch, and Mukilteo Library. CDs of electronic files of the Draft EIS and Technical Appendices are available to interested individuals at the Snohomish County PDS office at no cost. The Draft EIS is also available for review on the Snohomish County PDS website:  
http://snohomishcountywa.gov/2541/HorsemansTrail

Next Steps in the EIS Process:  
Following the close of the Draft EIS comment period, the County will review and respond to all comments received. Comments and responses will be published in the Final EIS. Everyone on the Draft EIS Distribution List (Chapter 5), and persons who comment on the Draft EIS will receive Notice of Availability of the Final EIS and information regarding where to view printed copies and/or obtain electronic files of that document.
Reader’s Guide for this Draft EIS

An Environmental Impact Statement (EIS) attempts to strike a balance between the technical information and format required by the State Environmental Policy Act (SEPA), and readability for persons interested in the project who may be unaccustomed to this manner of organizing the document. The Reader’s Guide summarizes the content of this Draft EIS, and suggests locations where information of interest can most readily be found.

The Horseman’s Trail/Frognal Estates Planned Residential Development (PRD) proposal has a long history and a complex framework of land use controls and regulations. In order to understand this application and comment effectively in the environmental review process, readers are encouraged to familiarize themselves with the land use context specifically applicable to this site. Draft EIS Chapter 1 summarizes the Land Use and Development History of the Site and Proposed Action in Section 1.3. Draft EIS Chapter 2, Section 2.4, provides a more detailed description.

The Table of Contents provides a complete list of the subjects covered in the document. Lists of figures and tables can also be used to locate topics of interest.

Chapter 1 provides an overview of SEPA procedures that have been followed during EIS preparation, and describes public involvement opportunities. It briefly summarizes the land use and development history of the site, the Proposed Action, and alternatives considered. Potential impacts of implementing the project, and measures to avoid or minimize these impacts (mitigation measures) are summarized in a table near the end of Chapter 1. Readers are encouraged to review more detailed information in Chapters 2 and 3 on any topic summarized in Chapter 1, to gain a more complete, “in-context” understanding of the issues, Proposed Action, and applicable regulations.

Chapter 2 provides a thorough description of the land use and development history of the site, describes the Proposed Action and alternatives considered, principal features of proposed development, the clearing and grading proposal, and the stormwater management proposal. Figures are provided to facilitate understanding of these descriptions. Figures and tables are also provided in Chapter 2 to facilitate comparison of the alternatives.

Chapter 3 is the real substance of the environmental review presented in the Draft EIS. This chapter describes existing conditions for the Earth and Water elements of the environment, and evaluates potential impacts to these elements in accordance with the limited scope identified for this EIS by Snohomish County Planning and Development Services. (The EIS Scoping process is described in Draft EIS Chapter 1, Section 1.2.) Existing environmental conditions are described under the heading Affected Environment. Following the description of the environmental setting, Potential Impacts During Construction and Potential Developed-Condition Impacts are described for the Planned Residential Development (PRD) and the Multi-Family Alternative. Each impact analysis is followed by a description of proposed and required mitigation measures that could be implemented to avoid or minimize potentially adverse impacts of the project. Proposed mitigation measures are listed under the heading Incorporated Plan Features. Required mitigation measures are listed under the heading Applicable Regulations.

The final chapters of the Draft EIS include Chapter 4, References, and Chapter 5, Distribution List.

Attachment 1 lists for reference precedent requirements imposed by the County on the adjacent Regatta Estates development in the early 1990s.

The Snohomish County contact person is identified in the Fact Sheet that precedes this Reader’s Guide. Instructions for submitting written comments are provided there.
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1. Summary

1.1 Purpose and Objectives of the Proposed Action

The purpose of the Horseman’s Trail/Frognal Estates Planned Residential Development (PRD) project is to provide single-family homesites in a livable and sustainable community on one of the last remaining large pieces of vacant land within Snohomish County’s Southwest Urban Growth Area (UGA). This area includes the established communities of Mukilteo, Edmonds and the Harbour Pointe Master Planned Community.

The criteria for developing the Horseman’s Trail/Frognal Estates PRD are primarily based on the following objectives:

- Compliance with Growth Management Act (GMA) policies and density requirements within the Snohomish County Southwest Urban Growth Area (UGA)
- Compliance with the Snohomish County General Policy Plan (GPP), Snohomish County Code (SCC), and Engineering Design and Development Standards (EDDS)
- Constructability and economic viability
- Compatibility within the site-specific environment
- Compatibility within the neighborhood as a whole
- Ability of the site development plan to create a “sense of community.”

The first two objectives are regulatory compliance criteria placed on any development of land within the Snohomish County UGA and the Harbour Pointe Master Plan area. The last four are the applicant’s objectives for achieving the project purpose on the Horseman’s Trail/Frognal Estates site.

1.2 SEPA Procedures and Public Involvement

The Horseman’s Trail/Frognal Estates PRD application was submitted to Snohomish County Planning and Development Services (PDS) in August 2005. A SEPA Checklist signed and dated August 4, 2005 accompanied the application. Upon reviewing the proposal and SEPA checklist, PDS determined that the grading proposal for the Proposed Action had the potential to cause significant adverse environmental impacts. PDS determined that a limited scope Environmental Impact Statement (EIS) would be required to address the Earth element of the environment; specifically, to analyze the potential impacts of moving large amounts of earth (cuts and fills) on a site with steep slopes:

EARTH – Grading in the amount of 285,000 cubic yards of cut and fills in a steeply sloped area adjacent to existing residences.
(excerpt from Determination of Significance and request for comments on scope of EIS)

PDS issued a combined Determination of Significance (DS) and request for comments on the scope of the EIS on April 27, 2007. On May 4, the DS and scoping notice were sent by U.S. postal mail to all parties of record and to all property owners within 500 feet of the proposed site. On May 9, 2007, the County published a combined DS and EIS Scoping Notice in the Everett Herald. The DS and scoping notice was subject to a 21-day scoping comment period and concurrent appeal period that extended 7 days beyond the scoping comment period. The scoping comment period ended May 30, 2007, and the DS appeal period ended June 6, 2007. No appeal of the DS was filed.
Letters of comment and/or e-mail messages received by Snohomish County PDS during the EIS Scoping comment period included correspondence from the City of Mukilteo, the Edmonds-Mukilteo Action Committee, the Pilchuck Audubon Society, three homeowners associations (Regatta Estates, WindandTide and Woodsound), and 252 parties and individuals. Several of the written comments requested that a complete Environmental Impact Statement (to address all elements of the environment) be required. Representative concerns identified by the City of Mukilteo, Pilchuck Audubon Society, local home owners associations, and residents in the vicinity of the project included:

- Geotechnical hazards: critical area protection
- Zoning densities
- Stormwater runoff impacts to slope stability
- Downslope effects of land use, construction, and drainage activities
- Site design adaptation in response to slope conditions encountered during construction
- Loss of habitat for numerous animals and birds, including large raptors
- Public services (including school capacity), and utilities
- Aesthetic impact to neighbors of higher density development on the Horseman’s Trail/Frognal Estates site
- Site runoff to Picnic Point Creek, in consideration of protecting salmon habitat
- Native Growth Protection Areas, clear-cutting, and designated wetland areas
- Safe walking conditions for school children in an area that lacks sidewalks
- Traffic volumes near two elementary schools: Picnic Point and Serene Lake
- Traffic volumes during rush hours on streets designed for fewer vehicles (in public opinion)
- Limited bicycle lanes and no transit facilities nearby
- Sewer system utility, given a moratorium on additional connections.

Based on review of the comments received during the EIS Scoping comment period, Snohomish County PDS expanded the scope of the EIS to include the Water element in addition to analysis of the impacts of proposed grading in the Earth element. Specifically, the EIS scope was expanded to require a downstream analysis of the potential effects of Horseman’s Trail/Frognal Estates stormwater runoff to Picnic Point Creek, from the site to Puget Sound (draft letter in the project file dated July 13, 2007).

Snohomish County PDS required the applicant to retain an EIS Consultant and a Peer Review geotechnical and hydrological consultant to prepare the EIS. PDS reviewed and accepted the professional qualifications of the EIS Consultant (Vicki Morris Consulting Services) and the Peer Review geotechnical/hydrological consultant (Anthony Burgess, PhD, PE, RPG; Anthony Burgess Consulting) selected from the County’s EIS Consultant Roster. The Peer Review geotechnical/hydrological consultant reviewed the geotechnical work performed and reports prepared by the applicant’s original geotechnical consultant (Associated Earth Associates, Inc.); 2) evaluated the need for additional investigations and/or modeling; and 3) performed additional analysis required for the EIS, including the downstream analysis and site geotechnical and groundwater analysis. The Peer Review geotechnical/hydrological consultant (Anthony Burgess Consulting) prepared four technical reports and the Earth and Water sections of this Draft EIS.

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Technical Appendix B: Geotechnical Conditions Report Horseman’s Trail PRD. September 2013b.
Technical Appendix C: Off-Site Analysis Report Horseman’s Trail PRD. September 2013c (including Attachment C: Wetland Analyses, September 2013d).
Technical Appendix D: Groundwater Conditions Report Horseman’s Trail PRD. September 2013d.
The Draft EIS was published with a 30-day comment period. Notice of Availability was sent to all agencies, Tribes, and persons on the Distribution List, including the Horseman's Trail/Frognal Estates PRD Parties of Record Register (Draft EIS Chapter 5). A compact disc of the Draft EIS was sent to agencies, municipal entities, utilities and service providers, Tribes and interested organizations on the Distribution List. The Notice of Availability indicated where printed copies of the Draft EIS were available for review, and provided information regarding how interested persons could obtain a compact disc of the Draft EIS electronic files. Following the close of the comment period, a Final EIS will be prepared. All written comments received on the Draft EIS will be published in the Final EIS, along with a written response to these comments. The Final EIS will be distributed to persons who commented on the Draft EIS, and to agencies, municipal entities, utilities and service providers, Tribes and interested organizations identified on the Distribution List.

1.3 Land Use and Development History of the Site and Proposed Action

The Horseman’s Trail/Frognal Estates site has a complex history of master plan criteria that define the intended use of the property, prior applications, submittals to and communications from Snohomish County Planning and Development Services related to the current application. The Land Use and Development History section of the Draft EIS (Chapter 2, Section 2.4) explains the development criteria for those portions of the proposed Horseman’s Trail/Frognal Estates PRD site that lie within Harbour Pointe Master Plan Sectors 22 and 23, and the portion that lies outside the Master Plan area. The summary below focuses on the residential density analysis. Other factors (open space, street network, sewer and water) are described in Draft EIS Sections 2.4.3, and 2.4.7.2 through 2.4.7.4.

The proposed Horseman’s Trail/Frognal Estates PRD is an assemblage of three parcels. One parcel (Lot 1 of Regatta Estates) lies within Sectors 22 and 23 of the Harbour Pointe Master Plan area (see Figure 2.4-1). Two parcels of the PRD site (Lots 27 and 28 of the Hillman’s Meadowdale Addition) are located outside the Harbour Pointe Master Plan area. The portion of the site encompassing Lot 1 of Regatta Estates lies primarily within Sector 22. A small segment of Lot 1 of Regatta Estates now lies within Sector 23. The total site area within the Harbour Pointe Master Plan area is 7.46 acres (approximately one-third of the site).

The two parcels located outside the Harbour Pointe Master Plan area are not subject to the Harbour Pointe Master Plan or Sector 22 and 23 approvals. The combined area of these two parcels is 14.88 acres (approximately two-thirds of the overall Horseman’s Trail/Frognal Estates PRD site).

In the late 1960s, the Winmar Company prepared the Possession Shores Master Plan for properties within the Paine Field area of southwest Snohomish County. Snohomish County completed a contract rezone in 1969 for properties covered by the Master Plan. The Master Plan was a generalized description of land uses and allowed for refinement of detail or variations in subsequent planning stages, provided that such refinements or variations were compatible with the original intent of the Master Plan and Snohomish County Code. In the early 1970s, C-W Properties, Inc. succeeded the Winmar Company as owners of the land covered by the Possession Shores Master Plan. C-W Properties proposed a revision to the Master Plan, and Snohomish County required preparation of a full Environmental Impact Statement to analyze the potential significant environmental impacts of the Master Plan. The EIS, issued June 13, 1978, covered all elements of the environment required by the SEPA Guidelines, and identified mitigation requirements for development within the Master Plan area. These are described in Draft EIS Section 2.4.

Amendments to the Possession Shores Master Plan were approved subsequent to the EIS process, and the amended Plan was renamed the Harbour Pointe Master Plan. The Master Plan was made contractually binding when the rezone was approved in Summer 1978. The zoning of land in Sectors 22 and 23 was changed at that time from Heavy Industrial, Rural Residential 12,500 and Rural Residential 20,000 to...
Rural Residential 8,400 (approximately 5 dwelling units/acre). The Harbour Pointe (Possession Shores) Master Plan included provisions that allowed a transfer of residential density within and between Sectors. The Master Plan stated that such density transfers could not exceed the maximum density for the total Master Plan area (5,183 dwelling units). The Plan also stated that the transfer of surplus allowable dwelling units would be subject to a maximum resulting density of 12 units per acre for the receiving area.

The Harbour Pointe (Possession Shores) Master Plan sets forth a process for review of development within each Sector of the Master Plan area, requiring preparation of a Sector Plan, preparation of Division of Development Plans,\(^2\) and public hearings on Sector Plans and plat approvals (described in Draft EIS Section 2.4.2). Each Sector Plan contains a general description of the type and intensity of land use, a generalized vehicular circulation system within the Sector, a generalized open space system, and a more specific description of the topographic and environmental conditions of the Sector. Portions of the proposed Horseman's Trail/Frognal Estates PRD subdivision are located within Harbour Pointe Sectors 22 and 23, and are therefore subject to the previous approvals of the Sector Plans for these Sectors.

**Sector 22:** The Snohomish County Planning Commission approved the Harbour Pointe Sector 22 sector plan on September 28, 1982. The Plan established the maximum density in this Sector of 169 dwelling units. The plan also stated that the final calculation of the maximum allowable units would be made at the preliminary plat or Division of Development stage. The County has required all residential development within Harbour Pointe to be subject to the PRD regulations in effect on the date of complete application. A Division of Development was approved for Sector 22 on May 25, 1990 for the planned subdivision of Regatta Estates. The Division of Development for the Regatta Estates PRD encompassed the entire 42.8 acres that comprise Sector 22. The preliminary plat of Regatta Estates PRD was approved in 1991. Regatta Estates divided Sector 22 into 78 single family residential lots (including Lot 1). This left a balance of 91 potential dwelling units in the 6.76-acre Lot 1 of Sector 22.

Lot 1 was not developed with the rest of Regatta Estates; it was designated for future residential development. The Division of Development for Regatta Estates indicated that a subsequent Division of Development and preliminary plat and development design would be submitted for development of Lot 1. This lot is included in the current Proposed Action (PRD proposal) for Horseman’s Trail/Frognal Estates, with 30 lots proposed for this area.

**Sector 23:** In 1980, the Snohomish County Planning Commission approved the Plan for Harbour Pointe Sector 23. The approved Sector Plan called for: development of approximately 10 acres of the Sector as an elementary school; development of 0.9 acre as a PUD electrical substation; development of 2.6 acres as a neighborhood shopping center; and 2.1 acres to remain as open space.

The Sector Plan noted that the projected residential density for Sector 23 in the Harbour Pointe Sectors would be 4.5 dwelling units per net acre. The Master Plan indicated that Sector 23 had a net area of 14 acres. Based on the projected residential density of 4.5 units per net acre in the Master Plan, the 14 net acres would yield a maximum potential of 63 dwelling units. However, the approved Sector 23 Plan did not indicate any residential development within the sector.

After approval of the Sector 23 Plan, a Division of Development was approved for development of the Picnic Point Elementary School. Ultimately, development of the Picnic Point Elementary School did

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\(^2\) The purpose of the Division of Development process is to provide descriptive text and/or maps describing the location, type, number, density and average lot size of residential uses; the location of proposed and existing open spaces and plans for open space improvements; the location of roads, access ways and right-of-way improvements; standards for road construction and slope treatment; utility systems; and proposed design controls.
not utilize the entire the 9.45-acre site, and the northerly tip (0.79 acre) remains undeveloped. The Division of Development for the Horseman’s Trail/Frognal Estates PRD incorporates the northerly undeveloped portion of the Picnic Point Elementary School site.

No rezone was submitted for development of a 2.6-acre neighborhood shopping center. Later, a Division of Development and plat were approved to develop this area with twelve (12) single-family residential dwelling units (Regatta Highlands). Factoring out the acreage in Sector 23 for the Picnic Point Elementary School (8.66 acres) and electrical substation (0.96 acre), the remaining area for residential development based on the latest GIS data is 5.76 acres. Applying the projected density of 4.5 dwelling units per net acre, the 5.76 acres would yield a maximum potential of 26 units. Subtracting the 12 units developed within the Regatta Highlands subdivision, the dwelling units remaining and available to Sector 23 are fourteen (14) single-family dwelling units, subject to approval of a new Division of Development and PRD plan.

**Horseman’s Trail/Frognal Estates PRD (Current Proposal):** The Horseman’s Trail/Frognal Estates PRD site includes Lot 1 of Regatta Estates reserved for future residential development (Sector 22 and a small portion of Sector 23), and Lots 27 and 28 of Hillman’s Meadowdale Addition located outside the Harbour Pointe Master Plan area. The portion of the proposed Horseman’s Trail/Frognal Estates PRD site within the Harbour Pointe Master Plan area (Sector 22 and a small portion of Sector 23) total 7.46 acres. Both of these Sectors are designated for “Single Family High Density Use” in the Possession Shores (Harbour Pointe) Master Plan.

The maximum potential density for the proposed Horseman’s Trail/Frognal Estates PRD is governed by a combination of the current Snohomish County Planned Residential Development (PRD) code provisions contained in SCC Chapter 30.42B, the Harbour Pointe Master Plan, and approved Sector 22 and Sector 23 Plans.

The maximum number of units permitted in the portion of the site within the Harbour Pointe Master Plan is determined by the Sector 22 and 23 Sector Plans. However, the final calculation of the maximum number of units will be made at the preliminary plat or Division of Development stage in conformance with the PRD chapter of the Snohomish County Zoning Code. The remaining number of dwelling units available in Sector 23 is fourteen, and six are proposed. The remaining number of dwelling units available in Sector 22 (Lot 1) is 91, and 30 are proposed.

The portion of Horseman’s Trail/Frognal Estates west of 60th Avenue W is outside the Harbour Pointe Master Plan area, and is solely regulated by the Snohomish County Land Use Code. For project consistency and environmental sensitivity, the proposal is to develop this area in accordance with Snohomish County PRD regulations (SCC 30.42B) as is required in the Harbour Pointe Master Plan areas (Sectors 22 and 23). The maximum number of dwelling units permitted in the portion of the PRD site outside the Master Plan area is determined by SCC 30.42B.040 (unit yield and bonus) provisions. This portion of the site is zoned R-9600 (one dwelling unit per 9,600 sf of land area), and includes 648,388 square feet. Dividing this area by the allowed zoning density yields 67.54 lots as a base calculation, with a 20 percent bonus for using the planned residential development (PRD) approach, yielding a total of 81 lots allowed. The Horseman’s Trail/Frognal Estates Proposed Action (PRD proposal) includes 76 lots in this area, outside of Sector 22 and Sector 23.

In summary, the maximum number of dwelling units allowed for the entire Horseman’s Trail/Frognal Estates PRD is 81 lots west of 60th Avenue W, and 99 lots (per Sector 22 and 23 Plans) east of 60th Avenue W, for a total of 180 allowable lots. The total lots allowed based on Snohomish County Code 30.42B (PRD) calculations would be 127. The Horseman’s Trail/Frognal Estates proposal is for 112 lots for the development of single-family detached homes.
1.4 Previously Prepared Environmental Studies and Documents

A large number of site-specific technical studies have been prepared over the course of the Horseman's Trail/Frognal Estates PRD application, both to accompany the August 2005 submittal of the Preliminary Plat application, and to respond to subsequent Snohomish County review comments and information requests. Technical reports used as reference documents during preparation of this Draft Environmental Impact Statement, and other sources cited, are listed in Draft EIS Chapter 5: References.

Because a portion of the site lies within Harbour Pointe, there are also several land use, environmental review, and technical documents that pertain to Snohomish County decisions over a period of several years in the 1980s and 1990s regarding the Harbour Pointe Master Plan, and specifically regarding Sectors 22 and 23 in which a portion of the Horseman's Trail/Frognal Estates is located. As described above in Section 1.3, the assemblage of parcels that comprise the Horseman's Trail/Frognal Estates site includes Lot 1 of the plat of Regatta Estates. The Regatta Estates site was similar in character to the Horseman's Trail/Frognal Estates site in that the topography included steep, forested slopes proposed for residential development. Given these similarities, and the link between the two sites through portions of Lot 1 of Regatta Estates, Snohomish County conditions of approval for the Regatta Estates plat are reviewed and summarized in Draft EIS Attachment 1. This attachment also describes changes in applicable regulations between the time of Regatta Estates plat approval and the time when the Horseman's Trail/Regatta Estates application was vested in regulations in effect in August 2005.

1.5 Description of the Proposed Action

Horseman's Trail/Frognal Estates is a proposed Planned Residential Development (PRD) of 112 single-family detached homes on 22.34 acres in unincorporated Snohomish County. The site lies between the cities of Lynnwood, Edmonds, and Mukilteo, within the Snohomish County Southwest Urban Growth Area (UGA). Existing land use on surrounding properties is suburban residential, with residential zoning that allows one dwelling unit per 8,400 square-foot lot east of 60th Avenue W (within the Harbour Pointe Master Plan area), and one dwelling unit per 9,600 sf-lot west of 60th Avenue W. The County’s GMA Comprehensive Plan designation requires a minimum residential density of 4 dwelling units per acre within the UGA, and allows up to 6 dwelling units per acre. The entire site is designated for Urban Low Density Residential use at 4 to 6 dwelling units per acre on the Future Land Use Map of the Snohomish County GMA Comprehensive Plan, effective July 10, 1995.3 To allow more efficient use of land and to provide a variety of housing types and community options, Snohomish County Code (SCC) includes residential development options that differ from standard lot-by-lot planning methods. The Horseman’s Trail/Frognal Estates PRD is proposed under the County’s Planned Residential Development (PRD) regulations, as codified in SCC 30.42B. Primarily, the PRD allows for smaller lot sizes than standard planning in exchange for setting aside at least 20 percent of the site as open space. The PRD approach would make most efficient use of the site, with overall less environmental impact than conventional site planning methods for residential development (as described in Draft EIS Chapter 2, Section 2.6). Further, the PRD site planning method is the only allowable choice for portions of the site regulated by the Harbour Pointe Master Plan.

Residential Lots, Parking and Open Space Proposal. The County’s PRD regulations would allow 81 lots in the portion zoned R-9600 (14.88 acres), and 46 lots in the portion zoned R-8400 (7.46 acres). Thus, a total of 127 residential lots could be developed on the property per Snohomish County GMA

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3 As described above in Section 1.3, there is also a long-standing history of land use regulations associated approximately one-third of the site that lies within the Harbour Pointe (formerly Possession Shores) Master Plan Area.
Code, provided that at least 4.467 acres are designated for open space. However, the portions of the Horseman's Trail/Frognal Estates site that lie within Harbour Pointe Sectors 22 and 23 are also subject to the density limits established by these Sector Plans (see the discussion in Draft EIS Section 1.3 above, pages 1-4 and 1-5). The Horseman’s Trail/Frognal Estates Proposed Action (PRD proposal) includes 112 lots, and 8 acres (approximately 35 percent of the site) of open space, compared to the minimum 20 percent requirement. About 60 percent of this open space will be retained in native vegetation, with the balance to be developed for active recreational use in designated community areas. Proposed lot sizes range from 7,400 square feet to 3,587 square feet. The average lot size in the Proposed Action (PRD proposal) is 4,317 square feet. All lots would border open space or community areas.

Snohomish County Code requirements for off-street parking are: two spaces per residential unit, provided in garages and/or on driveways. The PRD requirement for guest parking is one-half space per residential unit. The Horseman’s Trail/Frognal Estates Proposed Action (PRD proposal) includes four parking spaces per residential unit (two within a garage, and two on each driveway), and one guest parking space per unit in a parking lane along the street. The total number of parking spaces required is 280, compared to 392 spaces proposed.

**Terraced Development and Retaining Walls Proposal.** Site topography ranges from a low elevation of approximately 260 feet above mean sea level (MSL) to a high of approximately 460 feet above MSL. The low-end entry at 58th Place W (370 feet above MSL), to the exit at 60th Avenue W (460 feet above MSL), spans a 90-foot change in elevation. To meet GMA density goals for the Planned Residential Development on this site with significant topographical variation, the development needs to be terraced. Proposed terracing will require retaining walls with varying structural criteria (described in Draft EIS Chapter 2, Section 2.5.2).

**Clearing and Grading Proposal.** The clearing and grading proposal is a significant feature of the proposed action. Approximately 80 percent of the site (just under 18 acres) will be logged and cleared for development. Of this total, 14 acres will be developed for roads, infrastructure and homesites, and 4 acres will consist of developed open space tracts for recreational use. Approximately 20 percent of the site (just over 4 acres) will not be cleared, to be retained in native growth. Approximately 9.4 acres of landscaping will be installed with completion of residential development on the site.

Engineering and grading plans estimate that earthwork will be approximately balanced on the site. Approximately 275,000 cubic yards of material will be redistributed on the property (cut and fill) to achieve design grades. This material is comprised of organic surface soils, a weathered subsurface layer, lodgement till, and outwash sands. Select materials that will be imported to complete the finished grading plan will include compost soil amendments, crushed rock, asphalt pavement, and concrete to construct curbs and sidewalks. The site will be segregated into three approximate areas for soil management during grading, in order to phase the clearing and grading proposal. Segmental Retaining Walls (SRW) and/or various methods of soil reinforcement will be used to enhance the structural integrity of cut and fill slopes. Proposed earthwork methods are described and illustrated in detail in Draft EIS Chapter 2, Section 2.5.2. A geotechnical engineer will be onsite during structural grading to closely monitor all excavation work. A geotechnical technician will be onsite every day there is earthwork activity to monitor compliance with recommendations, and to test the density of placed soils. Before grading is initiated, the geotechnical engineer will review the areas to receive fills and provide site-specific guidance that may or may not vary from the Geotechnical Report. The geotechnical engineer will prepare written confirmation that each site segment is approved for excavation before grading begins. Grading will be scheduled during the first dry weather season after development approvals are received. (Detailed lists of mitigation measures for the grading proposal are provided in Draft EIS Chapter 3, Section 3.1.)
**Stormwater Management during Construction.** A Stormwater Pollution and Prevention Plan (SWPPP) will be prepared and implemented during the construction phase of the project. Best Management Practices may be added or deleted at any time to adjust to “real time” issues, in compliance with the Washington Department of Ecology Stormwater Management Manual for Western Washington (Ecology 2005, Volume 2). Measures for erosion control will be functionally in-place before earthwork is initiated on the site. The contractor will be responsible for maintenance of all erosion control facilities. To assure compliance with the SWPPP, a Certified Erosion/Sediment Control Lead (CESCL) will be hired by the owner to review and report on compliance with the conditions of the SWPPP. The requirement is for no turbid water to leave the site in exceedance of SCC 7.53 standards, and for no work to allow water quality to be compromised. The project engineer and property owner will be responsible to Snohomish County and the Washington State Department of Ecology for compliance with water quality standards during construction.

**Developed-Condition Stormwater Management Proposal.** The Horseman's Trail/Frognal Estates PRD stormwater management proposal will implement Low Impact Development (LID) techniques to provide recharge to the existing groundwater system. Consistent with the stormwater management strategies of LID, the proposal is integrated with distributed, small-scale stormwater controls that will allow stormwater to more closely mimic natural hydrologic patterns. Various techniques are proposed that will retain stormwater onsite or lengthen the “time of concentration” so as to “…reduce the size of conventional [stormwater] facilities that control storm flows.”

Site design and management strategies to meet the flow control objectives of Ecology's Low Impact Development Technical Manual Section 1.4 include distributed and integrated management practices as follows:

- Manage stormwater as close to its origin as possible by utilizing small scale, distributed hydrologic controls.
- Create a hydrologically rough landscape that slows storm flows and increases time of concentration.
- Increase reliability of the stormwater management system by providing multiple or redundant LID flow control practices.
- Integrate stormwater controls into the development design.

Open bio-retention swales with compost filter berms would receive runoff adjacent to roads; yards would be backfilled with engineered soils; linear community areas would be landscaped with bio-retention swales and rain gardens; and buried detention vaults would be located at the ends of the LID components as an extra pre-caution to receive and manage any excess runoff.

A **Targeted Drainage Report** has been prepared for the Horseman's Trail/Frognal Estates proposal that conceptually demonstrates how LID stormwater management techniques can be implemented to reduce the size of conventional facilities that control stormwater flows (Anthony Burgess Consulting Inc., September 2013a; Draft EIS Technical Appendix A). The developed-condition stormwater management proposal is described in detail in Draft EIS Chapter 2, Section 2.5.5.1.

**Roads and Circulation.** The proposed project has two points of access that will be connected by a continuous road system through the plat. One entry will be from 58th Place W that intersects with a collector arterial to the east, Picnic Point Road. The other entry will be from 60th Avenue W, several blocks north of its intersection with the 140th Street SW, a collector arterial. A proposed private road will serve 15 lots from proposed 60th Avenue W within the Horseman's Trail/Frognal Estates site. Streets through the development will be designed and constructed in accordance with Snohomish County...
Residential Street Standards, with some modifications approved by the Public Works Department. The road section will have two 10-foot wide travel lanes, an 8-foot wide parking lane, and 5-foot wide sidewalk on one side. The private road will be constructed using the same basic road section. Emergency vehicle access will be enhanced by the connectivity provided by project roads between Picnic Point Road and 60th Avenue W.

**Trails and Pedestrian Circulation.** Pedestrian circulation will be provided within the development in the form of sidewalks and paths adjacent to the parking lane along one side of the road, and a backyard community path through a community park and community gathering area. An additional 2,800 lineal feet of recreational/community paths are also proposed. These will be constructed as low impact trails through the community and around natural areas of the site.

**Landscaping and Maintenance Proposal.** About 4 acres of the Horseman’s Trail/Frognal Estates PRD community open space will be cleared, re-graded, and landscaped. Most of the landscaping will be a component of the Low Impact Development stormwater management plan, and therefore will provide a functional benefit as well as an aesthetic value. More than 1,200 trees are proposed in the landscape design along with nearly 4,000 shrubs. Landscape screening will be provided for proposed retaining walls within the development. Not included in these numbers is private residential landscaping that would total approximately 6 additional acres.

The Homeowners’ Association (HOA) will be responsible for maintenance of community open space areas and Low Impact Development stormwater management features. Maintenance Guidelines will be provided in the Covenants, Codes & Restrictions (CC&Rs) of the development, and in a Homeowner’s Handout. The HOA will be required to hire the services of a professional landscape maintenance company educated in the maintenance requirements of the Low Impact Development stormwater management features. Project approvals will include providing a drainage access easement to Snohomish County for the County to assure that the HOA maintains the drainage facilities, and that the cost of repair or replacement of any drainage facilities is the responsibility of the HOA.

**Water Supply and Distribution.** Alderwood Water and Wastewater District is the water supply purveyor within the project area. There are two existing 8-inch ductile iron pipe stubs extended to the Horseman’s Trail/Frognal Estates property line. The District has confirmed to the applicant that capacity is available to serve the proposed development.

**Sewage Collection, Treatment, and Disposal.** Alderwood Water and Wastewater District is also the purveyor of the wastewater collection, treatment, and disposal system within the project area. A sewer conveyance line crosses through the Horseman’s Trail/Frognal Estates site to Regatta Estates and Picnic Point Road on the 60th Avenue W alignment in an unopened right-of-way, with an easement to the Water and Wastewater District. The property also has access to the sewer main on Picnic Point Road via a recorded road and utility easement west of 61st Avenue W and Picnic Point Road. This road alignment is mapped as Richards Road.

Certificates of Water and Sewer availability were issued by the Alderwood Water and Wastewater District (AWWD) in August 2005. The certificates are valid for a one-year period, and have been renewed as the Horseman’s Trail/Frognal Estates project time-frame has been extended.

The new Picnic Point Wastewater Treatment Plant serves the northwestern portion of the district and has the capacity to treat 6.9 million gallons per day (mgd) of wet weather flows. Completion of this treatment plant resulted in lifting a moratorium on sewer hookups in the Picnic Point area effective April 4, 2011.
1.6 Description of Alternatives to the Proposed Action

Multi-Family Alternative

The Multi-Family Alternative is evaluated in this Draft EIS as a reasonable alternative that would meet most of the objectives of the proposal but at a lower environmental cost, in accordance with WAC 197-11-440(5)(b). The Multi-Family Alternative site plan (Figure 2.7-1 in Draft EIS Chapter 2) consists of 112 condominium units in 28 buildings with small individual yards. The buildings would be three and four stories (50 to 60 feet) in height, with parking garages on the lower level providing eight underground parking spaces per building. The open space concept includes undisturbed common areas totaling approximately 579,600 square feet; 87,674 square feet of lawn and landscaping; and 32,460 square feet of restored open space, for a total open space system of approximately 699,814 square feet (16.06 acres).

Road circulation and emergency access shown on the Multi-Family Alternative site plan (Figure 2.7-1) was not totally resolved for compliance with Snohomish County standards. The site plan includes a single 25-foot wide, 1,800-foot long access road from an extension of 58th Place W, through the developed plat of Regatta Estates, terminating as a dead-end street that would extend to the west portion of the project. This access road would not provide a connection to 60th Avenue W.

Implementation of the Multi-Family Alternative would have less significant clearing requirements than the Proposed Action (PRD proposal), reduced grading quantities, less impervious area, and drainage discharges equipped with innovative stormwater management (SWM) measures. However, the Multi-Family Alternative is less consistent with the objectives of the Proposed Action in that the market for 4-plex units is not currently as viable as the market for single-family detached homes such as those proposed in the PRD (preferred alternative). Also, while the Multi-Family plan would provide substantial elements and amenities for developing a “sense of community,” the 4-plex units may be considered less compatible than the Proposed Action (PRD proposal) with single-family detached homes in the surrounding neighborhood.

No Action Alternative

Under the No Action Alternative, there would be no development on the Horseman’s Trail/Frognal Estates site at this time. Existing County zoning and Harbour Pointe Master Plan land use regulations that apply to portions of the Horseman’s Trail/Frognal Estates site specify that the property shall be developed for residential use. Therefore, it can be anticipated that there would likely be a future application for site development, as this assemblage of parcels is one of the last remaining areas of vacant land for residential development that could be used to partially serve the Snohomish County population and housing growth projections for the current 20-year planning period. It is assumed for the purpose of environmental review that the property would temporarily remain undeveloped with the No Action Alternative.

Alternatives Considered and Eliminated from Further Evaluation

Numerous alternative site planning options were considered for the Horseman’s Trail/Frognal Estates

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4 On April 9, 2009, Snohomish County Planning and Development Services (PDS) issued a Code interpretation pursuant to Snohomish County Code (SCC) 30.83.010 advising that “... under Chapter 30.63C SCC, the director of PDS may modify the bulk and PRD regulations in chapters 30.23 and 30.42B SCC in order to allow the use of low impact development to meet the requirements of Chapter 30.63A SCC when a proposal meets the LID modification criteria in SCC 30.63C.040(2). The proposed reasonable alternative is a fourplex PRD design using LID techniques and best management practices. This makes it a plausible reasonable alternate to be studied in the Horseman’s Trail EIS under the provisions of Chapter 30.63A SCC.”
site prior to the applicant selecting the Proposed Action (PRD proposal) as the preferred development proposal. These included Traditional Lot-by-Lot Development: 8,400 and 9,600 square foot lots; Lot Size Averaging (LSA) per Snohomish County Code (SCC) 30.23.210; and Multi-Family development concept within the Reduced Drainage Discharge Demonstration Program (RDDDP) per SCC 30.34B. The Lot-by-Lot method was originally given considerable effort prior to adoption of the Growth Management Act, but never could be made to work overall on the site due to significant topographical variation. The cost of Traditional Lot-by-Lot Development and the impacts of site development in this manner would be similar to the proposal, though it would provide considerably fewer home sites. For these reasons, these two alternatives were eliminated from further evaluation, as described in Draft EIS Section 2.6.

1.7 Significant Impacts and Mitigation Measures

The full text of the Affected Environment, Potential Impacts, and Mitigation Measures for the proposed action and alternatives is presented in Draft EIS Chapter 3. A summary matrix of potential impacts and mitigation measures is provided in Table 1.7-1, following. Summary statements of project impacts in the table are presented in the absence of the context of existing environmental conditions (the Affected Environment discussions in Draft EIS Chapter 3). For these reasons, readers are encouraged to review the more comprehensive discussion of issues of interest in the Draft EIS to develop the most accurate understanding of impacts associated with the proposed action and alternatives.

The State Environmental Policy Act (SEPA) Guidelines require a summary of the proposal, impacts, alternatives, mitigation measures, and significant adverse impacts that cannot be mitigated (WAC 197-11-440[4]), and a comparison of the environmental impacts of the alternatives No Action (WAC 197-11-440[5][c][vi]). These summaries are customarily prepared in the form of a table or matrix in Chapters 1 and 2, respectively. In this Environmental Impact Statement, the two summaries are combined in Table 1.7-1.
### Table 1.7-1. Summary of environmental impacts and mitigation measures associated with the Horsemann’s Trail/Frognal Estates Planned Residential Development proposed action and alternatives.

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<td><strong>Mitigation Measures</strong></td>
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<td><strong>EARTH: Topography</strong></td>
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<tr>
<td>Recountouring approximately 17.2 acres of the site would be required in order to develop grades suitable for housing, utilities, and road construction.</td>
<td>APPLICABLE REGULATIONS: Snohomish County will require a site excavation plan and Land Disturbing Activity Permit that will impose conditions to minimize or avoid potential adverse impacts associated with earthwork.</td>
<td>Approximately 8.6 acres of the site would be recontoured to develop grades suitable for housing, utilities, and road construction within the Multi-Family Alternative.</td>
</tr>
<tr>
<td>Grading would involve excavation in the central and southern areas of the site to provide fill for the east and west ravines.</td>
<td>INCORPORATED PLAN FEATURES: • To the extent practicable, cut and fill volumes would be balanced on-site; i.e., excavated material would be redistributed and used for fill. • The proposal to balance cut and fill volumes on the site (to the extent practicable) would minimize the need for sand and gravel resources to be imported from off-site areas, thereby having the secondary beneficial effect of minimizing truck transportation impacts and mineral extraction from other sites.</td>
<td>Grading would involve excavation in the central and southern areas of the site, though more of the existing topography would be retained than with the Proposed Action. Approximately 39,000 cubic yards of fill would occur on site. It would be necessary to haul approximately 36,000 cubic yards (2,160 truck and trailer loads) of excavated material off-site for disposal or reuse elsewhere.</td>
</tr>
<tr>
<td>Significant volumes of fill material would be placed in the east and west ravines in a combination of cut and fill walls parallel to the slope to implement the Proposed Action (see Figure 3.1-2 in Draft EIS Section 3.1).</td>
<td>APPLICABLE REGULATIONS: Placement of fill would be regulated by the Snohomish County Land Disturbing Activity Permit required for the project, and by proposed stormwater management measures (described below).</td>
<td>There would be no filling near the head of the west ravine to implement the Multi-Family Alternative.</td>
</tr>
<tr>
<td>Overall, the site would be graded to step down from the south to the north in a series of terraces to implement the Proposed Action.</td>
<td>INCORPORATED PLAN FEATURES: • During final design, global stability analyses will be included to demonstrate that retaining systems and fill prisms are stable. • All slopes that will not be retained will be constructed as engineered cut or fill slopes that do not exceed 2H:1V. • These slopes will be protected by erosion control measures until vegetation growth has been re-established. • Slopes that will not be graded to a new configuration will be designated as native growth Protection Areas (NGPAs). • Steep slopes would be recontoured by grading and terracing. Soil retaining structures may include rockeries, block walls, soil nail walls, mechanically-stabilized earth walls, and/or soldier pile walls. Representative examples are described and illustrated in Draft EIS Section 2.5.2. Retaining wall construction techniques and wall types will be specified at the time of</td>
<td>There are no retaining walls in the concept drawing for the Multi-Family Alternative. Some retaining walls might be added if this concept were taken to final design, but they would be less extensive than with the Proposed Action.</td>
</tr>
</tbody>
</table>

5 Under the No Action Alternative, there would be no permit application to alter the site, and thus no change from existing conditions and no mechanism for requiring mitigation measures.
### PROPOSED ACTION

<table>
<thead>
<tr>
<th>Potential Impacts</th>
<th>Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final design and construction plan preparation, prior to submittal of the Land Disturbing Activity Permit application.</td>
<td>• All proposed retaining wall systems shall be properly designed and analyzed by the project Geotechnical Engineer to confirm that adjacent slopes and off-site properties would not be impacted by the proposed development.</td>
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<td></td>
<td>It would be necessary to import limited quantities of construction material (e.g., drain rock and compost for soil amendment) to develop the site as proposed.</td>
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<td><strong>APPLICABLE REGULATIONS:</strong> Off-site construction material sources would be subject to their own permit requirements and conditions that would minimize the impacts of extracting, processing, loading, and transporting material from these locations to the Horseman’s Trail/Frognal Estates site. Reusable soil materials (e.g., topsoil) will be stockpiled on-site for redistribution following site grading.</td>
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<tr>
<td>Significant Unavoidable Adverse Impacts: Grading for the construction of roads, building lots and utilities would result in unavoidable alterations to the existing topography of the site. However, steep slopes would be stabilized with retaining structures and various soil reinforcement methods; therefore, topographical impacts with either the Proposed Action or Multi-Family Alternative would not necessarily be significant or adverse.</td>
<td><strong>APPLICABLE REGULATIONS:</strong> Snohomish County will require submission of a site excavation plan and compliance with the conditions of a Land Disturbing Activity Permit.</td>
</tr>
<tr>
<td>Approximately 275,000 cubic yards of earthwork would be required to implement the Proposed Action.</td>
<td><strong>APPLICABLE REGULATIONS:</strong> Same as above. Land Disturbing Activity Permit conditions will include dust control measures and limits on the hours of earthwork activities. Controlling work hours will minimize noise impacts in the surrounding area during this phase of site work. Construction activities would be required to comply with Washington Department of Ecology fugitive dust and odor emissions regulations cited in WAC 173-400-040. Fill will be placed as compacted structural fill under the direction of the project Geotechnical Engineer to provide the necessary strength properties for foundations and slope stability. A licensed geotechnical engineer will be on-site (or on-call 24 hours/day) during grading and site construction activities.</td>
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<tr>
<td>The Proposed Action includes balancing excavation and fill volumes on the site to the extent practicable. These activities would constitute a change from existing conditions.</td>
<td><strong>APPLICABLE REGULATIONS:</strong> The need to haul an estimated 36,000 cy (64,800 tons) of excavated material off the site to implement the Multi-Family Alternative would result in approximately 2,160 off-site truck trips that would generate noise and emissions along the haul route(s).</td>
</tr>
<tr>
<td>The installation of utilities in excavations would require temporary cuts.</td>
<td><strong>APPLICABLE REGULATIONS:</strong> Excavations for the installation of utilities during construction would be stabilized by using temporary measures such as a trench boxes or sheet piles, or by laying back cut slopes in accordance with good practice and as required by.</td>
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### MULTI-FAMILY ALTERNATIVE

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<tr>
<th>Potential Impacts</th>
<th>Mitigation Measures</th>
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<tr>
<td></td>
<td>Similar to the Proposed Action.</td>
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<td><strong>APPLICABLE REGULATIONS:</strong> Same as the Proposed Action.</td>
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<tr>
<td></td>
<td>There would be no significant unavoidable adverse impacts to the topography of the site as a result of the No Action Alternative.</td>
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</table>

### NO ACTION ALTERNATIVE

<table>
<thead>
<tr>
<th>Potential Impacts</th>
<th>Mitigation Measures</th>
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<tbody>
<tr>
<td></td>
<td>With no construction on the site, there would be no need to import select construction materials.</td>
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<td>There would be no earthwork associated with the No Action Alternative, and thus no alteration to the geology or soils of the site.</td>
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<td>There would be no construction-related traffic noise or emissions attributable to the site with the No Action Alternative.</td>
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<td>Same as with the Proposed Action.</td>
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</table>
### Potential Impacts

#### PROPOSED ACTION

A limited area of the north slope above an off-site wetland meets the criteria for definition as a "landslide hazard area" under the Snohomish County Critical Areas Regulations (SCC 30.62B.340). This area would remain undisturbed within a Native Growth Protection Area (NGPA) in accordance with SCC 30.62.075.

**APPLICABLE REGULATIONS:**
- SCC 30.62B.340(2)(b) defines minimum setbacks from the top of slopes as the greater of one-third the height of the slope or 50 feet. The Snohomish County Planning and Development Services Director can approve reduced building setbacks from the steep slope hazard area subject to the conditions of SCC 30.62.200(2)(c) if a site-specific Geotechnical Report demonstrates that alternative setbacks would provide protection greater than or equal to that required by SCC 30.62.210(2).
- The area within the northwest corner of the site below Lots 24 and 25 shall be designated and protected as a critical area and kept from landsliding such that no fill or walls should be placed directly above the landslide hazard slope. A geotechnical evaluation prior to the Building Permit stage and prior to final plat recording will establish the appropriate setback from this landslide hazard area.
- Final setbacks for individual buildings next to the top of a descending slope of a landslide hazard area will be established at the Building Permit stage based upon the International Building Code (IBC) adopted by Snohomish County at the time a complete Building Permit application is received.
- Setbacks for buildings next to the toe of an ascending slope of a landslide hazard area are the greater of one-half the height of the slope or 50 feet as required by SCC 30.62B.340(2).
- All proposed retaining wall systems shall be properly designed and analyzed to confirm that adjacent slopes and off-site properties would not be impacted by the proposed development.
- All existing vegetation shall be retained within steep slope buffer areas.

**INCORPORATED PLAN FEATURES:**
- Topsoil removed and stockpiled during construction would be redistributed in areas to be landscaped within the completed development.

**APPLICABLE REGULATIONS:**
- Where necessary to improve infiltration characteristics, native and fill soils may be amended with organic material to improve infiltration rates, or to improve drainage.

#### MULTI-FAMILY ALTERNATIVE

Similar to the Proposed Action, although more of the existing topography would be retained with the Multi-Family Alternative.

Same as with the Proposed Action.

The north slope "landslide hazard area" would remain undisturbed with the No Action Alternative, though without the protection of a designated NGPA.

#### NO ACTION ALTERNATIVE

Deeper, more permeable deposits on the site exposed by grading would likely be utilized for stormwater infiltration.

**APPLICABLE REGULATIONS:**
- Topsoil and surface organic material would remain in place and undisturbed on the site under the No Action Alternative.

No grading would occur to expose more permeable deposits with the No Action Alternative. There would be no alteration of existing characteristics of stormwater infiltration.
<table>
<thead>
<tr>
<th>PROPOSED ACTION</th>
<th>MULTI-FAMILY ALTERNATIVE</th>
<th>NO ACTION ALTERNATIVE&lt;sup&gt;5&lt;/sup&gt;</th>
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<tr>
<td><strong>Potential Impacts</strong></td>
<td><strong>Mitigation Measures</strong></td>
<td><strong>Potential Impacts</strong></td>
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</table>
| Soils with a significant fines fraction, such as till, will likely be moisture-sensitive and therefore may be difficult to operate on or adequately compact during wet weather. | Provided through lower permeability soils to the underlying permeable advance outwash.  
- Infiltration facilities will be located away from steep slopes.  
- Surface drainage will be controlled and directed away from slopes to minimize slope saturation that could lead to erosion or instability.  
- All surface and roof water shall be properly discharged and not allowed to flow over slope faces or near slope crests, and shall not be allowed to enter a retaining structure drain system. | Similar to the Proposed Action, though over a less extensive area due to the reduced clearing and grading requirements of the Multi-Family Alternative. | Same as with the Proposed Action. | There would be no construction activity on the site with the No Action Alternative, and thus no disturbance of moisture-sensitive soils. |
| The seismic classification of the site is Class C (i.e., there would be some amplification of ground acceleration from bedrock to the surface during an earthquake). Investigations on the property show that N-values from standard penetration tests are greater than 50 for the Vashon till and pre-Vashon sediments. | Incorporated PLAN FEATURES:  
- Impacts associated with moisture-sensitive soils during construction could be mitigated by undertaking earthwork in these areas during dry weather (April 1 to September 30, whenever practicable).  
- During final design, global stability analyses will be performed to demonstrate that retaining systems and fill prisms are stable.  
- All slopes that will not be retained will be constructed as engineered cut or fill slopes that do not exceed 2H:1V. In addition, these slopes will be protected by erosion control measures until vegetation growth has been re-established.  
- Slopes that will not be graded to a new configuration will be preserved in designated Native Growth Protection Areas (NGPAs).  
- Design of foundations, slopes and retaining structures will take into account the effects of seismic loading. Additional geotechnical analysis will be performed prior to issuance of the Snohomish County Land Disturbing Activity Permit.  
**APPLICABLE REGULATIONS:**  
- Snohomish County Critical Areas Regulations and the International Building Code (IBC) require a factor of safety for landslide occurrences. Stability analyses along representative cross-sections of the Horseman’s Trail Frognal Estates site meet code requirements, as described in the Geotechnical Conditions Report (Anthony Burgess Consulting September 2013b). | Same as the Proposed Action. | Same as with the Proposed Action. | There would be no improvements designed for the site that would require seismic loading design considerations. |
<p>| <strong>Significant Unavoidable Adverse Impacts:</strong> Site development would consume natural resources such as sand and gravel. This impact would occur wherever within the County that provisions are made for new residential development to accommodate projected growth and achieve the County’s GMA residential density goals. | | | | There would be no significant unavoidable adverse impacts to the geology and soils of the site with the No Action Alternative. |</p>
<table>
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<tr>
<th>PROPOSED ACTION</th>
<th>MULTI-FAMILY ALTERNATIVE</th>
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<td><strong>Potential Impacts</strong></td>
<td><strong>Mitigation Measures</strong></td>
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<td><strong>Erosion</strong></td>
<td><strong>Erosion</strong></td>
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<td>Removal of native vegetation coupled with site runoff during construction could potentially cause erosion and transport of sediment, particularly if there was unanticipated suspension of grading for an extended period of time.</td>
<td>Incorporating Plan Features: The applicant proposes to comply with the following specific erosion/sedimentation control measures recommended by the project Geotechnical Engineer (AESI, April 25, 2012) and approved by the Peer Review geotechnical consultant (Anthony Burgess Consulting, May 20, 2013). These measures are in addition to, or refinements of, complying with applicable requirements of the Ecology 2005 SWMMWW, NPDES Construction Stormwater Permit, and Snohomish County Code (described below).</td>
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<td>- A Temporary Erosion and Sediment Control (TESC) Plan will be prepared and approved prior to the start of construction.</td>
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<td>- The owner and design team shall include adequate ground cover measures, access roads, and staging areas in the project bid to give the selected contractor a workable site under winter conditions (October 1 through March 31). The selected contractor shall be prepared to implement and maintain the required measures to reduce the amount of exposed ground. A site maintenance plan will be in place in the event that stormwater turbidity measures exceed Ecology standards, and to comply with the Snohomish County Pollution Control Code (SCC 7.52).</td>
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<td>- All TESC measures for a given area to be graded or otherwise worked shall be installed prior to any activity within that area. The sequence of construction within a given area shall be to install sediment traps and/or ponds and establish perimeter flow control prior to the start of mass grading.</td>
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<td>- During the wetter months of the year (October through March), or when large storm events are predicted during summer months, each work area shall be stabilized so that if showers occur, the work area can receive rainfall without excessive erosion or sediment transport. During the winter months, areas that are to be left unworked for more than two days shall be mulched or covered with plastic. During the summer months, stabilization can be accomplished by seal-rolling the subgrade. The stabilization process will also include establishing temporary stormwater conveyance channels through work areas to route runoff to approved treatment facilities.</td>
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<td>- Polyacrylamide could be applied to bare soil to</td>
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<tr>
<td>Similar to the Proposed Action, though potential impacts should be less in proportion to the lesser amount of clearing and vegetation removal required to implement the Multi-Family Alternative.</td>
<td>Similar to the Proposed Action. The Multi-Family Alternative stormwater management concept is described in Draft EIS Section 2.7.5.</td>
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<td>There would be no vegetation removal or grading of the site with the No Action Alternative, and therefore no change in erosion potential compared to existing conditions.</td>
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<tr>
<td>PROPOSED ACTION</td>
<td>Multi-Family Alternative</td>
<td>No Action Alternative</td>
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<td><strong>Potential Impacts</strong></td>
<td><strong>Mitigation Measures</strong></td>
<td><strong>Potential Impacts</strong></td>
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<tr>
<td>reduce erosion and control sediment. If necessary, approved additives could also be used to enhance settlement of suspended sediments in temporary erosion/sedimentation control ponds during construction.</td>
<td>• All disturbed areas shall be revegetated as soon as practicable. If site work is performed outside of the growing season, disturbed areas shall be covered with mulch, as recommended in the Erosion Control Plan. Straw mulch provides the most cost-effective cover measure and can be made wind-resistant with the application of a tackifier after it is placed.</td>
<td>• Surface runoff and discharge shall be controlled during and following site development. Under no circumstances shall concentrated discharges be allowed to flow over significant slopes.</td>
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<tr>
<td>Areas that would be most susceptible to erosion are those where excavation would expose fine-grained soils, particularly on slopes. If uncontrolled, sediment could be washed into the off-site wetland or off-site stormwater management systems, and ultimately into Picnic Point Creek. Suspended sediments could settle out in sections of the surface water system where velocities are low. This would potentially change the hydraulic and habitat characteristics of the wetland and creek, if erosion and sedimentation were allowed to occur. The creek supports populations of chum salmon, coho salmon, cutthroat trout and most likely other resident fish.</td>
<td><strong>APPLICABLE REGULATIONS:</strong> • The stormwater management proposal for the site would comply with the Washington Department of Ecology Stormwater Management Manual for Western Washington (SWMMWW) (2005). Proper installation and maintenance of these facilities would minimize or avoid potential adverse impacts associated with erosion/sedimentation during construction.</td>
<td>Similar to the Proposed Action, though less extensive due to the reduced clearing and grading requirements of the Multi-Family Alternative.</td>
</tr>
</tbody>
</table>
### Proposed Action

**Potential Impacts**

- (BMPs) during site development. Representative BMPs to be implemented are listed in Draft EIS Section 3.1.3.
  - A Certified Erosion & Sedimentation Control Lead (CESCL) will be on-site (or on-call 24 hours/day) during grading and site construction activities.
  - The Geotechnical Engineer will be required to be on-site to monitor the placement of fill in ravines and placement of any temporary ponds in fill.
  - The construction contractor would be required to obtain and comply with the conditions of a National Pollutant Discharge Elimination System (NPDES) Construction Stormwater Permit from the Washington Department of Ecology: maintain the site log book, record implementation of the SWPPP and other permit requirements, record installation and maintenance of BMPs, record site inspections to be conducted by the (CESCL), comply with and record the results of stormwater quality monitoring.
  - The construction contractor would be required to prepare and implement a construction Stormwater Pollution Prevention Plan (SWPPP) in accordance with Snohomish County Rule 3044. Representative Best Management Practices are listed in Draft EIS Section 3.1.3.

**Mitigation Measures**

- Design of the developed site stormwater management system includes discharge to the western ravine for flows that exceed the infiltration capacity of proposed drainage swales and rain gardens. Discharge to the ravine would have the potential to erode the floor and sides of the ravine if not properly designed.
- **Applicable Regulations:**
  - Proper installation and maintenance of developed-condition stormwater management facilities, as required by the Ecology 2005 SWMMWW, would minimize or avoid potential adverse impacts associated with erosion/sedimentation in the completed condition of the development.
  - Maintenance of the developed-condition stormwater management system will be the responsibility of the Homeowners’ Association (per SCC 30.63A.350). County code includes the additional assurance that the County may cause required maintenance to be done at the sole expense of the owner in the event that this intervention should ever be needed.

**Incorporated Plan Features:**

- If during final engineering design and construction plan review the Geotechnical Analysis determines that the risk of erosion cannot be adequately managed in the proposed

### Multi-Family Alternative

**Potential Impacts**

The original stormwater management concept for the Multi-Family Alternative included a system of injection wells. As originally conceived, these wells were to be constructed as deep borings through the glacial till, backfilled with clean rock around a perforated casing. This concept was not fully developed. Additional geotechnical information obtained during EIS preparation suggests that, as practical matter, stormwater management for this alternative would implement a similar philosophy to that described for the Proposed Action.

**Mitigation Measures**

- Similar to the Proposed Action.

### No Action Alternative

**Potential Impacts**

There would be no new stormwater management system components constructed on the site with the No Action Alternative.

**Mitigation Measures**

- Same as above.
<table>
<thead>
<tr>
<th>Proposed Action</th>
<th>Multi-Family Alternative</th>
<th>No Action Alternative</th>
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<tbody>
<tr>
<td><strong>Potential Impacts</strong></td>
<td><strong>Mitigation Measures</strong></td>
<td><strong>Potential Impacts</strong></td>
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<tr>
<td>at the west end of the project. Any discharge from a detention facility will be directed down the invert of the west ravine in a series of check dams that will provide a series of infiltration beds designed to further infiltrate runoff (see Figure 2.5.5-2 in Draft EIS Chapter 2). This series of infiltration beds will be designed with a series of check dams to avoid erosive flows, and will be lined with Permanent Turf Reinforcement fabric (or comparable). At the end of the stormwater management train, a level spreader is proposed at the toe of the ravine just above the offsite wetland. If the flow from the level spreader at the bottom of the valley were to become concentrated before reaching the wetland, rather than sheet flow, there would be a potential for erosion to occur.</td>
<td>West Basin stormwater management system, any discharge from a detention facility in this system would be piped directly to the Picnic Point Road stormwater conveyance system.</td>
<td>in the southeast portion of the site with the Multi-Family Alternative.</td>
</tr>
<tr>
<td>The clearing proposal to implement the Proposed Action would result in removal of approximately 450 existing trees and retention of approximately 100 existing trees on the property.</td>
<td>Check dams proposed in the West Basin stormwater management system would be installed by hand or with minimally invasive equipment to protect existing vegetation.</td>
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<tr>
<td><strong>Incorporated Plan Features:</strong></td>
<td><strong>Applicable Regulations:</strong></td>
<td><strong>Incorporated Plan Features:</strong></td>
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<tr>
<td>• The Proposed Action (PRD proposal) includes retaining significant trees and existing vegetation in designated Native Growth Protection Areas (NGPAs), and replanting the developed portion of the property with at least 1,204 evergreen and deciduous trees as indicated on Horseman’s Trail PRD Preliminary Plat Landscape Plans (Sheets L1 through L9) dated December 4, 2006.</td>
<td>• The Proposed Action will comply with the Snohomish County tree retention requirements in effect at the time this application was vested (August 2005): SCC Section 30.42B.130, or provide at least 477 new evergreen conifer and 727 new deciduous trees (1,204 trees total) within the developed portion of the subject property as indicated on the Horseman’s Trail Preliminary Plat Landscape plans (Sheets L1 through L9) dated December 4, 2006.</td>
<td>Clearing to implement the Multi-Family Alternative would result in removal of approximately 215 existing trees and retention of approximately 340 existing trees on the property.</td>
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<td>Potential Impacts</td>
<td>Mitigation Measures</td>
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<tr>
<td>PROPOSED ACTION</td>
<td>dated December 4, 2006, shall be removed except that hazardous, dead or diseased trees may be removed as necessary to remedy an immediate threat to person or property as determined by a letter from a certified arborist.</td>
<td>MULTI-FAMILY ALTERNATIVE</td>
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<td></td>
<td>• All NGPAs, perimeter open space tracts, and any individual significant tree to be retained as indicated on the Horseman’s Trail PRD Preliminary Plat drawings dated December 4, 2006 shall be protected as follows:</td>
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<td></td>
<td>a) Tree protective fencing shall be installed along the outer edge of the drip line surrounding the significant trees in order to protect the trees during any land disturbance activities. Fencing shall not be moved to facilitate grading or other construction activity within the protected area.</td>
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<td>b) Tree protective fencing shall be a minimum height of 3 feet, visible and of durable construction (e.g., orange polyethylene laminar fencing).</td>
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<td>c) &quot;Tree Protection Area&quot; signs must be posted on the fencing.</td>
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<tr>
<td>Significant Unavoidable Adverse Impacts:</td>
<td>With proper installation and maintenance of on-site stormwater management facilities during construction and in the developed condition of the site, and with proper implementation of Best Management Practices – all as required by applicable regulations administered by Snohomish County and the Washington Department of Ecology – no significant unavoidable adverse impacts in the form of erosion/sedimentation would be expected to occur during construction or in the completed and occupied condition of the Horseman’s Trail/Frognal Estates development under either the Proposed Action or the Multi-Family Alternative. Some native trees may be lost under either alternative due to removal of surrounding trees and wind-throw, especially in narrow open space tracts such as Tract 999 along the west and south edges of the site.</td>
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<td>Regrading the site would result in changes to existing drainage systems and an increase in runoff, since the interception and evapotranspiration currently provided by forest cover would be lost in the area to be cleared (approximately 17.2 acres with the Proposed Action). Fill placement over some areas of permeable soils, removal of lower-permeability silt soils, and exposure of underlying more permeable outwash soils would also alter existing site drainage characteristics.</td>
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<td></td>
<td>INCORPORATED PLAN FEATURES:</td>
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<td>Similar to the Proposed Action, though with less overall site alteration due to the reduced clearing and grading requirements (approximately 8.6 acres). The injection well concept for stormwater management in the Multi-Family Alternative was not fully developed or analyzed. The concept was that a vertical structure (i.e., a &quot;well&quot;) would convey water down to a more permeable layer since site grading would not extend to a depth that would expose the underlying outwash sands.</td>
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<td>• The stormwater management proposal includes the use of Low Impact Development (LID) techniques that would minimize the impact of stormwater generated from the developed condition of the site: bio-retention/infiltration swales, rain gardens, infiltration vaults, and compost-amended soils.</td>
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<td>• The meandering stream channel in the cascading pool feature between 60th Avenue W and 58th Place W will be lined for erosion control.</td>
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<td>• Roads would be constructed as &quot;shed sections&quot; to direct sheet flow runoff to bio-retention/infiltration swales parallel to the road alignment.</td>
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<td>• Additional LID technologies are described in Draft EIS Section 3.2.1.</td>
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</table>

* Requests for modifications to Engineering Design and Development Standards (EDDS) have been approved for these roadways as permitted within Planned Residential Developments as part of the PRD application and Division of Development submittal (SCC 30.42B.140).
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td><strong>PROPOSED ACTION</strong></td>
<td></td>
<td><strong>MULTI-FAMILY ALTERNATIVE</strong></td>
<td></td>
<td><strong>NO ACTION ALTERNATIVE</strong></td>
</tr>
<tr>
<td>Erosion potential would increase on the site during the clearing and grading phase.</td>
<td><strong>APPLICABLE REGULATIONS:</strong> The County Land Disturbing Activity Permit will require submission of a Temporary Erosion and Sediment Control Plan (TESCP). Also see the list of mitigation measures for EARTH: Erosion, above.</td>
<td>Similar to the Proposed Action, though with less overall site alteration due to the reduced clearing and grading requirements (approximately 8.6 acres) to implement the Multi-Family Alternative.</td>
<td>Same as with the Proposed Action.</td>
<td>There would be no site clearing or grading with the No Action Alternative, and thus no change in erosion potential from existing conditions.</td>
</tr>
<tr>
<td>Construction of the proposed West Basin stormwater management system (Draft EIS Figure 2.5.5-2) would have the potential to convey turbidity to the off-site wetland if not properly managed.</td>
<td><strong>INTEGRATED PLAN FEATURES:</strong> Placement of the proposed drainage blanket and pipe to carry upstream flow through the west ravine fill will be undertaken when there is no flow in the ravine. Since the only observation of &quot;flow&quot; in the west ravine occurred after a heavy rain on snow event in December 2007, there are unlikely to be weather constraints to performing this work.</td>
<td></td>
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<tr>
<td>There would be a low risk of potential impacts from accidental spills of petroleum products associated with construction equipment.</td>
<td><strong>APPLICABLE REGULATIONS:</strong> The County Land Disturbing Activity Permit will require preparation and implementation of a Spill Prevention Control and Cleanup Plan (SPCCP) to be implemented by the construction contractor.</td>
<td>Similar to the Proposed Action.</td>
<td>Same as with the Proposed Action.</td>
<td>There would be no risk of accidental spills, as no construction equipment would operate on the site.</td>
</tr>
<tr>
<td>Conversion of the site from its present forested condition to a residential development would increase the rate and volume of surface water runoff to be managed in an on-site stormwater management system:</td>
<td><strong>INTEGRATED PLAN FEATURES:</strong></td>
<td>Similar to the Proposed Action, though less impervious surface area would be introduced and more forest vegetation would remain with the Multi-Family Alternative:</td>
<td>Similar to the Proposed Action, though approximately 3.12 acres of landscaping would be provided with the Multi-Family Alternative.</td>
<td>There would be no alteration of the existing forested area of the site, and no landscaping would be introduced with the No Action Alternative.</td>
</tr>
<tr>
<td>- Approximately 8.43 acres of total impervious surface area would be introduced on the site with the Proposed Action: roads, parking areas, and roof tops.</td>
<td></td>
<td>- Approximately 3.44 acres of total impervious surface area would be introduced in the form of roads, parking areas, and roof tops.</td>
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<td>- Approximately 9.4 acres of landscaping would be provided with the Proposed Action to replace vegetation on the site.</td>
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<td>- Approximately 13.72 acres of forest would remain on the site with the Proposed Action.</td>
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<tr>
<td></td>
<td></td>
<td>- Approximately 5.1 acres of forest would remain on the site with the Proposed Action.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The stormwater infiltration proposal would increase groundwater recharge beneath the site, and thus would also increase shallow groundwater levels both on and off-site. The increase in shallow groundwater recharge would result in a slight increase in the volume of groundwater discharging to Picnic Point Creek, on the order of less than 1.0 percent (Anthony Burgess Consulting, September 2013c; Draft EIS Technical Appendix C). The magnitude of increase would decline with distance from the recharge location.</td>
<td><strong>APPLICABLE REGULATIONS:</strong> Compliance with the Ecology 2005 SWMMWW will require the site stormwater discharge to Picnic Point Creek to match developed discharge durations to pre-developed durations for the range of pre-developed discharge rates from 50 percent of the 2-year peak flow up to the full 5-year peak flow.</td>
<td>Similar to the Proposed Action, though less due to approximately 50% less stormwater runoff generated by the Multi-Family Alternative.</td>
<td>Same as with the Proposed Action.</td>
<td>There would be no change in the existing condition of stormwater infiltration on the site with the No Action Alternative.</td>
</tr>
<tr>
<td>The drainage system for the developed site would primarily use LID techniques to provide infiltration to the fullest extent possible. The LID infiltration</td>
<td><strong>APPLICABLE REGULATIONS:</strong> Any off-site discharge would be designed and implemented in accordance with applicable</td>
<td>Similar to the Proposed Action.</td>
<td>Same as with the Proposed Action.</td>
<td>There would be no new stormwater management system components constructed on the site with the No Action Alternative.</td>
</tr>
</tbody>
</table>
features have a linear component so that if the capacity of the site and system to infiltrate is exceeded, the overflow would enter piped conveyance to a stormwater detention system. In the western portion of the site, the detained discharge would be directed into the western ravine above the off-site wetland near the northwest corner of the property. The western ravine has highly infiltrative outwash soils and is expected to infiltrate the detained discharge before it reaches the property line. Infiltrated waters would become groundwater that would partially feed the offsite wetland. Detained discharges to the wetland would lag precipitation and infiltration events. The overall effect would be to increase flows to the wetland throughout the year, with no significant change in the water depth or hydrology of the wetland. Engineering calculations presented in Draft EIS Section 3.2.1 show that the increase in surface water flow from the site will have negligible impact on the erosive flow conditions of Picnic Point Creek. Proposed stormwater management measures, properly installed and adequately maintained, will control the rate of release to Picnic Point Creek. Additional analysis of the northeast drainage basin will be performed during final design (as required by SCC 30.63A.200[2][b]) to evaluate the conveyance(s) from site discharge(s) to the creek. Proposed stormwater management measures, properly installed and adequately maintained, will control the rate of release to Picnic Point Creek. Additional analysis of the northeast drainage basin will be performed during final design (as required by SCC 30.63A.200[2][b]) to evaluate the conveyance(s) from site discharge(s) to the creek. Engineering calculations presented in Draft EIS Section 3.2.1 show that the increase in surface water flow from the site will have negligible impact on the erosive flow conditions of Picnic Point Creek. Proposed stormwater management measures, properly installed and adequately maintained, will control the rate of release to Picnic Point Creek. Additional analysis of the northeast drainage basin will be performed during final design (as required by SCC 30.63A.200[2][b]) to evaluate the conveyance(s) from site discharge(s) to the creek.

### PROPOSED ACTION

**Potential Impacts**
- Limited filling near the head of the west ravine (parallel to the slope; see Draft EIS Figure 3.1-2) would have no impact on groundwater flow entering from the off-site area to the south. Field observations indicate that surface water that enters the site from the south under unusual conditions such as the December 2007 heavy rain on snow event occurs in an indistinct course and disappears about 100 feet north of the site property line (Anthony Burgess Consulting 2013a; Draft EIS Technical Appendix A).
- Backyards of Lots 9 through 28. The stormwater management proposal for this area is to infiltrate into compost-amended soil and native soil. Lots 9 through 15 will be located on the east ravine fill. This material will be predominantly till with low permeability.
- Runoff from urban development of the site is likely to have impaired water quality. Typical constituents are listed in Draft EIS Table 3.2-10. Approximately 4.23 acres of pollutant-generating surfaces (roads and parking areas) would be introduced on the site with the Proposed Action.

**Mitigation Measures**
- Incorporating Plan Features: The infrequent occurrence and small quantity of surface water that enters the site from the south would be controlled by a drainage blanket beneath the fill from which it would infiltrate into the underlying outwash sands or discharge from the downstream limit of the blanket into the west ravine. This flow would subsequently discharge to the offsite wetland either as groundwater or surface water. No water quantity impact to the wetland is anticipated.
- Incorporating Plan Features: The North Basin would include the roofs and backyards of Lots 9 through 28. The stormwater management proposal for this area is to infiltrate into compost-amended soil and native soil. Lots 9 through 15 will be located on the east ravine fill. This material will be predominantly till with low permeability.
- Incorporating Plan Features: Runoff from urban development of the site is likely to have impaired water quality. Typical constituents are listed in Draft EIS Table 3.2-10. Approximately 4.23 acres of pollutant-generating surfaces (roads and parking areas) would be introduced on the site with the Proposed Action.

### MULTI-FAMILY ALTERNATIVE

**Potential Impacts**
- Incorporating Plan Features: There would be no filling near the head of the west ravine to implement the Multi-Family Alternative. Fill would, however, be placed in the east ravine for road construction.
- Incorporating Plan Features: The North Basin would include the roofs and backyards of Lots 9 through 28. The stormwater management proposal for this area is to infiltrate into compost-amended soil and native soil. Lots 9 through 15 will be located on the east ravine fill. This material will be predominantly till with low permeability.
- Incorporating Plan Features: Runoff from urban development of the site is likely to have impaired water quality. Typical constituents are listed in Draft EIS Table 3.2-10. Approximately 4.23 acres of pollutant-generating surfaces (roads and parking areas) would be introduced on the site with the Proposed Action.

**Mitigation Measures**
- Incorporating Plan Features: There would be no filling near the head of the west ravine to implement the Multi-Family Alternative. Fill would, however, be placed in the east ravine for road construction.
- Incoporating Plan Features: The North Basin would include the roofs and backyards of Lots 9 through 28. The stormwater management proposal for this area is to infiltrate into compost-amended soil and native soil. Lots 9 through 15 will be located on the east ravine fill. This material will be predominantly till with low permeability.
- Incorporating Plan Features: Runoff from urban development of the site is likely to have impaired water quality. Typical constituents are listed in Draft EIS Table 3.2-10. Approximately 4.23 acres of pollutant-generating surfaces (roads and parking areas) would be introduced on the site with the Proposed Action.

### NO ACTION ALTERNATIVE

**Potential Impacts**
- There would be no filling near the head of the west ravine to implement the Multi-Family Alternative. Fill would, however, be placed in the east ravine for road construction.
- Incorporating Plan Features: The North Basin would include the roofs and backyards of Lots 9 through 28. The stormwater management proposal for this area is to infiltrate into compost-amended soil and native soil. Lots 9 through 15 will be located on the east ravine fill. This material will be predominantly till with low permeability.
- Incorporating Plan Features: Runoff from urban development of the site is likely to have impaired water quality. Typical constituents are listed in Draft EIS Table 3.2-10. Approximately 4.23 acres of pollutant-generating surfaces (roads and parking areas) would be introduced on the site with the Proposed Action.

**Mitigation Measures**
- Incorporating Plan Features: There would be no filling near the head of the west ravine to implement the Multi-Family Alternative. Fill would, however, be placed in the east ravine for road construction.
- Incorporating Plan Features: The North Basin would include the roofs and backyards of Lots 9 through 28. The stormwater management proposal for this area is to infiltrate into compost-amended soil and native soil. Lots 9 through 15 will be located on the east ravine fill. This material will be predominantly till with low permeability.
- Incorporating Plan Features: Runoff from urban development of the site is likely to have impaired water quality. Typical constituents are listed in Draft EIS Table 3.2-10. Approximately 4.23 acres of pollutant-generating surfaces (roads and parking areas) would be introduced on the site with the Proposed Action.

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7 As stated above, overflow discharges to the off-site wetland would lag precipitation and infiltration events, resulting in no significant change in the depth of flow in the wetland.
### Significant Unavoidable Adverse Impacts

With proper installation and maintenance of stormwater management facilities and Best Management Practices during construction, and with effective design, construction and maintenance of the developed-condition stormwater management system to include LID features – all as required by applicable regulations administered by Snohomish County and the Washington Department of Ecology – no significant unavoidable adverse impacts to surface water movement, quantity or quality would be anticipated with either the Proposed Action or the Multi-Family Alternative.

There would be no significant unavoidable adverse impacts to surface water quantity, quality, or movement as a result of the No Action Alternative.

### Water: Groundwater

**Applicable Regulations:**
- Compliance with Ecology's 2005 SWMMWW requires that the base of infiltration facilities have at least 5 feet of separation from the seasonal high groundwater level. All developed facilities on the site would meet this criterion.

**Incorporated Plan Features:**
- Dispersal of stormwater infiltration across the site area as proposed would reduce the rise in the shallow groundwater level, compared with infiltrating stormwater at one location.
- Installation of drains and drainage blankets behind retaining structures would lower groundwater levels in these very localized areas, thereby minimizing the potential for slope instability.
- The proposed Low Impact Development techniques would provide stormwater quality treatment prior to infiltration to shallow groundwater.
- A Homeowners' Association under either alternative could implement a public information program to educate residents on limiting the use of fertilizers and garden chemicals, and cleanup and disposal of pet wastes. These issues are typically addressed in the Operations and Maintenance Manual for the project.

The Multi-Family Alternative stormwater management system based on injection wells would have a similar affect on recharge to shallow groundwater as that which would result from infiltrating stormwater using LID techniques in the Proposed Action, though approximately 50% less stormwater runoff would be generated by the Multi-Family Alternative.

Same as with the Proposed Action.

There would be no change in groundwater conditions on the site; however, since the property boundary is not fenced, the potential would remain for uncontrolled activities such as dumping (by others) to lead to potential degradation of groundwater quality.

### The potential effects of an increase in subsurface water flow to the existing forest stand to remain in Tract 999 were considered. Most of Tract 999 is on well-drained advance outwash soil. Direct precipitation onto Tract 999 and subsequent infiltration will not change following site development. Therefore, the groundwater source of moisture for tree growth will not be changed.

No mitigation required for no change in hydrology to the existing forest stand in Tract 999.

Same as the Proposed Action.

There would be no impact to the existing forest stand in Tract 999 with the No Action Alternative.
### Significant Unavoidable Adverse Impacts

Identified groundwater impacts would either not be adverse (such as the minor increase in groundwater discharge to the off-site wetland and to Picnic Point Creek), or would not be significant (for example, the rise in the shallow groundwater level beneath infiltration areas).

There would be no significant unavoidable adverse impacts to groundwater quantity, quality, or movement as a result of the No Action Alternative.
1.8 Major Issues, Significant Areas of Controversy and Uncertainty, and Issues to be Resolved

Of the issues identified in letters of comment submitted to Snohomish County Planning & Development Services regarding the proposed Horseman’s Trail/Frognal Estates Planned Residential Development (listed in Section 1.2, above), an area of controversy that may remain with adjacent property owners is the allowed and proposed residential density on the sloping site. The Land Use and Development History section of Draft EIS Chapter 2 (Section 2.4) clearly establishes that the proposed residential density is within the range allowed. The Chapter 3 Earth section (Draft EIS Section 3.1) includes engineering solutions for slope stabilization and erosion/sedimentation control for the Proposed Action or Multi-Family Alternative. The Chapter 3 Water section (Draft EIS Section 3.2) lists engineering solutions for stormwater management during construction and in the developed condition of the site.
2.0 Description of the Proposal and Alternatives

2.1 Project Proponent

The application for Planned Residential Development (PRD) on the subject site was filed and vested in August 2005 under the name "Horseman’s Trail, L.L.C." by Integral Northwest Corporation, Manager. The project and registered owner underwent name changes in 2012. The registered owner, now Pegasus Pacific, Inc. in Everett, Washington, is the controlling member of Frognal Holdings, LLC. Frognal Holdings is now the applicant and sponsor of the project renamed from this point forward as "Frognal Estates." Due to the long history of this application within Snohomish County, and the large number of documents generated to describe and evaluate the Horseman's Trail site and proposal, the project is referred to throughout the EIS as "Horseman's Trail/Frognal Estates."

2.2 Purpose and Objectives of the Proposed Action

The purpose of this project is to provide single-family homesites in a livable and sustainable community on one of the last remaining large pieces of vacant land within Snohomish County’s Southwest Urban Growth Area (UGA). This area includes the established communities of Mukilteo, Edmonds and the Harbour Pointe Master Planned Community.

The criteria for developing the Horseman’s Trail/Frognal Estates PRD are primarily based on the following objectives:

- Compliance with Growth Management Act (GMA) policies and density requirements within the Snohomish County Southwest Urban Growth Area (UGA).
- Compliance with the Snohomish County General Policy Plan (GPP), Snohomish County Code (SCC), and Engineering Design and Development Standards (EDDS).
- Constructability and economic viability.
- Compatibility within the site-specific environment.
- Compatibility within the neighborhood as a whole.
- Ability of the site development plan to create a “sense of community.”

The first two objectives above are regulatory compliance criteria placed on any development of land within the Snohomish County UGA and the Harbour Pointe Master Plan area. The last four are the applicant’s objectives for achieving the project purpose on the Horseman’s Trail/Frognal Estates site.

The Washington State Growth Management Act (GMA) includes goals to encourage development within urban growth areas to reduce sprawling, low-density development (RCW 36.70A.020[1] and [2]). The Legislature also adopted a requirement that urban growth must be encouraged in UGAs (RCW 36.70A.110[1]). The Central Growth Management Hearings Board has interpreted these goals and requirements to mean that counties and cities in the Central Puget Sound region are required to zone properties within their urban growth areas at densities of no less than 4 housing units per net acre. State objectives in imposing a requirement for no less than 4 single-family homes per net acre criteria include: improving housing choices and affordability, protecting rural areas, and protecting neighborhoods.

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8 “Net acre” means minus the land required for streets, public facilities, preservation of critical areas, buffers, and other land that cannot be built upon.
The applicant's detailed and project-specific explanation for the objectives of the Proposed Action is as follows:

- **Being Constructible and Economically Viable** is an essential objective that evaluates a project based on simple criteria that summed up simply means: Can a desirable product be constructed at a cost that can be sold at a price acceptable to the market?

- **Compatibility within the site-specific environment** essentially asks the question “...can it go well with or fit...” the challenges of the existing site? Can comfortable home sites be created in terrain with such diverse vertical relief?

- **Compatibility within the neighborhood as a whole** evaluates whether the design-character of the proposed project would complement surrounding communities as a whole.

- **Ability of the site development plan to create a “sense of community”** evaluates the social environment and livability of the created home sites for long-term desirability to families, to garner a feeling of comfort in their chosen living environment. The applicant essentially asks, can a family making potentially their largest single investment have a “sense of pride” in this community?

### 2.3 Project Location

The site is located at the terminus of 60th Ave W and 58th Place W within unincorporated Snohomish County, immediately south of the City of Mukilteo. In geographic terms, the site is located within the NE \( \frac{1}{4} \) of section 32 and the NW \( \frac{1}{4} \) section of Section 33, Township 28N, Range 04E, WM, Snohomish County Washington.

### 2.4 Land Use and Development History of the Site and Proposed Action

Horseman's Trail/Frognal Estates is a proposed planned residential development (PRD) of 112 single-family detached homes on 22.34 acres in unincorporated Snohomish County, immediately south of the City of Mukilteo. This area is within the Snohomish County Southwest Urban Growth Area (UGA). The entire site is designated for Urban Low Density Residential use at 4 to 6 dwelling units per acre on the Future Land Use Map of the Snohomish County GMA Comprehensive Plan, effective July 10, 1995.

The site is also considered by the City of Mukilteo to be within their Municipal Urban Growth Area (MUGA). The City’s 2008 Comprehensive Plan map shows the site designated for Single Family Residential−Medium density development (SFR−M): 4.54 to 5.19 dwelling units per acre. The overall density of the Horseman’s Trail/Frognal Estates PRD proposal is 5.01 units per acre. The City adopted the Possession Shores (Harbour Pointe) Master Plan and applied it to the twenty Sectors annexed to Mukilteo. The Mukilteo City Council passed Resolution No. 2007-05 (March 5, 2007) requesting that the Snohomish County Executive, County Council, and/or Hearing Examiner require an Environmental Impact Statement (EIS) to be prepared for the Horseman’s Trail/Frognal Estates proposal. This EIS is responsive to that request. At one time, citizens in the South Mukilteo Annexation Area solicited signatures on petitions to annex approximately 4,000 properties (including the Horseman’s Trail site) to the City of Mukilteo. A brief analysis of the relationship of the Horseman’s Trail PRD proposal to City of Mukilteo land use regulations is presented in Draft EIS Section 2.4.7.1B, below.

The purpose of this Land Use and Development History section is to explain development criteria for those portions of the proposed Horseman’s Trail/Frognal Estates PRD site that lie within Harbour Pointe Master Plan Sectors 22 and 23, and the portion that lies outside the Master Plan area.
The proposed Horseman’s Trail/Frognal Estates PRD is an assemblage of three parcels. One parcel (Lot 1 of Regatta Estates) lies within Sectors 22 and 23 of the Harbour Pointe Master Plan area (see Figure 2.4-1). Two parcels of the PRD site (Lots 27 and 28 of the Hillman’s Meadowdale Addition) are located outside the Harbour Pointe Master Plan area. The portion of the site encompassing Lot 1 of Regatta Estates lies primarily within Sector 22. A small segment of Lot 1 of Regatta Estates now lies within Sector 23. This segment was purchased from the Mukilteo School District in 2005. A Boundary Line Adjustment (BLA) was approved in October 2005 (Snohomish County Recordation No. 200510191129 3 PGS) that adjusted a portion of the south boundary line of Lot 1 was adjusted south to encompass the land purchased from the Mukilteo School District (Picnic Point Elementary School). The BLA increased the size of Lot 1 to about 7.46 acres.

The two parcels located outside the Harbour Pointe Master Plan area are not subject to the Harbour Pointe Master Plan or Sector 22 and 23 approvals. The combined area of both parcels is equal to 14.88 acres, and represents approximately 67 percent of the overall Horseman’s Trail/Frognal Estates PRD site.

2.4.1 Harbour Pointe Master Plan – Land Use History

In 1968, the Winmar Company prepared a Master Plan for land under their ownership within the Possession Shores portion of the Paine Field area of southwest Snohomish County. The Master Plan was based on the County-approved Paine Field Comprehensive Plan in effect at that time. In August 1969, the northern and southern portions of a large tract owned by the Winmar Company located within the Paine Field Comprehensive Plan area was rezoned by Snohomish County through a contract rezone. The contract stipulated that development within the rezone area would be subject to the controls and requirements established in the Possession Shores Master Plan. The Master Plan was a generalized description of land uses and allowed for refinement of detail or variations in subsequent planning stages, provided that such refinements or variations were compatible with the original intent of the Master Plan and Snohomish County Code. In 1972, C-W Properties, Inc. succeeded the Winmar Company as owners of the land covered by the Possession Shores Master Plan. In 1977, C-W Properties proposed a revision to the Possession Shores Master Plan. Snohomish County reviewed the revision and required C-W Properties to prepare a full Environmental Impact Statement to analyze the potential significant environmental impacts of the Master Plan. The Draft EIS, issued February 10, 1978, covered all elements of the environment required by the SEPA Guidelines:9 Earth, Air, Water, Flora, Fauna, Noise, Light and Glare, Land Use, Natural Resources, Population, Housing, Transportation/Circulation, Public Services, Energy, Utilities, Human Health, Aesthetics, Recreation, and Archeological/Historical Resources, plus Economic Factors. The EIS identified the following mitigation measures:

- Retention of as much natural vegetation as practical to protect against erosion, lessen impacts on wildlife habitat, attenuate noise and soften aesthetic impacts associated with development as proposed.
- Adherence to prescribed Snohomish County guidelines and ordinances for stormwater detention, erosion control and slope-density ratios.
- Use of directional light dispersers on light standards to limit light and glare impacts in commercial and industrial sectors.
- Encouragement of insulation and energy efficiency in conserving natural resources during construction and maintenance of buildings and facilities within Possession Shores.
- Stormwater control/storage devices with capability to remove suspended solids and petroleum residues.

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9 WAC 197-11-444.
Regatta Estates
Sector 22 (44.91 ac.)
Sector 23 (15.55 ac.)
Hillman’s Lot 27 and 28 (14.88 ac.)*
Lot 1 Regatta Estates (6.66 ac. net)*
BLA Area (0.79 ac.)*
Total Horseman’s Trail Site Area (22.34 ac.)
* Areas After BLA, RDW Abandonments, and Dedications.

Figure 2.4-1
Sector Map
Harbour Pointe
Horsemans Trail

Harbour Pointe
Master Plan Area

REGATTA ESTATES
Sector 22 (44.91 ac.)
Sector 23 (15.55 ac.)
Hillman’s Lot 27 and 28 (14.88 ac.)*
Lot 1 Regatta Estates (6.66 ac. net)*
BLA Area (0.79 ac.)*
Total Horseman’s Trail Site Area (22.34 ac.)
* Areas After BLA, RDW Abandonments, and Dedications.
- Use of turning lanes and upgrading of transportation systems within and adjacent to the property, when demand warrants improved traffic control.

- Use of new tax revenues from the development as proposed to offset public costs for services provided.

In the April 1978, Snohomish County approved amendments to the Possession Shores Master Plan. The amended Master Plan was renamed the Harbour Pointe Master Plan.

The Harbour Pointe (Possession Shores) Master Plan covers 2,341 acres, and divides the area into 23 separate Sectors. The Master Plan provides land use designations, densities and specific development standards for the properties within each Sector. The Master Plan also contains a generalized circulation network for access to and from each Sector and within the Master Plan area, a general description of the major open space and park network, and a description of the process for review and approval of a Sector Plan for each Sector. The Master Plan also proposed rezoning the planning area. The Master Plan was made contractually binding when the rezone was approved in the Summer of 1978. The approved rezone contract established the following:

- A maximum of 5,183 dwelling units.

- Residential development would be subject to substantive non-procedural provisions of Snohomish County Code (SCC) Chapter 18.38 (Planned Residential Development), except as modified in the revised Master Plan.

- Residential density transfer concept.

The rezone contract changed the zoning of land in Sectors 22 and 23 from HI (Heavy Industrial), RR (Rural Residential) 12,500 and RR 20,000 to RR 8400.

The Harbour Pointe (Possession Shores) Master Plan included provisions that allowed a transfer of residential density within and between Sectors. The Master Plan stated that such density transfers could not exceed the maximum density for the Master Plan area of 5,183 dwelling units. The Plan also stated that the transfer of surplus allowable dwelling units would be subject to a maximum resulting density of 12 units per acre for the receiving area.\(^{10}\)

2.4.2 Harbour Pointe Master Plan − Development Planning Process

*Sector Planning*: The Harbour Pointe (Possession Shores) Master Plan sets forth a special process for review of development within each Sector of the Master Plan area. The Master Plan stipulates that planning for development within the Master Plan area follow the stages outlined below:

- **Stage 1**: Sector Plans submitted to the Snohomish County Planning Commission for public hearing and approval;

- **Stage 2**: Division of Development Plans submitted to the Snohomish County Director of Planning for approval;

- **Stage 3**: Plats submitted to the Snohomish County Planning Commission for public hearing and thereafter the Snohomish County Board of Commissioners.

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\(^{10}\) Possession Shores Master Plan (April 1978), page 4.
The Master Plan required a Planning Commission public hearing and approval of a Sector Plan for each Sector prior to review of any Division of Development and subsequent subdivision of land development within that Sector. The Master Plan also required Sector Plan approval for an entire Sector prior to the sale of any portion of that Sector to a developer. The Sector Plan contains a general description of the type and intensity of land use, a generalized vehicular circulation system within the Sector, a generalized open space system, and a more specific description of the topographic and environmental conditions of the Sector. A flow chart depicting the Harbour Pointe Master Plan Development Planning Process is included here as Figure 2.4-2.

Since adoption of the Harbour Pointe (Possession Shores) Master Plan, Snohomish County has adopted ordinances changing the responsibility for review of proposed plats within the Sectors from the Planning Commission to the Hearing Examiner.

Portions of the proposed Horseman's Trail/Frognal Estates PRD subdivision are located within Harbour Pointe Sectors 22 and 23, and are therefore subject to the previous approvals of the Sector Plans for these Sectors.

Division of Development Planning: The Harbour Pointe Master Plan required that a Division of Development for proposed development within each Sector be approved administratively by the Snohomish County Planning Director (now Director of Planning and Development Services). The purpose of the Division of Development process is to provide descriptive text and/or maps describing the following:11

- Location of residential uses (type, number, density and average lot size)
- Location of proposed and existing open spaces and plans for open space improvements
- Location of roads, access ways and right-of-way improvements
- Standards for road construction and slope treatment
- Utility systems (drainage, wastewater, water, electrical power, natural gas, telephone and solid waste disposal)
- Proposed design controls.

11 Possession Shores (Harbour Pointe) Master Plan (April 1978), pages 26 and 27.
Figure 2.4-2. Harbour Pointe Master Plan Development Planning Process

1. Snohomish County Planning Commission
   Public hearing and recommendations for Harbor Pointe Master Plan and amendments

2. Snohomish County Council
   Public hearing and approval of Harbor Pointe Master Plan and amendments

3. Snohomish County Planning Commission
   Public hearing and approval of Sector Plans and amendments

4. Snohomish County Planning and Development Services Director
   Administrative review and approval of Divisions of Development and amendments

5. Snohomish County Hearing Examiner
   Public hearing and approval of preliminary subdivisions (formal plats only)

6. Snohomish County Council
   Public hearing and approval of subdivisions
2.4.3 Harbour Pointe Master Plan, Development Planning – Open Space, Street Network, Sewer and Water

Open Space: The Harbour Pointe Master Plan established minimum open space requirements for each Sector. The Plan stated that the amount of land area to be reserved for open space for any residential Sector shall be the quantity of open space required by the open space provisions of Chapter 18.38 (Planned Residential Development) of the Snohomish County Zoning Code (SCC). Therefore, as required by former Zoning Code Chapter 18.38, each proposed Division of Development and subdivision within each Sector would need to indicate at least 20 percent of the net development area as open space. The Master Plan also provided special open space requirements for residential Sectors contiguous to proposed County park lands. For these residential Sectors, one-half of the open space requirement would be met by the proposed County park lands abutting the Sector. The balance (10 percent of the Sector net development area) of the open space requirement would be comprised of lands usable for recreational facilities such as open play areas, pedestrian and bicycle paths, picnic areas, community gardens and tot lots with play equipment. The 10 percent open space provision would be required for any Division of Development and subdivision abutting the area designated to be a County park. The Master Plan provided for the dedication of public park lands to the County along the north and east boundary of Sector 22 (see Figure 2.4-1).

Since Sector 23 is not contiguous with any of the 466 acres of dedicated County park land within the Harbour Pointe Master Planned Community, the open space requirement for Sector 23 for any PRD plat would be 20 percent of the net development area (NDA) as described in the Snohomish County PRD code at the time of vesting. Associated with the 12-lot Regatta Highlands PRD (2.9 acres) in Sector 23 is a 50-ft wide strip of land (open space) totaling 2.07 acres. The Active Recreation requirement of that PRD was satisfied by the adjacent Picnic Point Elementary School playgrounds and play equipment. Park mitigation fees would have been paid with building permits for residential development within the Regatta Highlands PRD.

Street Network: The Harbour Pointe Master Plan depicts a master plan street network serving Sector 22 from either side of Picnic Point Road north of 140th Street SW. Picnic Point Road is currently designated as a collector arterial.

Sewer and Water: The Master Plan indicated that Sector 22 would be served by a sanitary sewer lift station located further to the northwest on Picnic Point Road and by a public water system that would be extended to the north from the existing 140th Street SW water system.

2.4.4 Sector 22

On September 28, 1982, the Snohomish County Planning Commission approved the Plan for Harbour Pointe Sector 22. The Plan established the maximum density in this Sector of 169 dwelling units. The plan also stated that the final calculation of the maximum allowable units would be made at the preliminary plat or Division of Development stage. The County has required all residential development within Harbour Pointe to be subject to the PRD regulations in effect on the date of complete application. This implements one of the Residential Lands conditions set forth on page 4 of the Possession Shores (Harbour Pointe) Master Plan (April 1, 1978):

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12 SCC Chapter 18.38 contained the County’s PRD zoning code requirements at the time the Possession Shores (Harbour Pointe) Master Plan was adopted. The County Zoning Code was reformatted in 2004, and Chapter 18.38 was renumbered to become SCC Chapter 30.42B.

13 Harbour Pointe Sector 22 Plan (September 28, 1982), page 2.
“2. The substantive non-procedural provisions of Chapter 18.38, Planned Residential Development, of Title 18, Snohomish County Zoning Code, as modified herein in the ‘Open Space Land Use’ and the ‘Development Planning’ sections of this master plan.”

Snohomish County Code (SCC) Chapter 18.38 has been modified since the writing of the Possession Shores (Harbour Pointe) Master Plan. The Planning and Development Services Division (PDS) has historically applied the modified versions of Chapter 18.38 (which has now progressed to Chapter 30.42B SCC).

Consistent with the provisions of the Master Plan, a Division of Development was approved for Sector 22 on May 25, 1990 for the planned subdivision of Regatta Estates. The Division of Development for the Regatta Estates PRD encompassed the entire 42.8 acres that comprise Sector 22. The preliminary plat of Regatta Estates PRD was approved in 1991. Regatta Estates divided Sector 22 into 78 single family residential lots (including Lot 1). This left a balance of 91 potential dwelling units for the remainder of Sector 22. The history of land use approvals affecting Sector 22 to date is included here as Figure 2.4-3.

The approved Sector 22 Plan required the dedication of additional park land to the County along the north and east boundary of the Sector. The dedication of additional park land occurred as part of the final plat of Regatta Estates. Additionally, Sector 22 Plan approval stipulated that the maximum number of units in the Sector is 169, that the final calculation of maximum units will be made at the preliminary plat or Division of Development stage, and will be in conformance with the Planned Residential Development chapter of the Snohomish County Zoning Code.

2.4.5 Sector 23

In 1980, the Snohomish County Planning Commission approved the Plan for Harbour Pointe Sector 23. The approved Sector Plan called for: development of approximately 10 acres of the Sector as an elementary school; development of 0.9 acre as a PUD electrical substation; development of 2.6 acres as a neighborhood shopping center; and 2.1 acres to remain as open space.14

The Sector Plan noted that the projected residential density for Sector 23 in the Harbour Pointe Sectors would be 4.5 dwelling units per net acre.15 The Master Plan indicated that Sector 23 had a net area of 14 acres.16 Based on the projected residential density of 4.5 units per net acre in the Master Plan, the 14 net acres would yield a maximum potential of 63 dwelling units. However, the approved Sector 23 Plan did not indicate any residential development within the sector. Additionally, Sector 23 Plan approval indicated that it was consistent with the approved Harbour Pointe Master Plan and met the substantive requirements of the Snohomish County Planned Residential Development code.

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14 Since the Sector 23 Sector Plan was approved (April 1980), geographical information system (GIS) methods have vastly improved the accuracy of land area calculations that can now be obtained, compared to the sources of data from tables compiled in the Possession Shores (Harbour Pointe) Master Plan (April 1978) and Sector Plans. The current and most accurate area calculations for Sector 23 are as follows: Current developed portion of school site – 8.66 acres; undeveloped portion of school site (BLA to Regatta Estates Lot 1) – 0.79 acre; Open Space (Regatta Highlands) – 2.07 acres; Neighborhood Shopping Center – 2.9 acres; and PUD electrical substation – 0.96 acre, for a total Sector area of 15.38 acres.
15 Harbour Pointe Sector 23 Plan (August 26, 1980), page 1-1.
16 Possession Shores (Harbour Pointe) Master Plan (April 1978), page 8.
Figure 2.4-3. Harbour Pointe Sector 22 Historical Land Use Approvals

- Snohomish County Planning Commission
  Public Hearing and approval of Sector 22 Sector Plan
  1982

- Snohomish County Planning and Development Services Director
  Administrative review and approval of Divisions of Development for Regatta Estates PRD
  1990

- Snohomish County Hearing Examiner
  Review and approval of Regatta Estates PRD preliminary plat
  1994

- Snohomish County Council
  Review and approval of Regatta Estates final plat
  1996
After approval of the Sector 23 Plan, a Division of Development was approved for development of the Picnic Point Elementary School. Ultimately, development of the Picnic Point Elementary School did not utilize the entire 9.45-acre site, and the northerly tip (0.79 acre) remains undeveloped. The Division of Development for the Horseman’s Trail/Frognal Estates PRD incorporates the northerly undeveloped portion of the Picnic Point Elementary School site.

No rezone was submitted for development of a neighborhood shopping center for the 2.6 acres reserved for a neighborhood shopping center per Table 1-1 of the Sector 23 Sector Plan. Later, a Division of Development and plat were approved to develop this area with twelve (12) single-family residential dwelling units (Regatta Highlands). Factoring out the acreage in Sector 23 for the Picnic Point Elementary School (8.66 acres) and electrical substation (0.96 acre), the remaining area for residential development based on the latest GIS data is 5.76 acres. Based on a projected density of 4.5 units per net acre, the 5.76 acres would yield a maximum potential of 26 units. Subtracting the 12 units developed in the Regatta Highlands subdivision, the dwelling units remaining and available to Sector 23 are fourteen (14) single-family dwelling units, subject to approval of a new Division of Development and PRD plan. The Sector 23 Sector Plan was not amended to reflect development of the 12-lot Regatta Highlands (2.9 acres) in place of the planned neighborhood shopping center uses. This is because the zoning for the 2.9 acres remained R-8400. The history of land use approvals affecting Sector 23 to-date is shown on Figure 2.4-4.

### 2.4.6 Plat of Regatta Estates

As previously noted, a Division of Development for Sector 22 for the planned 78-lot plat of Regatta Estates was approved by the Snohomish County Planning and Community Development Director in 1990. In the Division of Development for Regatta Estates, Lot 1 was designated for future residential development. The Division of Development for Regatta Estates indicated that a subsequent Division of Development and preliminary plat and development design would be submitted in the future for development of Lot 1. Following administrative approval of the Division of Development, the preliminary plat of Regatta Estates was submitted for approval by the Snohomish County Hearing Examiner. The Regatta Estates Final Plat divided the entire area of Sector 22 into 78 single-family residential lots with the 6.76-acre Lot 1 reserved for future development. The maximum number of dwelling units allowed in this sector is 169. The development of Regatta Estates with 78 units leaves 91 potential additional units that could be developed within Sector 22.

The Harbour Pointe Master Plan required all future subdivisions that abutted the area designated as future County park land to provide at least 10 percent of the net development area as open space. Because the north boundary of Regatta Estates abuts the designated County park land, the preliminary plat was subject to the 10 percent open space requirement. Not counting Lot 1, the developed Regatta Estates subdivision provides approximately 62 percent of the net development area in open space. The Hearing Examiner approved the preliminary plat of Regatta Estates on October 10, 1991 (see additional information provided in Attachment 1 to this Draft EIS).

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17 The Division of Development and preliminary plat of Regatta Estates were submitted concurrently but reviewed sequentially.
Figure 2.4-4. Harbour Pointe Sector 23 Historical Land Use Approvals

Snohomish County Planning Commission
Public Hearing and Approval of
Sector 23 Sector Plan
1980

Snohomish County Planning and Development Services Director
Administrative review and approval of
Division of Development for PUD Electrical Substation
1980

Snohomish County Planning and Development Services Director
Administrative review and approval of
a 12-lot Subdivision Division of Development
1992

Snohomish County Hearing Examiner
Review and approval of
a 12-lot Preliminary Plat
1992

Snohomish County Council
Review and approval of
a 12-lot Final Plat
1993

Snohomish County Planning and Development Services Director
Administrative review and approval of
a Division of Development for Picnic Point Elementary School
1983

Snohomish County Hearing Examiner
Review and approval of
Conditional Use Permit for Picnic Point Elementary School
1983

Snohomish County Planning and Development Services Director
Administrative review and approval of
Commercial Building Permit for Picnic Point Elementary School
1984
2.4.7 Horseman’s Trail/Frognal Estates PRD – Description of the Site

The Horseman’s Trail/Frognal Estates PRD site topography slopes downward steeply from the plateau occupied by Picnic Point Elementary School to the south, and lands outside of the Harbour Pointe Master Plan to the west, down to the developed portions of Regatta Estates along Picnic Point Road (see Figures 3.1-1 and 3.1-6 in Draft EIS Chapter 3). Tree cover on these slopes includes a mixture of deciduous and coniferous trees: predominantly Douglas fir and western hemlock, with a few western red cedar, red alder, and Oregon big leaf maple. A Geotechnical Report prepared and submitted to the County in the early stages of site planning for Horseman’s Trail/Frognal Estates describes the subsurface soil, geologic and groundwater conditions within the subject 6.7 acres (AESI, November 1998). A Critical Area Reconnaissance Report (Wetland Resources, Inc., June 22, 2005) was also submitted. This report identifies a Category 3 wetland approximately 80 feet north of the western portion of the north-boundary of the site (see Figures 3.2-4 and 3.2-5 in Draft EIS Chapter 3). Analysis of the potential impacts of the Horseman’s Trail/Frognal Estates PRD proposal and alternatives to topography, geology and soils, erosion, surface water and groundwater is provided in Draft EIS Chapter 3.

2.4.7.1 Land Use – Residential Density

2.4.7.1A. Residential Density under Snohomish County Land Use Regulations. The Horseman’s Trail/Frognal Estates PRD site includes Lot 1 of Regatta Estates reserved for future residential development (Sector 22 and a small portion of Sector 23), and Lots 27 and 28 of Hillman’s Meadowdale Addition located outside the Harbour Pointe Master Plan area. The portion of the proposed Horseman’s Trail/Frognal Estates PRD site within the Harbour Pointe Master Plan area (Sector 22 and a small portion of Sector 23) total 7.46 acres. Both of these Sectors are designated for “Single Family High Density Use” in the Possession Shores (Harbour Pointe) Master Plan. The approved sector plans indicated a maximum of 169 Single-Family High Density dwelling units (SFH) for Sector 22, and a maximum of 63 SFH for Sector 23 based on the approved maximum density of 4.5 units per net acre.

Neither the Possession Shores (Harbour Pointe) Master Plan nor the Sector 23 Plan were amended after the Divisions of Development were approved for the elementary school and the PUD substation to adjust the number of units that could be developed within this sector. After deducting the elementary school site, the PUD electrical substation, the 12-lot Regatta Highlands PRD, and open space, the remaining number of units allowed within Sector 23 would be eight dwelling units. The Horseman’s Trail/Frognal Estates PRD proposal includes six units in that remaining portion of Sector 23.

The maximum potential density for the proposed Horseman’s Trail/Frognal Estates PRD (proposed action) is governed by a combination of the current County PRD code provisions contained in SCC Chapter 30.42B, the Harbour Pointe Master Plan, and approved Sector 22 and 23 Plans.

The maximum number of units permitted in the portion of the site within the Harbour Pointe Master Plan is determined by the Sector 22 and 23 Sector Plans. However, the final calculation of the maximum number of units will be made at the preliminary plat or Division of Development stage in conformance with the PRD chapter of the Snohomish County Zoning Code. The remaining number of dwelling units available in Sector 23 is eight, and six are proposed. The remaining number of dwelling units available in Sector 22 (Lot 1) is 91, and 30 are proposed.

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18 Eight lots are available in Sector 23 after development of the elementary school, a 12-lot plat, and other non-residential uses. See Draft EIS Section 2.4.5.

19 Source: Table II, Residential Land Use Densities (Possession Shores Master Plan, April 1, 1978, pages 7 and 8).
Pursuant to the applicable sections of SCC 30.42B.040, the maximum number of units permitted in the Sectors 22 and 23 portions of the site would be determined by dividing the net development area (NDA) by the minimum lot area permitted by the underlying zone (which is R-8400) and then multiplying this number by 1.2. There are no critical areas within these portions, so the provision for additional units derived from existing critical areas and buffers is not applicable. Because this portion of the site is zoned R-8400, the density in the NDA cannot exceed 9.0 du/acre.

The net development area (NDA) of the portion of Horseman’s Trail/Frognal Estates within Sectors 22 and 23 is 7.46 acres, or 324,632 square feet. Because there are no critical areas or critical area buffers within this portion of the site, the NDA and total area are the same. Dividing the NDA by the minimum R-8400 lot area of 8,400 square feet equals 38.65 lots. Multiplying 38.65 lots by 1.2 equals 46.38 lots, or 46 lots pursuant to the rounding provisions of SCC 30.42B.040(3). The proposed site plan for Horseman’s Trail/Frognal Estates indicates a total of 36 lots proposed within Sectors 22 and 23. The proposed 36 units divided by 7.46 acres equals a density of 4.83 du/acre. This is less than the maximum density allowed (9.0 du/acre) per the Snohomish County PRD code. The proposed 36 single family lots is also significantly less than the remaining 99 units allowed in Sectors 22 and 23 (see Table 2.4-1).

As noted previously, Lot 1 of Regatta Estates PRD that was reserved for future development comprises the entire portion of the Horseman’s Trail/Frognal Estates PRD site within Sectors 22 and 23.

The proposed PRD lot sizes vary, with a minimum lot size of 3,731 square feet and an average lot size of 4,315 square feet. Three (3) open space tracts and a Private Road Tract are also proposed in the portion of the site within Harbour Pointe Master Plan Sectors 22 and 23.

The portion of Horseman’s Trail/Frognal Estates west of 60th Avenue W is outside the Harbour Pointe Master Plan area, and is solely regulated by the Snohomish County Land Use Code. For project consistency and environmental sensitivity, the proposal is to develop this area in accordance with Snohomish County PRD regulations (SCC 30.42B) as is required in the Harbour Pointe Master Plan areas (Sectors 22 and 23). The maximum number of dwelling units permitted in the portion of the PRD site outside the Master Plan area is determined by SCC 30.42B.040 (unit yield and bonus) provisions. This portion of the site is zoned R-9600 (one dwelling unit per 9,600 sf of land area), and includes 648,388 square feet. Dividing this area by the allowed zoning density yields 67.54 lots as a base calculation, with a 20 percent bonus for using the planned residential development (PRD) approach, yielding a total of 81 lots allowed. The Horseman’s Trail/Frognal Estates PRD proposal includes 76 lots in this area, outside of Sector 22 and Sector 23.

In summary, the maximum number of dwelling units allowed for the entire Horseman’s Trail/Frognal Estates PRD is 81 lots west of 60th Avenue W, and 99 lots (per Sector 22 and 23 Plans) east of 60th Avenue W, for a total of 180 allowable lots. The total lots allowed based on Snohomish County Code 30.42B (PRD) calculations would be 127.\(^{20}\) The Horseman’s Trail/Frognal Estates proposal is for 112 lots for the development of single-family detached homes.

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\(^{20}\) Total lots allowed in a planned residential development (PRD) under City of Mukilteo regulations would be 118.
Table 2.4-1. Land use (density and open space) allowed per Possession Shores (Harbour Pointe) Master Plan and Sector Plans compared to density and open space proposed for Horseman’s Trail/Frognal Estates Planned Residential Development (PRD).

<table>
<thead>
<tr>
<th>Horseman’s Trail/ Frognal Estates</th>
<th>Maximum Allowable Residential Units(^1)</th>
<th>Number of Units Proposed in PRD</th>
<th>Open Space Requirement(^2)</th>
<th>Open Space Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sector 22</td>
<td>91</td>
<td>30</td>
<td>0.67 acre</td>
<td>2.11 acres</td>
</tr>
<tr>
<td>Sector 23</td>
<td>8</td>
<td>6</td>
<td>0.079 acre</td>
<td>0.092 acre</td>
</tr>
<tr>
<td>Outside Harbour Pointe</td>
<td>81</td>
<td>76</td>
<td>2.977 acres</td>
<td>5.78 acres</td>
</tr>
<tr>
<td><strong>Totals:</strong></td>
<td><strong>180</strong></td>
<td><strong>112</strong></td>
<td><strong>3.726 acres</strong></td>
<td><strong>8 acres</strong></td>
</tr>
</tbody>
</table>

\(^1\) Per approved Sector Plans within Harbour Pointe. (Only applies to PRD site area within Sectors 22 and 23.)

\(^2\) Per Open Space Provisions of the Possession Shores (Harbour Pointe) Master Plan (pages 29–31). (Only applies to PRD site area within Sectors 22 and 23.)
The Division of Development for Sector 22 and Regatta Estates required that all lots would meet the zoning code standards for development on steep slopes. (See additional information provided in Attachment 1 to this Draft EIS.)

Since approval of the Division of Development for Sector 22 and Regatta Estates, the Snohomish County Zoning Code has been amended to eliminate the application of the slope density regulations to Planned Residential Developments. SCC Section 30.41A.250 (density for sloping land) excludes the application of slope density regulations to PRDs combined with preliminary subdivisions.

2.4.7.1B. Residential Density under City of Mukilteo Land Use Regulations. In accordance with the Washington State Growth Management Act (GMA), Snohomish County designated Urban Growth Areas (UGAs) where municipal incorporation and/or annexation is encouraged. Within Snohomish County, all the southern cities were grouped together and the surrounding UGA is referred to as the Southwest UGA. In June 2009, the Washington State Boundary Review Board (BRB) of Snohomish County approved an annexation proposal submitted by the City of Mukilteo for an area that includes the Horseman’s Trail/Frognal Estates site, thereby including this property within the City's Municipal Urban Growth Area (MUGA). However, in August 2009, Snohomish County Fire District No. 1 filed a lawsuit with Snohomish County Superior Court against the City and against the BRB, appealing this decision. The affect of the lawsuit is to stay the effective date of the BRB decision. Therefore, the annexation election is postponed until the appeal is decided upon or withdrawn. The Mukilteo City Council withdrew its Notice of Intent on April 15, 2010.

In 1991, the City of Mukilteo annexed twenty Sectors regulated under the Harbour Pointe Master Plan. To maintain consistency, Snohomish County zoning was adopted for the area that encompassed these twenty sectors. The City established land use controls for properties regulated under the Master Plan with the following documents, in the following sequence:

1. Mukilteo Comprehensive Plan
2. Possession Shores (Harbour Pointe) Master Plan (April 1978)
4. Harbour Pointe Sector Plans
5. Mukilteo Development Standards

The Mukilteo Comprehensive Plan designation for the Horseman’s Trail/Frognal Estates site is Single Family Residential−Medium (SFR-M). The residential density under this designation is 4.54 to 5.19 dwelling units (du) per acre. The residential density of the Horseman’s Trail/Frognal Estates PRD proposal is 5.01 du/acre – within the range of the City of Mukilteo Comprehensive Plan designation for the site.

The Harbour Pointe Master Plan requires that portions of the Horseman’s Trail/Frognal Estates site within Sectors 22 and 23 be developed per the applicable Planned Residential Development (PRD) Code. If the site had been annexed to the City of Mukilteo prior to the PRD application to Snohomish County on August 4, 2005, the applicable PRD Code would be Mukilteo Municipal Code (MMC) Chapter 17.51. Table 2.4-2 compares the MMC PRD Code provisions to Snohomish County Code (SCC) PRD code.

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21 Versions of the City of Mukilteo land use regulations reviewed for this analysis were approved by the City Council November 17, 2008.
22 Since the Horseman’s Trail PRD application was made to Snohomish County, it will stay in the County’s process and be required to comply with County land use regulations. If the City were to annex the area that includes the site before the environmental review and development approval process is complete, the application could not be required to start over under City of Mukilteo land use regulations.
provisions, and shows the relationship of the Horseman’s Trail/Frognal Estates PRD proposal to both of these sets of regulations.

Table 2.4-2. Comparison of the Horseman’s Trail/Frognal Estates PRD proposal to Snohomish County and City of Mukilteo land use regulations.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Snohomish County PRD (SCC 30.42B)</th>
<th>City of Mukilteo PRD (MMC 17.51)</th>
<th>Proposed with Horseman’s Trail/ Frognal Estates PRD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross Site Area</td>
<td>973,020 sf</td>
<td>973,020 sf</td>
<td>973,020 sf</td>
</tr>
<tr>
<td>Deduction for Net Development Area</td>
<td>0 critical area</td>
<td>14.4% for roads</td>
<td>0 critical areas</td>
</tr>
<tr>
<td>Net Development Area</td>
<td>973,020 sf</td>
<td>832,905 sf</td>
<td>973,020 sf</td>
</tr>
<tr>
<td>Divide by Density Allowed by Zoning</td>
<td>106 lots&lt;br&gt;&lt;sup&gt;a&lt;/sup&gt;</td>
<td>99 lots&lt;br&gt;&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Add 20% PRD bonus</td>
<td>127 lots</td>
<td>119 lots</td>
<td>112 lots</td>
</tr>
<tr>
<td>% Open Space Required/ Proposed</td>
<td>20%</td>
<td>20%</td>
<td>35.8%</td>
</tr>
<tr>
<td>Open Space Required/ Proposed (in square feet)</td>
<td>194,604 sf</td>
<td>194,604 sf</td>
<td>348,542 sf</td>
</tr>
<tr>
<td>Minimum Lot Size</td>
<td>None</td>
<td>5,000/4,000 sf&lt;br&gt;&lt;sup&gt;b&lt;/sup&gt;</td>
<td>4,313 sf average</td>
</tr>
<tr>
<td>Minimum Lot Width</td>
<td>None</td>
<td>50 ft / 40 ft&lt;br&gt;&lt;sup&gt;b&lt;/sup&gt;</td>
<td>45 ft minimum</td>
</tr>
</tbody>
</table>

<sup>a</sup> Within Snohomish County, 8,400 sf lots are allowed east of 60th Avenue W, and 9,600 sf lots are allowed west of 60th Avenue W. Within the City of Mukilteo, the minimum allowed residential lot size for the entire Horseman’s Trail/Frognal Estates site would be 8,400 sf.

<sup>b</sup> Within the City of Mukilteo, the minimum lot size for a single-family home (including townhouse/duplex units 2,000 sf minimum size per unit) is 5,000 sf, with a 50-foot minimum lot width. There is an Optional PRD standard (MMC 17.51.055) that allows 4,000 sf lots and a minimum lot width of 40 feet by supplying more detail in the submittal. City of Mukilteo PRD standards also allow multiple-family dwellings in any PRD (MMC 17.51.050G).

If Horseman’s Trail/Frognal Estates had been annexed to the City of Mukilteo prior to its submittal to Snohomish County, with slight adjustments in some lot sizes the PRD proposal would be compliant with the criteria of the City’s Optional PRD code as codified in MMC 17.51.045 and 17.51.055. The PRD proposal could be made compliant with the City’s standard PRD criteria if the amount of open space proposed were significantly reduced (i.e., by approximately 77,000 sf – approximately 1.75 acres) and lot sizes were somewhat increased.
2.4.7.2 Circulation

The Horseman’s Trail/Frognal Estates portion of Sector 22 is bordered on the east by 58th Place W within the developed plat of Regatta Estates. The proposal includes extending this existing street further north into Horseman’s Trail/Frognal Estates to serve the portion of Horseman’s Trail/Frognal Estates lying outside of Sector 22 to the west (see Figure 2.5.4-1). This roadway extension is proposed with a 35-foot wide right-of-way with two standard 10-ft wide travel lanes totaling 20 feet in width. Included in the road section is a standard 8-foot wide parking lane that separates a 5-foot wide paved pedestrian walkway from the travel lanes (see Figure 2.5.4-2a).

The Sector 22 portion of Horseman’s Trail/Frognal Estates is bounded on the west by the unopened public street right-of-way of 60th Avenue W. The proposal includes extending the existing street north into the plat to a 90 degree elbow that turns west and loops back to the terminus of 58th Place W in Regatta Estates (see Figure 2.5.4-1). This segment of 60th Avenue W to the elbow is proposed with a 46-foot wide right-of-way with two travel lanes totaling 20 feet in width and an 8-foot wide parking lane. This segment of 60th Avenue W is proposed with standard curbs, gutters, a 5-ft wide planter, and a 5-ft wide sidewalk (see Figure 2.5.4-2b). This street section carries around the elbow to the east-west segment of the road system. This road extension has also been designed away from a conflict with an existing house built too close to the intended right-of-way. The segment of 60th Avenue W west of the elbow is proposed with two standard 10-foot wide travel lanes with an 8-foot wide parking lane and 5-foot sidewalk on one side. The sidewalk would be at-grade with the parking lane.

All plat public roads within the PRD are proposed with standard 10-foot wide travel lanes, 8-foot wide parking lanes and 5-foot wide sidewalks. Other standard street section elements, such as 5-foot wide planter strips, vertical curb and gutters on both sides, maximum slopes, design speed and sight distances have been modified and approved to facilitate Low Impact Development (LID) Storm Water Management (SWM) techniques. Most road sections are “shed-sections” that flow to bio-retention swales parallel to the road alignment and do not have the typical crown that directs flows to catch basins, conveyance pipes, and detention systems for point discharges. The modifications to road Engineering Design and Development Standards (EDDS) have, in most cases, been reviewed and approved by the Snohomish County Public Works Department.

Pedestrian circulation will be provided in various forms or pathways to also facilitate LID SWM techniques and provide for pedestrian movement in a safe, community-promoting configuration. Some road segments are proposed with traditional sidewalks behind planters; some segments would have sidewalks at-grade with the parking lane (see Figures 2.5.4-2a and 2b); and pedestrian movement would also be provided via paths through open space areas. These latter paths would provide opportunities for community interaction away from a street segment. At locations where slopes may cause sheet flow across at-grade sidewalks (and thus the potential for ice during freezing weather), these sidewalk sections will be elevated with drains installed beneath. Details such as this will be resolved during final design and construction plan preparation.

With a total of 112 single-family detached units proposed, Horseman's Trail/Frognal Estates is anticipated to generate approximately 1,120 new average daily trips on the project street network. The Snohomish County Department of Public Works has issued a Letter of Transportation Concurrency for this project.
2.4.7.3 Open Space

The Possession Shores (Harbour Pointe) Master Plan included the initial dedication of 466 acres of public parklands, including the existing park lands along the north and east borders of Sector 22. In addition to the dedication of park land, the Master Plan required that 20 percent of the Net Development Area (excluding roads, unbuildable land and public utility facilities) of any residential sector be designated as open space. However, the Master Plan provided that one-half of the 20 percent open space requirement could be met by the County park lands abutting the sector. The approved Sector 22 Plan noted that it is contiguous to the County park lands. Therefore, 10 percent of the NDA of any residential development in Sector 22 would need to be designated as open space. The portion of Horseman's Trail/Frognal Estates within Sectors 22 and 23 that is consistent with the definition of NDA for the Master Plan is 7.46 acres. Open space is proposed within portions of Sectors 22 and 23 of the Horseman's Trail/Frognal Estates PRD in Tracts 996, 997, and 998 that total approximately 2.2 acres. The proposed 2.2 acres equals an open space percentage of 29 percent. Most of this open space lies within Sector 22, except for a small area in Tract 997 within Sector 23.

The approved Sector 23 Plan designated 2.1 acres or 13 percent of the sector as open space. All of the open space required for Sector 23 (2.1 acres) is provided in the existing open space tract within Sector 23 as shown on Figure 2.4-1. Therefore, it is not necessary for Horseman’s Trail/Frognal Estates to designate any additional open space to meet the Sector 23 open space requirement.

Former SCC Chapter 18.38 (now SCC Section 30.42B.115 [Design criteria – Open space]) set forth the Planned Residential Development standards of the County Zoning Code. The PRD provisions of the County Zoning Code have been amended and revised over time. PRD preliminary subdivision applications are subject to the PRD standards in effect at the time of submittal of a complete PRD application. Therefore, the Horseman's Trail/Frognal Estates application is subject to the PRD provisions of the Snohomish County Code in effect as of the date the PRD application was considered complete (August 4, 2005).

As a collector arterial, Picnic Point Road is required by the Harbour Pointe Master Plan to have a 25-foot landscape buffer along either side within Sector 22.

2.4.7.4 Public Sewer and Water Service

Public sewer and water service will be provided to the Horseman’s Trail/Frognal Estates portions of Sectors 22 and 23 through extension of existing water and sewer lines within the adjacent plat of Regatta Estates and 60th Avenue W through this 7.46-acre portion of the proposed site. Certificates of Water and Sewer availability were issued by the Alderwood Water and Wastewater District (AWWD) in August 2005. The certificates are valid for a one-year period, and have been renewed as the Horseman’s Trail/Frognal Estates project time-frame has been extended. The current AWWD Certificate of Water and Sewer Availability for 2009 is Certificate Number 08A0029. A renewal to extend approvals to April of 2010 is pending.

The new Picnic Point Wastewater Treatment Plant serves the northwestern portion of the district and has the capacity to treat 6.9 million gallons per day (mgd) of wet weather flows. Completion of this treatment plant resulted in lifting a moratorium on sewer hookups in the Picnic Point area effective April 4, 2011.

Another segment of the sewer main extension will carry discharges out of the portion of Horseman’s Trail/Frognal Estates not in the Harbour Pointe Master Plan along an existing easement in Regatta Estates. A 60-ft wide easement known as “Richards Road” exists just west of 61st Place W in the open
space (Tract 992) of the western portion of Regatta Estates. This easement connects Picnic Point Road to the western “15-acres” of Regatta Estates. The easement was granted to Robert R. Workman “... and the public ...” in 1949 “... for a public road...” and is recorded as AFN 907815. A specific paragraph in the easement imposes a condition on use of the easement “…for any utility, including water and sewer lines, which require assessment against the East or West adjacent property, or against property covered by this easement ...” Chicago Title and AWWD have reviewed this condition of the easement and made a determination that a sewer line is allowed as long as costs are not assessed to properties other than Horseman’s Trail/Frognal Estates. Proof of ownership of this easement, and proof of permission to construct Horseman's Trail/Frognal Estates utility improvements within this easement was provided to Snohomish County PDS with response to Drainage Review comments (Land Technologies, Inc., September 14, 2012).

2.4.7.5 Resident Population

Discussions with Snohomish County Planning and Development Services demographics staff indicate that single-family detached units characteristically have a per-unit population of approximately 2.9 persons (personal communication with Steve Toy, Snohomish County PDS, February 28, 2008). This population per household factor is derived from the 2007 Buildable Lands Report for Snohomish County (Snohomish County Council, October 31, 2007). With 112 dwelling units proposed, the PRD proposal would therefore generate a population of approximately 325 persons.

2.4.7.6 Schools

Horseman's Trail/Frognal Estates is anticipated to generate approximately 58 students to be served by the Mukilteo School District. This projection is based on student generation factors of 0.239 elementary school students, 0.123 middle school students, and 0.147 high school students per dwelling unit (Mukilteo School District response to review of Horseman’s Trail/Frognal Estates application). It is anticipated that students from the development will attend Picnic Point Elementary School, Harbour Pointe Middle School, and Kamiak High School. The projected 27 elementary school students will be within walking distance of the school. The anticipated 14 middle school and 17 high school students require school bus transportation from a bus stop on 140th Street SW at 60th Avenue W. The Transportation Demand Management Plan prepared for the PRD describes a safe pedestrian system throughout the development (Land Technologies, December 2006).

2.5 Description of the Proposed Action

The proposal would provide 112 lots for single-family homes on an assemblage of parcels totaling 22.34 acres: undeveloped parcels within Sectors 22 and 23 of Harbour Pointe (approximately 7.46 acres total), and Lots 27 and 28 of the Hillman’s Meadowdale Addition (14.88 acres). Parcel numbers within the proposed project area include: 00473300002701, 00473300002800, and 00853500000100. The Proposed Action would be developed under the Planned Residential Development (PRD) provisions of the Snohomish County Code (SCC Chapter 30.42B). Infrastructure improvements at the site boundary and for a short distance offsite will include roadway access to 58th Place W and 60th Avenue W; realignment of the present terminus of 60th Avenue W to accommodate a home built by an adjacent property owner too close to the right-of-way; water system connections at 58th Place W and 60th Avenue W and across an easement through Lot 74 of Regatta Estates; and sewer system connections stubs at the end of 58th Place W and 60th Avenue W, and an extension from Picnic Point Road up the Richards Road alignment. Principal features of proposed development are described in Draft EIS Section 2.5.4, below.)
### 2.5.1 Clearing Proposal

Horseman’s Trail/Frognal Estates has combined acreage of 22.34 acres, about 20 percent of which will be left in native growth and not cleared. Just under 18 acres will be logged and cleared for development. Fourteen acres will be developed for roads, infrastructure and home sites. The remaining 4 acres will be re-developed into open space tracts for recreational use. A phased clearing approach is proposed, as described below under Structural Grading. Mitigation measures for erosion control are described in Draft EIS Chapter 3, Section 3.1.3.

Before any equipment is moved onto the site, a surveyor will flag the proposed clearing and grading limits. A certified arborist will evaluate the trees outside the grading limits that may have to be removed. Any trees that are dead/dying, diseased, dangerous or determined by the arborist to be removable for the health of the forest will be marked or flagged.\(^{23}\)

After the clearing limits are clearly and securely marked, contract loggers will remove trees from the areas designated for grading. Trees will be felled; logs will be dimensioned and skidded to landings, sorted, and stacked for loading onto trucks. Anticipated equipment to be used during logging will include a D-8 Cat bulldozer for opening up haul routes, a log-skidder for moving logs to a landing, and a log loader for sorting and stacking logs and load-outs to trucks.

Logging will take approximately 30 days to complete (approximately 6 work weeks). There will be an average of 4 to 5 trucks hauling logs from the site over a 20- to 25-day period. There are approximately 350,000 board feet of logs to be hauled away at a rate of about 3,500 to 4,000 board feet per truckload. A Forest Practice permit will be obtained from the Washington Department of Natural Resources prior to site clearing.

Two large excavators with thumbs, two large bulldozers with splitters and rakes, and a large tub grinder will grub, remove stumps, and grind debris from areas to be cleared. All woody debris will be chipped for reuse: onsite for erosion control; as organic amendments to onsite soils for Low Impact Stormwater Management; or removed from the site for recycle. About four truck loads of chips per day will be hauled from the site over a 25-workday period. About 10,000 cubic yards of fines generated from stump grinding will be stockpiled for use onsite, of which about 4,000 cubic yards will be used immediately to create filter berms and blankets for sediment containment at the perimeter of the property.

### 2.5.2 Grading Proposal

Engineering grading plans estimate that approximately 275,000 cubic yards of cut and a nearly equal amount of fill will be required to produce design grades on the site. This overall volume of material to be moved is comprised of organic surface soils, a weathered subsurface layer, lodgement till, and outwash sands. Materials that will be imported to complete the finished grading plan will include compost soil amendments, crushed rock, asphalt pavement, and concrete to construct curbs and sidewalks. Driveways and home foundations will be constructed by others after site preparation is finished and the site is stabilized.

Equipment to be utilized for grading is expected to include two large excavators, two large D8-size bulldozers, four tractor scrapers, one large smooth drum vibratory compactor, one large “sheepsfoot” compactor, and a water truck. Graders, small finishing dozers, and smaller excavators will be used as site features approach final design grades.

\(^{23}\) Visual inspection of this forest did not identify the presence of dead/dying or diseases trees at the time of this writing.
The site will be segregated into three areas for soil management during grading (see Figure 2.5.2-1). Segment 1 will be the area along 58th Place W, and will include Lots 6 to 47; Segment 2 will be the area south of Segment 1 along 60th Avenue W (the east-west leg), including Lots 48 to 85. Segment 3 will consist of the remainder of the site – primarily the area to the east that is referred to as Lot 1 of Regatta Estates, including Lots 1 through 5, and Lots 86 through 112. The segregations described here are unrelated to site development criteria; materials may be moved into and out of each segment as needed to facilitate overall project implementation.

Components of the grading proposal are described in more detail below. Erosion control measures are described in Draft EIS Chapter 3, Section 3.1.3. Grading will be scheduled during the first dry weather season approximately 6 months after development approvals are received.

**Organic Surface Soils:** Toward the end of the clearing, grubbing, and chipping, stripping the organic surface soils from the structural areas will begin. This organic layer varies from 6 to 9 inches thick over the areas to be graded, and will produce about 15,000 to 20,000 cubic yards of organic surface soils. This surface layer will be saved for reuse in the Low Impact Development (LID) stormwater management facilities for treatment and attenuation of runoff. These organic soils will be mixed with selected and imported compost to create an “engineered” soil with appropriate characteristics for stormwater management.

Surface soils will require management and will have to be moved at least twice before final placement. Initially, surface soils will be stockpiled in a temporary location on the bench/plateau of the western portion of the property; referred to above as Segment 2. The valley and the north half of the plateau (Segment 1) will be stripped and the strippings will be stockpiled on the south half of the plateau. Fill areas in the valleys will be “keyed” into undisturbed material in accordance with geotechnical recommendations (AESI, November 1998; Sections 9.3 and 10.0), and structural materials from Segment 1 will be placed in the valley. Once the subgrade has been established on the north half the plateau, organic soils will be moved to excavated surfaces for later processing into engineered soils.

Hauling the strippings from Segment 1 to Segment 2 in preparation for structural grading will take about one week. These soils will be stockpiled for approximately three weeks before they are moved back to the subgrade of the graded half of the site. All surface soils and wood chips/sawdust will be moved to the graded area for temporary stockpiling and processing. Moving the rest of the organic soils to the stockpile will take approximately 2 weeks.

The surface soils and chips will be left in roughly mixed stockpiles and seeded with Dutch white clover while the rest of the site grading is being completed. These surface soils will be stockpiled for about 12 weeks.

**Structural Grading:** To manage soil movements described above, grading will start in segments of the site and those segments will be finished to subgrade as other areas are started. The first area to be graded (Segment 1) will be the north half of the site or one lot deep along both sides of the alignment of 58th Place W. Each of the three segments will have adequate “cut” (excavation) to supply fill requirements. To the extent practicable, structural soils will be "balanced" between segments. It may be necessary for some sharing of materials to occur to balance the total earthwork onsite. If excavation or fill needs to be shared between segments, it may be necessary to make some modifications to the Temporary Erosion/Sedimentation Control Plan.
NOTES:
The three soil management areas (Segments 1, 2, and 3) are "loosely" defined areas used for grading management.

These areas are unrelated to any site development criteria. Materials may be moved in and out of each segment as needed.
Geotechnical borings conducted on the site have shown that a lodgement till layer below surface soils overlies advanced outwash sands. The lodgement till component is a silty sand; the outwash is clean sand. The depth/thickness of the till varies from a few feet to as much as 43 feet. The outwash sands extend beyond 75 feet deep. The stormwater management proposal will use a series of Low Impact Development facilities to treat and attenuate runoff, and provide recharge to groundwater using surface water runoff. It is important that soils below the bio-retention swales and raingardens have permeability and connectivity to the outwash materials.

A geotechnical engineer will be onsite during structural grading to closely monitor all excavation work. A geotechnical technician will be onsite every day there is earthwork activity to monitor compliance with recommendations, and to test the density of placed soils. Before grading is initiated, the geotechnical engineer will review the areas to receive fills and provide site-specific guidance regarding fill placement. The geotechnical engineer will prepare written confirmation that each site segment is approved for excavation before grading begins.

With approval that the site segment is ready for grading, fill areas will be prepared. The major fill area for Segment 1 will be the valley that crosses the site along the 60th Avenue W alignment (see Figure 2.5.2-1, above). After stripping, the toe of the fill area will be surveyed and located. A keyway will be dug out of the toe area of the beginning of the fill, and benches will be excavated/cut per directions from Geotechnical Report and per specific onsite guidance received from the geotechnical engineer (see Figure 2.5.2-2). The spall drainage blanket will be placed per the Geotechnical Report and at the direction of the geotechnical engineer as the fill progresses.

It will take about 4 weeks to excavate the north segment of the site to subgrade. Once the subgrade or near sub-grade is established, the organic soils will be moved to process areas north of the 58th Place W alignment. Organic soils from the entire site will be stockpiled again in this area, and re-seeded with Dutch white clover for stabilization while in storage. It will take approximately 2 weeks to move organic soils to the stockpile/process area. With the earthwork schedule determined by the rate at which soil nailing progresses (described below), it will take approximately 5 weeks to grade Segment 3 (the eastern portion of the site above Regatta Estates) to subgrade.

**Segmental Retaining Walls:** The site has greatly varied topography; therefore, to obtain design grades for roads and building sites, Segmental Retaining Walls (SRW) or soil reinforcement will be used to enhance the structural integrity of cut and fill slopes. Some of these walls will be “cut” walls and some will be “fill” walls. Fill walls will use Geo-grid reinforcement behind a segmental block on the face, such as a heavy block product like Redi-Rock (see Figure 2.5.2-3). Cut walls, through most of the site where the geology is supportive, will also use segmental walls, but the cut walls along the entry to the plat from 58th Place W will be reinforced with a system of soil nailing (or other equal or better stabilizing system such as soldier piles), as described in the Associated Earth Sciences, Inc., *Supplementary Report* (AESI, April 12, 2006), and supported by the Peer Review technical analysis in the *Geotechnical Conditions Report* (Anthony Burgess Consulting Inc., September 2013b; Draft EIS Technical Appendix B). These methods are also shown on Figure 2.5.2-3.
Soil Nailing: The photo on the left shows a cut face after the nails have been installed but before grouting the face. The photo on the right shows an aggressive application of soil nailing after the grout surface (by shotcrete) has been applied. These grouted surfaces can be shaped and textured in many forms to appear as natural rock outcrops.

Redi-Rock: Redi-Rock walls are a segmental block retaining wall using 500 to 2500 concrete blocks designed with a proprietary locking component to tie the blocks together as a cohesive unit. These blocks can be used with Geotechnical Reinforcement in fills, or without, in cuts up to eight feet high.

Segmental Wall: The photo on the left is example of Redi-Rock Block installation. The photo on the right shows the proprietary “dome” locking system with installation of Geo-Grid reinforcement.
Soil nailing consists of installing a grid pattern of grouted rebar tendons (“nails”) into slightly inclined drilled holes spaced on a vertical soil cut face as excavation proceeds vertically from the top down in stages of approximately 4 to 6 feet. These “nails” produce a reinforced zone that is itself stable and helps support the unreinforced ground behind it. The nails are passive in that they are un-tensioned at the time of installation. Over time, they become tensioned as they resist the deformation of the adjacent soil. The nail reinforcement improves stability in two ways. First, soil nails reduce the driving force along potential failure surfaces. Second, in frictional soils, nails increase the normal force, and hence, the soil shear resistances along potential slip surfaces.

Whether soil nailing on cut walls or building Geo-grid reinforcement walls in fills, retaining wall construction will be coordinated with earthwork. Soil nailing will require the earthwork contractor to excavate the sub-face of the wall in typical 6-foot lifts while a specialty contractor drills for the “nails,” sets and grouts the nails, provides for drainage, and shoots the temporary shotcrete face. Geo-grid walls in fills install at a faster pace. The site work contractor can install the grid and walls with their own workers, without relying on a specialty contractor. All wall construction will be observed and proof-tested by the onsite geotechnical engineer as constructed.

**Amended Soils:** Topsoil on the finished site will provide a functional component of the stormwater management plan. The organic soils and fines from the woody debris grinding will have been mixed and stored in Segment 1. Organic soils will be carefully stripped from the site to obtain only the organic-rich surface soil. The mixture of soil and wood debris fines will be tested for percent organics, carbon/nitrogen ratio, cation exchange capacity (CEC), and infiltration rates. It is predicted that these soils will meet the parameters required for use in stormwater management. If they should fail, additional compost will be imported to amend site soils until required parameters are met.

If additional compost is required, the site soils mixture will be spread in a 1-foot layer in the process area of Segment 1. An appropriate layer of compost will be spread over a blanket of site soils and mixed with a disc. A typical layer of compost over the 12 inches of site soils would be 3 to 6 inches deep. Given the characteristics of existing site soils, the compost layer is likely to be at the low end of this range. Once the mixture meets criteria established in the *Low Impact Design Manual for Puget Sound* (Ecology, Puget Sound Action Team, January 2005), it will be stockpiled again until needed for placement onsite.

Once subgrade has been established (18 to 24 inches below design grade) in all landscape areas, surface soils will be placed on a scarified subgrade per plan. Estimated quantities of amended soils for distribution on the site are 8,000 cubic yards for landscaped open space areas, 15,000 cubic yards on lots, and 2,500 cubic yards for use in bio-retention swales adjacent to project roads.

Prior to placement of amended soils, the subgrade surface is to be scarified to a minimum depth of 4 inches. After subgrade scarification, the amended soils can be placed immediately on the surface of open space and landscape areas. These areas can be finish-graded per plan with low ground pressure (LGP) equipment (small dozers, preferably with wide tracks).

BMP T5.13 requires a minimum 8-inch depth of amended soil. The proposal includes providing a deeper surface soil cross-section of 18 inches. Therefore, lot subgrade would be 18 inches below design contours. The ideal process for assuring that amended soils are placed as intended (outside of areas where structural support is required) is to stockpile these soils in a berm along the back of lots until the house

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24 Specific guidelines and minimum standards for “Post-Construction Soil Quality and Depth” can be found in the *Stormwater Management Manual for Western Washington* (Ecology 2005) as BMP T5.13. A detailed publication designed to help professionals implement BMP T5.13 can be found at www.SoilsforSalmon.org.
foundation is ready for backfill. This will assure that clean amended soils will be distributed on the surface of the yards.

Bio-retention swales should not be backfilled with amended soils until the edge curbs for the road and asphalt-treated base (ATB) is in place. Once the road surface and curbs are in, and the subgrade has been scarified, the amended soils should be placed with LGP equipment. In areas where the road grade exceeds 5 percent slope, these swales will have a filter berm check dam, covered with a Vmax Turf reinforcement mat before being seeded (see Figure 2.5.2-4).

2.5.3 Temporary Erosion and Sediment Control During Construction

A Stormwater Pollution and Prevention Plan (SWPPP) will be prepared and implemented during the construction phase of the project. Measures for erosion control will be functionally in-place before earthwork is initiated on the site. The contractor will be responsible for maintenance of all erosion control facilities. To assure compliance with the SWPPP, a Certified Erosion/Sediment Control Lead (CESCL) will be hired by the owner to review and report on compliance with the conditions of the SWPPP. The project engineer and property owner will be responsible to the Washington State Department of Ecology for compliance with water quality standards during construction.

SWPPP measures are an ongoing management process, and are dynamic in that control measures to implement Washington Department of Ecology (Ecology 2005, Volume 2) Best Management Practices may be added or deleted at any time to adjust to “real time” issues. The requirement is for no turbid water to leave the site in exceedance of SCC 7.53 standards, and for no work to allow water quality to be compromised.

Management of SWPPP measures is a daily task. Representative measures are described below. Additional detail will be provided in the SWPPP to be prepared for the construction phase of the project. Detailed use and implementation guidelines for Best Management Practices (BMPs) are provided in the Stormwater Management Manual for Western Washington (Ecology 2005). The proposed action will be required to comply with these guidelines.

- **Mark Clearing Limits** *(Element #1)*: Prior to beginning land-disturbing activities, including clearing and grading, clearing limits will be surveyed and clearly marked. Trees to be preserved along the clearing limits will be bordered with construction tape. Clearing limits will be marked in the field and on plans.

- **Stabilize Construction Entrance/Exit** *(BMP #105)*: Quarry spall pads will be one of the first control measures to be implemented. Before logging equipment is delivered to the site, a bull dozer will prepare a spall pad, and initially 12 inches of 4- to 6-inch diameter spalls will be placed at entry/exit points to/from the site. The pads will be maintained and replenished as needed to clean truck tires as construction-related vehicles leave the site. To supplement the function of the spall pad, a street sweeper will be available near the site entrance for the duration of site work. Streets will be swept each day there is activity that may track mud/dirt onto public streets.
Photo on left shows a channel lined with Vmax Turf Reinforcement before seeding. The Photo on the right shows grass emerging through Vmax. Vmax has been tested to be as effective against erosion as 30-inch rip-rap. Vmax has been flume-tested with up to 120 cfs (cubic feet per second) and velocity of approximately 20 feet per second with a 1.5 ft flow depth and experienced little to no soil loss (TECH FACTS sheet available upon request.)

Figure 2.5.2-4
Examples of Vmax Turf Reinforcement Mat for Channels
**Storm Drain Inlet Protection** (BMP #C220): Existing offsite catch basins will be protected from accumulations of silt and sands tracked to the existing road surfaces before clearing, grading, or before significant vehicle traffic is allowed on or off the site. A commercial “filter sock” will be installed in the inlet of each basin. In addition, Compost Wattles (Straw Wattles per BMP C235 filled with compost) will be placed in a “U” shape perpendicular to the curb flow line upstream of the catch basin. The wattles will pick up coarse sediments, and the filter sock will provide finer sediment protection from entering the existing stormwater conveyance system. Maintenance of the filter sock shall be a periodic task to assure inlet protection.

**Filter Fence/Filter Berms** (BMP #C233): Observations of existing site surface soils show no signs of surface erosion; however, after clearing, portions of the site would be more exposed to erosive forces. Vegetative cover will be maintained on the down-gradient side of cleared areas. As an additional erosion control measure, filter fabric fencing, filter berms made from chipping clearing debris, and compost will be placed along the downslope side of the clearing limits. All clearing/grading limits will have filter fence fabric or filter berms along the downslope side. These fences/filter berms will be in-place as clearing starts and fully functional before any stripping starts.

**Temporary and Permanent Seeding** (BMP #C120): The effectiveness of seeding is highly seasonal and is only effective in areas that are going to be left undisturbed for more than 90 days. Seeding is ineffective in the winter months when temperatures are less than 40° F. Mulching or matting BMPs will be used during seasons of wet weather. Temporary seeding of topsoil stockpiles with Dutch White Clover will be implemented on each topsoil stockpile immediately after completion of stripping.

**Surface Roughening** (BMP #C130): Surface roughening aids in establishment of vegetative cover, reduces runoff velocity, increases infiltration, and provides sediment trapping. Before applying seeding (when seeding is appropriate), mulch, or matting to exposed surfaces, they will be “roughened” by “track walking” the surface prior to applying seeding or matting. If straw mulch is used as a temporary cover, the “track walking” of the surface will be on top of the mulch to crimp the mulch into the soil.

**Mulching/Matting** (BMP #121 and #122): Sediment is one of the primary pollutants from a construction site that has the potential to affect water quality. Sediment can be dislodged when raindrops strike exposed soils, or when water is allowed to accumulate on the surface and flow across exposed soils. Keeping soils covered and unexposed to the erosive forces of precipitation and wind is one of the most effective ways of keeping sediment out of surface waters. An easy and effective way to minimize exposed soils is to keep them covered as long as possible with the natural forest litter that occurs on the site. As stumps and woody debris are grubbed from the site and chipped, the mulch will be used to cover exposed soils that may be subject to erosive forces. Areas that are to be left exposed for more than 7 days in the summer, or for more than 48 hours or 2 days in the winter, will be covered with compost, straw, or woody mulch from the chipping.

**Interceptor Swales/Cut-off Swales** (BMP #C200): As the site develops, interceptor swales may be needed to control surfaces flows of stormwater. These swales will have check dams located along their length to reduce the velocity of flows to allow sediments to settle out. Check dams will be spaced at intervals based on slopes. The top of the downstream check dam will be near the toe of the upstream check dam.

**Silt Traps/Ponds** (BMP #C240): Silt traps or ponds will be installed at the end of the interceptor swales to allow further settling of sediments conveyed in surface water runoff. Silt traps/ponds will be designed based on flows from the tributary basin to allow for settling of suspended solids from the water.
Water detained in this manner will be filtered or decanted into a pipe for safe discharge into receiving areas.

- **Phasing**: Minimizing exposed soil surface areas will reduce the risk for suspended sediment to develop that cannot be treated. The site, as described above in Section 2.5.2, will be segregated into three segments for mass grading activities. This will allow organic surface soils being stockpiled for later use to be protected/covered in portions of two areas while excavation and embankment of structural soils is being performed unimpeded in another area of the site. If there needs to be some sharing of structural soils between segments, it may be necessary to make some modifications to the Temporary Erosion/Sedimentation Control Plan.

- **Topsoiling/Seeding (BMP #C120 and #C125)**: Once subgrades are established, organic topsoils can be distributed over non-structural areas and be seeded to provide cover and protection of fine soil particles from rain.

  The installation of filter berms along downslope areas will be the primary means for protecting sediment-laden waters from leaving the site. Natural vegetative buffers between open surface water and the graded portions of the site will provide additional protection for receiving waters.

### 2.5.4 Principal Features of Proposed Development

The Growth Management Act (GMA) was enacted in Washington State in 1990. Cities and counties of a certain size and growth rate\(^{25}\) were required to develop comprehensive land use plans to address growth anticipated over a 20-year planning period, with 5-year updates. Snohomish County anticipated a population increase of approximately 300,000 people by 2025 – approximately equivalent to adding three more cities the size of Everett to the County. Zoning and Comprehensive Plan designations were developed to accommodate this growth and direct it to areas best suited to serve the residential influx.

Growth Management planning includes areas around the cities (Urban Growth Areas) into which development is to be directed as infill consumes developable land within incorporated areas, with an objective to avoid sprawl into rural lands and resource areas. The Horseman’s Trail/Frognal Estates site lies between the Cities of Lynnwood, Edmonds, and Mukilteo, within the Snohomish County Southwest Urban Growth Area (UGA). Existing land use on surrounding properties is suburban residential, with residential zoning that allows one dwelling unit per 8,400 square-foot lot east of 60th Avenue W (within the Harbour Pointe Master Plan area as described above in Section 2.4), and one dwelling unit per 9,600 sf-lot west of 60th Avenue W. The County’s GMA Comprehensive Plan designation requires a minimum residential density of 4 dwelling units per acre (as codified in SCC 30.23.020 *Minimum Net Density for Residential Developments in UGAs*), and allows up to 6 dwelling units per acre with standard planning methods (GMA Comprehensive Plan Future Land Use Map for land designated as Urban Low Density, and further described in the GMA Comprehensive Plan, General Policy Plan [GPP] Future Land Use Map, Urban Residential Designations, page LU-48).

To allow more efficient use of land and to provide a variety of housing types and community options, Snohomish County Code (SCC) includes residential development options that differ from standard lot-by-lot planning methods. The Horseman’s Trail/Frognal Estates PRD is proposed under the County’s Planned Residential Development (PRD) regulations, as codified in SCC 30.42B. The purpose of a PRD is to:

\(^{25}\) Generally, those counties with a population of 50,000 or more, and more than 10 percent population growth in the 10 years prior to May 1995, and the cities within these counties.
1) Allow flexibility and creativity in site layout and design while protecting critical areas through the use of open space.
2) Provide for small- and large-scale developments incorporating a variety of housing types and related uses that are planned and developed as an integral unit.
3) Promote efficient use of land by allowing a flexible arrangement of buildings and lots, circulation systems, land uses, and utilities.
4) Promote combination and coordination of architectural styles, building forms, and building relationships within a development.
5) Preserve the value, character, and integrity of surrounding areas which have been, or, are being developed under traditional zoning regulations.
6) Provide for the integration of new development into the existing community while protecting and preserving the value of the surrounding neighborhood.
7) Provide the opportunity for affordable housing to meet the needs of a wide range of income and age groups.
8) Encourage the preservation of existing natural site features such as trees, topography, and geologic features.
9) Create permanent, useable and commonly owned open space for both active and passive recreation to serve the development; and
10) Implement the policies of the comprehensive plan.

Primarily, the PRD allows for smaller lot sizes than standard planning in exchange for setting aside at least 20 percent of the site as open space. While total open space can contain critical areas, at least 600 square feet per dwelling unit is required to be useable open space to be developed for passive or active recreational opportunities. The overall purpose of the PRD is to build a better sense of community at a density that will accommodate estimated growth within Snohomish County.

The PRD site planning method is the applicant’s Preferred Alternative. It would yield 112 lots and thus meet GMA density goals for the site, and it could achieve compliance with GPP, SCC, and EDDS with simple and specifically-allowed deviations per SCC 30.42B.140(8). It is constructible, economically viable, and meets Snohomish County roadway and emergency vehicle access requirements. The PRD approach would make most efficient use of the site, with overall less environmental impact than conventional site planning methods for residential development, described in Draft EIS Subsection 2.6. Further, the PRD site planning method is the only allowable choice for portions of the site regulated by the Harbour Pointe Master Plan.

2.5.4.1 Residential Lots and Parking Proposal

The gross area of the site is 22.34 acres. The County’s existing PRD regulations would allow 81 lots in the portion zoned R-9600, and 46 lots in the portion zoned R-8400. Thus, a total of 127 residential lots are allowed on the property per Snohomish County GMA Code, provided that at least 4.467 acres are designated for open space. The Horseman’s Trail/Frognal Estates PRD proposal includes 8 acres (approximately 35 percent of the site) of open space, compared to the minimum 20 percent requirement. About 60 percent of this open space will be retained in native vegetation, with the balance to be developed for active recreational use in designated community areas.

The Horseman’s Trail/Frognal Estates PRD proposal includes 112 lots for the development of single-family detached homes, compared to 127 allowed per Code. Proposed lot sizes range from 7,400 square feet to 3,587 square feet. The average lot size in the PRD proposal is 4,317 square feet. All lots would border open space or community areas (see Figure 2.5.4-1).
Snohomish County Code requirements for off-street parking are: two spaces per residential unit, provided in garages and/or on driveways. The PRD requirement for guest parking is one-half space per residential unit. The Code requirement then is for 224 resident spaces and 56 guest parking spaces for a total of 280 parking spaces. The Horseman’s Trail/Frognal Estates PRD proposal will provide the two required resident spaces inside garages along with two incidental spaces on the driveways. The road section required by Snohomish County Public Works has two 10-foot wide travel lanes and one 8-foot wide parking lane. In between the driveway ramps, the required parking lanes will provide approximately 110 guest parking spaces, for a total of approximately 390 parking spaces within the development.

With increased emphasis from local, State and Federal regulatory agencies to use Low Impact Development Techniques (LID) for stormwater management, the Horseman’s Trail/Frognal Estates PRD will propose use of porous pavement in the parking lane during Full Engineering and Construction Plan review.

2.5.4.2 Terraced Development and Retaining Walls Proposal

Site topography ranges from a low elevation of approximately 260 feet above mean sea level (MSL) to a high of approximately 460 feet above MSL. The low-end entry at 58th Place W (370 feet above MSL), to the exit at 60th Avenue W (460 feet above MSL), spans a 90-foot change in elevation.

To meet GMA density goals for the Planned Residential Development on this site with significant topographical variation, the development needs to be terraced. Proposed terracing will require retaining walls with varying structural criteria, described above in Section 2.5.2. Some walls will be constructed along excavated banks and may need reinforcement. This will be accomplished by one of several techniques that include soil-nailing, over-excavation and/or placement of Geo-grid reinforcements, or structural concrete walls. Specific wall construction techniques and wall types will be specified at the time of final design and construction plan preparation.

The dense nature of the glacially-consolidated soils underlying the site is ideal for soil nailing. Soil nailing allows for structural reinforcing without the need to over-excavate the consolidated soils (i.e., till). Wall façades could be finished with any number of treatments, including rockery or shotcrete that could be formed into a natural-looking rock outcrop.

Segmental Retaining Wall (SRW) systems such as Redi-Rock are proposed with Geo-grid reinforcement in fill areas (see Figure 2.5.2-3). The site landscaping proposal (described below in Subsection 2.5.4.5) includes landscape screening to buffer the appearance of proposed retaining walls.

2.5.4.3 Roads, Circulation and Emergency Vehicle Access

The proposed project has two points of access that will be connected by a continuous road system through the plat. One entry will be from 58th Place W, that intersects with a collector arterial to the east, Picnic Point Road. The other entry will be from 60th Avenue W, several blocks north of its intersection with the 140th Street SW, a collector arterial. A proposed private road will serve 15 lots from proposed 60th Avenue W within the Horseman’s Trail/Frognal Estates site (see Figure 2.5.4-1).
Streets through the site will be designed and constructed in accordance with Snohomish County Residential Street Standards, with some modifications approved by the Public Works Department. The road section will have two 10-foot wide travel lanes, an 8-foot wide parking lane, and 5-foot wide sidewalk on one side. The private road will be constructed using the same basic road section. Project roads will be designed to drain toward a bio-retention swale along the edge of paved areas. Typical road sections are shown on Figures 2.5.4-2a and 2.5.4-2b.

Onsite roads will be designed as residential streets for local access. A large “loop” through the site is proposed to discourage pass-through traffic. Onsite roads are intended for Horseman’s Trail/Frognal Estates community use. Emergency vehicle access will be enhanced by the connectivity provided by project roads between Picnic Point Road and 60th Avenue W.

2.5.4.4 Trails and Pedestrian Circulation

Pedestrian circulation will be provided in two components: sidewalks and paths adjacent to the parking lane along one side of the road, and a backyard community path through a community park and community gathering area (see Figure 2.5.4-3).

In addition to the sidewalks and paths proposed for pedestrian circulation, the Horseman’s Trail/Frognal Estates PRD includes about 2,800 lineal feet of recreational/community paths. These will be constructed as low impact trails through the community and around natural areas of the site.

2.5.4.5 Landscaping and Maintenance Proposal

About 4 acres of the Horseman’s Trail/Frognal Estates PRD community open space will be cleared, re-graded, and landscaped. Most of the landscaping will be a component of the Low Impact Development stormwater management plan, and therefore will provide a functional benefit as well as an aesthetic value. More than 1,200 trees are proposed in the landscape design along with nearly 4,000 shrubs. Not included in these numbers is private residential landscaping that would total approximately 6 more acres. Proposed open space tracts are described below and illustrated on Figure 2.5.4-4.

**Tract 995** will be the community park. This will provide about three-quarters of an acre of community gathering, pedestrian circulation, and stormwater management area. Several north-south pedestrian path systems will provide access from the community at-large. The east-west path will be a 7-foot wide public pathway providing homes adjacent to the park with pedestrian connectivity to offsite street systems. A gazebo and benches are proposed to encourage community gatherings. The main feature of this open space area will be the functional landscapes provided for stormwater management. A landscaped bio-retention swale will run the length of the open space area and flow into a bio-retention cell or raingarden-like feature.

**Tract 996** is connected to Tract 995 and provides similar amenities. There will be large open lawn areas with a raingarden system that incorporates a series of cascading pools to provide stormwater management functions and convey stormwater to another bio-retention cell swale along 58th Place W. As the bio-retention cell swale flows back along 58th Place W, it will be back-dropped with a landscaped and terraced rock wall feature.

**Tract 997** is primarily a screening buffer tract with a 5,000 square foot open park area. This area will provide a buffer along the Private Road Tract across from the homesites. It will also have a terraced rock feature with two or three landscaped tiers.
Figure 2.5.4-3 Pedestrian Circulation

Horseman's Trail

PEDESTRIAN CIRCULATION TO BE PROVIDED WITH:

1. Sidewalk along some roads.
2. Paved paths behind parking strip for most roads.
3. Separated pathways through open space roads.
Tract 998 is an entry park from Regatta Estates. It will provide a community gathering area, a playfield/sports court, and likely some conventional stormwater management facilities (e.g., an underground vault). It will also buffer the back of lots 1 through 9. Terraced wall features will be included in this landscape also.

Tract 999 is 4.8 acres with about 3.5 acres in retained trees. This Tract will buffer adjacent land uses and provide a pedestrian recreational trail system, LID stormwater management features, a terraced landscaped rock wall system, and a conventional detention vault sized based on the effectiveness of the LID features to control or attenuate storm flows.

Bio-retention swales in the front of yards and streetscapes will provide both an aesthetic function and a stormwater management function. Bio-retention cells are shallow swales lined with compost-amended soils and planted with shrubs and grasses selected first for their phytoremediation characteristics, second for their hardiness, and third for their aesthetic appeal. Figures 2.5.4-5 and 2.5.4-6 illustrate typical Bio-retention cells and raingarden features.

Landscape screening of proposed retaining walls will buffer the appearance of these features on the site. Figure 2.5.4-7 shows a representative example of proposed planting material at these locations.

The Homeowners’ Association (HOA) will be responsible for maintenance of community open space areas and the Low Impact Development stormwater management components of the landscape. Maintenance Guidelines will be provided in the Covenants, Codes & Restrictions (CC&Rs) of the development, and in a Homeowner’s Handout. The HOA will be required to hire the services of a professional landscape maintenance company educated in the maintenance requirements of the Low Impact Development stormwater management features. Project approvals will include providing a drainage access easement to Snohomish County for the County to assure that the HOA maintains the drainage facilities, and that the repair or replacement of any drainage facilities is the responsibility of the HOA.

2.5.4.6 Open Space and Tree Retention Proposal

Residential sites within Snohomish County’s Urban Growth Area (UGA) are required to meet certain development densities, as described above at the beginning of Section 2.5.4. The County’s Planned Residential Development (PRD) provisions under which Horseman’s Trail/Frognal Estates is proposed require that at a minimum of 20 percent of the overall site be set aside as open space, to be preserved “in perpetuity” (i.e., permanently). For the 22.34-acre site, the minimum open space requirement is therefore 4.47 acres. The proposal includes 8 acres of open space, encompassing 35.8 percent of the site – nearly 180 percent of the Code requirement.

The portion of the property east of 60th Avenue W is also subject to park and open space requirements as set forth in the Harbour Pointe Master Plan for Sectors 22 and 23. The approved Sector Plans require 10 percent open space. The 7.46-acre portion of Horseman’s Trail/Frognal Estates within the Sector Plans includes more than 2 acres of open space – approximately 25 percent of the Sectors within this project. Therefore, the open space proposal significantly exceeds the requirements of the Sector Plans.

26 The Horseman’s Trail/Frognal Estates PRD is not subject to Urban Residential Design Standards because the application was deemed complete in August 2005, prior to the effective date of the URDS (April 21, 2009).
Figure 2.5.4-5

The pictures above and to the right are random photos taken of Raingardens. Raingardens appear as nicely landscaped areas, but are very much a workhorse for stormwater management. They serve as an excellent means for treating water before it is infiltrated back into the natural system. Raingardens also provide an aesthetic pleasing environment that provides for good community gathering places.

Above is a schematic of a bio-retention swale and to the right is a photo taken of a functioning swale near Redmond. The cell is lined with 1½ to 2 feet of Compost Amended Soils to provide treatment, infiltration, and attenuation of road runoff. Plants are selected to provide Phytoremediation of metals and hydrocarbons from road runoff.

Above left: is a bioretention swale before seeding has germinated. The VMAX turf reinforcement matting is in place and check dams can be seen along the swale.

Above right: is the same swale after low maintenance-low growing seed mix has matured. Shown is a summer and fall growth with no maintenance.

Figure 2.5.4-6

Photographs of Representative Bio-Retention Swales and Raingardens
Redi-rock walls are planned as the primary retaining wall system to be used on Horseman’s Trail. The walls alone provide an aesthetically pleasing structure. To enhance the aesthetics, the walls will be stepped with planter areas. The planters will be planted with a variety of trees, shrubs, and grasses that will form different appearances similar to those shown in the photos of other applications using Redi-Rock.

The primary Retaining Wall System proposed for Horseman’s Trail will use Redi-Rock. Walls will be stepped at 8-foot intervals or less. Along the “steps,” paths and/or plantings will be used to diversify the appearance of the wall face.

Where “soil-nailing” is used, a rock “outcrop” look will be molded with artistic grouting to form a rock cliff.
The proposal will comply with the tree retention requirements of Snohomish County Code (SCC) Section 30.42B.130 (Design criteria – tree retention) in effect in August 2005. Preliminary Plat application Landscape Plans dated December 4, 2006 include 477 new evergreen (conifer) trees 6 feet tall at the time of planting, and 727 new deciduous trees 6 feet tall or 1¼-inch caliper at the time of planting. While the Preliminary Plat application drawings are subject to change during final engineering design for construction approvals, the applicant proposes to plant at least this total number of trees (1,204) within the developed portion of the subject property. No existing significant trees as defined by SCC Section 30.91S.320 in effect in August 2005 shall be removed from Native Growth Protection Areas or perimeter open space tracts except as determined appropriate for removal by qualified arborist.

2.5.5 Utilities and Infrastructure

2.5.5.1 Developed-Condition Stormwater Management Proposal

Application and Vesting Dates

The Horseman’s Trail/Frognal Estates application was submitted to Snohomish County PDS on August 4, 2005 and the application was soon deemed complete giving the project a vesting date in August 2005. In August 2005, the Snohomish County Drainage Manual consisted primarily of the 1992 Department of Ecology (Ecology) Stormwater Management Manual (SWMM) with addendums by the Snohomish County Department of Public Works and the Engineering Design Development Standards. The 1992 Manual allowed use of the Santa Barbara Urban Hydrograph (SBUH). The SBUH Model was replaced by Ecology with the updated 2005 Stormwater Management Manual for Western Washington (SWMMWW). The 2005 Manual does not allow the use of SBUH for stormwater management but instead requires use of the calibrated continuous simulation hydrologic model based on the U.S. Environmental Protection Agency’s Hydrological Simulation Program-FORTRAN (HSPF).

Snohomish County did not adopt Ecology's 2005 Manual, but wrote an equivalent manual adopted September 30, 2010. The County allowed the Horseman's Trail/Frognal Estates applicant to submit a waiver requesting use of Ecology's 2005 Manual. This was typically not preferred by most developers and engineers as it requires increased performance standards in regards to stormwater modeling and management. The Horseman’s Trail/Frognal Estates stormwater management proposal is based on Ecology's 2005 Manual.

Low Impact Development


The new (LID) stormwater management tools as described above were developed to address a number of critical environmental issues facing Puget Sound, such as loss of habitat for salmon species Federally-listed as threatened under the Endangered Species Act. To better address these issues, Ecology and others have taken significant steps related to LID and better management of stormwater runoff. The initial guidelines for flow reduction credits when LID techniques are used in projects in western Washington have been included in Ecology's 2005 Drainage Manual. These credits provide “…additional tools to retain stormwater on-site and reduce the size of conventional facilities that control storm flows” (LID Technical Manual, January 2005).
The Horseman's Trail/Frognal Estates project, due to its vesting in August 2005, is not required to provide LID techniques; however, the applicant has chosen to utilize these techniques where feasible for this project. The Puget Sound Pollution Control Hearings Board has, since the application was vested for this project, directed the Department of Ecology “...to require the use of LID techniques where feasible.” The Phase I Municipal Stormwater Permit issued by Ecology on August 1, 2012, with an effective date of August 2013, directed Snohomish County as a Phase I permittee to adopt new stormwater regulations that would require the use of Low Impact Development (LID) techniques and Best Management Practices (BMPs) to be implemented where feasible. These regulations would require the adoption of a new County stormwater management manual that is equivalent to the 2012 Ecology Stormwater Manual, and to use the 2012 Western Washington Hydrology Model or an equivalent continuous runoff model to analyze storm drainage from new development or redevelopment projects. The revised County Code will go into effect in 2015.

While the focus of low impact development per the LID Technical Manual is to more effectively manage stormwater, LID can and should address other livability issues including (from the 2005 LID Technical Manual, page 15):

- Residential road design that reduces traffic speeds and promotes walking and biking as alternative transportation methods.
- **Development at appropriate densities that meets Growth Management Act goals**, and increases access to, and connection between, public transportation modes (emphasis added).
- Subdivision layout and building design that promote interaction between neighbors and the connection to open space and recreation areas.

The Horseman's Trail/Frognal Estates development proposal incorporates these principles.

**Horseman’s Trail/Frognal Estates Proposed Stormwater Management**

Conventional stormwater management systems typical of the 1992 Ecology Manual and use of the SBUH stormwater modeling method quickly directs surface water runoff to catch basins that convey runoff via pipes to various detention systems such as ponds or vaults. From these facilities, detained water is point-discharged to original or natural drainage systems (e.g., creeks, streams, rivers, lakes, or wetlands). Conventional systems are effective at removing water quickly from developed sites; however, they alter the natural hydrology of the receiving system. Receiving water courses are fed by groundwater along an entire reach. Conventional stormwater management systems result in a reduction in recharge above the discharge point, and an increase in volumes below the discharge point.

The Horseman's Trail/Frognal Estates PRD stormwater management proposal will implement Low Impact Development (LID) techniques to provide recharge to the existing groundwater system. Consistent with the stormwater management strategies of LID, the proposal is integrated with distributed, small-scale stormwater controls that will allow stormwater to more closely mimic natural hydrologic patterns. Various techniques are proposed that will retain stormwater onsite or lengthen the “time of concentration” so as to “reduce the size of conventional facilities that control storm flows.”

Site design and management strategies to meet the flow control objectives of Ecology's Low Impact Development Technical Manual Section 1.4 include distributed and integrated management practices as follows:
- Manage stormwater as close to its origin as possible by utilizing small scale, distributed hydrologic controls.
- Create a hydrologically rough landscape that slows storm flows and increases time of concentration.
- Increase reliability of the stormwater management system by providing multiple or redundant LID flow control practices.
- Integrate stormwater controls into the development design and utilize the controls as amenities—create a multifunctional landscape.
- Reduce reliance on traditional conveyance and pond technologies.

As required for review of preliminary PRD subdivisions, a Targeted Drainage Report has been prepared for the Horseman's Trail/Frognal Estates proposal that conceptually demonstrates how LID stormwater management techniques can be implemented to reduce the size of conventional facilities that control stormwater flows (Anthony Burgess Consulting Inc., September 2013a; Draft EIS Technical Appendix A).

At the time the drainage studies for the Preliminary Plat were prepared (2005), modeling tools to evaluate the true reduction in flows from various LID techniques were poorly developed. To provide confidence that the flow control facilities would be adequate, the conventional stormwater management facilities (vaults) were sized without applying full flow control reductions that would be offered by integration of LID techniques into the stormwater management proposal. Since the early reports were created for the Preliminary Plat, stormwater management modeling tools have significantly improved. Full Engineering Plans will use the updated modeling tools as prescribed by Ecology for final engineering of the Stormwater Management System. Updated engineering and use of the more sophisticated modeling tools will certainly reduce the vault size requirements presented in the Preliminary Plat Targeted Drainage Reports, and may very well eliminate one or more vaults.

Site Assessment for Application of LID Techniques

Comprehensive inventory and assessments of on-site and adjacent off-site conditions are the initial steps to implementing LID techniques. Soils and subsurface conditions have been explored by three monitoring wells to observe groundwater conditions, and by six borings and 28 exploration pits to evaluate geologic conditions and infiltration properties. Very detailed reports on Soils and Hydrologic Patterns and Features are provided elsewhere in this Environmental Impact Statement and Technical Appendices. Significant features are summarized here to provide information on why the LID features selected and described below are proposed. Soils and Hydrology details are available in the Geotechnical Reports prepared by Associated Earth Sciences, Inc. (2005 and 2006), and by Anthony Burgess Consulting Inc. (September 2013b; Draft EIS Technical Appendix B).

Soils

In summary, the high points of the site are overlain with a Recessional Outwash on top of Vashon Till. The Vashon Till soils in parts of the higher elevation areas (outside the two main “valleys” that cross the site) vary from zero to 43 feet thick. Directly under the Vashon Till is a very sandy Advance Outwash. The Advance Outwash is at the surface in the two valleys that cross the site. The water table is approximately 50 feet (in the valleys) to 173 feet below the surface, at about elevation 240 mean sea level. The groundwater downward movement is restricted by Pre-Vashon Deposits of silty sand with silt seams under the outwash soils. This restrictive layer below the outwash soils results in lateral flow of groundwater in the advance outwash to the north toward Picnic Point Creek.
Grading

A significant amount of grading is proposed in four soil regimes.

- The 18 to 24 inches of topsoil/forest duff with a high infiltrative capacity will be saved and protected for replacement in yards and other areas to be landscaped.
- Four to six feet of weathered Lodgement Till is a silty sand and gravel with a moderate infiltration capacity.
- Zero to 43 feet of Lodgement Till is consolidated silty sand and gravel with minimal infiltrative capacity.
- Advance Outwash soils are very sandy with a high infiltration capacity.

Proper management of these soils during construction will contribute to the effectiveness of the LID techniques to be employed throughout the site. Extensive soils investigations and preliminary mapping of the soils regimes has been provided with the Preliminary Plat Application. Detailed mapping of the four soil regimes and specific management plans for those soils will be provided with detailed Engineered Construction Plans and the Full Drainage Plan submittal required by the Drainage Code (SCC 30.63A).

The topsoil/forest duff will be “stripped” carefully from the surface and protected in stockpiles for replacement to the surface of yards and landscape areas. Subgrades will be held at least 18 inches below the design grade in landscape areas to allow for replacement of this material to all non-structural surfaces. This material will provide a significant element in the stormwater management strategy by providing proper surface soils for the yards, bio-retention cells, and bio-retention swales. These soils will be distributed throughout the site and will provide initial treatment and management of runoff adjacent impervious surfaces. It will provide attenuation of flows from the rooftops in the yards and from the roads into the bio-retention swales.

After stripping the topsoil/forest duff, areas of Lodgement Till will be confirmed in comparison to the mapped areas. As excavated material, it will be replaced under impermeable surfaces such as the roads and the houses. The strong structural capacity but low infiltration capacity of the Lodgement Till will make it a good fill material beneath the impermeable surfaces. Its infiltration capacity is low and restrictive, but it still has an infiltration rate that can provide some attenuation of flows to conventional detention facilities, thus helping reduce the size of these facilities.

The Advance Outwash soils that are at the surface in places but covered by a thick blanket of Lodgement Till in other areas are the ideal type of soil for LID Techniques. Their high infiltration rates allow for removal of significant amounts of stormwater from the surface and from having to be routed through conventional detention systems. Infiltration through this layer to the deep restrictive layer also provides for long-term recharge to Picnic Point Creek. Large portions of the Horseman's Trail/Frognal Estates site will have the Lodgement Till blanket removed, exposing the Advance Outwash subgrade (to be covered with 18 inches of amended topsoil). The goal is to manage the earthwork so as to leave the Advance Outwash available for infiltration. Where these soils are excavated from the in-situ location they will be replaced in the landscape areas so as to improve the infiltration capacity of the site.

The Preliminary Plat application as submitted does propose several basic LID techniques to attenuate flows to the conventional detention systems, thus reducing the size of these facilities and maintaining a healthier hydrological environment. As a Preliminary Plat submittal, the proposal at this stage provides beyond “neat and approximate” levels of detail but it has not yet gone to the level of detailed, engineered construction plans. Thus, the conventional detention facilities proposed at the end of the treatment and flow control “train” were sized without regard to the benefits of the various LID techniques proposed.
The vaults in the proposal could manage the stormwater per conventional techniques. It is expected that the LID components will significantly reduce the size of the vaults if not remove one or two entirely.

**Offsite Wetlands and Streams**

There are no wetlands or streams onsite; however, rainwater that falls on this property and its upstream basin do have a hydrological connection mainly to Picnic Point Creek and to an off-site Category III wetland north of the west corner of the project site (see Figure 3.2-1 in Chapter 3).

Picnic Point Creek has a 1,300-acre basin with 1,000 acres upstream of the Horseman's Trail/Frognal Estates site. This 22.34-acre project area has a small but important contribution to the base flows of the Creek. In brief, clearing and development of the site will diminish evapotranspiration and increase runoff and groundwater flow.

Maximizing the use of LID techniques to infiltrate stormwater will provide an overall increase to the base flows and low summer flows to the creek and wetland. (For a complete review of potential impacts and mitigation see “Off Site Analysis Report Horseman’s Trail PRD” prepared by Anthony Burgess Consulting Inc., September 2013c; Draft EIS Technical Appendix C.) Total reliance on conventional stormwater management techniques would likely result in small increases to peak flows and decreases in low flow periods when the water is most needed.

**LID Techniques Proposed**

Contrary to conventional stormwater management techniques, Low Impact Development (LID) strategies such as those proposed within the Horseman’s Trail/Frognal Estates PRD strive to re-create the natural hydrological regime and maintain recharge along the entire reach of a receiving watercourse. The design goal of LID is to infiltrate stormwater as close as possible to the point where precipitation falls. By directing flows from adjacent impervious surfaces to bio-retention swales, runoff is exposed to the ground surface and allowed to infiltrate into the soil. To allow time for runoff to infiltrate, flows need to be attenuated so that more stormwater is exposed to the soil for infiltration for longer periods of time.

Open bio-retention swales with compost filter berms would receive runoff adjacent to roads; yards would be backfilled with engineered soils; linear community areas would be landscaped with bio-retention swales and bio-retention cells; and buried detention vaults would be located at the ends of the LID treatment flow attenuation train. The vaults will be properly sized during engineering to be performed to prepare construction plans. Representative examples of these features are illustrated on Figures 2.5.4-5 and 2.5.4-6. The overall conceptual system is illustrated on Figure 2.5.5-1 (following). As design information is accumulated, it is projected that 100 percent of stormwater runoff can be managed by LID components.

Along roads, check dams and driveway crossings of swales will reduce flow velocities and allow more time for percolation into soils. To provide treatment of runoff from roads, the soils will be engineered using organic compost mixes designed to control infiltration and to provide filtration and treatment of runoff from pollutant-generating surfaces (such as roads and driveways exposed to vehicular traffic and parking). The swales will be planted with various grasses and other vegetation that will assist in phytoremediation of hydrocarbons and metals in stormwater runoff from roads.
Bio-retention cells (engineered versions of “Rain Gardens”) are also proposed within the development, to assist in the attenuation and treatment of runoff. Bio-retention cells are essentially depressional areas designed to detain, treat, and infiltrate stormwater (see Figures 2.5.4-5 and 2.5.4-6, above). The ponded area of the bio-retention cell can detain stormwater for longer periods of time to allow for infiltration to groundwater. Bio-retention cells are typically landscape focal points in open space areas or front yards. The Horseman’s Trail/Frognal Estates PRD proposal includes several bio-retention cells as part of the stormwater management system. One will be the focal point and community gathering area in Open Space Tract 995 (see Figure 2.5.4-4), and others will be cascading pools that are focal points in other open space areas. In the final design, front yards may have small bio-retention cells added to increase stormwater infiltration, as needed.

Private yards around homes within the PRD will be integrated into the stormwater management strategy. Soils amended with compost and engineered to the Soils for Salmon (www.soilsforsalmon.org) and BMP T5.13 criteria will be used for backfill around the homes. Roof runoff, instead of being piped off to a single point of discharge, will discharge to splash blocks and be allowed to flow across the yard and infiltrate through the engineered soil mixes.

The design goal is to “…retain stormwater on-site and reduce the size of conventional facilities that control storm flows”. The proposed system will attenuate significant portions if not all stormwater and infiltrate it onsite and back to the natural the groundwater regime. If during the detailed drainage analysis that will occur during the preparation of construction plans it is calculated that the site cannot manage all runoff by infiltration, buried detention vaults/tanks have been included in the design to reserve “space” and manage un-attenuated storm flows.

Three drainage subbasins with detention vaults have been mapped on the site (see Figure 2-4 in the Targeted Drainage Report, Anthony Burgess Consulting Inc., September 2013a; Draft EIS Technical Appendix A). At the “end” of each of these three basins, vault locations have been allocated so that all runoff, including the 100-year storm event, could be detained in these structures. The vault structures proposed were preliminarily sized to detain stormwater runoff from the site without full benefit of the LID Techniques described above.

The three drainage subbasins with conventional detention are identified as:

- The South East (SE) Basin which ends in a vault in the cul-de-sac of the private road in Tract 994. This Basin will discharge managed flows into the existing conveyance infrastructure on 58th Place West. This flow is conveyed down Picnic Point Road and will discharge to Picnic Point Creek at the stormwater management facilities for Regatta Estates. The flows from this site are the existing upstream flows to Regatta Estates.

- The North East (NE) Basin which is near the entry to Horseman’s Trail/Frognal Estates on 58th Place West just above Picnic Point Road. This basin discharges managed flows into the Picnic Point Conveyance and discharges to the same location as the SE Basin.

- The West Basin is at the far west side of the Horseman's Trail/Frognal Estates site. While it is the largest basin, this basin also has the highest potential for fully infiltrating stormwater without need of a vault. If needed, the vault would discharge managed flows into the far west valley into what is proposed as a series of lined infiltration beds behind check dams. If there is an extreme condition that would not allow full infiltration of the discharge, it would flow toward the property northwest corner of the site. This flow will be dispersed to a level spreader 20 feet from the property line above the offsite wetland (see Figure 2.5.5-2).
Outwash Surface Soils from surface to 70' deep.

Channel Side Slope per topography

Organic Soils check dam, Channel lining (erosion fabric)

Check Dams reduce velocity & energy, cause effective slope à 1%

Organic Soils & material reclaimed from channel.

Typ Check Dam Berm 1' to 1.5' tall

Line channel bottom & side slopes with permanent turf reinforcement such as North American Green SC-250 or equivalent stabilizing fabric.

Check dams reduce velocity & energy to create HIIHFWLYHVORSH§

See Detail 34

Profile follows C/L of channel, based on tracing LIDAR topography.

Proposed Bubble up from detention vault

Proposed Bubble up, Typ Check Dam Berm 1' to 1.5' tall

Pedestrian Trail

Check dam (typ) per Detail 34

Line Channel & Check Dam with North American Green Vmax SC-250 (or equiv)

Outwash Surface Soils from surface to 70' deep.

Spacing 15' typ.

15'-18' typ.

Proposed Bubble up from detention vault

Figure 2.5.5-2
West Basin
Proposed Stormwater Management System
Horsemans Trail

BLM 5-123050-SD

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MAKING A "WAY" OUT OF "NO WAY"
There are two additional smaller on-site sub-basins identified as the North Basin and the East Basin. These basins are comprised of some rooftops and yards. By analysis in the Targeted Drainage Studies, these flows are expected to be managed by downspout dispersion and the eighteen inches of amended soils in the yards. The Engineering Full Drainage Design for Construction Plans will make any adjustments that may be needed to this Preliminary Plat design.

Downstream drainage has, especially at Picnic Point Creek, been described in the “Off Site Analysis Report Horseman’s Trail PRD” prepared by Anthony Burgess (September 2013c; Draft EIS Technical Appendix C).

Future Drainage Improvements

The Horseman’s Trail/Frognal Estates application was submitted and vested in August 2005. The LID Technical Manual had just been released in January of 2005, and Ecology's 2005 Stormwater Management Manual for Western Washington (SWMM) had just been released in February of that year. The Western Washington Hydraulic Modeling (WWHM) software that was required for use by the 2005 Manual was excellent for modeling conventional stormwater systems but had not yet developed “tools” that effectively modeled LID Techniques and their benefit to conventional detention.

During the same time period, Snohomish County still used Ecology's 1992 Manual that allowed SBUH modeling. The County allowed use of the updated manual and modeling methods by waiver to the Ecology 2005 Manual, consistent with the waiver or modification procedure allowed in SCC 30.63A.

Since submittal of this application in August 2005, there have been many upgrades to the WWHM software and it now has many modeling tools for LID techniques. In addition, other LID techniques have gained acceptance that were not used in the original application.

Upgrades to the WWHM software will provide some of the most significant opportunities to more accurately model the benefits of the proposed LID Techniques to reduce the size of the conventional detention systems. Engineering for construction plans will employ the use of software that was not available at the time of the August 2005 application.

Many basic LID techniques were proposed at the time of the initial application that were commonly accepted. One LID technique not then proposed but that has since gained acceptance is the use of permeable concrete for paving on roads and driveways. These products were not proposed at the time of the 2005 application but will be another tool that can be used in the treatment and flow control train to reduce the need for conventional detention. Use of permeable concrete within the Horseman's Trail/Frognal Estates development will be analyzed during final engineering for construction plans.

As a Peer Reviewer for Snohomish County, Anthony Burgess Consulting had a considerable amount of additional boring and soil exploration work done to better analyze the site hydrology. Through this additional work and analysis, it was shown that in the West Basin and the North East Basin, the vaults would be sitting on Advance Outwash soils. It was recommended that instead of conventional detention vaults that infiltration “vaults” or infiltration galleries be analyzed during final engineering for the construction plans.
**Maintenance**

Primary maintenance of the stormwater management system will be the responsibility of each homeowner on each lot, and the responsibility of the Homeowners’ Association for all facilities in common areas or easements. To assure compliance, a Maintenance Covenant will be recorded with the Final Plat (per SCC 30.63A.350). This covenant will include right-of-entry for inspection by the County. The County may issue a notice based on determinations that maintenance and/or repairs are necessary. Such notices would specify a reasonable timeframe in which individual lot owners or the Homeowners’ Association would be required to comply. If required maintenance is not performed within the specified timeframe, the County will contact the HOA to inform them that the maintenance will be performed, and that the expense of the maintenance costs will be their responsibility to pay.

Details of the stormwater management concept are provided in the plans and reports that were submitted with the PRD proposal.

**2.5.5.2 Water Supply and Distribution**

Alderwood Water and Wastewater District (AWWD) is the water supply purveyor within the project area. There are two existing 8-inch ductile iron pipe stubs extended to the Horseman’s Trail/Frognal Estates property line. The District has confirmed to the applicant that capacity is available to serve the proposed development.

Water supply will have three points of connection to off-site sources: one at the existing dead-end of 60th Avenue W; the second at the existing street-end at 58th Place W; and the third to be a new connection in 58th Place W southerly of the intersection with 136th Place SW. The third segment will extend along the private road in Tract 994 and out the cul de sac across an easement through Lot 74 of Regatta Estates (see Figure 2.5.5-3).

**2.5.5.3 Sewage Collection, Treatment and Disposal**

Alderwood Water and Wastewater District (AWWD) is also the purveyor of the wastewater collection, treatment, and disposal system within the project area. A sewer conveyance line crosses through the Horseman’s Trail/Frognal Estates site to Regatta Estates and Picnic Point Road on the 60th Avenue W alignment in an unopened right-of-way, with an easement to the Water and Wastewater District. The property also has access to the sewer main on Picnic Point Road via a recorded road and utility easement west of 61st Avenue W and Picnic Point Road. This road alignment is mapped as Richards Road (see Draft EIS Section 2.4.7.4). The pre-construction concept design has three sewage collection system segments (see Figure 2.5.5-4):

- **Segment 1** will be an extension from the stub at the end of 58th Place W in Regatta Estates. This segment is 490 feet long, and will add two manholes. All of the alignment will be in the road right-of-way. It will serve Lots 1 through 9.

- **Segment 2** will be an extension from Picnic Point Road up the Richards Road alignment west of 61st Avenue W. This segment will tie into the sewer main near the northeast corner of the Alderwood Water and Wastewater District sewage treatment plant. The first 350 feet will be offsite across undeveloped land to the north boundary of the Horseman’s Trail/Frognal Estates property. It will continue north through another 110 feet of proposed open space area onsite, in part of a trail system between Lots 23 and 24, and into the paved area of 58th Place W. This off-road/offsite segment may be conveyed in welded polyethylene pipe laid along the terrain to minimize disturbance of open space areas.
5 ft Recreation Path not for sidewalk replacement (Typ.)

Existing 8-inch Main Connect For New Loop

Existing 8-inch Stub Connect For Loop

Existing W/ New 8-inch Loop

Figure 2.5.5-3
Points Of Connection To Existing Water Mains
	Horseman’s Trail
SEGMENT 2

5 ft Recreation Path not for sidewalk replacement (Typ.)

Existing Sewer Main

Private Utility Access Easement (1920)

PICNIC PARK ROAD

RICHARDS ROAD

Existing Manhole

Segment 3
"Re-alignment"

Segment 4

Begin Segment 1

Figure 2.5.5-4
Points Of Connection To Existing Sewer System
Horseman's Trail
At the manhole in 58th Place W\textsuperscript{27}, the sewer main will be extended to the east approximately 1,000 feet to service Lots 10 to 23 (and Lots 35 to 47). Another leg will follow 58th Place W approximately 390 feet toward the west and north to the intersection with 60th Avenue W. At the intersection with 58th Place W and 60th Avenue W, the main extends east approximately 770 feet and west 120 feet. These last legs serve will serve up to Lot 85.

- Segment 3 includes re-alignment of the existing sewer main that extends through the Horseman’s Trail/Frognal Estates site from the end of 60th Avenue W to Regatta Estates. The existing home on the corner of 136th Place and 60th Avenue W was built too close to the right-of-way. To accommodate this misplacement, the proposed alignment of the extension of 60th Avenue W curves to the east. This portion of the existing sewer main will be moved to the new road alignment. From the re-aligned sewer main, another leg will be extended along the private road in Tract 994. The existing main in 60th Avenue W, the re-aligned main along 60th, and the leg through Tract 994, will serve Lots 86 to 112.

Certificates of Water and Sewer availability were issued by the Alderwood Water and Wastewater District (AWWD) in August 2005. The certificates are valid for a one-year period, and have been renewed as the Horseman’s Trail/Frognal Estates project time-frame has been extended. The current AWWD Certificate of Water and Sewer Availability for 2009 is Certificate Number 08A0029. A renewal to extend approvals to April of 2010 is pending.

The new Picnic Point Wastewater Treatment Plant serves the northwestern portion of the district and has the capacity to treat 6.9 million gallons per day (mgd) of wet weather flows. Completion of this treatment plant resulted in lifting a moratorium on sewer hookups in the Picnic Point area effective April 4, 2011.

2.5.5.4 \textit{Electricity, Natural Gas, Cable Television and Telecommunications}

Natural gas, electricity, cable television and telecommunications services will also be provided to the Horseman’s Trail/Frognal Estates portions of Sectors 22 and 23 through extension of these utilities from the adjacent plat of Regatta Estates and 60th Avenue W.

The Snohomish County Public Utility District provides electrical service within the project area. Puget Sound Energy would provide natural gas to the site.

2.6 \textbf{Alternatives Considered and Eliminated}

Numerous alternative site planning options were considered for the Horseman’s Trail/Frognal Estates site prior to the applicant selecting the PRD proposal as preferred:

- Traditional Lot-by-Lot Development: 8,400 and 9,600 square foot lots
- Lot Size Averaging (LSA) per Snohomish County Code (SCC) 30.23.210
- Multi-Family development concept within the Reduced Drainage Discharge Demonstration Program (RDDDP) per SCC 30.34B.

\textsuperscript{27} A determination may be made by Snohomish County during the development approval process to change some of the street names indicated on the preliminary plat of Horseman’s Trail. For example, 58th Place W may be renamed 134th Place W, and 60th Avenue W may be renamed 135th Place W due to the east/west alignment of these streets.
The Lot-by-Lot method was originally given considerable effort prior to adoption of the Growth Management Act, but never could be made to work overall on the site due to significant topographical variation. The cost of Traditional Lot-by-Lot Development and the impacts of site development in this manner would be similar to the proposal, though it would provide considerably fewer homesites. For these reasons, these two alternatives were eliminated from further evaluation. The relationship of these site planning methods to the objectives of the proposal (listed in Draft EIS Section 2.2) is discussed below. The viable Multi-Family Alternative is discussed in more detail in Draft EIS Section 2.7 (below).

2.6.1 Traditional Lot-by-Lot Development

A Traditional Lot-by-Lot subdivision would be least effective at meeting the objectives of the proposal listed above. It would result in the least residential density, unlikely to achieve even 4 lots per acre consistent with zoning and SCC 30.23.020. Theoretical yields would provide about 80 lots, but maximum yields based on terrain and Code would not exceed 60 lots. Practical yields were closer to 40 lots, which would not meet the objectives of the proposal for economic viability. Road construction and connectivity requirements to build 40 or 60 lots would be equal to or greater than any of the other alternatives considered. Traditional Lot-by-Lot Development would also rely on detention ponds and vaults for stormwater management, not readily lending itself to Low Impact Development (i.e., low-impact drainage design), due primarily to Snohomish County EDDS requirements. Clearing and grading requirements for building access and circulation requirements would be similar to the PRD proposal. No protected open space would be provided within the Traditional Lot-by-Lot Development concept, and logging/clearing practices would clear ground to the extent of parcel boundaries. Without open space, pedestrian circulation, and community gathering areas, the “sense of community” would be minimal with this alternative, failing to meet this objective as well.

2.6.2 Lot Size Averaging

The Lot Size Averaging planning method would allow higher yields than Traditional Lot-by-Lot Development, as smaller lots (down to 3,000 square feet) could be designed into the constructible areas of the site using “credit” from open space areas toward density. Maximum density would be subject to the “Density for Sloping Land” requirements in SCC 30.41A.250. The theoretical maximum would allow for 105 lots; however, with reduction requirements due to sloping land and terrain, yields would be reduced to fewer than 55 lots, which would not meet the economic viability objective of the proposal. Clearing, grading, and circulation requirements would be approximately the same as for the Traditional Lot-by-Lot planning method. The Lot Size Averaging alternative with smaller lots and greater open space requirements, would provide better buffering to adjacent homes than the Traditional Lot-by-Lot Alternative; however, without amenities such as trails, open space parks, and community gathering areas the “sense of community” would be low, thereby failing to meet this objective of the proposal.

2.7 Multi-Family Alternative

The Multi-Family Alternative was pursued intensely in 2002–2003, with application and acceptance into the Reduced Drainage Discharge Demonstration Program (RDDDP). This alternative was set aside when agencies delayed support on the variance to the Snohomish County General Policy Plan (GPP) for Multi-Family structures in single-family neighborhoods. It is, however, still the most viable alternative. Some site plan modifications would be required to fully address road circulation and emergency access requirements, overall site grading and Low Impact Development (LID) techniques if this alternative were selected for implementation.  

28 On April 9, 2009, Snohomish County Planning and Development Services (PDS) issued a Code interpretation pursuant to Snohomish County Code (SCC) 30.83.010 advising that “... under Chapter 30.63C SCC, the director of
This alternative would achieve most of the objectives of the proposed action to a greater extent than either the Traditional Lot-by-Lot or Lot Size Averaging planning methods described in Section 2.6, above. With 112 dwelling units, the Multi-Family Alternative would meet the density requirements of GMA. It would be challenging, however, to achieve the parameters of the Snohomish County GPP, SCC, and EDDS. Multi-family units within a single-family zone would not be in compliance with either the GPP or SCC, and access in a manner that would minimize environmental impacts (to meet Snohomish County EDDS requirements) had not yet been achieved with the Multi-Family site plan. Since there appeared to be significant overall benefits to this alternative, the proponent applied to have it included in the Reduced Drainage Discharge Demonstration Program where criteria per SCC and EDDS could be made more flexible if the project could demonstrate significant benefits to the environment, and could improve stormwater management by reducing or eliminating drainage discharges at point locations. The project was accepted into the RDDDP, but was stalled in the GPP variance process to allow Multi-Family structures within single-family zones. The proponent initiated review of other site development alternatives in 2004, and proceeded to identify the Planned Residential Development (PRD) approach as the preferred alternative.

Under Chapter 30.63C SCC, the Director of PDS may modify the bulk and PRD regulations in Chapters 30.23 and 30.42B SCC in order to allow the use of low impact development to meet the requirements of Chapter 30.63A SCC when a proposal meets the LID modification criteria in SCC 30.63C.040(2). The proposed reasonable alternative is a four-plex PRD design using LID techniques and best management practices.

The Multi-Family Alternative is evaluated in this Draft Environmental Impact Statement as a reasonable alternative that would meet most of the objectives of the proposal but at a lower environmental cost, in accordance with WAC 197-11-440(5)(b). Implementation of the Multi-Family Alternative would have less significant clearing requirements, grading quantities, impervious areas and drainage discharges with innovative stormwater management (SWM) measures. Road circulation and emergency access shown on the Multi-Family Alternative site plan (Figure 2.7-1) is not totally resolved for compliance with Snohomish County standards. The Multi-Family Alternative is less consistent with the financial objectives of the proposed action in that the market for 4-plex units is not currently as viable as the market for single-family detached homes such as those in the Proposed Action (Horseman’s Trail/Frognal Estates PRD). Also, while the Multi-Family plan would provide substantial elements and amenities for developing a “sense of community,” the 4-plex units may be considered less compatible than the PRD proposal with single-family detached homes in the surrounding neighborhood.
2.7.1 Description of the Multi-Family Alternative Site Plan

The Multi-Family Alternative site plan (Figure 2.7-1) consists of 112 condominium units in 28 buildings with small individual yards. While these yard areas would technically be common area, they would have individual maintenance covenants and easements associated with them. The buildings would be three and four stories (50 to 60 feet) in height, with parking garages on the lower level providing eight underground parking spaces per building. The architectural concept for this alternative would keep roof slopes to two or three pitches, with dwellings designed to achieve a sense of aesthetic harmony on the site. Some variety in unit design, layout and size within the unit types could be considered. A condominium association would be responsible for maintaining common areas.

The site plan for the Multi-Family Alternative shows a series of walkways linking all areas of the site with adjacent development. These walkways would provide a safe and convenient connection to the existing elementary school southeast of the site. These paths could be constructed with a permeable surface (rather than concrete sidewalks), for compatibility with the character of the development, integrated with the surrounding forest, and to encourage infiltration.

2.7.2 Roadways, Circulation, and Parking

The Multi-Family Alternative development concept includes a single 25-foot wide access road from an extension of 58th Place W, through the developed plat of Regatta Estates. The street network in this alternative is a 1,800-foot long, dead-end street extending to the west portion of the project (see Figure 2.7-1). This roadway would require a deviation from the Snohomish County Engineering Design and Development Standards (EDDS), since this dead-end roadway would serve 112 units. The EDDS limit dead-end roads to serving no more than 25 dwelling units. This access road would not provide a connection to 60th Avenue W, as required by the Snohomish County policy of road connectivity (providing through-road connections whenever possible in new developments). This roadway system would also require deviations from EDDS for steepness, width, the absence of on-street parking, and horizontal curvature. The conceptual site plan shows a walkway system of 5-foot wide pathways, separated from the access roadway. Approximately 49 guest parking areas are shown perpendicular to the project roadway.

2.7.3 Open Space

The Multi-Family Alternative development concept includes a common open space system comprised of approximately 579,600 square feet of undisturbed open space, 87,674 square feet of lawn and landscaping, and 32,460 square feet of restored open space, for a total open space system of approximately 699,814 square feet (16.06 acres). The conceptual site plan (Figure 2.7-1) shows the pedestrian pathway traversing the open space area adjacent to the condominium units. In addition, development under this alternative would include approximately 44,888 square feet of private lawn and landscaping. Project amenities identified in the Multi-Family Alternative include: a playground area, a barbeque area, a community garden area and a gazebo and picnic area.

2.7.4 Clearing and Grading

A conceptual grading plan was prepared but not finalized for the Multi-Family Alternative. The conceptual plan showed that approximately 8.6 acres (375,370 sf) of the site would be cleared to implement this alternative. Grading requirements would include approximately 75,000 cubic yards (cy) of bank excavation; 39,000 compact cy of embankment fill; and 36,000 cy (64,800 tons) of export/import material, requiring approximately 2,160 truck trips to/from the site during the earthwork phase (see Table 2.7-1).
Because the grading plan was never completed for the Multi-Family Alternative, the comparison between the earthwork requirements of this alternative and the PRD single-family detached home proposal is approximate only. There were some unresolved problems (e.g., driveway/garage access) that likely would have increased clearing and grading requirements over those indicated by the conceptual site plan. These are described in Draft EIS Subsection 2.7.2, above.

Table 2.7-1. Horseman’s Trail/Frognal Estates PRD proposal/Multi-Family Alternative approximate comparison (Land Technologies, March 2008).

<table>
<thead>
<tr>
<th>Project Elements</th>
<th>PRD: Single-Family Homes</th>
<th>Multi-Family Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building/Planning</td>
<td>Single-family fee simple</td>
<td>4-plex condominium units</td>
</tr>
<tr>
<td>Number of Dwelling Units</td>
<td>112</td>
<td>112</td>
</tr>
<tr>
<td>Road System</td>
<td>Public/private 28-ft residential streets</td>
<td>25-ft private access aisle</td>
</tr>
<tr>
<td>Length of road</td>
<td>3,713 feet, total length</td>
<td>1,450 ft to last units; 1,300 ft to turning circle</td>
</tr>
<tr>
<td>Paved area</td>
<td>109,598 sf$^{29}$</td>
<td>72,225 square feet</td>
</tr>
<tr>
<td>Connectivity</td>
<td>Two: 58th Pl to 60th Ave W</td>
<td>None, one access from 58th Place</td>
</tr>
<tr>
<td>Emergency access</td>
<td>Two access points (above)</td>
<td>One access from Picnic Pt Road</td>
</tr>
<tr>
<td>Parking</td>
<td>Residents: 224 spaces: 8 per 4-plex</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Guests: 112 on-street, 224 in driveways</td>
<td>49 pull-in stalls</td>
</tr>
<tr>
<td>Earthwork</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Site Area</td>
<td>22.34 ac (973,020 sf)</td>
<td>22.34 ac (973,020 sf)</td>
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<tr>
<td>Area to be cleared</td>
<td>17.2 ac (748,200 sf)</td>
<td>8.6 ac (375,370 sf)</td>
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<td>Grading</td>
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<tr>
<td>Excavation</td>
<td>275,000 cubic yards (cy)</td>
<td>75,000 cy</td>
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<tr>
<td>Embankment</td>
<td>275,000 cy</td>
<td>39,000 cy</td>
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<tr>
<td>Export/import subgrade</td>
<td>0</td>
<td>36,000 cy (2,160 truck trips)</td>
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<td>Vegetation Removal</td>
<td>17.2 acres</td>
<td>8.6 acres</td>
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<tr>
<td>Number of Trees Removed</td>
<td>Approximately 450 trees</td>
<td>Approximately 215 trees</td>
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<td>Tree Retention</td>
<td>Approximately 100 trees</td>
<td>Approximately 340 trees</td>
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<td>Tree Replacement</td>
<td>Approximately 1,204 trees</td>
<td>Approximately 500 trees</td>
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<tr>
<td>Stormwater Management</td>
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<td></td>
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<tr>
<td>Pollutant-generating surface$^{1}$</td>
<td>184,058 sf</td>
<td>72,225 sf</td>
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<tr>
<td>Roof tops (conventional)</td>
<td>179,200 sf$^{2}$ (1,600 x 112)</td>
<td>77,540 sf</td>
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<td>Landscaped areas</td>
<td>409,659 sf (9.4 acres)</td>
<td>135,940 sf (3.12 acres)</td>
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<td>Roofgardens (lawn over bldgs)</td>
<td>0</td>
<td>48,430 sf</td>
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<tr>
<td>Forested</td>
<td>222,278 sf (5.1 acres)</td>
<td>597,650 sf (13.72 ac)</td>
</tr>
<tr>
<td>Swales and raingardens</td>
<td>16,123 sf</td>
<td>0</td>
</tr>
</tbody>
</table>

1 Pollutant-generating surfaces are paved surfaces (like roads and parking areas) used by vehicles.

2 Actual area per conceptual plan for buildings is 145,817 sf; maximum roof top area included in table.

29 "Paved area" is the combined area of paved surfaces proposed on public roads and private roads within the development under each alternative.
2.7.5 Stormwater Management

The Multi-Family Alternative could be considered to meet the residential density goals of the Growth Management Act (GMA) while minimizing clearing and grading on the site by minimizing the introduction of impervious surface areas. This could be accomplished by condensing rooftops into multi-family (i.e., common-wall) units, and using the Parking Lot access code. These benefits would not be without trade-offs, however. For example, four-plex units could be considered out of place in this traditional single-family home neighborhood, and the driveway access to units shown on the Figure 2.7-1 site plan would either require more clearing and grading, or a Snohomish County Engineering Development Design Standards (EDDS) deviation to achieve the County’s connectivity and emergency vehicle access requirements (see Draft EIS Subsection 2.7.2).

Less overall clearing and impervious surface creation would be the primary benefits of this alternative. Even with the significant reduction in these forms of impact compared to the PRD proposal, the increase in the rate of stormwater runoff would have to be managed. Approximately 77,540 sf of rooftop and 72,225 sf of pavement would replace forested cover. Landscaped areas (an additional 185,000 sf of site area) would also contribute to an increased rate of runoff compared to the undeveloped condition of the site.

To manage the increased rate of runoff, paved-area runoff would be directed through a water quality treatment system before being conveyed into infiltration systems that would convey runoff through the impervious layers of soil on the site to the deeper layers of sandy outwash soils. Rooftop and landscaped area runoff would also be conveyed to these infiltration systems.

The site was analyzed by hydrogeologists for the feasibility of this stormwater management concept and to provide design guidance on the infiltration systems. The site is underlain with a very sandy glacial outwash, covered by a blanket of condensed glacial till. This blanket varies in thickness from 0 to 40 feet. The thickest blanket of condensed till soils occur on the “plateau” where building sites are shown on the conceptual site plan for the Multi-Family Alternative. The outwash is nearest the surface in the two larger valleys that cross the site (see Figure 2.7-1).

A formal drainage analysis and design was not completed for the Multi-Family Alternative; however, to minimize grading and stormwater recharge the groundwater system, injection wells were contemplated. To disperse flows, several injection wells would be installed around the site, to receive runoff water from catchments around developed areas. By specifying clean rooftop construction materials, this water could be directly injected into the ground without treatment. Runoff from pollutant-generating surfaces such as the drive aisles would require significant levels of water quality treatment prior to subsurface injection.

Use of rain-gardens and bio-retention cells in landscape areas would improve the functionality of the stormwater injection system. These features would provide the required treatment, and would attenuate flows prior to injection.

There are various ways to construct injection wells, but the primary system considered in 2002 when the Multi-Family Alternative was proposed was simply a deep boring through the glacial till, backfilled with clean rock around a perforated casing. With the better understanding of site geology now available as a result of additional geotechnical investigations performed for the PRD proposal, open swale conveyance to outwash sands near the surface would be more practical. This would require conveyance to

30 If injection wells are proposed, they would require independent review and permitting by the Washington Department of Ecology.
the valleys that would also result in concentrations of groundwater recharge from a broad area of the site to specific areas of the site. To properly disperse runoff, “injection” would still require several well sites distributed throughout developed areas of the site.

The Multi-Family Alternative would require less clearing than the PRD proposal, and would introduce less impervious surface area that would generate less runoff for stormwater management (see Table 2.7-1). The Reduced Drainage Discharge Demonstration Program, however, would create more of a point-discharge design with conveyance to specific injection well-points. The more numerous the well-points, the better the distribution recharge to the groundwater system. Too few well points could create groundwater mounding issues.

The Targeted Drainage Plan submitted with the Multi-Family Alternative depicted stormwater collection and water quality treatment facilities utilizing stormwater runoff infiltration systems. The total estimated amount of pollutant-generating impervious surface (i.e., paved area used by vehicles) would be approximately 72,225 square feet (sf). Other stormwater management considerations include approximately 77,540 sf of conventional rooftops; 135,940 sf of landscaped area; approximately 48,430 sf in roof gardens (likely lawn over buildings); and approximately 597,650 sf (13.72 acres) to remain (or be replanted) as forest cover (see Table 2.7-1).

2.7.6 Public Sewer and Water Service

As with the PRD proposal, public sewer and water service would be provided to the Horseman’s Trail/Frognal Estates portions of Sectors 22 and 23 through extension of existing water and sewer lines within the adjacent plat of Regatta Estates and 60th Avenue W through the Multi-Family condominium site.

2.7.7 Electricity, Natural Gas, Cable Television, and Telecommunications

Again, similar to the PRD proposal, electricity, natural gas, cable television, and telecommunications services would be provided to the Horseman’s Trail/Frognal Estates portions of Sectors 22 and 23 through extension of these utilities from the adjacent plat of Regatta Estates and 60th Avenue W.

2.7.8 Resident Population

An analysis of multi-family condominium projects in Snohomish County indicated an average per-unit population of such units of 2.2 persons. Most of the units were one- or two-bedroom units. The Horseman’s Trail/Frognal Estates Multi-Family Alternative consists of large 3-bedroom units. Discussions with Snohomish County Planning and Development Services demographics staff indicates that these larger units would be more characteristic of single-family detached units; therefore, a per-unit population of 2.9 has been used to estimate project population for this alternative (personal communication with Steve Toy, Snohomish County PDS, February 28, 2008). With 112 dwelling units, the project would generate a total resident population of approximately 325 persons, comparable to the PRD proposal. It was anticipated that these same units would generate school-aged students in the same approximate proportion as single-family detached homes: 0.239 elementary school-aged children, 0.123 middle school students, and 0.147 high school students per unit, for a total of approximately 58 students: 27 elementary, 14 middle school, and 17 high school students.
2.7.9 Schools

As with the PRD proposal, students that would reside within the Multi-Family Alternative would be served by the Mukilteo School District. It is anticipated that students from the development would attend Picnic Point Elementary School, Harbour Pointe Middle School, and Kamiak High School. The projected 27 elementary school students would be within walking distance of the school. The anticipated 14 middle school and 17 high school students would require school bus transportation from a bus stop on 140th Street SW at 60th Avenue W. The Transportation Demand Management Plan prepared for the project described a safe pedestrian system throughout the development (Land Technologies (December 2006).

2.7.10 Reason for Not Selecting the Multi-Family Alternative

The Multi-Family Alternative site plan was developed under the Snohomish County Reduced Drainage Discharge Demonstration Program (RDDDP) in 2002. Under the RDDDP, County staff worked with the County Council to obtain approval for the use of this multi-family proposal within the single-family zone, while still maintaining the density limits of the single-family zone. This authorization for multiple-family use was never acted upon by the County Council. At the same time, the applicant's design team was having difficulty with roadway and grading designs to arrive at a multi-family layout that functioned well with the site topography. These are the predominant reasons why a more flexible single-family detached home design within the PRD Proposal was selected by the applicant as preferred.

2.8 No Action Alternative

Under the No Action Alternative, there would be no development on the Horseman’s Trail/Frognal Estates site at this time. Thus, there would be no clearing or grading, no stormwater management system, no extension of utilities, no home construction, and no resident population on the site in the foreseeable future. There would be no new trip generation associated with the site, and no change in public service requirements to serve the property.

Existing County zoning and Harbour Pointe Master Plan land use regulations that apply to portions of the Horseman’s Trail/Frognal Estates site specify that the property shall be developed for residential use. Therefore, it can be anticipated that there would likely be a future application for site development, as this assemblage of parcels is one of the last remaining areas of vacant land for residential development that could be used to partially serve the Snohomish County population and housing growth projections for the current 20-year planning period.

Under the No Action Alternative, Frognal Holdings, L.L.C. would have the discretion to decide whether to maintain ownership of the property, or delay and reapply for development at some future time. The property could also be sold to others for development. In the event of further delay with regard to the residential development proposal, Frognal Holdings, L.L.C. (or some subsequent owner) could decide to pursue a Forest Practices permit to log the site, to generate an income to manage the carrying costs of the property (taxes, assessments, maintenance). It is assumed for the purpose of this environmental review that the property would temporarily remain undeveloped and unaltered with the No Action Alternative.

2.9 Comparison of the Environmental Impacts of the Alternatives

Table 1.7-1 in Draft EIS Chapter 1 compares the potential developed-condition impacts of the PRD proposal and the Multi-Family Alternative. Either of these site plan alternatives would basically implement the principle features of the proposed Master Planned Community, as described above in Section 2.5. Where it is possible to estimate quantitative differences between the alternatives, to
determine which would have greater or lesser impacts, these quantitative comparisons are made in Table 1.7-1.

More descriptive presentations of the potential impacts of proposed development, and mitigation measures to avoid or minimize these impacts, are provided in Table 1.6-1 in Draft EIS Chapter 1 (Summary), and throughout Chapter 3. Readers are referred to those locations in the document for a more comprehensive context regarding the comparative impacts summarized below.

2.10 Benefits and Disadvantages of Reserving Project Implementation for Some Future Time

The SEPA Guidelines encourage applicants and permitting agencies to view each generation as a trustee for succeeding generations. With this perspective, environmental review is encouraged to consider whether approving a proposal at this time would foreclose future options (WAC 197-11-440[5][c][vii]).

In the short-term, leaving the Horseman’s Trail/Frognal Estates assemblage of parcels undeveloped until some future time would effectively result in implementing the No Action Alternative. The No Action Alternative is described in Section 2.8, above, and addressed throughout Draft EIS Chapter 3 in the context of each element and subelement of the environment evaluated in this EIS. Perceived benefits of leaving the Horseman’s Trail/Frognal Estates property undeveloped may include: no change in the forest cover and existing topography of the site; no alteration of surface water or groundwater quantity, quality or flow; no resident population or traffic increase attributable to this site; and no change in public service and utility requirements to serve the property.

The primary disadvantage of reserving project implementation to some future time would be the fact that the Horseman’s Trail/Frognal Estates site is within the County’s Urban Growth Area, and it is currently factored into the County’s Buildable Lands analysis (Snohomish County Council, October 31, 2007) that helps identify whether the County can provide for the anticipated urban growth the County is required to accommodate over the current 20-year planning horizon. If this property were unavailable for development in the long-term, the County would not be able to accommodate the amount of urban growth allocated to the unincorporated area by the Washington State Office of Financial Management. In the short term, a disadvantage of not proceeding with development approvals at this time would be a shortage of lots available for residential development when there is recovery from the current economic downturn.

The Horseman’s Trail/Frognal Estates owner/applicant has been engaged in site planning for beneficial use of the property since 2001, and in environmental review since 2005. A good-faith effort has been made to comply with all Snohomish County requirements to be allowed to proceed with site development in accordance with applicable land use regulations for the property. Significant expense for these services as well as interest expense on the land has been incurred by the owner during a period of local, national and international economic hardship. It could be an untenable disadvantage to the owner/applicant if a decision were made to reserve project implementation for some future time. In the event of further delay in processing the application for residential development of the site, the property owner may apply for a Forest Practices permit to log the site to generate an income to manage the carrying costs of the land (taxes, assessments, maintenance).

Site development at a later time, by a different applicant, and/or within a different jurisdiction (e.g., if the City of Mukilteo were to annex the area that includes the property) might differ in character and amenities.
3. Affected Environment, Potential Impacts, and Mitigation Measures

3.1 Earth

This section describes the geographic and geologic setting of the Horseman’s Trail/Frognal Estates site, and significant processes related to Earth elements that are to be considered. Studies that have been performed include a review of available reports and data from Federal and State agencies, and site-specific investigation of subsurface conditions by test pits and borings. It is concluded that there will be impacts to existing topography from the grading proposal. Normal design and construction standards will minimize potential impacts associated with erosion. The risk of impact from earthquakes is considered low.

3.1.1 Topography

Affected Environment

The Horseman’s Trail/Frognal Estates site consists of 22.34 acres in Township 28N Range 4E Sections 32 and 33, in Snohomish County. The site is on the south side of the Picnic Point Creek valley with elevations ranging between 270 feet and 460 feet msl. The central and southern portions of the site are relatively flat-lying, with elevations above about 400 feet msl. The northern portion of the site occupies the valley side. The site is incised by two dry ravines running south to north. Areas south of the site and to the north of the eastern portion of the northern boundary have been developed with single-family residences. The remaining areas adjacent to the site are currently undeveloped.Existing topography is shown on Figure 3.1-1.

Potential Impacts During Construction

Proposed Action

Because of the significant topographic variation across the site, the development will be terraced with retaining walls in order to achieve GMA residential density goals. Recontouring approximately 17.2 acres of the site for the Proposed Action (the PRD proposal) would be required in order to develop grades suitable for housing, utilities and road construction. Approximate topography following regrading is shown on Figure 3.1-2. Grading activities would involve excavation in the central and southern areas to provide fill for the east and west ravines. Overall, the site would be graded to step down from the south to the north in a series of terraces. Limited quantities of construction material are not available on site; for example, drain rock and compost for soil amendment. Import of material from off-site could result in indirect impacts, such as changes in topography at source borrow pits.

Multi-Family Development Alternative

The site recontouring requirements of the Multi-Family Development Alternative would be similar to those described for the Proposed Action. However, since clearing and grading would not be as extensive with this alternative (approximately 8.6 acres), impacts would be less. More of the existing topography would be retained. Although some filling of the ravines would also be required with this site development alternative, there would be no filling near the head of the west ravine.
Figure 3.1-1
Existing Site Topography
Horseman's Trail PRD

Figure 3.1-2
Developed Site Topography: Proposed Action
No Action Alternative

No clearing or grading would be performed on the site under the No Action Alternative; therefore, there would be no alterations to existing site topography.

POTENTIAL DEVELOPED-CONDITION IMPACTS

Proposed Action

Following construction, only minor additional regrading activities would occur; for example, associated with placement and/or redistribution of topsoil for plantings.

If import of specialized material, for example landscape rock, is required, it would result in changes to the topography at the source quarry – an indirect impact of the proposed action. Quarries are regulated by their own site-specific permits.

Multi-Family Development Alternative

Potential impacts to topography in the developed condition of the Multi-Family Alternative would be minor and similar to the Proposed Action.

No Action Alternative

There would be no developed-condition impacts to the existing topography of the site with the No Action Alternative.

MITIGATION MEASURES

Incorporated Plan Features. During final design, global stability analyses will be included to demonstrate that retaining systems and fill prisms are stable. All slopes that will not be retained will be constructed as engineered cut or fill slopes that do not exceed 2H:1V. In addition, these slopes will be protected by erosion control measures until vegetation growth has been re-established. Slopes that will not be graded to a new configuration will be designated as Native Growth Protection Areas (NGPAs). Specific wall construction techniques and wall types will be specified at the time of final design and construction plan preparation, prior to submittal of the Land Disturbing Activity Permit application. Typical examples are described and illustrated in Draft EIS Section 2.5.2.

To the extent practicable, cut and fill volumes would be balanced on-site, and excavated topsoil would be stockpiled for reuse. This would minimize the need for sand and gravel resources from off-site areas, thereby minimizing impacts from traffic and mineral extraction industries. It would be more difficult to balance cut and fill volumes on the site if the Multi-Family Alternative were selected for implementation.

Applicable Regulations. Snohomish County will require a site excavation plan and a Land Disturbing Activity permit for site development. These permits and approvals would impose conditions to minimize or avoid potential adverse impacts on the site associated with earthwork.

Construction materials obtained from off-site source borrow pits would be purchased from permitted quarries. Similarly off-site areas identified to receive excess grading materials from the site if the Multi-
Family Alternative were selected would be subject to separate permit conditions that would minimize the impacts of transporting and placing material from the Horseman's Trail/Frognal Estates site.

**SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS**

Grading for the construction of roads, building lots and utilities would result in unavoidable alterations to the existing topography of the site. However, steep slopes would be stabilized with retaining structures and various soil reinforcement methods; therefore, topographical impacts with either the Proposed Action of Multi-Family Alternative would not necessarily be significant or adverse.

**3.1.2 Geology and Soils**

Subsurface conditions of the Horseman’s Trail/Frognal Estates site have been explored by three monitoring wells to observe groundwater conditions, and by six borings and 28 exploration pits to evaluate geologic conditions and infiltration properties. Details, including logs, are presented in reports prepared by Associated Earth Sciences (1998, 2005, 2006a, 2006b), and Anthony Burgess Consulting (September 2013b; Draft EIS Technical Appendix B). The locations of these investigations are shown on Figure 3.1-3. The borings and monitoring wells were completed to depths of up to 218 feet below ground surface. The test pits were excavated with a track-mounted hydraulic excavator to depths ranging between 4 and 17 feet below ground surface, and were backfilled with the excavated material after logging.

The investigations showed that the higher-elevation south and central areas of the site are underlain by dense silty sand Vashon till, with local areas of sand and gravel recessional outwash. The till is underlain by gravelly sand advance outwash that rests on dense sands and silts of the Whidbey Formation.

**AFFECTED ENVIRONMENT**

*Regional Geology.* Geological mapping of the area has been published by the U.S. Geological Survey (USGS; Minard 1982). The Washington Department of Natural Resources has updated this with more recent data and strata nomenclature, and made them available as Geographical Information System (GIS) data on their website (Washington Department of Natural Resources 2008). Soil survey data for the area are available from the U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (2008).

The Pacific Northwest is located along the western margin of the North American plate, above the subduction zone of the Juan de Fuca plate. This geologically active zone has resulted in regionally high relief, and ongoing seismic and volcanic activity. Within this area, the Puget Lowland occupies a north-south trough filled with glacial and interglacial deposits, with bedrock along the east and west margins. During the Pleistocene period (from 1.8 million to 10,000 years ago), glacial ice advanced into the Puget Lowland at least seven times (Troost et al. 2003). The most recent advance, the Vashon Stade of the Fraser Glaciation, extended to south of Olympia.

Deposits associated with glacial action vary widely. The composition of the till that is deposited below the ice sheet depends upon the source rock and the thickness of the ice. Meltwater streams associated with the ice sheet produce outwash deposits of sands and gravels. As the names suggest, “advance” outwash is developed during the period of advance of the ice sheet, consolidated by the subsequent override of the ice. Outwash that is generated during the retreat of the ice sheet is called “recessional” outwash. Without the weight of ice to consolidate it, recessional outwash is typically less dense than advance outwash. In addition to the coarse-grained sediments associated with meltwater, fine-grained sediments are deposited where lakes form in depressions or where outlets have been blocked.
Figure 3.1-3
Subsurface Investigation Locations
These areas are characterized by deposits of silts and clays, often showing rhythmic layering. This is in response to annual thawing leading to erosion and transport of sediments, with settling and deposition of the finer fractions taking place in the quiescent period when inflow is reduced by freezing temperatures.

Vashon till underlies the upland area between Highway 99 and Puget Sound. This area has low relief at an elevation of 400 to 600 feet above msl. The Vashon till is a dense sand and silt with occasional cobbles and boulders. Underlying the till is the advance outwash, called the Esperance Sands. It is exposed only in the sides of valleys incised into the till and in the bluffs along Puget Sound. It is composed of coarse sand with gravel. The oldest unit of the Vashon glacial stade is the Lawton Clay. This is not identified in published geological maps of the area. However, a thin clay was observed near the base of the advance outwash during the stream survey of Picnic Point Creek (Anthony Burgess Consulting Inc., September 2013c; Draft EIS Technical Appendix C). The Lawton Clay is significant since it frequently forms the base of landslide features. The glacial deposits of the Vashon Stade are underlain by non-glacial dense silt and fine sand of the Whidbey Formation. This formation is exposed in the lower reaches of Picnic Point Creek and in the bluffs overlooking Puget Sound.

**Geomorphology.** Picnic Point Creek occupies a valley that is deeply incised into the till plain. Advance outwash deposits of sand and gravel that underlie the till form the valley sides in the middle and lower sections of the valley. Older deposits underlie the valley bottom from the mouth of the creek to about a mile upstream.

The stratigraphic sequence outlined above has resulted in well-documented instability along the bluffs overlooking Puget Sound (Baum et al. 2000). Geological mapping of the area adjacent to the mouth of Picnic Point Creek identifies recent landslide deposits (Washington Department of Natural Resources 2008). In a survey of Picnic Point Creek undertaken in support of this EIS, two possible areas of mass movement were identified (Anthony Burgess Consulting Inc., September 2013c; Draft EIS Technical Appendix C). About 1,000 feet upstream of the Picnic Point Road crossing of the creek, on the opposite bank to the wastewater treatment plant, soft silty clay overlying tan sand (Esperance Sand) is exposed in the right (north) bank. Downstream of this, seeps are visible and the right bank has leaning trees and irregular topography, indicating possible mass movement. About 500 feet downstream of the Picnic Point Road crossing of the creek, review of the LIDAR imagery indicates a possible landslide and headscarp on the left (south) bank, although this is not identified on published geological maps.

The slopes on the Horseman’s Trail/Frognal Estates site are cut into Vashon till and advance outwash. There is no evidence of slope instability on the site. However, The Snohomish County definition of a “landslide hazard area” is met in a limited area (approximately 0.5 acre) of the north slope above a wetland. This area has a slope greater than 33 percent, and the presence of a wetland at the base of the slope indicates likely groundwater seepage.

**Site Geology.** The geology of the Horseman’s Trail/Frognal Estates site is shown in Figure 3.1-4. Representative cross-sections are shown in Figure 3.1-5. The upland central and southern portion of the site is underlain by Vashon till. Recessional outwash overlying the till was observed locally; for example, in exploration pit EP-17. The upper 3 to 5 feet of the till are frequently weathered and less dense than the underlying unweathered till. The thickness of the till varies from zero in the sides of the ravines and the slope above Picnic Point Road, to more than 50 feet where the ground elevation is highest in the southeast corner of the site. The base of the till slopes to the northwest, from above 410 feet msl in the southeast to below 360 feet msl in the northwest. The till is dense to very dense grey silt and fine sand with occasional cobbles and boulders. Strength properties for granular soils (sands, gravels) can be estimated from the Standard Penetration Test (SPT) N-value obtained during exploration drilling. In the SPT, a 2-inch diameter split sampling tube is driven into the ground using a 140 lb hammer with a 30-inch drop. The number of blows is recorded for each 6 inches for a total penetration of 18 inches. The total number of
blows for the last 12 inches is recorded as the N-value. The “N” value is a measure of the strength of the formation (Jumikis 1971). The “N” value from standard penetration tests (SPTs) taken during drilling varies from 58 (EB-4 at 10 ft below ground surface) to greater than 50 blows for 3 inches (EB-5 at 20 ft below ground surface). Soils with N values of greater than 50 are classified as very dense.

The advance outwash forms the sides of the ravines and the north-facing slope above Picnic Point Road. This section of the advance outwash is a brown coarse sand and gravel. Near surface, it is frequently loosened by tree root growth and burrowing animals. At depth, it is generally dense to very dense with an “N” value greater than 40, with occasional intervals with lower “N” values. Boreholes MW-2 and EB-6 show that the deeper section of the advance outwash becomes significantly finer grained, and is predominately a fine sand and silt.

The lower sections of the north slope are locally mantled by colluvium. This soil that has been eroded, transported and deposited over geological time from higher up on the slope. The colluvium is similar to the advance outwash in grain size, but is much less dense since it has not been subjected to consolidation by ice loading.

Soils. Surficial soil conditions were evaluated by reviewing data available from the USDA Natural Resources Conservation Service (2008). Site soils are Alderwood gravelly sandy loam (2 to 8 percent slopes), and Alderwood-Everett gravelly sandy loams (25 to 70 percent slopes). The Alderwood gravelly sandy loam is formed where the underlying parent material is Vashon till. It forms the mineral soil in the higher southern and central areas of the Horseman’s Trail/Frognal Estates site. The Alderwood-Everett gravelly sandy loams are a soil complex (mixture) of Alderwood and Everett soil types. As noted above, the Alderwood soils form on till, whereas the Everett soil type forms where the underlying material is outwash. The Alderwood-Everett soils are found on the slopes of the ravines and the sloping northern portion of the property.

Borrow Material. All of the geologic material on the Horseman’s Trail/Frognal Estates site is suitable for re-use as fill. However, in certain areas, it may be necessary to supplement the on-site fill soils with imported material; for example, to improve drainage characteristics or structural properties.

Infiltration Properties. The advance outwash is well-suited for infiltration of surface water, with estimated hydraulic conductivities in the range of 1 to 88 feet per day, equating to potential infiltration rates in the range of 0.5 to 44 inches per hour (Anthony Burgess Consulting Inc., September 2013e; Draft EIS Technical Appendix D). The weathered till that forms the Alderwood gravelly sandy loam is identified as moderately well-drained in the USDA Natural Resources Conservation Service report. However, most of this material is likely to be excavated during site grading, exposing the underlying unweathered Vashon till. This unit has a low infiltration capacity, estimated at less than one inch per hour. Fill material derived from excavation of the till will also have a low infiltration capacity following replacement and compaction.

Unique Physical Features. Steep slopes occur in several areas of the Horseman’s Trail/Frognal Estates site, notably the sides of the ravines that intersect the property, and the slope above Picnic Point Road along the northern portion of the property. Percent inclination of slopes is shown on Figure 3.1-6. Field observations of these slopes show no evidence of shallow slides. Review of LIDAR imagery does not show any features such as hummocky ground or headscarsps that would be indicative of deep-seated failures. The slopes are typically capped with till, with most of the slope being formed in advance outwash. The coarse-grained, granular nature of the advance outwash provides strength and limits groundwater build-up in the slopes that could be conducive to soil failures.
Cross sections C-C and D-D shown on Figure 3.1-5

Horseman’s Trail PRD

Figure 3.1-4
Site Geology
Section C-C

Section D-D

Notes:
Cross section locations shown on Figure 3.1-4
Vertical exaggeration 2.6 to 1

Horseman’s Trail PRD
Geological Cross Sections
Seismicity. As noted above in the discussion of regional geology, the Horseman’s Trail/Frognal Estates site is in a seismically-active area. An “active fault” is defined by the Building Seismic Safety Council (2003) as a fault for which there is an average historic slip rate of 1 mm per year or more and geographic evidence of seismic activity within Holocene times (past 11,000 years). Research is currently underway regarding historical large-magnitude, subduction-related earthquake activity along the Washington and Oregon coasts. Geologists are reporting evidence that suggests several large-magnitude earthquakes (Richter magnitude 8 to 9) have occurred in the last 1,500 years, the most recent of which occurred about 300 years ago. No earthquakes of this magnitude have been documented during the recorded history of the Pacific Northwest.

For the proposed Horseman’s Trail/Frognal Estates PRD, the closest potentially seismic geological structure is the southern Whidbey Island fault (SWIF) The SWIF was first identified in 1985 (Gower et al.) based on gravity and magnetic anomalies. Further investigations (Johnson et al, 1996; Sherrod et al. 2005) provided additional data on the fault zone on Whidbey Island, across Puget Sound and into Snohomish County. The current interpretation is that the fault occupies a zone about 3 miles wide, within which there are a number of individual fault “strands.” The location of the strands is shown on Figure 3.1-7 based on the most recent USGS published digital mapping (United States Geological Survey 2006). The traces of the fault strands beneath Puget Sound and in the adjacent Snohomish County onshore area are based on the interpretation of anomalies in the earth’s magnetic field. These anomalies can be caused by faults that juxtapose strata with different magnetic properties. However, the nature and locations of the features creating the anomalies cannot be precisely determined. The Standard Oil Company of California Alderwood #1 well, drilled in the late 1940s about two miles east-southeast of the proposed Horseman’s Trail/Frognal Estates PRD, is located within the hypothesized onshore projection of the SWIF (Blakely et al, 2004). Oil company descriptions of the well document evidence of tectonic deformation between depths of 1209 and 2713 m (3965 and 8900 feet), variously described as slickensides, fault gouge, and “badly crushed” or “badly fractured” strata.

Further inland, in the Woodinville area, linear features observable on LIDAR images and interpreted as possible SWIF-related features, were investigated by trenching (Sherod et al. 2008). Trench mapping and radiocarbon age-dating indicated three and possibly as many as eight earthquakes have occurred during the last 16,400 years with magnitudes of M=6 to M=7, thus meeting the definition for an active fault.

In the area of the proposed Horseman’s Trail/Frognal Estates PRD, urbanization has largely masked any features that could be associated with faulting. However, in studies for the expansion of the Picnic Point Wastewater Treatment Facility (WWTF), about 700 feet west-northwest of the proposed Horseman’s Trail/Frognal Estates PRD, URS Corporation, design consultants to Alderwood Water and Wastewater District, identified geomorphic features that could be caused by faulting (URS Corporation 2005a and 2005b). Further investigation by trenching and age dating did not identify any features on the WWTF site that showed evidence of Holocene seismic activity.

Based on currently available published information, it appears that the southern strand of the fault zone may underlie or be close to the Horseman’s Trail/Frognal Estates site. However, there are currently no data to definitively locate the surface trace of the fault, or to determine if it meets the definition of an active fault.
Reference: USGS, 2006. Quaternary fault and fold database for the United States

Horseman’s Trail PRD

Figure 3.1-7
Southern Whidbey Island Fault (SWIF)
Mapping by the Washington Department of Natural Resources (Palmer et al. 2004a) has identified the seismic site class values for Snohomish County. The seismic site class is used to estimate the potential ground acceleration increase from bedrock to the surface, based on the type and thickness of soils, and is used by engineers in the design of structures. The mapping identifies the Horseman’s Trail/Frognal Estates site as site class C and site class C to D. However, investigations on the property show that N-values from standard penetration tests are greater than 50 for the Vashon till and pre-Vashon sediments. (N-values are defined above in the Site Geology subsection.) The N-values for the advance outwash are greater than 50 at depth, but lower near the surface, particularly where the investigative boring was located on a slope. These reduced N-values may represent colluvium and/or soil loosened by periglacial action. Since these soils are limited in extent and can be excavated and recompacted during earthwork, seismic site class C is the appropriate classification for the Horseman’s Trail/Frognal Estates property (Building Seismic Safety Council 2003). Thus, there will be some amplification of ground acceleration from bedrock to the surface.

Estimates of ground accelerations appropriate for design in accordance with NEHRP Recommended Provisions for Seismic Regulations for New Buildings and Other Structures have been obtained from the United States Geological Survey (2008a) website, and are as follows:

Conterminous 48 States
Latitude = 47.88
Longitude = 122.32
Spectral Response Accelerations SMs and SM1
SMs = FaSs and SM1 = FvS1
Site Class C - Fa = 1.0, Fv = 1.352

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The geotechnical engineer of record will use seismic parameters in force at the time of design, in accordance with Snohomish County Code.

In addition to the potential for damage due directly to shaking, damage may also occur from liquefaction of soils. Liquefaction refers to a condition where vibration or shaking of the ground results in development of excess pore pressures in saturated soils, and subsequent loss of strength in the deposit of soil so affected. In general, soils that are susceptible to liquefaction include loose to medium dense "clean" to silty sands that are below the water table. Washington Department of Natural Resources has mapped the liquefaction susceptibility of soil in Snohomish County (Palmer et al. 2004b). Site soils are identified as having low to very low susceptibility to liquefaction. This is confirmed by subsurface investigations that show all soils except colluvium are dense to very dense. The colluvium is located above the groundwater level and therefore is not susceptible to liquefaction. Also, any colluvium that is within an area proposed as the location of a foundation for a retaining structure or beneath a fill will be removed.
**POTENTIAL IMPACTS DURING CONSTRUCTION**

**Proposed Action**

As noted in Section 3.1.1, regrading the site would occur with construction of either the Proposed Action (PRD proposal) or the Multi-Family Alternative. Grading would be accomplished using conventional earthmoving equipment. It is anticipated that stripping of 3 to 6 inches will be required to remove organic material and topsoil prior to mass grading. Earthwork excavation volume is estimated to be approximately 275,000 bank cubic yards (cy), all of which is intended to be redistributed and used on the site for fill.

Soils with a significant fines fraction, such as the till, will likely be moisture-sensitive, and therefore may be difficult to operate on or adequately compact during wet weather.

Site clearing, logging, and stump removal would generate noise, dust, and off-site hauling trips during the temporary earthwork phase.

**Multi-Family Development Alternative**

The construction impacts of the Multi-Family Alternative would be similar to those described above for the Proposed Action. Earthwork excavation volume is estimated to be approximately 75,000 bank cy, of which approximately 39,000 bank cy would be used on site for fill, and approximately 64,800 tons (36,000 bank cy) would be exported (see Table 2.7-1 in Draft EIS Chapter 2). Actual site construction impacts should be less because the total volume of grading and site disturbance would be significantly less with the Multi-Family Alternative.

**No Action Alternative**

There would be no construction impacts to geology or soils associated with the No Action Alternative.

**POTENTIAL DEVELOPED-CONDITION IMPACTS**

**Proposed Action**

Based on the anticipated grading that will be conducted on the site, it is likely that the deeper, more permeable deposits may be utilized for local stormwater infiltration. There would be no additional impacts to geology or soils following construction.

Use of borrow material from an off-site source could produce indirect impacts to geology and soils at the source location(s). Loading and transporting borrow material from an off-site source would also produce noise and dust at the borrow site. Permission to use these sources, noise and dust control, and reclamation requirements, would be regulated by separate, site-specific permits obtained by the owners of those properties.

**Multi-Family Development Alternative**

As with developed-condition impacts of the Proposed Action (PRD proposal), the Multi-Family Alternative might also utilize the deeper, more permeable deposits for local stormwater infiltration after site grading. There would be no additional impacts to geology or soils following construction.
No Action Alternative

There would be no developed-condition impacts to geology or soils associated with the No Action Alternative.

Mitigation Measures

Incorporated Plan Features. During final design, global stability analyses will be included to demonstrate that retaining systems and fill prisms are stable. All slopes that will not be retained will be constructed as engineered cut or fill slopes that do not exceed 2H:1V. In addition, these slopes will be protected by erosion control measures until vegetation growth has been re-established. Slopes that will not be graded to a new configuration will be designated as Native Growth Protection Areas (NGPAs). Design of foundations, slopes and retaining structures will take into account the effects of seismic loading. The additional geotechnical analysis will be performed prior to issuance of the County permit for site grading.

To mitigate potential instability in the developed condition of the site, steep slopes would be recontoured by grading and terracing. Soil retaining structures (for example, rockeries, block walls, soil nail walls, mechanically-stabilized earth walls, and/or soldier pile walls) would be used where the proposed site layout would result in near-vertical slopes. Examples of these soil and slope reinforcement methods are described and illustrated in Draft EIS Chapter 2, Section 2.5. During construction, drainage would be controlled and directed away from slopes to minimize slope saturation that could lead to erosion and instability.

Infiltration facilities, for example the rain garden and infiltration swales, would be located away from steep slopes.

Fill would consist of compacted structural fill to provide the necessary strength properties for foundations and slope stability.

Impacts associated with moisture-sensitive soils during construction could be mitigated by undertaking earthwork in these areas during dry weather, whenever practicable. This would minimize operational difficulties and reduce the potential for erosion.

The proposal to approximately balance cut and fill during on-site earthwork would minimize construction-related traffic and associated noise and emissions in off-site areas.

Topsoil removed and stockpiled during construction would be redistributed on the site in areas to be landscaped. Where necessary to improve infiltration characteristics, native and fill soils may be amended with up to 12 to 18 inches of organic material (Compost Amended Fill) to improve infiltration rates, or to improve drainage provided through lower-permeability soils to the underlying permeable advance outwash.

Applicable Regulations. Snohomish County will require submission of a site excavation plan and compliance with the conditions of a Land Disturbing Activity Permit. Permit conditions will include dust control measures and limits on the hours of earthwork activities. Controlling work hours would minimize noise impacts in the surrounding area during this phase of site work. Several of the erosion control measures described in Section 3.1.3 (below) would also be effective in minimizing dust.

As noted above (Section 3.1.2 Affected Environment), a limited area of the north slope above an off-site wetland meets the criteria for definition as a “landslide hazard area” under Snohomish County...
Critical Area Regulations (Snohomish County 30.62B.340). Section 30.62B.340 (2)(b) of the Critical Area Regulations defines standard minimum setbacks from the top of slopes as the greater of one-third the height of the slope or 50 feet. The identified potential landslide hazard area has a height of 90 feet and a slope of about 50 percent (see Figure 3.1-8).

The Snohomish County Planning and Development Services Director can approve reduced building setbacks from the steep slope hazard area subject to the conditions of Snohomish County Code 30.62.200(2)(c), as follows:

Per SCC 30.62.200(2)(c) *The director may approve setbacks which differ from those required by SCC 30.62.210(2) if the applicant submits a geotechnical report which technically demonstrates and visually illustrates that the alternative setbacks provide protection which is greater than or equal to that provided by the setbacks required in SCC 30.62.210(2).*

Final setbacks for individual buildings next to the top of a descending slope of a landslide hazard area will be established at the Building Permit stage based upon the International Building Code (IBC) adopted by Snohomish County at the time a complete Building Permit is received. Setbacks for buildings next to the toe of an ascending slope of a landslide hazard area are the greater of one-half the height of the slope or 50 feet as required by SCC 30.62B.340(2).

Both AESI and the EIS Geotechnical Peer Review Consultant, Anthony Burgess, P.E., Ph.D., submit the following recommendations to be incorporated into future phases of project design and construction:

- All proposed retaining wall systems shall be properly designed and analyzed to confirm that adjacent slopes and off-site properties would not be impacted by the proposed development.
- All existing vegetation shall be retained within the steep slope buffer area.
- All surface and roof water shall be properly discharged and not allowed to flow over the slope face or near the slope crest, and shall not be allowed to enter a retaining structure drain system.

The area within the northwest corner of the site below Lots 24 and 25 shall be designated and protected as a critical area and kept from landsliding such that no fill or walls should be placed directly above the landslide hazard slope. A geotechnical evaluation prior to the Building Permit stage of development and prior to final plat recording will establish the appropriate setback to this landslide hazard area.

Section 30.62.210 (3)(a) of the Snohomish County Critical Area Regulations requires that all portions of landslide hazard areas on the Horsemans’s Trail/Frognal Estates site that are undisturbed by development activities shall be designated as Native Growth Protection Areas (NGPA) in accordance with SCC 30.62.075. The proposed PRD site plan will preserve the potential landslide hazard area undisturbed in a NGPA (see Figure 2.5.4-1 in Draft EIS Chapter 2).

Section 30.62.210 (3)(b) of the Snohomish County Critical Areas Regulations require that the factor of safety for landslide occurrences shall not decrease below the limits of 1.5 for static conditions or 1.1 for dynamic conditions. Stability analyses along representative cross-sections of the Horseman’s Trail/Frognal Estates site meet these criteria. Details are presented in the *Geotechnical Conditions Report* (Anthony Burgess Consulting Inc., September 2013b; Draft EIS Technical Appendix B).
Seismic design for the preliminary plat was evaluated using the parameters presented in the 2006 *International Building Code* (International Code Council, 2006). Further details are provided in project geotechnical reports prepared by Associated Earth Sciences (2006b) and Anthony Burgess Consulting Inc. (September 2013b; Draft EIS Technical Appendix B). Buildings and slopes will be re-evaluated in accordance with the IBC then in effect at the time of the application.

The installation of utilities in excavations would require temporary cuts. Potential instability impacts would be mitigated by temporary support of excavations (such as a trench box or sheet piles) or by laying back cut slopes in accordance with good practice and as required by the Occupational Safety and Health Administration (OSHA).

**SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS**

Site development would consume natural resources such as sand and gravel. This impact would occur wherever within the County that provisions are made for new residential development to accommodate projected population growth. This impact is unavoidable, but is not considered significant due to the volumes of material involved. Grading of the site would result in the unavoidable alteration of the topography. However, steep slopes would be stabilized with retaining structures and thus the impact would not be significant. Overall, there would be no significant unavoidable adverse impacts to the geology and soils on the site as a result of implementing the Horseman’s Trail/Frognal Estates proposal.

### 3.1.3 Erosion

**AFFECTED ENVIRONMENT**

There is no evidence of runoff from the upland portion of the Horseman’s Trail/Frognal Estates site where the surficial mineral soil is weathered till. Interflow on top of unweathered till will infiltrate into the advance outwash at the feather edge of the till along the ravines and north slope. Where advance outwash and colluvium are the surficial mineral soils, precipitation will infiltrate directly into these soil units. Run-on is directed onto the site from residential stormwater systems to the south (see Draft EIS Section 3.2.1). However, examination of the areas immediately downhill of these discharges showed no erosion and only very limited evidence of surface water flow for a few tens of feet onto the site. Over the Horseman’s Trail/Frognal Estates site area, therefore, erosion from surface water flow is not observed.

There is no evidence of sliding or mass wasting of the ravine side slopes or the north slope. However, some local erosion may occur; for example, where trees are blown down in windstorms, temporarily exposing the soil in the root area.

**POTENTIAL IMPACTS DURING CONSTRUCTION**

**Proposed Action**

The grading proposal to implement the Proposed Action (PRD proposal) would result in vegetation removal from approximately 17.2 acres of the site, and loss of approximately 450 existing trees (see Table 2.7-1 in Draft EIS Chapter 2, Section 2.7.4).

Removal of native vegetation coupled with site runoff could potentially cause erosion and transport of sediment, particularly if there was unanticipated suspension of grading for an extended period of time. Areas that would be most susceptible are those where excavation would expose fine-grained soils, particularly on slopes. If uncontrolled, sediment could be washed into the off-site wetland or off-site stormwater management systems, and ultimately, into Picnic Point Creek. Suspended sediments could
settle out in sections of the surface water system where velocities are low. This would potentially change the hydraulic and habitat characteristics of the wetland and creek, if erosion and sedimentation were allowed to occur. Suspended sediment could potentially affect the spawning of salmonid species that are likely to use the reach of Picnic Point Creek below the Picnic Point Road crossing. The creek has chum salmon, coho salmon, cutthroat trout and most likely other resident fish (personal communication with Ginger Holser, Regional Habitat Biologist, WDFW, February 2009). The spawning periods are November/December for chum and mid-October through December for coho (Snohomish County Public Works, Surface Water Management Division 2009).

Multi-Family Development Alternative

The grading proposal to implement the Multi-Family Alternative would result in vegetation removal from approximately 8.6 acres and loss of approximately 215 existing trees (see Table 2.7-1 in Draft EIS Chapter 2, Section 2.7.4).

Because the Multi-Family Alternative would require less clearing and removal of existing vegetation than the Proposed Action, impacts in the form of erosion that could be caused during construction of the Multi-Family Alternative would be similar in nature but potentially less than those described above for the Proposed Action.

No Action Alternative

There would be no change in existing vegetation or erosion potential on the site associated with the No Action Alternative.

POTENTIAL DEVELOPED-CONDITION IMPACTS

Proposed Action

Design of the developed site stormwater management system includes discharge to the western ravine for flows that exceed the infiltration capacity of proposed drainage swales and rain gardens described in Draft EIS Chapter 2, Section 2.5.5.1. Discharge of stormwater to the ravine has the potential to erode the floor and sides of the ravine if not properly designed.

Stormwater from the northern portion of the site will be infiltrated on the developed portion of the property to the greatest extent possible. Any runoff that may not be possible to infiltrate will be conveyed to a detention facility or infiltration basin at the west end of the project. Any discharge from a detention facility will be directed down the invert of the west ravine in a series of pools designed to further infiltrate runoff (see Figure 2.5.5-2 in Draft EIS Chapter 2). This series of infiltration beds will be designed with a series of check dams to avoid erosive flows, and will be lined with Permanent Turf Reinforcement fabric (or comparable). At the end of the stormwater management train, a level spreader is proposed at the toe of the ravine just above the offsite wetland. If the flow from the level spreader at the bottom of the valley were to become concentrated before reaching the wetland, rather than sheet flow, there would be a potential for erosion to occur.

The paragraph above describes the current design option for the Preliminary Plat. If, during final engineering design and construction plan review the Geotechnical Analysis determines that the risk of erosion cannot be adequately managed, any discharge from a detention facility would be piped directly to the Picnic Point Road stormwater conveyance system.
The grading proposal to implement the Proposed Action (PRD proposal) would result in removal of approximately 450 existing trees and retention of approximately 100 existing trees. The Proposed Action (PRD proposal) includes retaining significant trees and existing vegetation in designated Native Growth Protection Areas, and replanting the developed portion of the subject property with at least 1,204 evergreen and deciduous trees as described in Draft EIS Chapter 2, Section 2.5.4.6, and as indicated on Table 2.7-1 in Chapter 2, Section 2.7.4. Some native trees may be lost under either alternative due to removal of surrounding trees and wind-throw, especially in narrow open space tracts such as Tract 999 along the west and south edges of the site.

**Multi-Family Development Alternative**

The potential for erosion to occur in the developed-condition of the Multi-Family Alternative would be similar to that described above for the Proposed Action, though clearing and grading would be less extensive and more of the existing topography would be retained as described above in Section 3.1.1.

The Multi-Family Alternative would result in removal of approximately half the number of trees compared to the Proposed Action (PRD proposal): about 215 trees compared to approximately 450 trees (see Table 2.7-1 in Draft EIS Chapter 2, Section 2.7.4). In the same manner, the Multi-Family Alternative would retain a larger number of existing trees on the property: approximately 340 compared to about 100 trees with the Proposed Action. The tree replacement proposal under the Multi-Family Alternative would be approximately 500 new evergreen and deciduous trees.

**No Action Alternative**

There would be no change in the characteristics of erosion from the site at the present time associated with the No Action Alternative. No vegetation would be removed, and none would be introduced in landscaping.

**Mitigation Measures**

*Incorporated Plan Features.* The stormwater management proposal for the site would comply with the Washington Department of Ecology (Ecology) 2005 *Stormwater Management Manual for Western Washington* (SWMMWW), and would include Low Impact Development (LID) elements. Proper installation and maintenance of these facilities would minimize or avoid potential adverse impacts associated with erosion/sedimentation during construction and in the completed condition of the development.

The applicant proposes to comply with erosion/sedimentation control measures recommended by the project Geotechnical Engineer (AESI, April 25, 2012) and approved by the Peer Review geotechnical consultant (Anthony Burgess Consulting Inc., September 2013a; Draft EIS Technical Appendix A):

- A Temporary Erosion and Sediment Control (TESC) Plan will be prepared and approved prior to the start of construction.
- The winter (October 1 through March 31) performance of a site is dependent on a well-conceived plan for control of site erosion and stormwater runoff. The owner and design team shall include adequate groundcover measures, access roads, and staging areas in the project bid to give the selected contractor a workable site. The selected contractor shall be prepared to implement and maintain the required measures to reduce the amount of exposed ground. A site maintenance plan will be in-place in the event that stormwater turbidity measures exceed Ecology standards, and to comply with the Snohomish County Pollution Control Code (SCC 7.53).
• All Temporary Erosion/Sedimentation Control (TESC) measures for a given area to be graded or otherwise worked shall be installed prior to any activity within that area. The sequence of construction within a given area shall be to install sediment traps and/or ponds and establish perimeter flow control prior to the start of mass grading.

• During the wetter months of the year (October through March), or when large storm events are predicted during the summer months, each work area shall be stabilized so that if showers occur, the work area can receive the rainfall without excessive erosion or sediment transport. During the winter months, areas that are to be left unworked for more than two days shall be mulched or covered with plastic. During the summer months, stabilization can be accomplished by seal-rolling the subgrade. The stabilization process will also include establishing temporary stormwater conveyance channels through work areas to route runoff to approved treatment facilities.

• Polyacrylamide could be applied to bare soil to reduce erosion and control sediment. If necessary, approved additives could also be used to enhance settlement of suspended sediments in temporary erosion/sedimentation control ponds during construction.

• All disturbed areas shall be revegetated as soon as practicable. If site work is performed outside of the growing season, disturbed areas shall be covered with mulch, as recommended in the Erosion Control Plan. Straw mulch provides the most cost-effective cover measure and can be made wind-resistant with the application of a tackifier after it is placed.

• Surface runoff and discharge shall be controlled during and following site development. Under no circumstances shall concentrated discharges be allowed to flow over significant slopes.

• Soils that are to be reused around the site shall be stored in such a manner as to reduce erosion from the stockpile. Protective measures may include, but are not limited to, covering with plastic sheeting, the use of low stockpiles in flat areas, or the use of straw bales/silt fences around pile perimeters. These measures shall be required during the period between October 1 and March 31.

• On-site erosion control inspections and turbidity monitoring shall be performed in accordance with Ecology requirements. Weekly and monthly reporting to Ecology shall be performed on a regularly-scheduled basis. TESC monitoring shall be part of weekly construction team meetings. Temporary and permanent erosion control and drainage measures shall be adjusted and maintained, as necessary, at the time of construction.

**Applicable Regulations.** The applicant will also be required to comply with National Pollutant Discharge Elimination System (NPDES) regulations administered by Ecology, and with the Snohomish County Code (SCC). There is some duplication in the lists of mitigation measures proposed by the applicant and required by State and County regulations.

All construction sites greater than one acre in extent are required to obtain a NPDES Construction Stormwater Permit from the Washington Department of Ecology. A requirement of a NPDES permit is to develop an Erosion and Sedimentation Control (ESC) plan, also referred to as a construction Stormwater Pollution Prevention Plan (SWPPP).

• A Certified Erosion Sediment Control Lead (CESCL) will be required to monitor implementation of the Temporary Sediment and Erosion Control Plan (TESCP) during construction.

• The Geotechnical Engineer will be required to be on-site to monitor the placement of fill in ravines and placement of any temporary ponds in fill.

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The NPDES Construction Stormwater Permit would require a site log book to be maintained containing a record of implementation of the SWPPP and other permit requirements including the installation and maintenance of Best Management Practices (BMPs), site inspections, and stormwater monitoring. Site inspections would be conducted at least once every calendar week and within 24 hours of any discharge from the site. However, if the site were temporarily stabilized or inactive, the frequency would be reduced to once every calendar month. Site inspections would be conducted by a Certified Erosion and Sediment Control Lead (CESCL).

NPDES permit conditions would also require water quality monitoring of any surface water discharge from the site. Measurement of turbidity would be required on a weekly basis within 24 hours of a surface water discharge from the site. If construction activities involving significant concrete work (greater than 1,000 cubic yards poured concrete or recycled concrete) within the area contributing to surface water discharge, then measurement of pH (the acidity or alkalinity of the water) would also be required.

Snohomish County Rule 3044 (Snohomish County Planning and Development Services 2006) establishes the County's requirements for construction SWPPPs, including a methodology for determining the site risk category and level of SWPPP required. Appropriate BMPs detailed in the Stormwater Management Manual for Western Washington (Ecology 2005) would be implemented during construction to minimize erosion. Representative BMPs that could be used at the Horseman’s Trail/Frognal Estates site are listed below. These also include mitigation measures imposed by the Snohomish County Council on the adjacent Regatta Estates plat.

- Prepare a Stormwater Pollution Prevention Plan (SWPPP) that is consistent with Snohomish County Code (SCC) Chapter 30.63A and consistent with the Washington Department of Ecology NPDES Construction General Permit requirements for sites larger than 1 acre in size. Outline in the SWPPP procedures to ensure that erosion control measures will be implemented and kept current. The SWPPP shall require that the site be monitored closely by an approved Certified Erosion and Sedimentation Control Lead (CESCL) to identify any erosive action on the site. The CESCL shall notify the County if erosion is occurring and shall implement corrective measures immediately. The SWPPP shall specify the timing of construction of sedimentation ponds removal of vegetation and replanting to minimize potential erosion impacts.

- Notify Snohomish County PDS immediately about any changes to the SWPPP or the approved CESCL for the project.

- Include a requirement in the SWPPP that amended soils shall be added to cut slopes in areas where construction is not to occur immediately to facilitate the quick revegetation of such slopes pursuant to full site stabilization.

- Restrict grading activities to dryer months of the year (April 1 through September 30) if winter-work BMPs are insufficiently effective.

- Reduce the total area of site to be cleared of native vegetation.

- Preserve natural vegetation in environmentally sensitive areas.

- Apply temporary and permanent seeding or sodding to re-establish vegetation.

- Use mulch, plastic covering, or erosion control netting on soil surfaces to limit erosion.

- Install silt fence, brush barrier, or straw wattles to reduce water velocities of rill and sheet flow.

- Install check dams, sediment traps or sediment ponds to reduce water velocities in ditches and allow settling of suspended particulates.
• Install rock weirs and channel armoring to protect the western ravine from erosion from stormwater discharge.

• Line temporary sedimentation ponds with impermeable membrane or 2 feet of glacial till if the bottom of the sedimentation pond is within 2 (two) vertical feet of permeable sands and the pond is located within 25 feet of the top of a steep slope.

• Inspect Erosion/Sedimentation Control (ESC) facilities and make prompt repairs when needed.

• Designate open space areas beyond proposed grading limits as Native Growth Protection Areas, and retain these areas in a substantially natural state.

The Proposed Action shall also comply with the County's tree retention requirements in effect at the time this application was vested (August 2005), as follows:

• The proposal shall comply with the tree retention provisions of SCC Section 30.42B.130 (Design criteria – tree retention) in effect in August 2005, or provide at least 477 new evergreen conifer and 727 new deciduous trees (1,204 trees, total) within the developed portion of the subject property as indicated on the Horseman's Trail PRD Preliminary Plat Landscape Plans (Sheets L1 through L9) dated December 4, 2006, whichever results in the greatest number of new trees (see Draft EIS Chapter 2, Section 2.5.4.6). Each new conifer tree shall be at least 6 feet tall at the time of planting, and each new deciduous tree shall be at least 6 feet tall or of 1¾-inch caliper at the time of planting, as indicated on the Preliminary Plat Landscape Plans.

• No existing significant tree as defined by SCC Section 30.91S.320 (Significant tree) in effect in August 2005 shall be removed from within any Native Growth Protection Area or perimeter open space tracts designated on the Horseman's Trail PRD Preliminary Plat drawings.

• No individual significant tree to be retained within the development, as indicated on the Horseman's Trail PRD Preliminary Plat plans dated December 4, 2006, shall be removed except that hazardous, dead or diseased trees may be removed as necessary to remedy an immediate threat to person or property as determined by a letter from a certified arborist.

• All Native Growth Protection Areas, perimeter open space tracts, and any individual significant tree to be retained as indicated on the Horseman's Trail PRD Preliminary Plat drawings dated December 4, 2006 shall be protected as follows:

  a) Tree protective fencing shall be installed along the outer edge of the drip line surrounding the significant trees in order to protect the trees during any land disturbance activities. Fencing shall not be moved to facilitate grading or other construction activity within the protected area.

  b) Tree protective fencing shall be a minimum height of 3 (three) feet, visible and of durable construction (e.g., orange polyethylene laminar fencing).

  c) "Tree Protection Area" signs must be posted on the fence.

As noted in the Geology and Soils section above (3.1.2 Affected Environment), a limited portion (approximately 0.5 acre) of the northern slope meets the definition of a landslide hazard area. Section 30.62B.340(2)(b) of the Snohomish County Critical Area Regulations defines standard minimum setbacks from the top of slopes. The identified potential landslide hazard area has a height of 90 feet and a slope of about 50 percent. The proposed structure locations meet the requirement for a setback from the top of the slope of the height of the slope divided by 3, or 50 feet, whichever is greater. The Snohomish County Planning and Development Services Director can approve reduced building setbacks from the steep slope.
hazard area subject to the conditions of Snohomish County Code 30.62.200(2)(c). Final setbacks for individual buildings next to the top of a descending slope of a landslide hazard area will be established at the Building Permit stage based upon the International Building Code (IBC) adopted by Snohomish County at the time a complete Building Permit is received. Setbacks for buildings next to the toe of an ascending slope of a landslide hazard area are the greater of one-half the height of the slope or 50 feet as required by SCC 30.62B.340(2).

Section 30.62.210(3)(a) of the Snohomish County Critical Area Regulations requires that all portions of landslide hazard areas on the site which are undisturbed by development activities shall be designated as Native Growth Protection Areas in accordance with SCC 30.62.075. The proposed PRD site plan will maintain the potential landslide hazard area as Native Growth Protection Area.

There is a potential for erosion in the western ravine as a result of discharge from the site stormwater management system. If final engineering determines that a vault with point discharges will be too high to infiltrate, this could be mitigated by additional infiltration facilities where suitable locations exist, by additional erosion measures within the ravine and/or energy dissipater above the wetland, or by conveying the discharge around the valley to Picnic Point Road drainage along existing easements.

Check dams proposed in the West Basin stormwater management system would be installed by hand or with minimally invasive equipment to protect existing vegetation.

**SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS**

With proper installation and maintenance of on-site stormwater management facilities during construction and in the developed condition of the site, and with proper implementation of Best Management Practices – all as required by applicable regulations administered by Snohomish County and the Washington Department of Ecology – no significant unavoidable adverse impacts in the form of erosion/sedimentation would be expected to occur during construction or in the completed condition of the Horseman’s Trail/Frognal Estates development.

Some native trees may be lost under either alternative due to removal of surrounding trees and wind-throw.
3.2 Water Resources

Water is a valuable resource that is constantly moving and transforming as part of the hydrologic cycle. Precipitation runs off to streams and rivers, and infiltrates into the ground to replenish groundwater. The groundwater ultimately discharges to surface water (freshwater and marine) through seeps and springs. In turn, surface water evaporates into the atmosphere as water vapor, forming clouds that lead to precipitation, and the cycle continues. Thus, changes to one element of the hydrologic cycle may have impacts elsewhere in the cycle.

3.2.1 Surface Water Movement, Quantity and Quality

In the context of the proposed Horseman’s Trail/Frognal Estates development, surface water refers to streams and wetlands. Surface water is fed directly by runoff following precipitation. Some of the precipitation infiltrates into the soil. A portion of this water remains within a few feet of the surface, typically in the soil horizons developed by plants and trees. This is called “interflow,” and is usually considered as a component of runoff, since it enters nearby drainages shortly after falling as precipitation. The rest of the infiltrating water penetrates deeper into the subsurface and recharges groundwater. Relative to streams and rivers, which typically have velocities up to a few feet per second, groundwater moves very slowly, with velocities ranging from a few feet per day to a few feet in several years or longer.

AFFECTED ENVIRONMENT

Surface Water Movement and Quantity

The Horseman’s Trail/Frognal Estates site is located in the Picnic Point Creek basin. The basin has an area of about 1,300 acres (approximately 2 square miles), of which about 1,000 acres are upstream of the site. The basin has a length of 2.5 miles and maximum width of 1.2 miles. Picnic Point Creek flows into Puget Sound at Picnic Point County Park (approximately 0.75 mile downstream of the Horseman’s Trail/Frognal Estates site). The maximum elevation within the basin is 580 ft in the vicinity of Highway 99.

The average annual precipitation in the Everett area is about 37 inches based on the record from 1948 through 2007 collected at Everett Junior College (Western Regional Climate Center 2008). Monthly averages, maxima and minima are presented in Table 3.2-1. The Washington Department of Ecology (2007) Western Washington Hydrologic Model (WWHM) data for Everett produces an average annual precipitation of 37.5 inches for the period 1949 to 1997 (Washington Department of Ecology 2007). For the site location, WWHM uses a precipitation factor of 0.8 of the Everett gauge data, which translates to an annual average precipitation at the site of approximately 30 inches.

Approximately one-half of the precipitation evaporates or is transpired by existing vegetation on the Horseman’s Trail/Frognal Estates site. The remaining precipitation infiltrates to become groundwater recharge. A small amount of runoff and interflow occur on a local scale, but at the overall scale of the site, nearly all runoff infiltrates in a short period of time.
Table 3.2-1. Precipitation (in inches) at Everett Junior College (Western Regional Climate Center 2008).

<table>
<thead>
<tr>
<th>Month</th>
<th>Average</th>
<th>Maximum</th>
<th>Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>4.58</td>
<td>9.77</td>
<td>0.54</td>
</tr>
<tr>
<td>February</td>
<td>3.36</td>
<td>6.75</td>
<td>0.4</td>
</tr>
<tr>
<td>March</td>
<td>3.57</td>
<td>6.08</td>
<td>0.55</td>
</tr>
<tr>
<td>April</td>
<td>2.71</td>
<td>5.69</td>
<td>0.65</td>
</tr>
<tr>
<td>May</td>
<td>2.36</td>
<td>6.03</td>
<td>0.63</td>
</tr>
<tr>
<td>June</td>
<td>2.17</td>
<td>5.52</td>
<td>0.25</td>
</tr>
<tr>
<td>July</td>
<td>1.18</td>
<td>3.57</td>
<td>0</td>
</tr>
<tr>
<td>August</td>
<td>1.33</td>
<td>4.23</td>
<td>0</td>
</tr>
<tr>
<td>September</td>
<td>1.97</td>
<td>5.42</td>
<td>0.27</td>
</tr>
<tr>
<td>October</td>
<td>3.44</td>
<td>8.53</td>
<td>0.08</td>
</tr>
<tr>
<td>November</td>
<td>4.93</td>
<td>9.41</td>
<td>0.56</td>
</tr>
<tr>
<td>December</td>
<td>5.15</td>
<td>8.53</td>
<td>0.76</td>
</tr>
<tr>
<td>Annual</td>
<td>37.00</td>
<td>50.13</td>
<td>22.22</td>
</tr>
</tbody>
</table>

The Picnic Point Creek drainage basin is shown on Figure 3.2-1, based on Figure 1-2 in the Drainage Needs Report for Puget Sound Sub-Basins (Snohomish County 2002). Geological mapping of the basin is shown on Figure 3.2-2, based on data from the Washington Department of Natural Resources digital 1:100,000 scale geological map (2008). Descriptions of map units and the percentage of the basin area they occupy are given in Table 3.2-2.

Table 3.2-2. Stratigraphy and basin areas.

<table>
<thead>
<tr>
<th>Map Symbol</th>
<th>Old Symbol</th>
<th>Name</th>
<th>Description</th>
<th>Percent of Basin Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qls</td>
<td>Qls</td>
<td>Landslide</td>
<td>Mass-wasting deposits, mostly landslides</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Qgt</td>
<td>Qvt</td>
<td>Vashon Till</td>
<td>Continental glacial till, Fraser-age</td>
<td>70%</td>
</tr>
<tr>
<td>Qga</td>
<td>Qva</td>
<td>Vashon Advance Outwash</td>
<td>Advance continental glacial outwash, Fraser-age</td>
<td>23%</td>
</tr>
<tr>
<td>Qc(w)</td>
<td>Qn</td>
<td>Whidbey Formation</td>
<td>Continental sedimentary deposits or rocks</td>
<td>5%</td>
</tr>
<tr>
<td>Qgp(d)</td>
<td>Qg</td>
<td>Double Bluff Drift</td>
<td>Continental glacial drift, pre-Fraser</td>
<td>1%</td>
</tr>
</tbody>
</table>

Except for the Vashon Advance Outwash, the geological units have generally low hydraulic conductivity.
Based on the mapping of the USDA Natural Resources Conservation Service (2008), soil types present within the basin are listed in Table 3.2-3. Their distributions are shown on Figure 3.2-3.

Table 3.2-3. Picnic Point Creek basin soil types.

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Percent of Basin Area</th>
<th>Hydrologic Soil Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alderwood gravelly sandy loam</td>
<td>35%</td>
<td>C</td>
</tr>
<tr>
<td>Alderwood-Everett gravelly sandy loams</td>
<td>27%</td>
<td>A/B</td>
</tr>
<tr>
<td>Alderwood-Urban land complex</td>
<td>16%</td>
<td>C</td>
</tr>
<tr>
<td>Everett gravelly sandy loam</td>
<td>22%</td>
<td>A/B</td>
</tr>
<tr>
<td>Other</td>
<td>&lt;1%</td>
<td></td>
</tr>
</tbody>
</table>

USGS aerial photos (http://www.terraserver-usa.com) were used to delineate four primary types of land use within the Picnic Point Creek basin: multi-family/commercial/industrial, medium-density single-family residence (MDSFR), low-density single-family residence (LDSFR), and undeveloped. The relative areas of each of these land use types are shown in Table 3.2-4.

Table 3.2-4. Picnic Point Creek basin land use types.

<table>
<thead>
<tr>
<th>Land Use Type</th>
<th>Percent of Basin Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-family/commercial/industrial</td>
<td>22.2%</td>
</tr>
<tr>
<td>Medium-density single-family residence</td>
<td>27.5%</td>
</tr>
<tr>
<td>Low-density single-family residence</td>
<td>9.3%</td>
</tr>
<tr>
<td>Undeveloped</td>
<td>41.0%</td>
</tr>
</tbody>
</table>

A detailed description of Picnic Point Creek is provided in the Puget Sound Tributaries Drainage Needs Report Appendix E (Snohomish County 2002). In addition, a survey of the creek downstream of the Horseman’s Trail/Frognal Estates site was undertaken by the Peer Review consultant as part of the preparation of this Draft EIS. The data and conclusions of the stream survey are presented in the Off-site Analysis Report Horseman’s Trail PRD (Anthony Burgess Consulting Inc., September 2013c; Draft EIS Technical Appendix C). The following discussion summarizes these data sources and follows the designation of reaches and stationing shown on Figure 3.2-4.

The headwaters Reach 1 (Station 108+00 to 79+00) of Picnic Point Creek receives stormwater runoff from three tributaries, residential streets, and properties adjacent to the upstream channels. This reach extends to the approximate edge of the bluff, and is characterized by a broad, gently-inclined valley underlain by glacial till. The average channel gradient is about 2 percent, varying locally from 1 percent to a maximum of 6 percent. The bankfull channel dimensions vary from 8 to 12 feet wide, and from 4 to 5 feet deep. There are active seeps on both banks throughout this reach.

Reach 2 (Station 79+00 to 61+00) extends about 1,800 feet downstream from the break in slope at the edge of the bluff. This reach is characterized by a straight channel underlain by Esperance Sand and increasing confinement by ravine slopes. Channel gradient ranges from 2 percent at the upstream end, to nearly 6 percent at the downstream end. Bankfull channel dimensions generally vary from 8 to 10 feet wide with local widening to 15 feet, and 3 to 4 feet deep. The stream banks throughout Reach 2 are presently undergoing erosion with numerous overturned trees, undermined by erosional undercutting. There are numerous indicators of seasonal seepage through the upper portion of this reach.
Legend

Geologic Units

DB  Double Bluff Drift
E   Esperance Sand
     (Advance Outwash)
W   Whidbey Formation

Geologic unit boundary

Wetland

Reference: *Drainage Needs Report for Puget Sound Sub-Basins* (Snohomish County 2002) Figure 6-2.

*Horsemans Trail PRD*

Figure 3.2-4
Picnic Point Creek Basin Detail
Reach 3 (Station 61+00 to 43+50) is underlain by erosion-resistant Whidbey Formation, and is characterized by a straight channel in a deep V-shaped ravine. It receives surface water from Reach 2, a tributary on the right (north), and numerous groundwater seeps and springs originating at the contact between the Whidbey Formation and the Esperance Sand. Large volumes of sand, gravel and woody debris enter the channel from landslides in the Esperance Sand unit exposed on the ravine slopes. The reach-averaged gradient is about 4 percent, with local highs reaching 6 percent. The bankfull channel dimensions vary from about 12 feet wide and 5 feet deep in the upper reach to nearly 20 feet wide and 4 feet deep in the lower reach. Throughout Reach 3, the ravine slopes form the channel banks. The banks are typically eroded exposing the Whidbey Formation. The streambed, underlain by Whidbey silt, is U-shaped with local scour pools associated with flow obstruction from large woody debris. Overturned trees, both spanning the channel and lying on the ravine slopes, are present throughout Reach 3. The descriptive text in the Puget Sound Tributaries Drainage Needs Report Appendix E identifies landslide debris and several trees partially obstructing the flow. However, the location at which this is noted (Station 30+29) is downstream of Reach 3, and is the approximate location of the crossing of Picnic Point Road. It therefore appears that the location is in error. The Regatta Estates stormwater retention pond discharges to Picnic Point Creek at about Station 46+00.

Reach 4 (Station 43+50 to 30+00) extends to Picnic Point Road, and is underlain by the Whidbey Formation. The gradient is steeper than Reach 3, approximately 6 to 8 percent with local maximums reaching 10 percent. Surface water enters Reach 4 from Reach 3, from two tributaries entering the mainstem at Stations 29+00 and 30+80, and from groundwater seepage from the Whidbey/Esperance contact. Bankfull dimensions are about the same as observed in Reach 3, although the channel is narrower in the upper portion of Reach 4. The stream is confined by ravine slopes that are steeply sloping and eroded, exposing very stiff to hard gray laminated silt. Woody debris is present throughout Reach 4. Much of the large wood on the lower ravine slopes was likely transported downslope by landslides. Numerous active groundwater seeps and seasonal seep indicators are present throughout Reach 4. This reach includes the Alderwood Water and Wastewater District (AWWD) wastewater treatment plant on the left bank from about Station 35+00 to 41+00. Inquiries with AWWD revealed that the Picnic Point Wastewater Treatment Plant has no non-storm water inflows to Picnic Creek (personal communication with Brigette McCarty, Senior Engineer and Project Manager, 2007). The plant has a piped outflow system of non-stormwater discharge that extends from the plant facility for a distance of approximately 1,000 feet beyond the ordinary high water mark of Possession (Puget) Sound. Picnic Point Road crosses the creek on an embankment with the creek passing through a 24-inch diameter concrete culvert. At the time of the stream survey in December 2007 (Anthony Burgess Consulting Inc., September 2013c; Draft EIS Technical Appendix C), the upstream entrance to the culvert was partially obstructed by woody debris. Without obstruction, the culvert has an estimated capacity of 75 cfs with the water level approximately 4.5 feet above the crown of the upstream side.

Reach 5 (Station 30+00 to 16+30) extends downstream from Picnic Point Road to Puget Sound Boulevard. The upper half of the reach is underlain by the Whidbey Formation, and the lower half by the Double Bluff Drift. Surface water and sediment enters Reach 5 from Reach 4, from the ravine slopes and from a tributary on the left bank immediately downstream of the Picnic Point Road crossing. This tributary is sourced in the wetland located northwest of the Horseman’s Trail/Frognal Estates site. It forms the roadside ditch for Picnic Point Road from the wetland to its discharge to the creek immediately downstream of the creek crossing. Downstream of the Picnic Point Road crossing, residential and road runoff enter the stream directly. Reach 5 is characterized by a widening ravine and heavily-armored stream banks. The entire right bank and lower ravine slope, from the edge of the stream to Picnic Point Road is armored with large riprap. Channel gradients throughout Reach 5 vary from 6 percent to as much as 11 percent. Stream bank armoring confines the channel dimensions measured at about the ordinary high water level to roughly 10 feet wide and 3 to 5 feet deep. Where exposed, the stream banks are composed of Whidbey or Double Bluff Drift soils. The native banks vary from two to six feet high and
are generally eroded to vertical faces exposing native silt and roots. The channel floor throughout Reach 5 is characterized by numerous weirs placed along the centerline of the channel. The weirs are constructed from large riprap and logs. In between the weirs, the channel floor is composed of loosely packed sand and gravel with occasional riprap. Numerous indicators of seasonal seeps are present at channel edges and along lower ravine slopes within the upper and middle portions of Reach 5. The creek passes under Puget Sound Boulevard in an arched corrugated metal culvert, 12 feet wide and 7 feet high.

Reach 6 (Station 16+30 to 0+00) extends from the Puget Sound Boulevard crossing to the BNSF rail line. This reach is underlain by Double Bluff Drift and Modified Soils. The channel gradient throughout Reach 6 is 1 percent or less, significantly less than upstream reaches. Similar to Reach 5, the channel has been reconstructed and heavily armored. Channel modifications include wood weirs with cascades and plunge pools. Channel dimensions throughout Reach 6 are roughly 10 feet wide and 3 feet deep. Pools formed by the weirs are 2 to 3 feet deep. The railroad embankment at the downstream end of the reach is roughly 8 feet high and extends the entire width of the valley. The Drainage Needs Report Appendix E states that a box culvert, approximately 6 feet high and 4 feet wide, allows the passage of stream flow beneath the railroad embankment to Puget Sound. However, elsewhere in the report, the crossing is identified as two 48-inch diameter concrete culverts. The field survey by Anthony Burgess Consulting Inc. measured the culverts as 36-inch diameter (September 2013c; Draft EIS Technical Appendix C). At the time of the survey, the upstream entrance to the culverts was obstructed by woody debris. Without obstruction, the capacity of the culverts is estimated to be approximately 200 cfs, with the upstream water level 4.5 feet above the culvert crown. No groundwater seeps were noted along Reach 6.

No estimates were made for flows in Picnic Point Creek in the Puget Sound Tributaries Drainage Needs Report (Snohomish County 2002), and inquiries to County and State agencies did not yield any field data. Therefore, an estimate of the average and peak monthly flows was made using the Western Washington Hydrologic Model (WWHM) developed by the Department of Ecology (2007). Land use and soil types described above were used to produce stream hydrographs for precipitation over the period 1947 to 1997. WWHM uses the precipitation data to calculate runoff, interflow and infiltration to groundwater. However, it does not include the ability to route flows and therefore to take account of storage and lags in the system. As a result, peak flows are likely to be over-estimated. WWHM is typically used for site drainage analysis, and has a default that assumes runoff and interflow report to surface water. However, for a drainage basin such as Picnic Point Creek, it is likely that a high proportion of the groundwater eventually discharges to the creek within the basin. Therefore, analyses were also made that included groundwater reporting to surface water. The results are summarized in Table 3.2-5.

Table 3.2-5. Estimates of monthly flow in Picnic Point Creek from analyses using Western Washington Hydrologic Model.

<table>
<thead>
<tr>
<th></th>
<th>Runoff and Interflow (cfs)</th>
<th>Runoff, Interflow and Groundwater (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average monthly flow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>1.7</td>
<td>2.7</td>
</tr>
<tr>
<td>Maximum</td>
<td>8.7</td>
<td>10.3</td>
</tr>
<tr>
<td>Peak monthly flow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>57.5</td>
<td>58.4</td>
</tr>
<tr>
<td>Maximum</td>
<td>279.2</td>
<td>279.7</td>
</tr>
</tbody>
</table>

Downstream of the Horseman’s Trail/Frognal Estates site, wetlands have been identified bordering Picnic Point Creek (Figure 3.2-4). A Category 3 wetland has also been identified adjacent to the
northwest corner of the site (WRA-2), as delineated by Wetland Resources, Inc. (2005). The WRA-2 wetland is fed by runoff and groundwater. The road and drainage plan for Regatta Estates 133rd Avenue SW indicates that stormwater from the portion of the development south of Picnic Point Road and runoff from Picnic Point Road discharge to this wetland (Trepanier Engineering 1993). Groundwater that flows northwest in the advance outwash also provides water to the wetland.

An area of 19.473 acres south of the site is developed as residential and discharges to the head of the west ravine, based on a review of drawings submitted to Snohomish County and site observations. The only evidence of surface water flow on the Horseman’s Trail/Frognal Estates site occurs where the west ravine crosses the southern property line. The area was visited shortly after heavy rain in December 2007. For a short distance north from the property line, the forest duff had been eroded and washed sand and gravel was observed around vegetation clumps. The course of the water was indistinct and disappeared about 100 feet north of the property line. The source of the run-on to the property during this heavy rain on snow event is believed to have been stormwater discharge from the developed area south of the site.

Over the remainder of the Horseman’s Trail/Frognal Estates site, there is no evidence of surface water. All precipitation infiltrates into the forest duff and underlying mineral soil.

Based on topography, the site has been divided into two Threshold Discharge Areas (TDAs). A TDA is defined by Ecology as an “... onsite area draining to a single natural discharge or multiple... locations that combine within one-quarter mile downstream.” The West TDA is formed by the west basin, and extends from the western property line to the topographic spine east of the east ravine. The East TDA, formed by the northeast and southeast basins, occupies the remainder of the site (Figure 3.2-5). All basins are forested with till (soil type C) underlying the upland portions, and advance outwash (soil type A/B) forming the ravine and valley slopes. Basin characteristics are summarized in Table 3.2-6.

Table 3.2-6. Horseman’s Trail/Frognal Estates site existing drainage basin characteristics.

<table>
<thead>
<tr>
<th>Drainage Basin Characteristics</th>
<th>West TDA</th>
<th>East TDA</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Basin (acres)</td>
<td>Northeast Basin (acres)</td>
<td>Southeast Basin (acres)</td>
</tr>
<tr>
<td>A/B forest flat</td>
<td>0</td>
<td>0.002</td>
</tr>
<tr>
<td>A/B forest moderate</td>
<td>0.91</td>
<td>0.028</td>
</tr>
<tr>
<td>A/B Forest steep</td>
<td>6.936</td>
<td>0.202</td>
</tr>
<tr>
<td>C Forest flat</td>
<td>1.213</td>
<td>0.370</td>
</tr>
<tr>
<td>C Forest moderate</td>
<td>2.573</td>
<td>1.413</td>
</tr>
<tr>
<td>C Forest steep</td>
<td>4.357</td>
<td>1.929</td>
</tr>
<tr>
<td><strong>Total areas</strong></td>
<td><strong>15.988</strong></td>
<td><strong>3.943</strong></td>
</tr>
</tbody>
</table>

1 TDA = Threshold Discharge Area.

The WWHM was used to estimate flow frequencies under existing conditions. Details are provided in Anthony Burgess Consulting Inc. (September 2013a; Draft EIS Technical Appendix A) and summarized in Table 3.2-7.
Existing flow paths

Lines

Water courses

Lines

Wetlands

Areas

Existing drainage basins

Areas: Basin id
Northeast
Southeast
West

Contour interval 10 ft

Figure 3.2-5
Existing Site Flowpaths
Table 3.2-7. Flow frequencies for existing conditions at the Horseman’s Trail/Frognal Estates site.

<table>
<thead>
<tr>
<th>Flow Frequency (years)</th>
<th>West TDA (cfs)</th>
<th>East TDA (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>0.1094</td>
<td>0.0818</td>
</tr>
<tr>
<td>5</td>
<td>0.1729</td>
<td>0.1284</td>
</tr>
<tr>
<td>10</td>
<td>0.2162</td>
<td>0.1600</td>
</tr>
<tr>
<td>25</td>
<td>0.2713</td>
<td>0.2001</td>
</tr>
<tr>
<td>50</td>
<td>0.3123</td>
<td>0.2298</td>
</tr>
<tr>
<td>100</td>
<td>0.3529</td>
<td>0.2592</td>
</tr>
</tbody>
</table>

1 TDA = Threshold Discharge Area.

**Surface Water Quality**

Water quality data for Picnic Point Creek are for three observations of benthic invertebrate index reported on the Snohomish County Surface water web site (Snohomish County 2009), and grab sample analyses for ammonia and nitrite + nitrate taken periodically between 2002 and 2006 (personal communication with Steve Britsch, Snohomish County Department of Public Works, February 4, 2009).

Benthic macro-invertebrates live on or in the bed of a water body and include insects, crustaceans, worms, snails, and clams. They are monitored because they are good indicators of the biological health of stream systems and play a crucial role in the stream ecosystem. The Benthic Index of Biotic Integrity (BIBI) score sums together ten measurements of the richness of benthic species that measure different aspects of stream biology. The Picnic Point Creek data were collected at the County Park on September 21, 2001 and August 15, 2005, and had values of 14 and 18 respectively. A sample was also collected at 59th Avenue W and 133rd Place SW on August 26, 2005 and had a value of 22 (Snohomish County Surface Water Online Data, 2009). Values in the range 10 to 16 are considered to indicate a very poor condition, and values in the range 18 to 26 are considered to indicate a poor condition (Puget Sound Stream Benthos 2009).

The results of the analyses for nitrite + nitrate range from 300 ug/L to 1850 ug/L. Although there is no State standard for total nitrogen in surface waters, levels above 1,000 ug/l are typically indicative of anthropogenic (i.e., human-caused) inputs. For Picnic Point Creek, the elevated levels of total nitrogen may be due to excessive levels of lawn fertilization and associated over-watering and runoff. Ammonia is the most reduced form of nitrogen. It has many effects on fish, including a reduction in hatching success, reduction in growth rate and morphological development, and pathologic changes in the tissues of gills, livers, and kidneys. Freshwater phytoplankton and vascular plants are more tolerant to ammonia than invertebrates or fish. Ammonia concentrations from two sampling events were 0.005 mg/L and 0.05 mg/L. Levels greater than 0.1 mg/L are above background (Embrey and Inkpen 1998), and may therefore be indicative of anthropogenic inputs.

**POTENTIAL IMPACTS DURING CONSTRUCTION**

**Proposed Action**

Regrading the site to meet development requirements would result in changes to existing drainage systems (Figure 3.2-6), and an increase in runoff since the interception and evapotranspiration currently provided by forest cover would be lost in the area to be cleared (approximately 17.2 acres). Additionally,
fill will be placed over some areas of permeable soils, and in other areas, lower permeability till soils will be removed exposing underlying more-permeable outwash soils. During earthwork activities, there would be a potential for water quality impacts to arise from erosion of bare ground, resulting in suspended sediments in runoff. There would also be a low risk of accidental spills of petroleum products from construction equipment.

Placement of the drainage blanket and pipe to carry upstream flow through the west ravine fill will be undertaken when there is no flow in the ravine, thereby avoiding a potential surface water quality impact to the offsite wetland into which the west ravine discharges (see Figure 2.5.5-2 in Draft EIS Chapter 2).31

**Multi-Family Development Alternative**

Potential surface water quality impacts during construction would be similar for the Multi-Family Development Alternative to those described above for the Proposed Action. However, the Multi-Family Development Alternative would require only about half as much clearing: approximately 8.6 acres compared to approximately 17.2 acres with the Proposed Action. The potential increase in runoff would, therefore, not be as great.

**No Action Alternative**

Under the No Action Alternative, there would be no change to existing conditions of evapotranspiration, infiltration, or surface water runoff.

*POTENTIAL DEVELOPED-CONDITION IMPACTS*

**Proposed Action**

**Surface Water Movement and Quantity**

Areas of proposed site features that would affect stormwater generation in the completed condition of the PRD are summarized in Table 3.2-8.

Table 3.2-8. Proposed Action features that would affect stormwater generation.

<table>
<thead>
<tr>
<th>Developed-Condition Site Features</th>
<th>Area of Site Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site area</td>
<td>22.34 acres</td>
</tr>
<tr>
<td>Pollutant-generating surface (roads)</td>
<td>184,058 sf (4.23 acres)</td>
</tr>
<tr>
<td>Roof tops (conventional)</td>
<td>179,200 sf (4.1 acres)</td>
</tr>
<tr>
<td>Landscaped areas</td>
<td>409,659 sf (9.4 acres)</td>
</tr>
<tr>
<td>Forested areas</td>
<td>222,278 sf (5.1 acres)</td>
</tr>
<tr>
<td>Swales and raingardens</td>
<td>16,123 sf (0.37 acre)</td>
</tr>
</tbody>
</table>

1 The roof top estimate is based on 1,600 sf per dwelling unit x 112 single-family detached homes.

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31 Note that the only evidence of surface water flow on the Horseman’s Trail site was an occurrence during a heavy rain on snow event in December 2007. The course of the water was indistinct and disappeared about 100 feet north of the property line.
Figure 3.2-6
Developed Site Flowpaths
Conversion of the site from its present forested condition to residential development would result in decreased evapotranspiration. As a result, the volume of surface water generated for a particular storm event would increase. Runoff (direct surface water runoff and interflow) computed for existing conditions using the Western Washington Hydrologic Model would not be exceeded following development. Therefore, a significant amount of stormwater would be infiltrated on-site. Since the infiltration volume would increase relative to existing conditions, recharge to groundwater beneath the site would also increase shallow groundwater levels.

The increase in recharge to shallow groundwater would result in an increase in the volume of groundwater discharging to Picnic Point Creek, and may increase groundwater levels both on and off site. The magnitude of the increase would decline with distance from the recharge location. Analyses of the potential impacts to groundwater (Anthony Burgess Consulting Inc., September 2013a; Draft EIS Technical Appendix A) used a representative average water year (October 1960 through September 1961), and a wet water year (October 1970 through September 1971). Using these analyses together with the analyses undertaken for the design of the site stormwater management system, development of the site would result in a net increase in volume of runoff and groundwater flow to Picnic Point Creek of 11 acre-ft and 12 acre-ft for the average and wet years, respectively. These represent less than 1.0 percent of the total basin flow volumes for the average and wet years.

The drainage system for the developed site would primarily use LID techniques to provide infiltration to the fullest extent possible. The LID infiltration features have a linear component so that if the capacity of the site and system to infiltrate is exceeded, the overflow would enter piped conveyance to a stormwater detention system. In the western portion of the site, the detained discharge would be directed into the western ravine above the offsite wetland near the northwest corner of the property. The upper portion of the west ravine will be filled as part of proposed site grading. However, fill will not be placed in the lower portion of the west ravine, including the area downstream of the proposed discharge (see Figure 3.1-2 in the Earth section). Because of the high infiltration capacity of the outwash soils in the west ravine, it is expected that the detained discharge will infiltrate before it reaches the property line. Infiltrated waters would become groundwater that would partially feed the offsite wetland. Detained discharges to the wetland would lag precipitation and infiltration events. The overall effect would be to increase flows to the wetland throughout the year, with no significant change in the water depth or hydrology of the wetland.

Groundwater modeling (Anthony Burgess Consulting Inc., September 2013e; Draft EIS Technical Appendix D) shows that development of the Horseman’s Trail/Frognal Estates site will result in an overall increase in recharge to groundwater from the site area. As a result, the groundwater flow to the wetland, the principal location of discharge of site groundwater, will increase. However, the effects of storage and low flow rate in the groundwater system will result in the flows to the wetland lagging precipitation and infiltration events. The overall effect will be to increase the duration of flows to the wetland throughout the year, including the summer months when existing groundwater flows are at their lowest. The increased groundwater flows will not result in significant change in the depth of flow in the wetland.

The site grading proposal includes filling both the east and west ravines. There is no on-site evidence of surface water flow through these ravines at the present time. There is not a significant drainage area upstream of the site for the eastern ravine. However, off-site stormwater drainage from about 20 acres of residential development is directed to a discharge point in the west ravine immediately upstream of the

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32 A combination of cut walls and fill walls is proposed parallel to the slope in the upper portion of the west ravine. The fills will be keyed in or appropriately sloped down the ravine.
Horseman’s Trail/Frognal Estates site. Flows and corresponding frequencies for this drainage area were estimated using WHHM and are shown in Table 3.2-9.

Table 3.2-9. Estimated flows and frequency for off-site area discharging to west ravine within the Horseman’s Trail/Frognal Estates site.

<table>
<thead>
<tr>
<th>Flow Frequency (years)</th>
<th>Flow (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1.5459</td>
</tr>
<tr>
<td>5</td>
<td>2.2471</td>
</tr>
<tr>
<td>10</td>
<td>2.7663</td>
</tr>
<tr>
<td>25</td>
<td>3.4859</td>
</tr>
<tr>
<td>50</td>
<td>4.0691</td>
</tr>
<tr>
<td>100</td>
<td>4.6933</td>
</tr>
</tbody>
</table>

The erosion-causing threshold flow is generally taken as 50 percent of the 2-year return period flow (Washington Department of Ecology 2005, Volume I, Section 2.5.7 Minimum Requirement #7: Flow Control). WHHM analyses for Picnic Point Creek estimate the 2-year return period flow to be 109 cfs (Anthony Burgess Consulting Inc., September 2013c; Draft EIS Technical Appendix C). The increase in the 2-year return period flow (sum of west and east TDAs for developed conditions minus sum of west and east TDAs for existing conditions) is 0.06 cfs (Anthony Burgess Consulting Inc., September 2013a; Draft EIS Technical Appendix A). The increase in surface water flow from the site will therefore have negligible impact on the erosive flow conditions of Picnic Point Creek.

Surface Water Quality

Studies have shown that runoff from urban areas frequently has impaired water quality. Common pollutants and some potential sources are described below in Table 3.2-10 (Washington Department of Ecology 2006).

Table 3.2-10. Common pollutants in urban stormwater runoff and some potential sources.

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Potential Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead</td>
<td>Motor oil, transmission bearings, gasoline²</td>
</tr>
<tr>
<td>Zinc</td>
<td>Motor oil, galvanized roofing, tire wear, down spouts</td>
</tr>
<tr>
<td>Cadmium</td>
<td>Tire wear, metal plating, batteries</td>
</tr>
<tr>
<td>Copper</td>
<td>Brake linings, thrust bearings, bushings</td>
</tr>
<tr>
<td>Chromium</td>
<td>Metal plating, rocker arms, crank shafts, brake linings, yellow lane strip paint</td>
</tr>
<tr>
<td>Arsenic</td>
<td>Smelters, fossil fuel combustion, natural occurrence</td>
</tr>
<tr>
<td>Bacterial/Viral Agents</td>
<td>Domestic animals, septic systems, animal &amp; manure transport</td>
</tr>
<tr>
<td>Oil &amp; Grease</td>
<td>Motor vehicles, illegal disposal of used oil</td>
</tr>
<tr>
<td>Organic Toxins</td>
<td>Pesticides, combustion products, petroleum products, paints and preservatives, plasticizers, solvents</td>
</tr>
<tr>
<td>Sediments</td>
<td>Construction sites, stream channel erosion, poorly vegetated lands, slope failure, vehicular deposition</td>
</tr>
</tbody>
</table>
Nutrients | Sediments, fertilizers, domestic animals, septic systems, vegetative matter  
---|---  
Heat | Pavement runoff, loss of shading along streams  
Oxygen Demanding Organics | Vegetative matter, petroleum products.

Reference Guidance for UIC Wells that Manage Stormwater Department of Ecology December 2006 Publication No. 05-10-067 Table 4.1.


2Although lead is no longer an additive to gasoline, it is still present in the environment in trace amounts, and the remaining lead on the ground can be picked up by stormwater runoff.

The water quality impacts to Picnic Point Creek following development of the Proposed Action would be negligible for the following reasons:

- There are no industrial or commercial activities associated with the proposed action.
- The proposed stormwater management system would make extensive use of compost-amended soil, bioswales and infiltration facilities. These will retain many of the potential contaminants such as heavy metals, oils and grease in runoff from paved surfaces used by vehicles. Other contaminants, such as nitrates from fertilizer, would be wholly or partially taken up by the vegetation in the bioswales and rain garden features, thus limiting transfer to groundwater that ultimately discharges to Picnic Point Creek.
- The greatest contaminant loading in stormwater flows occurs in the “first flush” in the early part of a storm. The stormwater management system is designed to infiltrate and/or detain the first flush volumes, rather than directly discharging to Picnic Point Creek.
- There will be no water quantity impact to the wetland from filling the west ravine. The flow from developments upstream will be routed through the ravine fill via a pipe and drainage blanket.

**Multi-Family Development Alternative**

Surface water movement, quantity and quality impacts associated with the Multi-Family Development Alternative should be less than those described above for the Proposed Action. The area of principal features that would affect stormwater generation are summarized in Table 3.2-11.
Table 3.2-11. Multi-Family Development Alternative developed-condition areas.

<table>
<thead>
<tr>
<th>Developed-Condition Site Features</th>
<th>Area of Site Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site area</td>
<td>22.34 acres</td>
</tr>
<tr>
<td>Pollutant-generating surface (roads)</td>
<td>72,225 sf (1.66 acres)</td>
</tr>
<tr>
<td>Roof tops (conventional)</td>
<td>77,540 sf (1.78 acres)</td>
</tr>
<tr>
<td>Pathways and Decking</td>
<td>41,235 sf (0.95 acre)</td>
</tr>
<tr>
<td>Landscaped areas</td>
<td>135,940 sf (3.12 acres)</td>
</tr>
<tr>
<td>Roofgardens (lawn over buildings)</td>
<td>48,430 sf (1.11 acres)</td>
</tr>
<tr>
<td>Forested</td>
<td>597,650 sf (13.72 ac)</td>
</tr>
<tr>
<td>Swales and raingardens</td>
<td>0</td>
</tr>
</tbody>
</table>

With the Multi-Family Development Alternative, both the total impervious surface area (pollutant-generating surface and conventional roof tops) and landscaped area would be less than one-half of the comparable areas within the Proposed Action, and the forested area to be preserved would be greater by a factor of more than 2.5. Therefore, the amount of stormwater generated by the Multi-Family Development Alternative would be approximately 50 percent less than with the Proposed Action (PRD proposal).

**No Action Alternative**

There would be no change in surface water runoff and infiltration conditions if the No Action Alternative were selected. Since access to the site is not physically restricted by fencing, there is a potential for uncontrolled activities such as dumping that could lead to water quality degradation.

**MITIGATION MEASURES**

*Incorporated Plan Features.* The stormwater management proposal includes elements of Low Impact Development (LID) that would minimize the impact of stormwater generated on the site. These include bio-retention/infiltration swales, rain gardens, infiltration vaults, and compost-amended soils. The meandering stream channel in the cascading pool feature between 60th Avenue W and 58th Place W will be lined for erosion control.

Most road sections are “shed-sections” that flow to bio-retention/infiltration swales parallel to the road alignment. Requests for modifications to Engineering Design and Development Standards (EDDS) have been approved for these roadways as permitted within Planned Residential Developments as part of the PRD application and Division of Development submittal (SCC 30.42B.140).

Appropriate LID technologies are identified and described in the *Low Impact Development Technical Guidance Manual for Puget Sound* (2005). Technologies that might have applicability for the Horseman’s Trail/Frognal Estates development include:

- Permeable pavement to reduce runoff and improve infiltration
- Rain gardens to delay discharge and allow infiltration
- Soil amendment with compost to a depth of 10 to 12 inches to improve moisture retention in areas to be landscaped. Compostable material could be obtained during clearing operations by grinding wood waste and stumps. Soil moisture retained during the wet season would be evapotranspired by plants in the drier months.
• Roof runoff directed to dispersion and infiltration facilities.

Reduction in peak flows leaving the site may be achieved by routing stormwater flows through retention ponds or vaults. These are engineered structures that are designed to store incoming stormwater and release it at a controlled, reduced rate.

The proposal to fill the west ravine would block the natural drainage pathway for stormwater discharge from the upstream developed drainage areas. Although the drainage area upstream of the west ravine is limited to infrequent weather events (such as heavy rain on snow), the proposal includes installing a pipe that would allow passage of the unusual flows around the fill (see Figure 2.5.5-2 in Draft EIS Chapter 2). Installation of a drainage blanket is also proposed at the base of the fill to direct any runoff through the fill to the advance outwash where it could infiltrate through outwash sands to groundwater (approximately 100 feet below ground surface at this location). Preliminary engineering plans indicate that the stormwater conveyance pipe would be connected to a proposed catch basin located behind Lots 69 and 70 along the east property line. The pipe would collect runoff from lots and roads in the southeast portion of the development and connect to a proposed covered vault west of Lots 29 and 30. The vault would discharge through a series of infiltration beds and check dams to a level spreader at the northwest corner of the site. As an alternative, discharge from the vault may be conveyed by pipe to the Picnic Point Stormwater Conveyance (presently a roadside ditch).

The North Basin would include the roofs and backyards of Lots 9 through 28. The stormwater management proposal for this area is to infiltrate into compost-amended and native soil. Lots 9 through 15 will be located on the east ravine fill. This material will be predominantly till with low permeability. In order to avoid introducing runoff into the fill retaining structure, drainage will be directed to an infiltration trench to the west for runoff that exceeds the local infiltration capacity.

Applicable Regulations. The Snohomish County Water Pollution Control Code will prohibit discharge of pollutants to the County drainage system or waters of the State. Permits for land disturbing activities will require submission of Erosion and Sediment Control (ESC) and Spill Prevention Control and Cleanup (SPCC) plans. Compliance with these plans will minimize the potential for water quality impacts during construction. Pollution control measures will also be required in the developed-condition stormwater management system.

As detailed on the Snohomish County Planning and Development Services web site (2008), the Snohomish County Code 30.63A requires that stormwater management systems comply with the Stormwater Management Manual for the Puget Sound Basin (Washington Department of Ecology 1992), the Snohomish County Addendum (Snohomish County 1998), and Volume II of Ecology’s 2005 Stormwater Management Manual for Western Washington (SMMWW). The 2005 Ecology SMMWW defines more stringent design criteria for stormwater systems than the 1992 manual. The stormwater management system for the proposed Horseman’s Trail/Fрогнал Estates development, including construction ESC measures, will follow the requirements of the 2005 SMMWW. Of particular note is SMMWW Minimum Requirement No. 7 that requires stormwater discharge to streams to match developed discharge durations to pre-developed durations for the range of pre-developed discharge rates from 50 percent of the 2-year peak flow up to the full 50-year peak flow.

• Detailed drainage modeling will be provided to analyze surface and below ground drainage, retaining wall drainage, and the function of the proposed stormwater management and water quality treatment system prior to the issuance of any County permits for site grading.

The Off Site Analysis Report (Anthony Burgess Consulting Inc., September 2013c; Draft EIS Technical Appendix C) provides detailed analysis of potential project effects on Picnic Point Creek.
• Additional analysis of the Northeast Drainage Basin will be performed during final design (as required by SCC 30.63A.200[2][b]) to evaluate the conveyance(s) from the site discharge(s) to the creek.

Reviewers are also encouraged to read the list of mitigation measures for erosion/sedimentation in Draft EIS Section 3.1.3.

SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

With proper installation and maintenance of stormwater management facilities and Best Management Practices during construction, and with effective design, construction and maintenance of the developed condition stormwater management system to include Low Impact Development features – all as required by applicable regulations administered by Snohomish County and the Washington Department of Ecology – no significant unavoidable adverse impacts to surface water movement, quantity or quality would be anticipated.

3.2.2 Groundwater Movement, Quantity and Quality

Groundwater occupies subsurface pore space in soil and rocks. The groundwater level or elevation is the level to which water rises in a well constructed in the water-bearing formation. Soils that are permeable, such as sands and gravels, allow the free flow of groundwater, and are called “aquifers.” By contrast, soils that restrict the flow of groundwater, such as clays, are called “aquitards.” Aquifers are classified as being either confined or unconfined. A confined aquifer has aquitards above and below, and a water level that rises above the top of the aquifer. An unconfined aquifer has a water level that is within the aquifer. As a result, the section of the aquifer that is above the water level (or water table as it is also called), is only partially saturated. This zone of partial saturation is also known as the vadose zone.

By installing monitoring wells at various locations within an aquifer, the hydraulic heads relative to a datum, usually sea level, can be determined. Groundwater flows from areas of high hydraulic head to areas of low hydraulic head. If contours (called equipotentials) are drawn through points of equal hydraulic head, the groundwater flow direction is generally in the direction of steepest slope. The slope between two points divided by the distance between the points is the hydraulic gradient. The ability of aquifer material to transmit water is called permeability, or “hydraulic conductivity.” The quantity or flux of water that flows through a section of aquifer is a function of the hydraulic gradient, the hydraulic conductivity and the cross-sectional area of the aquifer.

Recharge to a groundwater system occurs from the natural infiltration of precipitation into the subsurface. Man-made systems such as irrigation, stormwater infiltration ponds and injection wells can also contribute water to the groundwater. Discharge of groundwater occurs from springs and seeps. Some of these are visible, for example at the base of slopes. Elsewhere, springs and seeps occur into the beds of lakes, streams and rivers and can only be detected by careful observation of flows or by small changes in water temperature or chemistry.
AFFECTED ENVIRONMENT

Regional and Site Groundwater Units

Recessional Outwash. The recessional outwash is typically sand and gravel, deposited by glacial meltwater during the retreat of the most recent glaciation. On the Horseman’s Trail/Frognal Estates site, this unit is thin, and has been identified only in EP-17 in the southeastern part of the site (AESI 2005). No groundwater was encountered during the excavation of this exploration pit.

Vashon Till. The Vashon till is the most widespread near-surface glacial deposit underlying the Horseman’s Trail/Frognal Estates site upland and surrounding area. It is a dense silty sand with gravel and cobbles. The till is an aquitard, restricting the downward movement of infiltrating water. However, the upper 3 to 5 feet are typically weathered, and root growth and other near-surface processes result in an increased permeability in this zone.

Advance Outwash (Qva). The advance outwash directly underlies the Vashon till, and was deposited by meltwaters in advance of the Vashon glaciation. It is typically sand with variable amounts of silt and gravel. On the Horseman’s Trail/Frognal Estates site, the full thickness of the advance outwash was encountered in MW-1, extending from 43 feet below ground surface (bgs) to 216 feet bgs, for a total thickness of 173 feet. The base of the advance outwash was encountered at elevation 237 feet msl. Monitoring well MW-3 located in Regatta Estates (adjacent to Horseman’s Trail/Frognal Estates on the east) encountered only pre-Vashon deposits. Ground surface at this location is about elevation 240 feet msl, indicating that the base of the advance outwash is above this elevation. Exploration boring EB-6 was terminated in fine sand at elevation 237.5 due to heaving sand in the boring. This is interpreted as indicating that the boring extended below the water table, and that the final depth was close to the base of the advance outwash and the less-permeable underlying pre-Vashon sediments.

Pre-Vashon Deposits. A series of glacial and non-glacial deposits underlie the Vashon glacial sequence. The uppermost sequence encountered in MW-3 consists of silty sand with silt seams, resulting in a lower permeability than the overlying advance outwash. The pre-Vashon deposits restrict the downward movement of groundwater which results in the lateral flow of groundwater in the advance outwash.

Investigations

Site investigation work included the construction of three monitoring wells at the locations shown on Figure 3.1-3. Water level observations have been collected since March 2006 using a manual water level probe. In addition, pressure transducers with data loggers were installed in the monitoring wells to provide continuous readings of water levels over selected periods.

The water level in monitoring well MW-1, located near the southern property boundary and screened in the advance outwash, has shown a gradual increase of about one foot over the period of observation. This is consistent with other observations in the Puget Sound area that have shown groundwater levels rising following a period of below-normal rainfall from 2000 to 2005. The water level has shown seasonal fluctuation of 0.1 to 0.2 feet, being highest in the summer, and lowest in the late fall and winter. Short-term fluctuations (of the order of a few days) have been up to 0.6 feet in response to significant precipitation events. Monitoring well MW-2, also screened in the advance outwash and located near the northern property boundary, has shown similar water level fluctuations to MW-1. The increase in water level over the period of observation has been about 0.8 feet, with a seasonal fluctuation of up to 0.4 feet. The well does not exhibit short term fluctuation. Monitoring well MW-3 is located off site to the north in Regatta Estates, and is screened in the pre-Vashon sediments underlying the advance outwash. It also
shows an increase in groundwater level of about 0.8 feet over the period of observation. It shows medium-term fluctuations (on the order of a few weeks) up to one foot, which is significantly greater than observed in the wells screened in the advance outwash. Since the end of May 2008, the water level has shown a consistent decline that correlates with construction activities at the wastewater treatment plant that have included excavation dewatering.

Aquifer characteristics were estimated using field and laboratory techniques. The results are summarized in Table 3.2-12. Water level observations and well testing data are presented in *Groundwater Conditions Horseman’s Trail PRD* (Anthony Burgess Consulting Inc., September 2013c; Draft EIS Technical Appendix D).

Table 3.2-12. Estimates of hydraulic conductivity on the Horseman’s Trail/Frognal Estates site.

<table>
<thead>
<tr>
<th>Location</th>
<th>Stratum</th>
<th>Test Method</th>
<th>Hydraulic Conductivity (ft/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MW-1</td>
<td>Advance outwash</td>
<td>Slug</td>
<td>1.5 to 2.1</td>
</tr>
<tr>
<td>MW-2</td>
<td>Advance outwash</td>
<td>Slug</td>
<td>0.6 to 3.6</td>
</tr>
<tr>
<td>MW-3</td>
<td>Advance outwash</td>
<td>Slug</td>
<td>0.5 to 0.8</td>
</tr>
<tr>
<td></td>
<td>Advance outwash</td>
<td>Estimates from grain size</td>
<td>34 to 88</td>
</tr>
<tr>
<td></td>
<td>Till</td>
<td>Compacted till laboratory constant head</td>
<td>0.011</td>
</tr>
</tbody>
</table>

**Recharge**

A schematic of the recharge system under existing conditions is shown in Figure 3.2-7. The Horseman’s Trail/Frognal Estates site receives an annual average of about 37 inches of precipitation. Under existing conditions, about half of the precipitation evaporates or is transpired by the forest cover on the site. Nearly all of the remainder infiltrates to become groundwater recharge. A small amount of runoff and interflow occurs locally, but at the scale of the site, nearly all runoff infiltrates in a short period of time. For existing conditions with average annual precipitation, recharge is estimated from the Washington Department of Ecology (2007) Western Washington Hydrologic Model (WWHM) to be 8.6 inches per year for till forest and 11.1 inches per year for outwash forest. In the area underlain by till, the infiltrating water moves vertically downward through the weathered till. The underlying unweathered till is less permeable than the overlying weathered section. This causes some of the infiltrating water to move laterally, while the remainder enters the unweathered till and slowly leaks downwards to the underlying advance outwash. Water moving along the unweathered/weathered till interface enters the advance outwash where the till is eroded along the valley or ravine. In the permeable sand and gravel outwash, the infiltrating water moves downward until it reaches the water table.

**Groundwater Flow**

Groundwater flow in the advance outwash is from south to north and northwest, based on observations in monitoring wells. The aquifer is recharged by leakage through the till and by direct infiltration where the advance outwash is near the ground surface. Local groundwater flow and basins in water table aquifers typically reflect surface topography. Based on this premise, the groundwater divide is expected to run east-west, approximately aligned with 140th Street SW, which is midway between the Picnic Point Creek and Norma Creek drainage to the south. Surface water discharge from the advance outwash is to the wetland adjacent to the northwest corner of the site. The advance outwash also loses water by downward leakage into the less-permeable pre-Vashon deposits, and by lateral flow into the geologically recent valley alluvium, particularly within the side valley in which Picnic Point Road was constructed, east of Regatta Estates.
Weathered till

Unweathered till

Sand and Gravel advance outwash

Silty sand advance outwash and pre-Vashon sediments

Precipitation

Evapotranspiration

Figure 3.2-7

Site Hydrologic System Schematic
**Groundwater Model**

The objectives of groundwater modeling were to evaluate the impacts of infiltrating stormwater on the Horseman’s Trail/Frognal Estates site. The groundwater model used the software package Visual MODFLOW (Waterloo Hydrologic 2008) that is based on the USGS MODFLOW model (MacDonald and Harbough 1988). The model area is shown on Figure 3.2-8. Details of the model, including boundary conditions, discretization, calibration, and parameters are provided in *Groundwater Conditions Horseman’s Trail PRD* (Anthony Burgess Consulting Inc., September 2013e; Draft EIS Technical Appendix D).

The groundwater model reproduced the existing conditions flow system interpreted from monitoring well observations. For the Proposed Action, recharge was applied to simulate monthly average infiltration rates for average, dry and wet years as determined from the WWHM analyses. Changes in groundwater levels beneath the site and adjacent areas, and changes in the groundwater flux to the wetland and Picnic Point Creek were estimated from the model analyses.

**POTENTIAL IMPACTS DURING CONSTRUCTION**

**Proposed Action**

During construction, approximately 17.2 acres of forest cover will be removed from the site with implementation of the Proposed Action (PRD proposal). As a result, evapotranspiration will be reduced, and the volume of surface water runoff will increase. Since the proposal is to infiltrate runoff on-site to the fullest extent possible, recharge to shallow groundwater would increase. Temporary conditions during construction were not explicitly evaluated. However, impacts to groundwater would be less during site preparation than following project full build-out since the maximum runoff-generating impervious surface area would not occur until all construction is complete.

**Multi-Family Development Alternative**

Construction impacts to groundwater quantity and movement would be similar for the Multi-Family Alternative to those described above for the Proposed Action, though only approximately 8.6 acres of forest cover would be removed from the site and the west ravine would not be filled.

**No Action Alternative**

Under the No Action Alternative, there would be no change from existing conditions of evapotranspiration, infiltration, or surface water runoff.
Figure 3.2-8
Groundwater Model Area
Proposed Action

Total impervious surface area (roads, parking areas and rooftops) would be approximately 8.34 acres with implementation of the Proposed Action (PRD proposal). Forest cover to remain would be approximately 5.1 acres. Direct impacts could result from the increase in stormwater infiltration and recharge to groundwater that would occur as a result of these alterations to the site. This could produce minor increases in fluxes to the off-site wetland and Picnic Point Creek. Increases in groundwater levels and discharges to the wetland and Picnic Point Creek are summarized in Table 3.2-13. For reference, the average annual flow in Picnic Point Creek is estimated from WWHM modeling to be 2.7 cfs and 3.8 cfs for average and wet years, respectively. The increases in flow due to the development of the Horseman’s Trail/Froginal Estates PRD would therefore not be significant compared with existing flows in the creek. The increase in groundwater discharge to the wetland, and hence change in stage, was evaluated using open channel flow hydraulics. It was concluded that the maximum increase in water depth would be less than one-half inch, and therefore would not be significant to wetland functions (Anthony Burgess Consulting Inc., September 2013d, Attachment C: Wetland Analyses, in Draft EIS Technical Appendix C).

There would be no significant change to the hydrology that supports the stand of trees to remain in Tract 999. Most of this tract is on well-drained advance outwash soils. Direct precipitation onto Tract 999 and subsequent infiltration of this precipitation will not change following site development. Therefore, the groundwater source of moisture for tree growth will not be changed. Groundwater modeling summarized in Section 5.2.2 of the Groundwater Conditions Report prepared for the project (Anthony Burgess Consulting Inc., September 2013e; Draft EIS Technical Appendix D) predicts a rise in the groundwater level in the Tract 999 area following development of between 1.1 feet (northeast location, wet year), and 2.3 feet (northwest location, dry year). Over much of Tract 999 it is unlikely that there is significant root structure to the depth of groundwater, since the unsaturated zone is extensive, reaching about 100 feet deep at the top of the slope. Even if roots reach groundwater on the lower portion of Tract 999, the slight predicted rise in the groundwater level is unlikely to be significant as natural changes in the groundwater level of 0.8 foot have been observed in monitoring well (MW) 2, screened in the advance outwash (Anthony Burgess Consulting Inc., September 2013e; Draft EIS Technical Appendix D).

Multi-Family Development Alternative

Potential impacts to groundwater quantity and movement with the Multi-Family Development Alternative would be similar to the impacts of the Proposed Action, described above. As noted in Section 3.2.1, compared with the Proposed Action, the Multi-Family Development Alternative would require less area to be cleared (approximately 8.6 acres), thus leaving more undisturbed forest (approximately 13.72 acres). Also, the Multi-Family Alternative would introduce less total impervious surface area (approximately 3.4 acres). Stormwater generation, and therefore infiltration quantity with the Multi-
Family Development Alternative would be about 50 percent of the volume generated by the Proposed Action, thus resulting in less recharge to shallow groundwater.

No Action Alternative

There would be no change in groundwater conditions on the site if the No Action Alternative were selected. Since access to the property is not physically restricted by fencing, there would be a potential for uncontrolled activities such as dumping on the unoccupied site that could lead to degradation of groundwater quality.

Mitigation Measures

Incorporated Plan Features. The stormwater management proposal includes Low Impact Development (LID) techniques that would minimize the impact of stormwater generated from the developed condition of the site: bio-retention/infiltration swales, rain-gardens, infiltration vaults, and compost-amended soils. These techniques will also provide water quality treatment of stormwater prior to infiltration.

Dispersal of stormwater infiltration across the site area as proposed would reduce the rise in the shallow groundwater level, compared with infiltrating stormwater at one location.

Installation of drains and drainage blankets behind retaining structures would lower groundwater levels in these very localized areas, thereby minimizing the potential for slope instability.

To mitigate potential surface and groundwater quality impacts, the Homeowners’ Association could implement a public information program to educate residents on limiting the use of fertilizers and garden chemicals, and cleanup and disposal of pet wastes. These issues are typically addressed in the Operations and Maintenance Manual for the project.

Applicable Regulations. Criteria for the design of stormwater infiltration systems are defined in the Stormwater Management Manual for Western Washington (Washington Department of Ecology 2005). In particular, there is a requirement that the base of infiltration facilities are to have a separation of at least 5 feet from the seasonal high groundwater level. All developed facilities would meet this criterion.

Significant Unavoidable Adverse Impacts

Identified groundwater impacts would either not be adverse (such as the increase in groundwater flow to Picnic Point Creek), or would not be significant (for example, the rise in the shallow groundwater level beneath infiltration areas).
4. References

Alderwood Water and Wastewater District. 2007. Personal communication between Brigette McCarty, Senior Engineer and Project Manager, and Jim Miller, Jim Miller Planning Services, re: discharge from Picnic Point Wastewater Treatment Plant.


Associated Earth Sciences, Inc. 2006b. Revised Supplementary Subsurface Exploration, Geologic Hazards, and Preliminary Geotechnical Engineering Study, Horseman’s Trail Development.


Britsch, Steve. Snohomish County Department of Public Works, Surface Water Management Division. February 4, 2009. Personal communication by e-mail with Tony Burgess, Anthony Burgess Consulting, Inc., Horseman’s Trail PRD EIS Peer Review Consultant, re: Picnic Point Creek water quality data.


Holser, Ginger. Regional Habitat Biologist, Washington Department of Fish & Wildlife. February 2009. Personal communication with Tony Burgess, Anthony Burgess Consulting, Inc., Horseman’s Trail PRD EIS Peer Review Consultant, re: Picnic Point Creek salmon populations and critical spawning and rearing periods.


Kegel & Associates. February 27, 1981. Road and Drainage Plan and Profile for Forest Landing Divisions 1 and 2, Sheet 2 of 3.


Land Technologies. December 2006. Transportation Demand Management Plan: Horseman’s Trail PRD.


Mukilteo School District. May 2008. Personal communication with Jim Miller, Jim Miller Planning Services, re: student generation rates and schools that would be attended by Horseman’s Trail students.


[http://www.dnr.wa.gov/geology/dig100k.htm](http://www.dnr.wa.gov/geology/dig100k.htm).


5. Distribution List

SNOHOMISH COUNTY
Snohomish County Planning and Development Services, Attn: Kay Wheeler
Biologist
Drainage Plans Examiner
Long Range Planning
Snohomish County Department of Public Works
Snohomish County Department of Public Works, Surface Water Management
Snohomish County Department of Parks and Recreation, Attn: Pat Kenyon
Snohomish County PUD No. 1, Attn: Mary Wicklund

OTHER MUNICIPAL ENTITIES
City of Mukilteo, Attn: Mayor Joe Marine
City of Mukilteo, Attn: Anita Marrero
Snohomish County Fire District #1
Snohomish Health District, Attn: Bruce McCormick

UTILITIES AND SERVICE PROVIDERS
Alderwood Water & Wastewater District
Community Transit
Mukilteo School District #6, Attn: Josette Baines
Mukilteo School District #6, Attn: Dennis Armstrong, Transportation
Snohomish County Public Utility District #1
Washington Natural Gas Company

LIBRARIES AND NEWSPAPERS
Everett Main Downtown Library
Everett Evergreen Branch Library
Everett Herald
Mukilteo Library
Mukilteo Beacon News

TRIBES
Stillaguamish Tribe, Attn: Edward Goodridge
Tulalip Tribes
Muckleshoot Tribe

STATE AGENCIES
Washington State Department of Agriculture
Washington State Department of Archaeology & Historic Preservation
Washington State Department of Ecology
Washington State Department of Fish & Wildlife
Washington State Department of Natural Resources
Washington State Department of Health
Washington State Department of Transportation, Attn: Ramin Pazooki
FEDERAL AGENCIES

U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Soil Conservation Service
U.S. Fish & Wildlife Service

INTERESTED ORGANIZATIONS

Edmonds–Mukilteo Action Committee
Master Builders Association of King and Snohomish Counties, Attn: Jeff Danks
Pilchuck Audubon Society, Attn: Kristen Kelly

APPLICANT

Frognal Holdings, LLC; Integral Northwest, Manager: John Lakhani
Frognal Holdings, LLC; Integral Northwest, Manager: Kamil Lakhani

CONSULTANTS

Anthony Burgess Consulting, Inc., Attn: Anthony Burgess
Associated Earth Sciences, Inc.
Land Technologies, Attn: Merle Ash
Jim Miller Planning Services, Attn: Jim Miller
Vicki Morris Consulting Services, Attn: Vicki Morris

INTERESTED INDIVIDUALS: PARTIES OF RECORD

<table>
<thead>
<tr>
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Horseman's Trail/Frognal Estates PRD Draft EIS
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**ADJACENT PROPERTY OWNERS**

Notice of issuance of the Horseman's Trail/Frognal Estates PRD Draft EIS has been mailed to property owners of record within 500 feet of the external boundaries of this project.
Reference Information as it Relates to Horseman’s Trail/Frognal Estates Draft EIS Chapter 2 Subsection 2.4.6, Discussion of the Grading Conditions on the Adjacent Plat of Regatta Estates

At the time the Regatta Estates (PRD) plat was under review, preliminary plats in the Paine Field area of Snohomish County had to comply with the Paine Field Area Comprehensive Plan (PFACP) pertaining to grading and development on steep slopes. Since development of Regatta Estates, a new GMA Comprehensive Plan was adopted for Snohomish County. At the 10-year update of the County's General Policy Plan (GPP) Comprehensive Plan effective February 1, 2006, the PFACP along with other subarea plans was repealed and policies in the subarea plan no longer applicable to development in that portion of the County.

The second modified (final) MDNS dated August 26, 1991 for Regatta Estates identified a number of potential impacts and mitigation measures for Regatta noted below. These were associated with increased surface stormwater runoff from construction activity and development on steep slopes:

**Impacts**

- Increased surface water runoff from construction activity and the impervious surfaces created by the project will occur, increasing the potential for siltation and additional pollutants to be discharged into Picnic Point Creek.
- Topographic modifications and the potential for erosion will occur due to proposed grading activities.

**Mitigation Measures**

- Siltation and erosion control measures shall be employed as necessary to ensure appropriate on-site and off-site water quality control.
- Compliance with Title 17 and Title 24 Snohomish County Code (SCC) provisions, and all grading in the critical areas near steep slopes and adjacent to wetlands shall be monitored by a qualified engineer to ensure proper implementation of erosion/siltation control devices, and recommendations of applicable geotechnical reports.
- Prior to final plat approval, the proponent shall adequately demonstrate that lots 59-62, 71-74 and lot 77, identified on the preliminary plat map can be developed in accordance with professional planning method standards (18.46.030(3)(b) SCC). Information submitted in accordance with this requirement shall also include clearing and revegetation plans, detailed geotechnical analysis as well as limits of site disturbance for each lot.
- All open space areas shall be designated on the final plat as Native Growth Protection Areas and shall remain in substantially natural state.
- A minimum of 25% of the conifer trees, where the trunk is over 8 inches in diameter 3 feet above the ground, shall be retained on each lot in the plat or an 8-foot tall conifer shall be planted to replace every such tree removed; a maximum of four replacement trees are required to satisfy this requirement. In any event there shall be a minimum of four conifer trees remaining on each lot.
The Hearing Examiner Decision for the Regatta Estates preliminary plat (October 10, 1991) noted that the Snohomish County Code (at the time) contained regulations regarding residential development on steep slopes (Chapter 18.46 SCC [Development on Steep Slopes]). The Planning Department calculated a maximum potential lot yield of 188 lots based on these regulations. The applicant had provided an analysis of slope conditions for each of the lots on the subject property and had utilized the “professional planning method” on Chapter 18.46 SCC for those lots exhibiting the highest degree of slope.

The Hearing Examiner decision approving the preliminary plat was appealed to the County Council. The Council’s decision on the appeal (Council Motion 92-079, March 11, 1992) included several conclusions and conditions noted below that pertained to preservation of native vegetation and development on steep slopes.

- The Council found that the County is to carefully consider cumulative impacts and modify the proposal such that it is compatible with Environmentally Sensitive Areas (ESA) regulations (Paine Field Comprehensive Plan). Plan Policies I.1 and I.4 provide that conditions in developments with ESAs may include 25 to 50-foot natural vegetative buffers to minimize impacts on the hydrologic system. Policy I.9 states that major modifications to the physical environment in steeply sloping areas are to be avoided.

- The Council concluded that the environmentally sensitive nature of the site and the cumulative impacts from development and at least two road washouts which have already occurred in the drainage basin together with the impacts of this development require careful attention to and treatment of stream and wetland buffers, and of steep slopes on the site.

- Clearing plans shall have been submitted to and approved by the Department of Planning and Community Development which show retention of a minimum of 25% of conifer trees having a trunk diameter of eight inches or greater measure three feet above the ground. As an alternative, the plan may depict the planting of an eight foot tall minimum conifer for every such tree removed provided that the maximum number of replacement trees shall be four. In any event, the plan shall depict a minimum of four conifer trees on each lot. In addition, said plan shall include treatment of the vegetative buffer along Picnic Point Road.

- Grading activities shall take place only during dryer months defined herein as April 1 to October 1.

- Lots with slopes in excess of 25% shall have such areas depicted as Native Growth Protection Areas, except as described in the Hearing Examiner’s decision Condition G.vi. and G.x.

Regatta Estates received preliminary approval on March 27, 1992 following the County Council decision on the appeal. At the time Regatta Estates was under review, residential development on steep slopes was subject to the steep slopes provisions of SCC 18.46.030(1-3) (Development on Steep Slopes – Subdivision Regulations). The regulations limited the maximum potential dwelling unit density on steep slopes with the limitation based on the residential zone of a site and the slope percentage. The regulations included a provision that allowed the planning director to call for engineering justification for any development in sloped areas if the director determined that public, health and safety might be jeopardized. The steep slope provisions applied to all subdivisions and short subdivisions.

In 1995, the County’s first Critical Areas Regulations (CAR) were adopted in SCC Chapter 32.10. These regulations included provisions in SCC 32.10.420 (Landslide Hazard Areas) that regulated development on steep slopes that applied to all subdivisions. The code at that time defined Landslide Hazard Areas with respect to slope percentage as slopes steeper than 33% which intersect geologic contacts that contain springs or ground water seeps.
Sometime between 1996 and 2002, SCC 18.46.030 (1-3) was amended to exclude Planned Residential Developments (PRDs) combined with subdivisions from the provisions that regulated residential development on steep slopes. In December 2002, the Council approved Ordinance 02-064 that in part updated language for development on steep slopes in Chapter 18.46 SCC. The updated language was substantially simplified in the transfer to the Unified Development Code (Title 30) and was adopted in SCC 30.41A.250(2) [Density for Sloping Land – Determination of Potential Maximum Dwelling Unit Density] in 2002. The regulations limited maximum potential dwelling unit density in the same manner as the previous regulations in SCC 18.46.030(1-3). The requirements in SCC 30.41A.250(2) in effect when the Horseman's Trail/Frognal Estates application was submitted to Snohomish County and deemed complete in August 2005 included a provision that excluded PRDs from the steep slope regulations.

The Horseman's Trail/Frognal Estates PRD application, deemed complete in August 2005, is subject to the steep slope regulations of SCC 30.62.210 (Landslide Hazard Areas) that are part of the County’s Critical Area Regulations that were in effect in 2005. The code in 2005 defined Landslide Hazard Areas with respect to slope percentage as slopes steeper than 33% which intersect geologic contacts that contain springs or ground water seeps. The northwest portion of the Horseman's Trail/Frognal Estates PRD site (approximately 0.5 acre) meets the definition of a Landslide Hazard Area pursuant to SCC 30.62.210 due to slopes of approximately 50% and presence of a wetland at the base of the slope that indicates likely groundwater seepage. The Critical Areas Regulations in effect in 2005 for steep slopes allowed development on slopes greater than 33% as long as engineering or geotechnical analysis was prepared to determine proper protective measures.

**Citations for Environmental Documents**


Land Use and Development History Reference Documents

Final EIS prepared for revision to the Possession Shores Master Plan and contract rezone (June 13, 1978).
Second Modification to Mitigated Determination of NonSignificance for Regatta Estates Subdivision (signed August 26, 1991).
Geotechnical Report for Regatta Estates (dated/received by Snohomish County PDS September 1989).
Wetlands Determination and Conceptual Mitigation Plan for Regatta Estates Preliminary Plat (dated/received by Snohomish County PDS September 1989).
Harbour Pointe Sector 23 Plan (approved August 29, 1980).
Possession Shores (Harbour Pointe) Master Plan (April 1978).
Harbour Pointe Sector 22 Plan (approved September 1982).
Hearing Examiner decision on Regatta Estates Preliminary Plat (October 10, 1991).
Corrected Motion No. 92-079-Appeal from Hearing Examiner Decision, Plat of Regatta Estates (March 11, 1992).
Hearing Examiner Decision in Response to Limited Remand – Plat of Regatta Estates (March 27, 1992).
Alderwood Water and Wastewater District Expansion of Picnic Point Wastewater Treatment Plant (WWTP) Facility: Upstream and downstream water quality and erosion analysis for Picnic Point Creek and other environmental documents for the WWTP (potential impacts to ESA-listed fish species).
Final EIS and Addendums for 10-Year Update of Snohomish County General Policy Plan (GPP) Comprehensive Plan.