



CITY OF WOODINVILLE, WA
REPORT TO THE CITY COUNCIL
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To: Honorable City Council **Date:** 4/14/2015
From: Richard A. Leahy, City Manager *[Signature]*
By: David Kuhl, Development Services Director *[Signature]*
Subject: Public Hearing for the 2015 Comprehensive Plan

ISSUE: Shall the City Council open the public hearing and receive testimony regarding the 2015 Comprehensive Plan and Zoning Code Update?

RECOMMENDATION: To open the public hearing and receive testimony.

POLICY DECISION: The Comprehensive Plan is being updated as required by state law. Approval of the Plan is required no later than June 30, 2015. As part of Comprehensive Plan Update, the Zoning Code is being simplified and updated.

BACKGROUND/DISCUSSION: The public hearing includes the 2015 Comprehensive Plan (Ordinance 591), the Parks, Recreation and Open Space Plan (Ordinance 591), Code Amendments associated with a Best Available Science Review for critical area regulations (Ordinance 605), and a Planned Action Ordinance for the Central Business District (Ordinance 606).

There are two memos included as attachments that are responses to questions posed by Council.

ALTERNATIVES:

1. Open the Public Hearing for Ordinance No. 591, 605, 606, take testimony, and continue the hearing to May 5, 2015.
- 2.

RECOMMENDED MOTION:

1. **OPEN THE PUBLIC HEARING FOR ORDINANCE NO. 591, 605 and 606 REGARDING THE 2015 COMPREHENSIVE PLAN, THE PARKS, RECREATION AND OPEN SPACE PLAN, CODE AMENDMENTS ASSOCIATED WITH A BEST AVAILABLE SCIENCE REVIEW FOR CRITICAL AREA REGULATIONS AND A PLANNED ACTION ORDINANCE FOR THE CENTRAL BUSINESS DISTRICT.**
2. **OPEN THE PUBLIC TESTIMONY PORTION OF THE HEARING.**
[Receive the staff report and public comment]
3. **I MOVE TO CONTINUE THE PUBLIC HEARINGS TO MAY 5, 2015 IN THE WOODINVILLE CITY HALL COUNCIL CHAMBERS AT 7:00PM OR AS SOON THEREAFTER AS MAY BE HEARD.**

Attachment 1: Council Questions and Responses dated 4-3-2016

Attachment 2: Memo dated 4-06-2015 responding to Council Comp Plan Questions

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WOODINVILLE COMPREHENSIVE PLAN & MUNICIPAL CODE UPDATE

Council Questions and Responses | April 3, 2016

1. History of median age of city population.

In the Existing Conditions Report Section 2.4, Economic Development, the median age in Woodinville as of 2011 was just over 36 years old, while the median age for King County was 37 years old (2007-2011 American Community Survey Data). More recent information, as well as historic information is presented below in Exhibit 1.

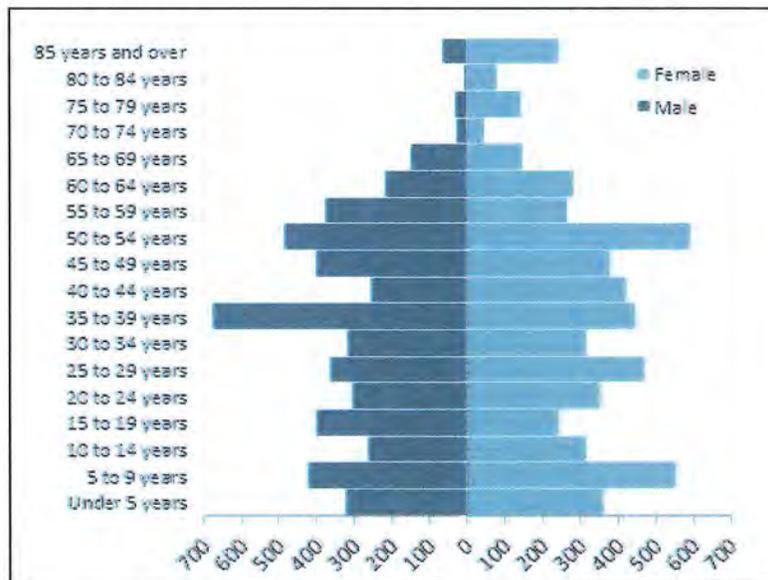
Exhibit 1. Median Age (Years) of Population, Woodinville, Washington

2000	2010	2007-2011	2008-2012	2009-2013
35.7	38.9	36.4	37.7	39.4

Source: US Census 2000 and 2010; American Community Survey 5-Year Estimates, 2011, 2012, and 2013

Over the 20-year planning period it is anticipated the population will have a greater percentage of those who are of retirement age, per Exhibit 2 below (also included in the November 2014 Existing Conditions Report).

Exhibit 2. Age Distribution by Sex, 2007-2011 5-Year Average



Source: US Census American Community Survey, 2007-2011 5-Year Average; BERK, 2013

2. Where/how is "Open Space" defined in Comp Plan, Woodinville Municipal Code, Regulations

Please see the following definition in the Draft 2014 Parks, Recreation, and Open Space (PRO) Plan. It is basically the same as the 2005 PRO Plan definition with an acreage update.

Resource/Open Space Parks

Resource parks are natural resource lands set aside for preservation of significant natural resources, open space and areas for visual aesthetics, buffering, and preservation of vegetation, wetland, stream, or wildlife habitat. These lands are typically characterized by steep slopes, significant natural vegetation, wildlife habitats, drainage ways and ravines, surface water management areas, wetlands, lakes, streams, other environmentally sensitive areas and utility easements. The location and frequency of resource areas will depend on the natural conditions intrinsic to the place of study.

Resource and open space lands are defined by areas of natural quality for passive use or nature oriented outdoor recreation. They should encompass lakes, streams, marshes, flora, fauna, topography and other diverse or unique natural resources. Recreational use, such as an interpretative trail, viewpoint, exhibit signs, picnic areas or other features, may be secondary, non-intrusive uses of the property.

The City currently owns seven properties totaling approximately 97 acres of land within the city limits that are considered resource or open space. These lands include stream corridors, wetlands and floodplains, steep slopes and woodland areas, unique ecological and wildlife habitats and other fragile environments.

The shaded paragraph above was included as a “sidebar” in the Planning Commission Recommended Comprehensive Plan (March 2015) within the Parks and Recreation Element.

The current 2009 Comprehensive Plan includes a similar Public Parks designation as well as an Open Space Tract designation:

Public Parks

This designation has been applied to all existing and planned publicly owned parks.

Open Space Tracts

This designation has been applied to all “open space tracts” within the city limits that have been retained as open space areas. Many of these areas were set aside as part of development agreements and are owned by King County. They are often located in sensitive environmental areas. Open Space areas may be suitable for passive and/or active recreation development such as neighborhood parks.

The Planning Commission Recommended Comprehensive Plan (March 2015) Land Use Element includes the following related land use designation:

Public Parks

Purpose: This designation is applied to all existing and planned publicly owned parks.

Allowed uses & density: Public parks.

The 2015 Recommended Plan does not include the Open Space Tracts designation. A purpose of the Plan Update included consolidating and simplifying land use designations. Open Space designations would be redesignated to the surrounding predominant designation. As another example, Office and High Density Residential and Office would be redesignated to surrounding designations such as CBD or General Commercial.

The Subdivision regulations in Title 20 WMC includes this definition of open space:

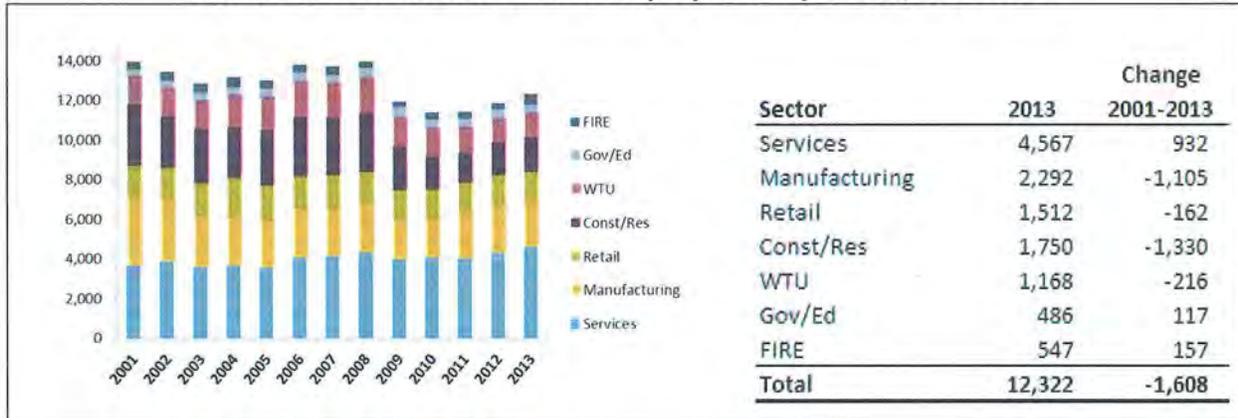
20.04.160 Open space.

Open space: open land for conservation of natural features, provision of visual amenity and for recreational use. It is land which is retained in or restored to a condition where nature predominates, and is substantially free of structures, impervious surface, and other land altering activities of man's built environment.

3. Need a detail of jobs in the SERVICES Category, particularly software.

The Existing Conditions Report Section 2.4, Economic Development, includes the following exhibit with rolled up sectors:

Exhibit 3. Woodinville Covered Employment by Sector, 2001-2013



Source: Puget Sound Regional Council, 2013; BERK, 2014

Note: Const/Resource = Construction and Resources; WTU = Warehousing, Transportation, and Utilities; Gov/Ed = Government and Education; FIRE = Finance, Insurance, and Real Estate

A more detailed breakdown of sectors is available from Puget Sound Regional Council (who obtains the data from the Employment Security Department) but the data is partially suppressed.¹

¹ The Puget Sound Regional Council protects confidential employer information through data suppression, as stipulated by ESD. Data from individual employers is not shared; where aggregate employment values represent fewer than three reporting firms, or when a single employer accounts for more than 80 percent of jobs, the value is withheld (in these tables, replaced with an asterisk).

Exhibit 4. Jobs by Detailed Sector

2-Digit NAICS Categories	Jobs
11 - Agriculture, Forestry, Fishing and Hunting	*
21 - Mining	-
22 - Utilities	-
23 - Construction	*
31-33 - Manufacturing (data for 32 is supressed)	1,854
42 - Wholesale Trade	*
44-45 - Retail Trade	*
48-49 - Transportation and Warehousing (48 supressed, 49 none)	*
51 - Information	132
52 - Finance and Insurance	*
53 - Real Estate and Rental and Leasing	*
54 - Professional, Scientific and Technical Services	748
55 - Management of Companies and Enterprises	95
56 - Administrative and Support and Waste Management and Remediation Services	728
61 - Educational Services	208
62 - Health Care and Social Assistance	854
71 - Arts, Entertainment and Recreation	115
72 - Accommodation and Food Services	1,142
81 - Other Services (except Public Administration)	531
Government	158
Education	350
Total	12,338

The broader Services sector includes: Information, Professional, Scientific and Technical Services, Management of Companies and Enterprises, Administrative and Support and Waste Management and Remediation Services, Health Care and Social Assistance, Arts, Entertainment and Recreation, Accommodation and Food Services, Other Services (except Public Administration).

4. Liquefaction Map Best Available Science pages 255+

Zipper Geo (see Planning Commission Exhibit 26) peer reviewed Golder’s map and suggested a minor edit to the Liquefaction map as a result of the Woodin Creek development geotechnical report. Golder is amending their map accordingly. All of the Golder maps will have legend adjustments to clarify the Potential Annexation Area versus the Urban Growth Area, and the Joint Study Area.

5. Missing Snohomish County Peat Bog information on our maps

Draft EIS Appendix D and Existing Conditions Report Appendix D include study area maps showing the mapped wetlands in the city limits, Urban Growth Area in Snohomish County and Joint Study Area. Maps show in faded colors mapped wetlands outside the collective Comprehensive Plan study area including mapped wetlands abutting the city limits/county line. Snohomish County has purchased the bog. An aerial photo and other information appears at this link: <http://www.bearcreekhw.org/hooven-bog.html>.

As mapping is improved over time by Snohomish County and other agencies, the City can update its maps.

6. Add Geotech information for locations identified by City Council

Golder Associates is reviewing the requested locations; some additional locations were requested on March 31, 2015. A report is anticipated to be presented at the City Council Hearing on April 14, 2015.

7. Impacts on rents by allowing retail in Warehouse District

Qualitatively, if retail uses are capped in terms of size and are accessory in nature, we would not anticipate significant changes in rents. The location and scope of the allowances should consider the mix of uses in the different industrial parks. For example, would accessory retail/restaurant associated with wineries and distilleries conflict with hours of use by other light industrial uses, e.g. manufacturing, assembly, construction, etc.?

The City's 2012 Retail Demand Study identified the unmet demand for an additional 400,000 square feet of retail space in the City's Primary Retail Trade Area. A recent review of retail rents in the area supports that there is still substantial unmet demand for retail space, with rents steadily increasing since 2010 and recent vacancy rates below 4%. Opening up the Warehouse District to more retail uses will likely increase overall rents in this area making it more difficult for industrial uses to continue operation in the area.

8. Menu approach of proposed alternatives showing the number of housing units or jobs generated by each separate option

The following Exhibit approximates the number of housing and jobs by feature. The estimates are based on a land capacity analysis that provides for average densities or floor area ratios/square feet per employee.

Exhibit 5. Approximate Number of Housing and Jobs by Alternative 2 and 3 Feature

Option	Additional Housing Units	Additional Jobs
Alternative 2: Amenity Mixed Use District	100	70
Alternative 2: Regional Retail Overlay	NA	75
Allow only small retail in Warehouse District	NA	35-45
Alternative 2: CBD enhanced development incentives including affordable housing incentives and the SEPA Facilitation tools	315	620
Alternative 2: Allow Mixed Use in GB, Change Gateway to GB, Update development incentives (e.g. for office)	70	185
Alternative 3: Allow Additional Heights in Downtown: Add a sixth story, at up to 75-80 feet in the CBD	705	7,100

Notes: Figures are rounded. See also Draft EIS Exhibit 2-4 table notes for description of features and capacity. See comparison of CBD capacity by alternative in Draft EIS Exhibit 2-6. Option 3

Source: BERK Consulting 2014 and 2015

For the Amenity Mixed Use and GB districts, the estimates assume that a small number of redevelopable or vacant properties would convert to mixed uses, due to the investments in the area already and the newness of the code allowances; there would some sites with appropriate amenities, location, and property owner interest that would develop with mixed uses.

The estimate of small retail in the Warehouse District is based on the following assumptions: 2,500 square feet of restaurant or retail accessory to industrial uses, with about 25,000 square feet established over the planning period (10 operations), and 550-700 square feet per employee (the current GB and I zone employee rates in land capacity analysis).

Regarding the Regional Retail Overlay, the estimate of new jobs is fairly modest as it was assumed that there would be likely one larger center, and that some of the existing jobs in that area would convert from an industrial focus to a retail focus (meaning the 70 net jobs is part of the total jobs for the Regional Retail Overlay opportunity; regional retail can support 135-350 jobs per store).

9. Comparison of jobs in multi-story industrial versus single story big box

The City’s land capacity assumptions are summarized in Existing Conditions Report Appendix A and Draft EIS Appendix B. Regarding employment rates for industrial versus retail, the assumptions by zone are shown in Exhibit 6 below.

Exhibit 6. Job Rates in Land Capacity Analysis

Zone	Alternative 1: Square Feet / Emp.	Alternative 2: Square Feet / Emp	Notes
CBD	400	400	
GB	550	400	Alt 2: Assumes GB mixed use and greater office.
I	700	550	Alt 2: Assumes Industrial Base, Regional Retail Overlay, and Amenity Mixed Use/TBD.
NB	475	475	
O	325	325	
R-48/O	325	325	
TBD	400	400	

Source: King County Buildable Lands Report 2007, 2014; BERK Consulting 2015

If a single or multistory building equaled 70,000 square feet, it would potentially house the following under industrial, office, or retail uses:

Exhibit 7. Comparison of Jobs Generated in 70,000 Square Foot Building

Building Size 70,000			
Type of Use	Employee Rate	Number of Jobs	
Industrial	700	100	
Office	325	215	
Retail	400	175	
Industrial 50%/ Office 50%	700/325	158	

Source: BERK Consulting 2015

The City’s 2013 informal job survey in the Northwest Gateway showed a range of employee rates similar to those listed above.

- McClendon’s is classified in the Assessor Records as Retail (Big Box); it has a building size of around 24,000 square feet, employs 60 persons, and has a rate of about 400 square feet per employee.
- A warehouse with 71,600 square feet and a variety of wholesale and light industrial businesses employs 118 persons (carpet and windows, coffee manufacturing, home improvement, motorsports, mechanical operation) and has about 600 square feet per employee.

- A cabinet and millwork shop has about 5,000 square feet, 5 employees and 1,000 square feet per employee.

Based on 2009 research regarding total employees per store conducted by BERK Consulting for Kittitas County, Home Depot would have an average of 135 employees per store, Costco would have an average of 250 per store, and Wal-Mart 350 per store.

10. Impact of public transit service reductions on Transportation Element trip projections (flip side is impact of public transit increases).

The Transportation Element’s trip projections assume that the amount of trip diversion to public transit continues at current rates. In Woodinville’s case, public transit trip diversion is relatively small, with a current diversion of approximately 400-500 weekday bus boardings in Woodinville (most at the Park-and-Ride Lot). Even if all bus service is discontinued to Woodinville, the resulting trip generation is considered immaterial; and could actually result in a net trip reduction since they would no longer be generating trips to/from the Park-and-Ride Lot.

11. Trip Generation difference between Options 1, 2, and 3.

Below is a table summarizing the marginal impacts of the three different Comp Plan Options on housing units, jobs, and trip generation.

Alternative	New Housing Units	New Jobs	Estimated New PM Peak Hour Trips
No. 1: Current Plan (No Action)	2,615	4,476	2,845
No. 2: Mixed Use Land Use Changes	2,682 – 3,097	5,028 – 5,433	3,485
No. 3: Greater Downtown Density and City Infill	3,090	12,944	6,032

A new multifamily housing unit in the Downtown Core area of Woodinville is estimated to create 0.5 PM Peak hour Trips per unit. A new employee (FTE) will generate approximately 0.3 PM Peak hour Trips per FTE. The difference of trip generation between each of the alternates is because each alternate has different levels of new employment and new housing units.

MEMORANDUM

DATE: April 6, 2015
TO: Richard Leahy, City Manager
FROM: David Kuhl, Director Development Services
SUBJECT: 2015 Comprehensive Plan Questions

Following are Responses to Questions about the 2015 Comp Plan Amendment submitted by a Council member. Responses follow each question.

- 1. From Golder, I see a 10-page Technical Memorandum dated November 13, 2014, 7 maps and a two-page Technical Memorandum dated October 17, 2014. These are the last pages in Exhibit 2. Together, are these what we're referring to as "the Golder report," or does "the Golder report" refer to something else? If something else, where would I find it?**

Response: No. The Golder Reports have been previously included in Exhibit 3, pages 245 to 262; and pages 263 to 264. For your convenience, both of these reports are attached to this memo.

- 2. Where is the ZipperGeo review of Golder's report?**

Response: This report was included in Exhibit 26, pages 9 to 16. For your convenience, another copy of that report is attached to this memo.

- 3. The draft vision statement in Exhibit 1 refers to "Northwest woodland character," not "Northwest woodland design character" as I think was shown in the slide deck on Tuesday evening. I'm not comfortable at this point that I'm reviewing what I'm ultimately going to be asked to vote on. Can we get a clean draft, cleanly paginated instead of the arcane pagination we're receiving currently, once the Planning Commission completes its recommendations?**

Response: The City Council has asked for a legal opinion regarding this matter. A revised draft of the Comprehensive Plan, with new pagination and the Planning Commission's recommendation, is scheduled to be distributed to the City Council on April 7, 2015. We hope this newly revised draft will meet your needs.

- 4. With that draft, could we please receive an updated inventory of additions, deletions, and changes from the current Comp Plan?**

Response: Because we've made such a drastic change to simplify and organize the Comp Plan, a ~~Strikeout~~Underline markup copy is not possible. However, Exhibit 40 (attached) attempts to identify and explain proposed changes. Exhibit 76 summarizes the Planning Commission Recommendations and updates the comparison chart in Exhibit 40 with Planning Commission Recommendations.

Planning Commission recommendations included:

- 1. Selection of Alternative 2, Option 1, presented in Exhibit 2.**
 - Revision to reduce Regional Retail Overlay to cover only the area north of 200th.

2. *Recommend Draft Comprehensive Plan, November 2014, with the following revisions:*
- **Land Use Element**
 - *Exhibit 6, policy addition on view corridors from SR-202 to the Sammamish River every 500 feet.*
 - *In response to public comment in Exhibit 26, revision to Goal LU-7, replace the word “cohesive” with “well-designed”*
 - **Transportation, Utilities, and Natural Environment Elements**
 - *Transportation: Clarifications to text and policies in Exhibit 6A, replacing Chapter 6.*
 - *Transportation, Utilities and Natural Environment: In response to public comments in Exhibit 24, Addressing fish passage barriers and river enhancement programs.*
 - **Multiple Elements**
 - *Element Comparisons: Based on the current plan and draft plan comparisons, clarifications and additions identified in Exhibits 40 and 43.*
 - *Changes in response to PSRC comments – Exhibit 57*
 - *Staff errata to correct Parks inventory:*
 - *Add open space property (0.75 acres).*
 - *Does not significantly affect our LOS analysis.*
 - **Capital Facilities Element – Sewer Policies**
 - *Remove this policy (November 2014 Draft Number 6.1): Encourage conversion from on-site wastewater disposal systems as sewer lines become available.*

5. **What is the current status of the “Joint Study Area” references in the draft Comp Plan?**

Response: Initiation of this effort has always rested with King County. We are not aware that King County has any plans to proceed with this effort. However, we recommend that it be included in the Comp Plan to ensure that the issue is not lost should the City wish to pursue it.

6. **Are the Exhibit 3 EIS and Planned Action precursors to an ordinance that is separate from the Comp Plan update, or are the Comp Plan update, EIS, and Planned Action going to be combined in a single ordinance?**

Response: The Comp Plan will be adopted in one Ordinance; the Planned Action will be addressed in a separate ordinance. The EIS is the responsibility of the SEPA Responsible Official, the Development Services Director. The EIS is referenced in the Planned Action Ordinance.

7. **EIS’s are commonly preceded by a DEIS, with a deadline for comments. Is Exhibit 3 a DEIS, and if so is there a comment deadline?**

Response: Yes, Exhibit 4 is a DEIS. Comments in response to the DEIS were accepted from November 17, 2014 through January 9, 2015. Please refer to Exhibit 4 (previously provided) and the cover memorandum explaining this process. The Final EIS is in the process of being prepared to address the Planning Commission Recommendations and to compile the responses to comments (see for example Exhibits 24 and 26 with responses to tribal comments received during the comment period). A Final EIS will be published in the spring 2015 (targeted for May). The City Council will deliberate and provide its direction, anticipated to be in the range of alternatives studied in the EIS.

8. **Is Exhibit 3 [Correct Exhibit is #4] and its ordinance intended to eliminate the need for any future EIS’s in the CBD?**

Response: Yes, no additional SEPA threshold determination would be required, so long as a proposed project complies with the criteria contained in the enabling ordinance, its impacts are adequately identified in the EIS and mitigated by adopted plans or regulations, and it does not exceed or violate the environmental thresholds contained in the EIS and Planned Action Ordinance for the Comp Plan Update.

The objective of the Planned Action is to conduct the environmental assessment for the identified area in advance of development. This assessment includes identifying types and levels of development, identifying and evaluating all material environmental impacts, establishing thresholds for these environmental factors, and establishing mitigation requirements and projects.

Since the City has already adopted a Master Plan for the area; has already identified the maximum level of development and its impacts, including trip generation and the infrastructure improvements necessary to accommodate that level and type of development; has already identified environmentally sensitive areas/issues and has adequate regulations to mitigate impacts on these areas; the Planned Action will eliminate the need to perform additional environmental review, including SEPA, for a project if it stays within these identified limits.

If a project exceeds adopted thresholds, or its impacts and required mitigation are not addressed in the EIS, then an environmental assessment/review is required.

9. Please provide us the documents that describe the scope for the EIS in Exhibit 3 [Draft EIS is Exhibit #4].

Response: The Determination of Significance and Request for Comments on Scope of EIS was published January 6, 2014 (in Exhibit 4, Appendix A).

As part of the scoping process, public meetings were held before the City Council and Planning Commission respectively on January 14, 2014 and February 5, 2014.

One scoping comment letter from the Muckleshoot Indian Tribe was received on February 6, 2014 as described in Section 2.4 of Exhibit 4. The comments addressed:

- *Differences in critical area regulations and Shoreline Master Program (SMP) regulations for the Sammamish River, streams and wetlands between the City, King County and Snohomish County, and how Woodinville intends to address any differences to ensure that these critical areas are protected to the fullest extent.*
- *Inventory and fix fish passage barriers within the existing and expanded City planning area where transportation and capital facilities programs and projects are contemplated over the 20-year planning period.*

The Draft EIS provides an analysis of water resources and plants and animals (Section 3.3) where these topics are addressed.

The City issued the Draft EIS with a 45-day comment period between November 17, 2014 and January 9, 2015. See Exhibit 4, 2015 Comprehensive Plan & Municipal Code Update Environmental Impact Statement Including Proposed CBD Planned Action, November 2014. Through this review process members of the public and agencies could comment on the proposal and alternatives and the scope and content of the environmental analysis.

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TECHNICAL MEMORANDUM

Date: November 13, 2014
To: Lisa Grueter
From: David P. Findley, LG, LEG and Jill E. DeKoekkoek, LG
RE: CITY OF WOODINVILLE GEOLOGIC HAZARD AREAS AND CRITICAL AQUIFER RECHARGE AREAS

Project No.: 14-05198.004
Company: Berk Consulting

1.0 INTRODUCTION

The following presents the results of our work in completing the geologic hazard mapping for the City of Woodinville. We understand this work will be included in the Comprehensive Plan document that Berk Consulting is completing for the City of Woodinville.

At the request of the City of Woodinville, the following maps have been prepared:

- Landslide Hazard Areas
- Liquefaction Hazard Area
- Erosion Hazard Areas
- Problem Soil Areas
- Fault Hazard Areas

In addition to the Geologically Hazardous Areas defined by WMC 21.24.290 – 21.24.310, the City has requested a review of the Woodinville Critical Aquifer Recharge Areas (CARAs; WMC 21.24.190 – 21.24.200).

The following presents the rationale and details behind each of the Geologic Hazard Maps. Figure 1 is a general location map for the City of Woodinville and surrounding areas; Figure 2 is the Landslide Hazard Areas Map; Figure 3 is the Liquefaction Hazard Area map; Figure 4 is the Erosion Hazard Areas map; Figure 5 is the Problem Soil Areas map; Figure 6 is the Fault Hazard Area map; and Figure 7 is the Critical Aquifer Recharge Area (CARA) map. Details related to each of the hazard map areas are presented in Section 3.0.

2.0 METHODOLOGY

The Geologic Hazard maps were created by collecting and reviewing data available within the limits of the City of Woodinville. Geologic Hazards were reviewed based on current definitions of the geologic hazards, existing geologic hazard mapping, and interpretation of surficial mapping. The Woodinville Municipal Codes (WMC) 21.24.290 – 21.24.310 for Geologically Hazardous Areas and WMC 21.24.190 – 21.24.200 for CARAs provided definitions of Geological Hazard areas for landslide hazard areas, erosion

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hazard areas, and CARAs (accessed September 15, 2014). The geologic hazard mapping and surface mapping were collected from the City of Woodinville, King County, the United States Geological Survey (USGS), the Washington Department of Natural Resources (DNR), Tetra Tech, and the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS). The various maps used are described in the description of each individual Geologic Hazard map. The base layer for each Geologic Hazard Area map is a digital elevation model (DEM) hillshade image created from the 2003 King County LiDAR data.

3.0 GEOHAZARD MAPS

3.1 Landslide Hazard Map

The objective of the Landslide Hazard Areas shown in Figure 2 is to capture the most likely type of landslide hazards that may occur in the City of Woodinville. Landslides involve the down slope movement of earth materials under certain conditions such as low soil strength; high groundwater pore pressures; prolonged or shorter, heavy periods of precipitation; rain-on-snow events; and local geologic conditions for example. Landslide activity within the Puget Sound region generally consists of three primary types of landslides: 1) shallow colluvial slides that involve movement of the shallow (generally less than 10 feet) of loose topsoil, weathered disaggregated glacial soils, and vegetation, 2) deeper seated, rotational landslides, and 3) debris flows that involve mobilization of accumulated loose, slope debris in steep sided well developed drainages.

The City of Woodinville WMC 21.06.353 defines Landslide Hazard Areas as:

- 21.06.350** **Landslide.** Landslide: episodic downslope movement of a mass including, but not limited to, soil, rock or snow.
- 21.06.353** **Landslide hazard areas.** Landslide hazard areas: those areas in City of Woodinville subject to severe risks of landslides, including the following:
- (1) Any area with a combination of:
 - (a) Slopes steeper than fifteen (15) percent,
 - (b) Impermeable soils, such as silt and clay, frequently interbedded with granular soils, such as sand and gravel, and
 - (c) Springs or ground water seepage.
 - (2) Any area which has shown movement during the Holocene epoch, from 10,000 years ago to the present, or which is underlain by mass wastage debris from that epoch.
 - (3) Any area potentially unstable as a result of rapid stream incision, stream bank erosion or undercutting by wave action,
 - (4) Any area which shows evidence of or is at risk from snow avalanches.
 - (5) Any area located on an alluvial fan, presently subject to or potentially subject to inundation by debris flows or deposition of stream-transported sediments.

The updated Landslide Hazard Area map was produced by using current surficial maps and by reviewing previous landslide hazard maps (from TetraTech, King County, DNR, and Watershed Company). The surficial maps included existing geologic maps (DNR 2010; Minard 1985a, 1985b, 1983) and a DEM of the 2003 LiDAR imagery. The 2003 LiDAR DEM was the basis for the review of geomorphic evidence of past landslide events and for extracting slope data as described in WMC 21.06.353 and WMC 21.06.628. The geologic mapping review included analysis of geologic stratigraphic contacts that are known to be associated with landslides in the Puget Sound region.

Five layers within the geographic information systems (GIS) mapping program were created to produce the landslide hazard area map shown in Figure 2. These layers include:

1. Slopes greater than 15 percent and located in areas containing other slope hazard parameters as defined by the WMC 21.06.353. The other parameters included in this layer are stratigraphic contacts where permeable soils overlie lower permeable soils, springs and groundwater seepage.
2. Steep slopes (slopes greater than 40 percent). This layer captures slopes defined as steep slopes in WMC 21.06.628.
3. Areas of known or suspected landslides were mapped by evaluation of the geomorphological features in the DEM.
4. Debris flow hazard source areas were mapped by evaluation of the geomorphological features in the DEM.
5. Geologic contacts layer captures the slope parameter for landslide hazard areas from WMC 21.06.353 that accounts for local geologic conditions where permeable soils overlie less permeable soils.

These five layers were incorporated to produce Figure 2. The Landslide Hazard Areas shaded in purple illustrates slopes greater than 15 percent and incorporates elements from WMC 21.06.353 that include the geologic stratigraphic slope parameter delineating the contact (shown in yellow) between granular, more permeable advance glacial outwash, overlying lower permeability fine grain transition beds. Slopes greater than 40 percent are presented in WMC 21.06.628 as steep slope hazards and appear in green in Figure 2. The dark orange cross-hatched area in Figure 2 shows one area that exhibits geomorphic evidence of older landslide terrain. The geomorphic expression consists of an arcuate irregular topographic scarp with subdued hummocky topography within the slide area. The subdued nature of the geomorphic expression suggests an older landslide feature, possibly earliest Holocene in age (around 10,000 years ago). The light orange cross-hatched areas displays where accumulated colluvium and alluvium provide potential source areas for debris flows. Upon completion of the mapping, site visits were made to selected locations to verify suspect geomorphic features.

3.2 Liquefaction Areas

Liquefaction is a geologic process where loose, saturated or partially saturated sediments substantially loses strength and stiffness in response to an applied stress, usually the result of strong earthquake ground motion or other sudden change in stress condition, causing it to behave like a liquid resulting in loss of bearing strength of the soil mass.

The liquefaction hazard areas map was created by evaluating the following sources:

- King County mapped seismic hazards as defined by the King County Sensitive Areas Ordinance (SAO) – GIS data (accessed September 15, 2014)
- Washington State Department of Natural Resources (DNR) mapped liquefaction susceptibility layer – GIS data (Palmer et al. 2004)
- Review of geological maps (DNR 2010; Minard 1985a, 1985b, 1983), comparing Quaternary Alluvium to mapped liquefaction hazards by DNR and King County
- Review of DNR water bodies that may indicate the presence of saturated sediments in areas of geographical depressions – GIS data
- Site visits were completed at select locations to verify presence of possible saturated liquefiable soils

Figure 3 delineates areas of potential liquefaction. The largest area is the Sammamish River Valley and Bear Creek areas. Several smaller areas such as the area around Lake Leota are included as well as areas underlain by potentially liquefiable soils.

3.3 Erosion Hazard Areas

Soil erosion potential is a function of soil type and slope inclination and how easily the soil may be mobilized by erosive agents such as water and wind. The WMC 21.06.215 defines the soils from the USDA NRCS that are particularly sensitive to erosion and includes the slope inclination greater than 15 percent in the definition. The guidelines from the Washington Administrative Code (WAC) include the following:

- 21.06.213 Erosion.** Erosion: the process by which soil particles are mobilized and transported by natural agents such as wind, rain splash, frost action or surface water flow.
- 21.06.215 Erosion hazard areas.** Erosion hazard areas: those areas in City of Woodinville underlain by soils, which are subject to severe erosion when disturbed. Such soils include but are not limited to those classified as having a severe to very severe erosion hazard according to the USDA Natural Resource Conservation Service (NRCS), the 1973 King County Soils Survey or any subsequent revisions or addition by or to these sources. These soils include, but are not limited to, any occurrence of River Wash (Rh) and the following when they occur on slopes fifteen per cent or steeper:
- (1) The Alderwood gravely sandy loam (AgD),
 - (2) The Alderwood and Kitsap soils (AkF),
 - (3) The Beausite gravely sandy loam (BcD and BcF),
 - (4) The Kitsap silt loam (KpD),
 - (5) The Ovall gravely loam (OvD and OvF),
 - (6) The Ragnar fine sandy loam (RaD), and
 - (7) The Ragnar-Indianola Association (RdE).

The NRCS soils mapping for King County were processed and queried (United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS), Soil Survey Geographic (SSURGO) for King and Snohomish Counties, accessed September 15, 2014) in GIS to identify soils when they occurred on slopes that are 15 percent or greater. These areas are shown in Figure 4.

3.4 Problem Soil Areas

The problem soil areas are those interpreted to present potential construction issues. These issues are interpreted to include local accumulations of peat and compressible organic silt and clay deposits and other soils that present bearing strength capacity challenges. The Problem Soils Areas correspond quite closely to those outlined on the Liquefaction Areas because of the shared common characteristics and depositional history. Problematic soils will be those composed of peat, compressible organic soils, and saturated or partially saturated sediments that can result in differential settlement of structures if the foundations and subgrade are not designed properly.

The Problem Soil Areas map was created by combining the previously mapped Liquefaction Areas with areas that may contain peat and compressible organic soils. The geologic map did not note organic soils, but several small ponds were mapped by the DNR. Closed topographic depressions that may have accumulated peat or organic materials were included in the mapped area of Problem Soil Areas shown in Figure 5. Site visits were conducted at selected sites to verify the likely presence of inferior soils.

Figure 5 delineates the areas that present the potential for problem soils. As on the Liquefaction Hazard Area map (Figure 3), the largest area is the Sammamish River Valley and Bear Creek areas. Several smaller areas such as the area around Lake Leota are included as well as areas underlain by potentially peaty or soft compressible soils.

3.5 Fault Hazard Areas

Figure 6 shows the inferred locations of known or suspected Quaternary faults within the City of Woodinville. These lineaments are defined largely by subsurface geophysical profiles conducted by the DNR that suggest disrupted quaternary stratigraphy. No surface expression of the suspected features was observed on the LiDAR imagery.

The Fault Hazard area map was created by reviewing available published geologic data by the DNR (accessed September 12, 2014) and the USGS (2006; accessed September 15, 2014). The USGS data did not show any faults within the area of the City of Woodinville. The DNR mapping showed six known or suspected faults within the city limits.

4.0 CRITICAL AQUIFER RECHARGE AREAS

Critical aquifer recharge areas (CARA) as defined in the City of Woodinville's WMC 21.24.200 are those areas designated by Chapter 365-190-080(2) WAC that have been determined to have effect on aquifers used for potable water, including areas where an aquifer that is a source of drinking water is vulnerable to contamination that would affect the potability of the water, or is susceptible to reduced recharge.

Critical aquifer recharge areas within Woodinville (WMC 21.24.190) are categorized as follows:

- a. Category I critical aquifer recharge areas include those areas designated on the critical aquifer recharge area map as highly susceptible to ground water contamination and that are located within a sole source aquifer or wellhead protection area.
- b. Category II critical aquifer recharge areas include those mapped areas designated that:
 - i. Have a medium susceptibility to ground water contamination and are located in a sole source aquifer or wellhead protection area; or
 - ii. Are highly susceptible to ground water contamination and are not located in a sole source aquifer or wellhead protection area.

The City of Woodinville regulations allow for variances under prescribed conditions:

"An applicant can request that the Development Services Director declassify a specific area included in the map adopted under subsection (1) of this section. The request must be supported by a critical areas report that includes a hydro-geologic assessment. The request to declassify an area shall be reviewed by the Development Services Director following the procedure in WMC 21.24.110. (Ord. 465 § 27, 2008; Ord. 375 § 3, 2004)"

- (1) The following new uses or activities are not allowed in Category I critical aquifer recharge areas:
- a. Hazardous liquid transmission pipelines;
 - b. Sand and gravel, and hard rock mining on land that is not zoned for mining as of December 1, 2004;
 - c. Mining of any type below the ground water table;
 - d. Processing, storage, and disposal of radioactive wastes;
 - e. Hydrocarbon extraction;
 - f. Commercial wood treatment facilities on permeable surfaces;
 - g. Golf courses;
 - h. Cemeteries;
 - i. Wrecking yards;
 - j. Landfills for hazardous waste, municipal solid waste, or special waste; and
 - k. On-site septic systems on lots smaller than one acre without a treatment system that results in effluent nitrate-nitrogen concentrations below 10 milligrams per liter.
- (2) The following new uses and activities are not allowed in a Category II critical aquifer recharge area:
- a. Mining of any type below the water table;
 - b. Processing, storage, and disposal of radioactive substances;
 - c. Hydrocarbon extraction;
 - d. Commercial wood treatment facilities on permeable surfaces;
 - e. Wrecking yards;
 - f. Landfills for hazardous waste, municipal solid waste, or special waste; and
 - g. On-site septic systems on lots smaller than one acre without a treatment system that results in effluent nitrate-nitrogen concentrations below 10 milligrams per liter.
- (3) The following standards apply to any development proposal in a critical aquifer recharge area:
6. All storage tanks proposed to be located in a critical aquifer recharge area must comply with local building code requirements and must conform to the International Fire Code requirements for secondary containment.
 7. Commercial vehicle repair and servicing must be conducted over impermeable pads and within a covered structure capable of withstanding normally expected weather conditions. Chemicals used in the process of vehicle repair and servicing must be stored in a manner that protects them from weather and provides containment should leaks occur.
 8. No dry wells shall be allowed in critical aquifer recharge areas on sites used for vehicle repair and servicing. Dry wells existing on the site prior to facility development must be abandoned using techniques approved by the Washington State Department of Ecology prior to commencement of the proposed activity.
 9. The activities listed below shall be conditioned in accordance with the applicable State and Federal regulations as necessary to protect critical aquifer recharge areas.

Activity	Applicable State and Federal Regulations
Above-ground storage tanks	WAC 173-303-640
Animal feedlots	Chapter 173-216 WAC, Chapter 173-220 WAC
Automobile washers	Chapter 173-216 WAC, Best Management Practices for Vehicle and Equipment Discharges (WDOE WQ-R-95-56)
Chemical treatment storage and disposal facilities	WAC 173-303-182
Hazardous waste generator (boat repair shops, biological research facility, dry cleaners, furniture stripping, motor vehicle service garages, photographic processing, printing and publishing shops, etc.)	Chapter 173-303 WAC
Injection wells	Federal 40 CFR Parts 144 and 146, Chapter 173-218 WAC
Junk yards and salvage yards	Chapter 173-304 WAC, Best Management Practices to Prevent Storm Water Pollution at Vehicles Recycler Facilities (WDOE 94-146)
Oil and gas drilling	WAC 332-12-450, Chapter 173-218 WAC
On-site sewage systems (large scale)	Chapter 173-240 WAC
On-site sewage systems (< 14,500 gal/day)	Chapter 246-272 WAC, Local Health Ordinances
Pesticide storage and use	Chapter 15.54 RCW, Chapter 17.21 RCW
Sawmills	Chapter 173-303 WAC, Chapter 173-304 WAC, Best Management Practices to Prevent Storm Water Pollution at Log Yards (WDOE 95-53)
Solid waste handling and recycling facilities	Chapter 173-304 WAC
Surface mining	WAC 332-18-015
Underground storage tanks	Chapter 173-360 WAC
Wastewater application to land surface	Chapter 173-216 WAC, Chapter 173-200 WAC, WDOE Land Application Guidelines, Best Management Practices for Irrigated Agriculture

The CARA map from the Woodinville Comprehensive Update, dated May 29, 2014, was reviewed and evaluated with the mapped surficial geology map from the City of Woodinville dated September 2014. The mapped CARA areas correspond with particular mapped geology units. Aquifer recharge areas have been identified as those mapped as either Vashon advance outwash (map symbol Qva) or Vashon recessional outwash (map symbol Qvr). The outwash deposits are generally granular in nature and permeable. The advance outwash forms the local aquifer. In a complete intact stratigraphic sequence, Vashon lodgment till separates the underlying advance outwash and the overlying recessional outwash, thus the lower permeability lodgment till serves as an aquitard between these two outwash deposits. Locally however, the till may be missing because it was not deposited at a particular location or erosion

Lisa Grueter
Berk Consulting

9

November 13, 2014
14-05198.004

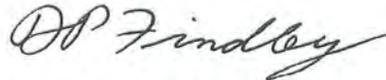
has removed it and the recessional outwash may be in direct contact with the advance outwash, thus allowing hydrologic communication between the two different outwash deposits.

Figure 7 shows the CARA delineated areas within the City of Woodinville.

GOLDER ASSOCIATES INC.



Jill E. DeKoekkoek, LG
Project Geologist



Dave P. Findley, LG, LEG
Associate Engineering Geologist

Attachments:

- Figure 1 City of Woodinville Geohazards - Overview
- Figure 2 City of Woodinville Geohazards - Potential Landslide Hazard Areas
- Figure 3 City of Woodinville Geohazards - Potential Liquefaction Hazard Areas
- Figure 4 City of Woodinville Geohazards - Potential Erosion Hazard Areas
- Figure 5 City of Woodinville Geohazards - Potential Problem Soil Areas
- Figure 6 City of Woodinville Geohazards - Potential Fault Hazards
- Figure 7 City of Woodinville Geohazards - Critical Aquifer Recharge Areas

JED/DPF/tp

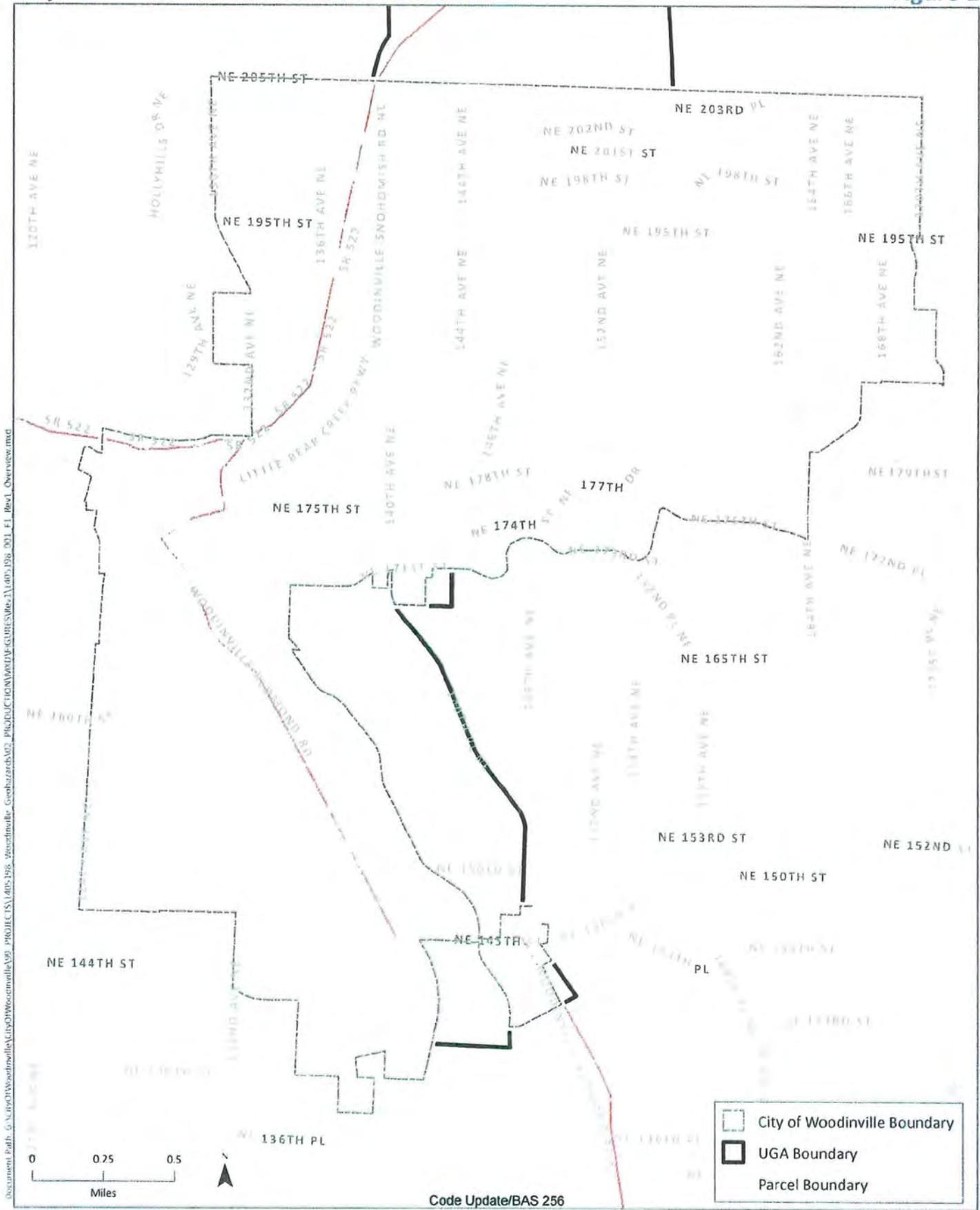
5.0 REFERENCES

- City of Woodinville Municipal Code, accessed September 15, 2014 from the City of Woodinville website: <http://www.ci.woodinville.wa.us/Documents/CityHall/Ordinances/Ordinance%20375.pdf>
- King County Critical Areas Ordinance, accessed September 15, 2014 from the King County website: <http://www.kingcounty.gov/property/permits/codes/CAO.aspx>. King County Sensitive Areas Ordinance seismic GIS mapping, accessed September 12, 2014 from King County GIS Center website: <http://www5.kingcounty.gov/gisdataportal/>
- Minard, J.P., 1985a, Geologic Map of the Maltby Quadrangle, Washington: United States Geological Survey, Miscellaneous Field Studies Map MF-1746, 1:24,000.
- Minard, J.P., 1985b, Geologic Map of the Bothell Quadrangle, Washington: United States Geological Survey, Miscellaneous Field Studies Map MF-1747, 1:24,000.
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- United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS), Soil Survey Geographic (SSURGO) for King and Snohomish Counties, accessed September 15, 2014 from USDA Data Gateway website: <http://datagateway.nrcs.usda.gov/>
- United States Geological Survey (USGS), 2006, Quaternary fault and fold database for the United States, accessed September 15, 2014, from USGS website: <http://earthquake.usgs.gov/regional/qfaults/>
- Washington State Department of Natural Resources (DNR), 2010, Surface Geology, 1:100,000, accessed September 12, 2014 from the DNR website: <http://fortress.wa.gov/dnr/app1/dataweb/dmmatrix.html>
- Washington State Department of Natural Resources (DNR), hydrographical GIS mapping, accessed September 12, 2014 from DNR website: <http://fortress.wa.gov/dnr/app1/dataweb/dmmatrix.html>

ATTACHMENTS

City of Woodinville Geohazards - Overview

Figure 1



Document Path: G:\Projects\Woodinville\City\Woodinville\99_PROJECTS\405198_99\geotiff\Geohazards\GUR\GUR_001_F1_Rev1_Overview.mxd

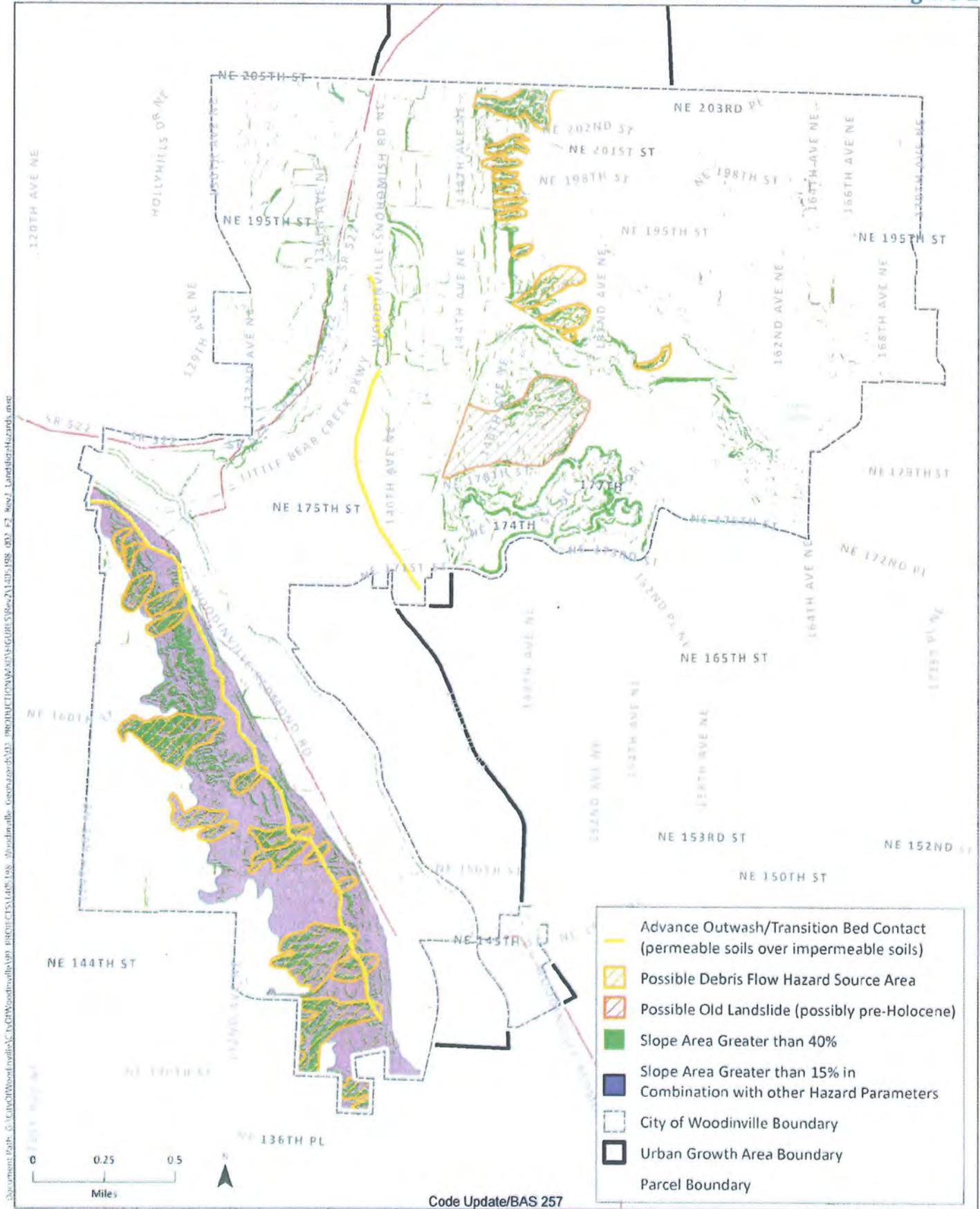


Date: October, 2014
Source: City of Woodinville, King County



City of Woodinville Geohazards - Potential Landslide Hazard Areas

Figure 2

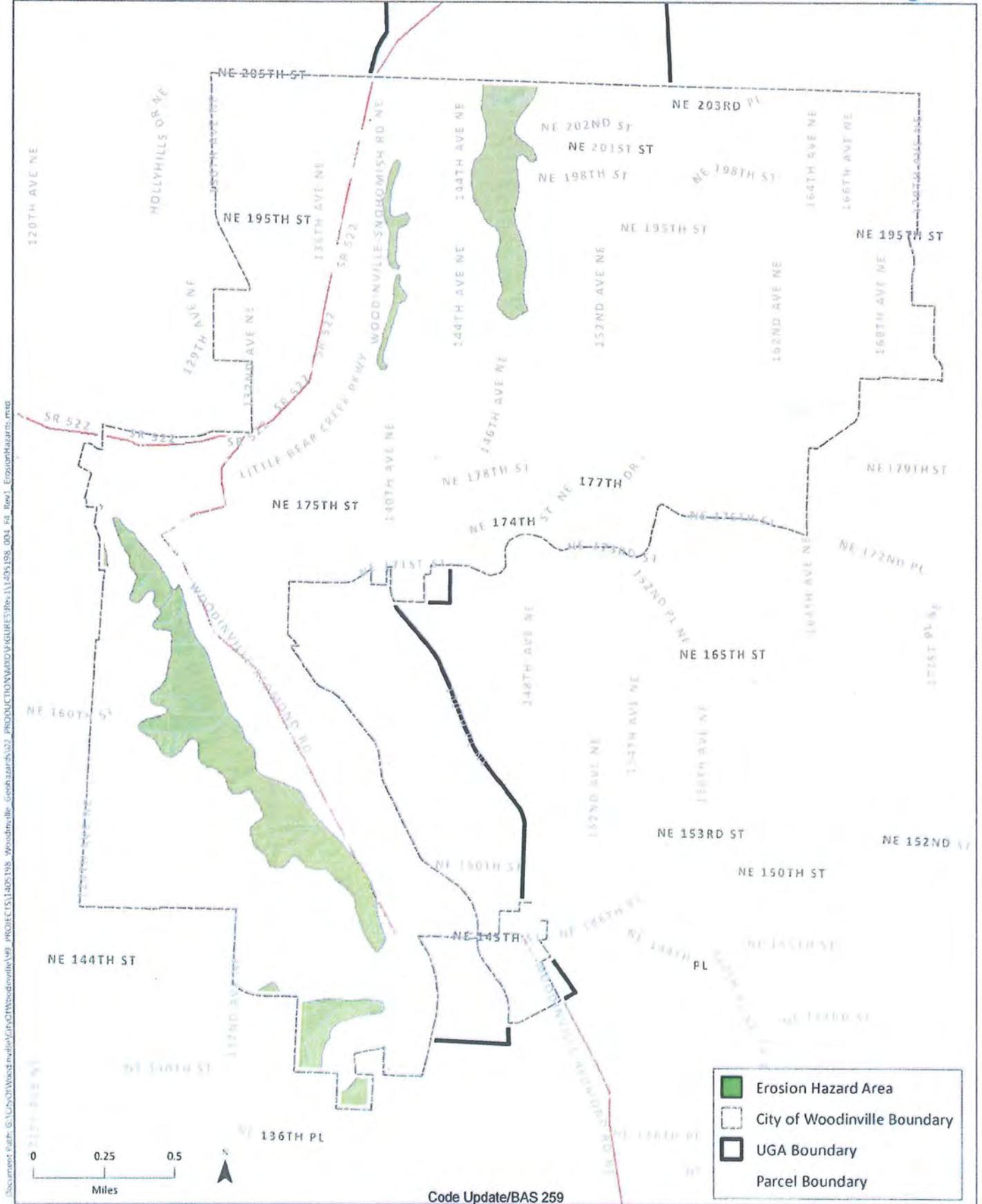


Date: November, 2014
Source: City of Woodinville, King County, Washington DNR, Golder Associates Inc.



City of Woodinville Geohazards - Potential Erosion Hazard Areas

Figure 4



Occurrence Path: G:\GIS\CityWoodinville\GIS\CHWoodinville\93_PROJECTS\1405198_Woodinville_Geohazards\02_PRODUCTION\MXD\FIGURES\Rev1\1405198_001_01_Rev1_ErosionHazards.mxd

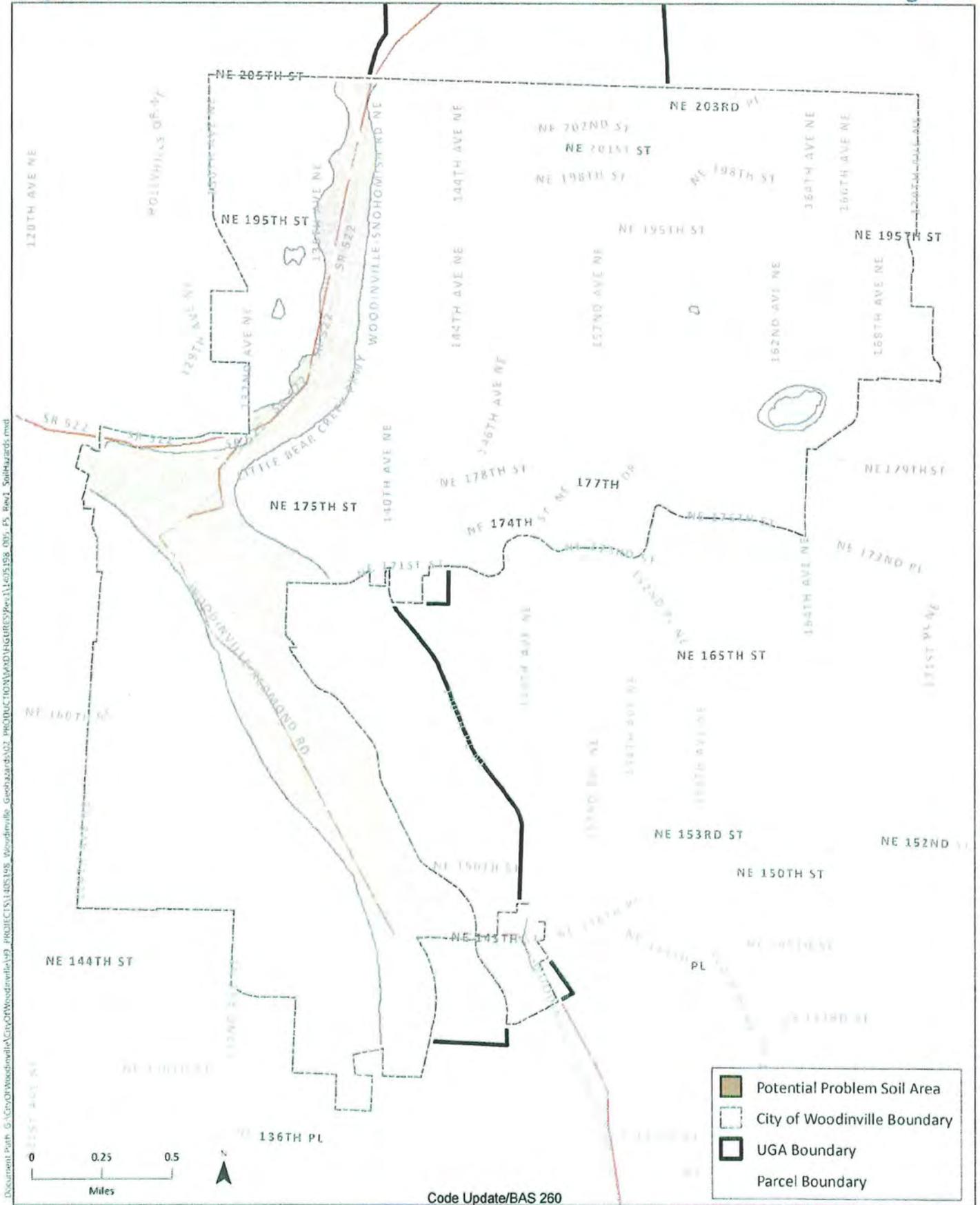


Date: October, 2014
Source: City of Woodinville, King County, U.S. Dept. of Agriculture - NRCS



City of Woodinville Geohazards - Potential Problem Soil Areas

Figure 5





TECHNICAL MEMORANDUM

Date: October 17, 2014
To: Lisa Grueter
From: Dave P. Findley, LG, LEG
cc:
Project No.: 14-05198.004
Company: Berk Consulting
Email: dfindley@golder.com
RE: CITY OF WOODINVILLE – COMMENTS ON ORDINANCE 275 GEOLOGICALLY HAZARDOUS AREAS SECTION 21.24.290 THROUGH 21.24.310

The following comments are provided at your request regarding the City of Woodinville's Ordinance 375 for Geologically Hazardous Areas (Sections 21.24.290 through 21.24.310).

1.0 COMMENTS

1.1 Section 21.24.300 Development Standards: General Requirements

Under Development Standards general requirements section (1) paragraph (b):

"Alterations of geologically hazardous areas or associated buffers may only occur for activities that Will not adversely impact other critical areas and are designed so that the hazard to the project is eliminated or mitigated to a level where there is: no reasonable chance of harm to the project or its associated land use."

How is "reasonable" defined in terms of harm? This is a subjective condition. It would be preferable to use a baseline statement such as "no increased adverse impacts beyond the pre-development condition".

1.2 Section 21.24.310 Performance Standards: Specific Hazards

1.2.1

Section (1) Paragraph (a) states:

"The size of the buffer shall be determined by the City to eliminate or minimize the risk of property damage"

The risk level can be reduced but never eliminated, suggest dropping the word "eliminated"

1.2.2

Section (1), Paragraph C (Design Standards) seems prescriptive and unnecessarily limiting. For example:



"The requirement for long term slope stability shall exclude designs that require regular and periodic maintenance to maintain their level of function."

This limitation removes several commonly used techniques for slope stability mitigation such as horizontal drains. Horizontal drains can be very effective in slope stability mitigation and have been used effectively by numerous public agencies and private sector owners.

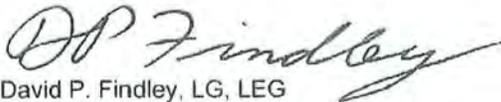
1.2.3

Section (1) Paragraph (c) (i) states:

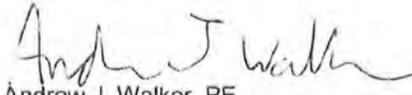
"The proposed development shall not decrease the factor of safety for landslide occurrences below the limits of 1.5 for static conditions and 1.2 for dynamic conditions. Analysis of dynamic conditions shall be based on a minimum horizontal acceleration as established by the current version of the International Building Code."

What about natural slope that have an existing Factor of Safety (FOS) of less than 1.5 but are currently stable? Suggest something like "proposed development shall not decrease the Factor of Safety below pre-development levels based on demonstrated geotechnical back analysis by a qualified geotechnical professional subject to review and approval by the City."

GOLDER ASSOCIATES INC.



David P. Findley, LG, LEG
Associate



Andrew J. Walker, PE
Principal

DPF/AJW/km

Zipper Geo Associates, LLC
Geotechnical and Environmental Consulting

Project No. 1407.08
15 January 2015

City of Woodinville
17301 – 133rd Avenue NE
Woodinville, Washington 98072

Attention: Mr. Thomas E. Hansen, PE, Public Works Director

Subject: Summary of Comprehensive Plan Updates Geotechnical Review (Revised)
Woodinville, Washington
Task Order No. 2014-4

Dear Mr. Hansen:

This letter summarizes the geotechnical review completed by Zipper Geo Associates, LLC (ZGA) of the proposed updates to the City of Woodinville Comprehensive Plan in regard to geologically hazardous areas regulated under the Woodinville Municipal Code. Our services have been provided in general accordance with the scope of services summarized in Task Order No. 2014-4. Verbal authorization to proceed with our review was provided by you on 16 December 2014. This letter is an instrument of service and the conclusions and recommendations presented herein have been prepared in accordance with generally accepted geotechnical engineering consulting practice. This letter has been prepared for the exclusive use of the City of Woodinville, and its agents, for specific application to the subject properties and stated purpose. This letter may replace our original comment letter dated 5 January 2015.

SCOPE OF SERVICES

Our authorized scope of services included the following tasks:

- Reviewing technical memoranda prepared by Golder Associates, Inc. regarding updated mapping of geologic hazards and critical aquifer recharge areas regulated under the Woodinville Municipal Code;
- Reviewing the July 2014 report prepared by the Geotechnical Extreme Events Reconnaissance (GEER) working group, sponsored by the National Science Foundation, regarding the March 2014 Oso Landslide;

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Woodinville Comprehensive Plan Updates Geotechnical Review (revised)
Project No. 1407.08
15 January 2015

- Meeting with City staff to discuss the document review and preparing this letter summarizing our review comments and conclusions and recommendations regarding Woodinville Municipal Code language regarding regulated geologic hazards.

DOCUMENT REVIEW

In accordance with our authorized scope of services, we reviewed the following documents and information sources:

- Woodinville Municipal Code (WMC) Section 21.24 pertaining to geologic hazards;
- Golder Associates, Inc., *Technical Memorandum re: City of Woodinville Geologic Hazard Areas and Critical Aquifer Recharge Areas*, Project No. 14-05198.004, dated 13 November 2014;
- Golder Associates, Inc., *Technical Memorandum re: City of Woodinville – Comments on Ordinance 275 Geologically Hazardous Areas Section 21.24.290 through 21.24.310*, Project No. 14-05198.004, dated 17 October 2014;
- National Science Foundation, *Geotechnical Extreme Events Reconnaissance (GEER), The 22 March 2014 Oso Landslide, Snohomish County, Washington*, dated 22 July 2014.

In addition, we also reviewed the following document:

- The SR 530 Landslide Commission, *The SR 530 Landslide Commission Final Report*, dated 15 December 2014.

REVIEW COMMENTS

The Golder Associates, Inc. (GAI) technical memorandum (13 November 2014) includes a discussion regarding updated mapping of geologic hazards. Geologically hazardous areas regulated under the WMC include erosion, landslide, and seismic hazard areas, other geological events including mass wasting debris flows, rock falls, and differential settlement. GAI addresses these hazards, as well as problem soil areas and fault hazard areas. GAI includes a thorough discussion regarding the methodology employed to evaluate the areal extent of the hazard areas and the use of Best Available Science. GAI also employed currently available LIDAR data in the

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Project No. 1407.08
16 January 2016

preparation of the hazard area maps, and this is particularly useful and currently considered state-of-the-art when evaluating landforms as part of assessing potential landslide hazards. Likewise, the discussions regarding the preparation of maps delineating the extent of potential problem soils area, fault hazard areas, and Critical Aquifer Recharge Areas (CARAs) indicate that GAI employed Best Available Science as basis for their assessments.

We spoke with Mr. David P. Findley, LG, LEG of GAI over the course of our review. Mr. Findley indicated that GAI had determined the limits of potentially liquefiable soils (as shown on the Potential Liquefaction Hazard Areas, Figure 3) based on soil mapping. GAI has not reviewed the geotechnical engineering reports prepared by Associated Earth Sciences, Inc. (AESI) for the Woodin Creek development that is currently under construction to the east of City Hall. One of the AESI reports provided for our review by City staff indicates that liquefiable soils are present at the Woodin Creek site. We recommend that the AESI geotechnical reports, or others that the City may have available that address site-specific liquefaction hazards, be provided to GAI for their review. This would allow GAI to verify the limits of the Potential Liquefaction Hazard Areas map (Figure 3) of the 13 November 2014 Technical Memorandum.

GAI'S 17 October 2014 Technical Memorandum includes review comments concerning specific language in WMC Sections 21.24.290 through 21.24.290. Our comments are summarized below.

Regarding GAI's comment concerning the wording of Section 21.24.300 Development Standards - General Requirements, we take no exception with their recommendation regarding substitution of "no increased adverse impacts beyond the pre-development condition".

We concur with GAI's comment concerning dropping "eliminate" from WMC 21.24.310 Performance Standards: Specific Hazards (in specific reference to buffers). The City may also want to consider dropping "minimize" as well given that "minimize" can be interpreted as subjective. As GAI indicates, risk level can be reduced (and a reduction can be quantified), and "minimize" may be subject to interpretation.

GAI makes the case in their comment regarding the use of designs that require regular and periodic maintenance [WMC 21.24.310.1(c)] would exclude the use of time-proven means of improving slope stability, such as horizontal drains. We agree with GAI's comment. However, it would be in the City's best interests in such situations to also determine to the extent possible that funds will be available to completed regular and periodic maintenance following construction when considering whether such stabilization methodologies are permissible.

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Project No. 1407.08
15 January 2015

GAI's final comment regarding the standards for factors of safety relative to landslide occurrences in the pre-development and post-development cases as described in WMC 12.24.310.1.(c)(i) would be beneficial provided that detailed geotechnical analysis indicates that proposed development activity will have no impact of slopes near the development activity.

GEER Report Review Comments

In response to the City's request to identify information in the 22 July 2014 GEER report regarding the Oso Landslide that may be applicable to Woodinville, we offer the following:

Do the geologic conditions at Oso apply to Woodinville? The general geologic conditions of the hillsides within the Woodinville city limits are not as complex as those present in the Stillaguamish River valley and at the Oso landslide location. Woodinville hillside stratigraphy typically includes, in descending stratigraphic order, granular recessional outwash deposits, Vashon lodgement glacial till, granular advance outwash, and relatively fine-grained Transitional Beds. Localized variation in this sequence is influenced by slope height and the nature of the glacial deposits and depositional and erosional history, factors which have influenced the distribution of the geologic units. Groundwater may be present in the recessional outwash and advance outwash deposits, although the groundwater occurrence varies by location. Based upon the research GAI conducted while preparing the Potential Landslide Hazard Areas map (Figure 2 in the 15 October 2014 draft Technical Memorandum), the primary geologic contact along which landslides have a significant potential for occurrence is the boundary between the advance outwash deposits and the underlying, fine-grained Transitional Beds. This contact has been shown on a regional basis to have a relatively high potential for landslide development when groundwater within the advance outwash deposits is present above the less permeable Transitional Beds. GAI also identified potential debris flow hazard areas in association with incised drainage channels with steep side slopes. One potential ancient (pre-Holocene) landslide feature in north-central Woodinville was identified based upon GAI's landform analysis.

Geologic conditions at the Oso landslide are far more complex than those present along Woodinville hillsides if for no other reason that the slopes along the Stillaguamish River valley are much taller (well over twice the height of the tallest slopes in Woodinville) and therefore expose a far thicker geologic section. The section includes multiple horizons of water-bearing granular soils above less permeable fine-grained soils, disturbed fine-grained soils, and the feature contains and is flanked by incised streams. The site of the 2014 Oso landslide had also been

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Woodinville Comprehensive Plan Updates Geotechnical Review (revised)
Project No. 1407.08
15 January 2016

subject to multiple episodes of slope movement in the past, resulting in the emplacement of disturbed and weakened soils on the slope. These older landslide deposits are far more likely to yield future landslide activity than intact and otherwise undisturbed soils. There is no evidence suggesting that the slopes in Woodinville have been subject to repeated landslides in the past 10,000 years, nor have significant occurrences of disturbed fine-grained soils been mapped in Woodinville.

To the extent that the slopes in southwest Woodinville have been mapped as containing a contact between the granular advance outwash deposits and the underlying fine-grained Transitional Beds, there is some similarity with the conditions at Oso, but on a much smaller scale. Likewise, the incised drainages identified on GAI's Figure 2 are on smaller scale than Oso. The one historic landslide identified by GAI is thought to be very old and dormant, unlike the previous landslides at Oso which were relatively young and much more likely to re-activate.

A significant factor that makes the slopes along the Stillaguamish River more likely to experience landsliding, and to differentiate it from conditions in Woodinville, is the lateral migration of the Stillaguamish River over time. As the river has flowed along the base of the adjacent steep slopes, erosion has taken place, and this has created unstable conditions that have contributed to numerous landslides. The Sammamish River is currently not flowing adjacent to the steep slopes in Woodinville, so the risk of destabilizing river influences is not applicable.

The Oso landslide caused extensive property damage and fatalities due to its long runout of mudflow/landslide debris. Site-specific geologic and topographic conditions contributing to this long runout are not fully understood following the GEER report. It is known that similar large-scale mudflow/landslide debris runouts had occurred in the Stillaguamish River valley in the past. Although conditions that increase the risk of comparably long runouts of mudflow/landslide debris are not known to be present in the mapped landslide hazard areas of Woodinville, additional site-specific study of this topic may be warranted to establish buffers at slope toes if such conditions are suspected or identified.

Does anything in the GEER report apply to Woodinville regarding approaches to planning, land use, and lessons learned? A critical point that may be taken from the GEER report is that communication regarding potential geologic hazards needs to be improved between departments within public agencies and also with the public. Several studies that identified the risk of landslides at Oso had been undertaken since the late 1940s but much of this information was not disseminated to public agencies responsible for land use policy making and planning, nor

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Woodinville Comprehensive Plan Updates Geotechnical Review (revised)
Project No. 1407.08
15 January 2015

with the public. Local agency outreach to citizenry regarding the potential risks associated with geologic hazards would help in this communication process. The City of Woodinville is taking steps in the right direction by updating the geologic hazard sections of the WMC. Making the hazard maps readily available to the public will be beneficial in terms of improving the general public's awareness of geologic hazards.

The communication process does not need to be expensive or sophisticated. For example, the City of Mukilteo provides its residents with a simple three-page flyer that describes in basic terms the potential risks associated with steep slopes in terms of landsliding and erosion. Some local jurisdictions hold workshops staffed by local geotechnical professionals (who typically volunteer their time) as well as agency planning professionals, to help raise awareness regarding geologic hazards among the public.

Should the WMC regarding geologic hazards be modified based on the GEER report conclusions?

Based upon our review of the WMC and our experience with other local jurisdiction's code requirements regarding regulated geologic hazards, it is our opinion that the WMC is largely adequate in terms of its handling of regulated geologic hazards. However, the GEER study noted that damage and fatalities occurred at Oso within a large part of the valley that was not within the designated landslide hazard area or buffers from the mapped landslide hazard area slope toe. Section 21.24.300 of the WMC does not specifically address assessment of risks to properties potentially affected by long runouts of debris flows or mudflows. It would be prudent for the WMC to require assessment of this risk on a site-specific basis as part of critical areas studies for land use proposals for properties located below possible debris flow hazard areas as delineated on GAI's Figure 2.

We recommend that the City consider amending WMC 21.24.130 Contents of Critical Area Special Study to require review of available LIDAR data as part of assessing potential landslide hazard areas. LIDAR imagery has been shown to be quite useful in this regard.

In light of the potential for long runouts from possible debris flow hazard areas, we recommend that the City consider amending WMC 21.24.300(1) to read *Will not increase the threat of the geological hazard to adjacent and potentially affected properties.*

Zipper Geo Associates, LLC

Woodinville Comprehensive Plan Updates Geotechnical Review (revised)
Project No. 1407.08
15 January 2015

SR 530 Landslide Commission Final Report Review Comments

The SR 530 Landslide Commission was developed by Governor Jay Inslee in order to review the events and circumstances concerning the March 2014 Oso landslide. The Commission's charter was to *...better understand the collective response and inform recommendations for the future that will guide policy makers as well as to improve planning and response for similar events.* The report includes 17 recommendations. Our comments regarding the Commission's recommendations relative to geologic hazards and steps that the City may consider are summarized below.

Recommendation 2 – Support a Statewide Landslide Hazard and Risk Mapping Program: This recommendation considers expanding data collection and landslide mapping efforts in order to assist public and private land use planning and decision making. The use of LIDAR in this effort has been recommended. The City has already made steps in this direction with the current updates to the mapping of geologic hazards as completed by GAI, including the use of current LIDAR data in the mapping effort.

Recommendation 15 – Update the WACs Related to Critical Area Regulations: Similar to the Commission's recommendation that state regulations be updated, the steps that the City is taking to update the WMC regarding regulated geologic hazards and providing current hazard mapping will enhance the public's awareness of geologic hazards and assist the land use planning process.

Recommendation 17 – Advance Public Awareness of Geologic Hazards: Similar to the GEER report, the Commission recommends that local governments develop public awareness initiatives to inform property owners and the general public of geologic hazards. As discussed previously, these efforts can be relatively straightforward and relatively inexpensive.

ADDITIONAL CONSIDERATIONS

It would be beneficial, in our opinion, for the City to require the inclusion of language in property titles that discloses the presence of geologic hazards. Some local jurisdictions, such as Seattle and Mercer Island, require that a covenant associated with property titles characterize the critical area(s) as applicable. This helps to make sure that property owners and purchasers are aware of the presence of regulated geologic hazards.

It would also be beneficial for the City to compile information regarding landslides when they occur and maintain this information in a file system that is available to City staff and the public. Other

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16 January 2015

local jurisdictions maintain files such as these and they are a very good resource in terms of understanding property history.

CLOSURE

We hope that this letter meets your current needs. Please do not hesitate to contact us should you have any questions.

Respectfully submitted,
Zipper Geo Associates, LLC

David C. Williams
David C. Williams, LG, LEG
Principal Engineering Geologist



DAVID C. WILLIAMS

John E. Zipper
John E. Zipper, PE
Managing Principal



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November 17, 2014

SUBJECT: Woodinville Comprehensive Plan and Municipal Code Update



Dear Reader:

The City of Woodinville is updating its Comprehensive Plan and Municipal Code to comply with Growth Management Act (GMA) requirements (RCW 36.70A.130(5)). The new plan will extend the Comprehensive Plan to a new 20 year planning period of 2015 to 2035. The Comprehensive Plan inventory, vision, goals, policies, and implementation strategies are being reviewed, updated and amended, including the following elements: Introduction, Land Use and Community Design, Housing, Economic Development, Parks and Recreation, Transportation, Capital Facilities, Utilities, and Environmental Elements.

Comprehensive Plan amendments would result in changes to development regulations as appropriate. In addition the City of Woodinville (City) wishes to streamline and revise its code format and content. Zoning, critical areas, grading, and other development regulations would be amended. Plan and code amendments are being developed in 2014 and 2015.

Last, the City is considering the use of State Environmental Policy Act (SEPA) tools to promote the vision of mixed use growth in the Central Business District (CBD) and potentially other mixed use zones in the City, such as a planned action (RCW 43.21C.440; WAC 197-11-164 to 172) or a mixed use and residential infill exemption (RCW 43.21C.229) where development that meets City codes and performance standards would have a streamlined SEPA process and rely on the this Comprehensive Plan EIS rather than require a new threshold determination.

The City has developed three land use alternatives for the purposes of study in this Draft Environmental Impact Statement (DEIS) that include different policy, regulatory, and SEPA tools for consideration by the City:

- Alternative 1 – Current Comprehensive Plan (No Action) Alternative
- Alternative 2 – Comprehensive Plan Update with Mixed Use Land Use Changes
- Alternative 3 – Current Comprehensive Land Use Plan with Greater Downtown Growth and City Infill

The DEIS describes existing conditions and compares the alternatives for potential impacts to earth, water resources, plants and animals, land use, plans and policies, aesthetics, transportation, and public services and utilities.

Key environmental issues and options facing decision makers include:

- Alternative land use patterns in relation to 20-year growth estimates and community vision,
- Relationship of land use patterns to environmentally sensitive areas and land use compatibility, and
- Effect of growth on demand for public services, utilities, and parks and transportation capital improvements.

All Alternatives would allow for new population, housing and employment growth and increased urbanization, particularly within the Downtown area, Industrial areas, and through infill of residential areas.

Prior to preparation of the Final EIS, the following issues are anticipated to be resolved:

- Selection and refinement of future land use and zoning features studied in the range of alternatives;
- Refinement of goals, objectives, and policies;
- Refinements of proposed code changes; and
- Deliberations on a planned action or infill exemption for the CBD.

Written comments on the DEIS will be accepted by the City through **5 p.m. January 9, 2015**. Please send comments to:

- Dave Kuhl, Development Services Director, SEPA Responsible Official
Woodinville City Hall
17301-133rd Avenue NE
Woodinville, WA 98072
davek@ci.woodinville.wa.us

To learn more about the proposal, agencies, affected tribes, and members of the public may consult the project website for meetings and hearings regarding the Comprehensive Plan and Municipal Code Update:

<http://www.ci.woodinville.wa.us/Work/ComprehensivePlan2015.asp>

Sincerely,



Dave Kuhl
SEPA Responsible Official, Development Services Director
City of Woodinville