BEYLER CONSULTING

MODI SHORT PLAT

Preliminary Technical Information Report

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Revised: February 18, 2015

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I. PROJECT OVERVIEW

Project Description

This project proposes to short plat a vacant parcel located within the city limits Woodinville Washington. The project address is 19400 136th Ave NE (parcel #0622100060). The current zoning of the parcel is Residential 6 indicating a maximum density of 6 dwelling units per acre. This project proposes 2 duplexes and a single family residential unit on 3 lots on the 1.63 acre property.

The short plat proposal includes providing 3 lots for residential uses, associated driveways, frontage improvements, stormwater management facilities, and appropriate utilities. The structures will be permitted at a future date. There will be no internal roadways as a part of this project. All residences will be accessed off of 136th Ave NE.

The property is adjacent to 136th Ave NE to the west. Larger parcels, over 1 acre, are located to the north and south, each with a single family residence. To the east is HWY 522. The project is keeping consistent with neighboring land use characteristics.

The site is currently is currently undeveloped and heavily forested with mixed native species and invasive shrub species. Through the middle of the site runs Little Bear Creek. The topography of the site shown the property slopes down from 136th Ave NE to Little Bear Creek and then back up again to the east toward HWY 522. A stream and wetland assessment was performed by Acera LLC. Acera has indicated Little Bear Creek as a Type 1 stream with a 150 feet buffer. Also identified on the site is a 1,800 sf category IV wetland with an associated buffer of 50 feet. The applicant wishes to reduce the stream and wetland buffers to 100 feet and 25 feet through a buffer mitigation plans. All proposed development activity will remain outside of the reduced stream and wetland buffers. A copy of Acera's report, *Stream and Wetland Assessment Report and Buffer Reduction Plan,* dated May 2014, has been included as a part of the short plat application submittal package.

It has been requested by the City of Woodinville on the Pre-Application Meeting summary, from the July 10, 2013 pre-application to provide street improvements. This improvements are to meet the high density residential standard. This includes widening the east half of the 136th Ave NE to 18 feet, vertical curb and gutter, 6' planting strip, and 6' sidewalk. These improvements have been shown on the preliminary site plan.

A subsurface exploration on the project site was conducted by Robinson Noble, Inc in July 2014. In summary, explorations at the top of the slope generally encountered a surficial layer of topsoil that was less than 0.5 feet in thickness. The topsoil consisted of loose, brown silty very fine sand with roots and organics. Underlying the topsoil the geotechnical engineer encountered loose to medium dense fine sand with trace silt and varying amounts of gravel that was interpreted as probable roadway fill. Robinson Noble, Inc does not recommend infiltration as a method for managing stormwater.

This project is subject to the 2009 King County Surface Water Design Manual (King Manual) as adopted by the City of Woodinville. Per Table 1.1.2.A of the King Manual, the project is subject to a Full drainage review as a result of creating more than 2,000 sf of new and/or replaced impervious surface.

Figure 1. TIR Worksheet

The TIR Worksheet will be included during final Engineering

Figure 2. Location Map

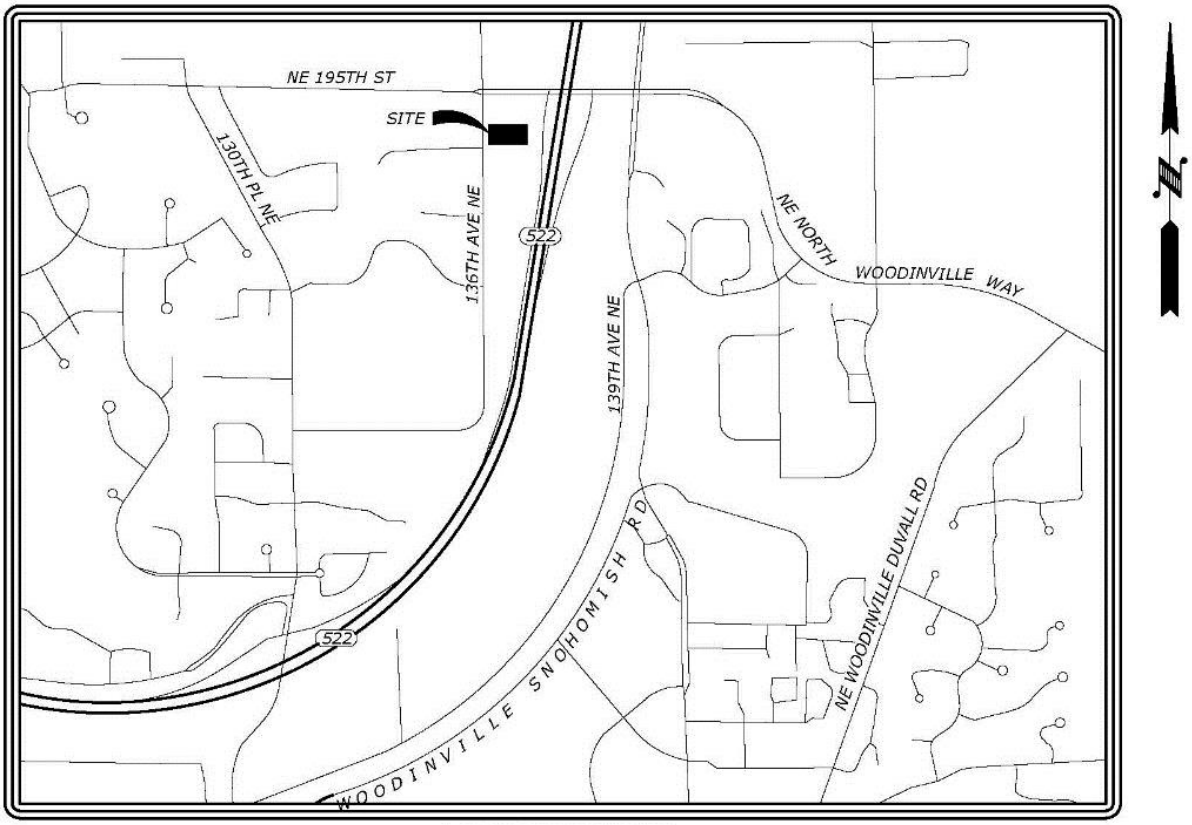


Figure 3. Drainage Basin Map

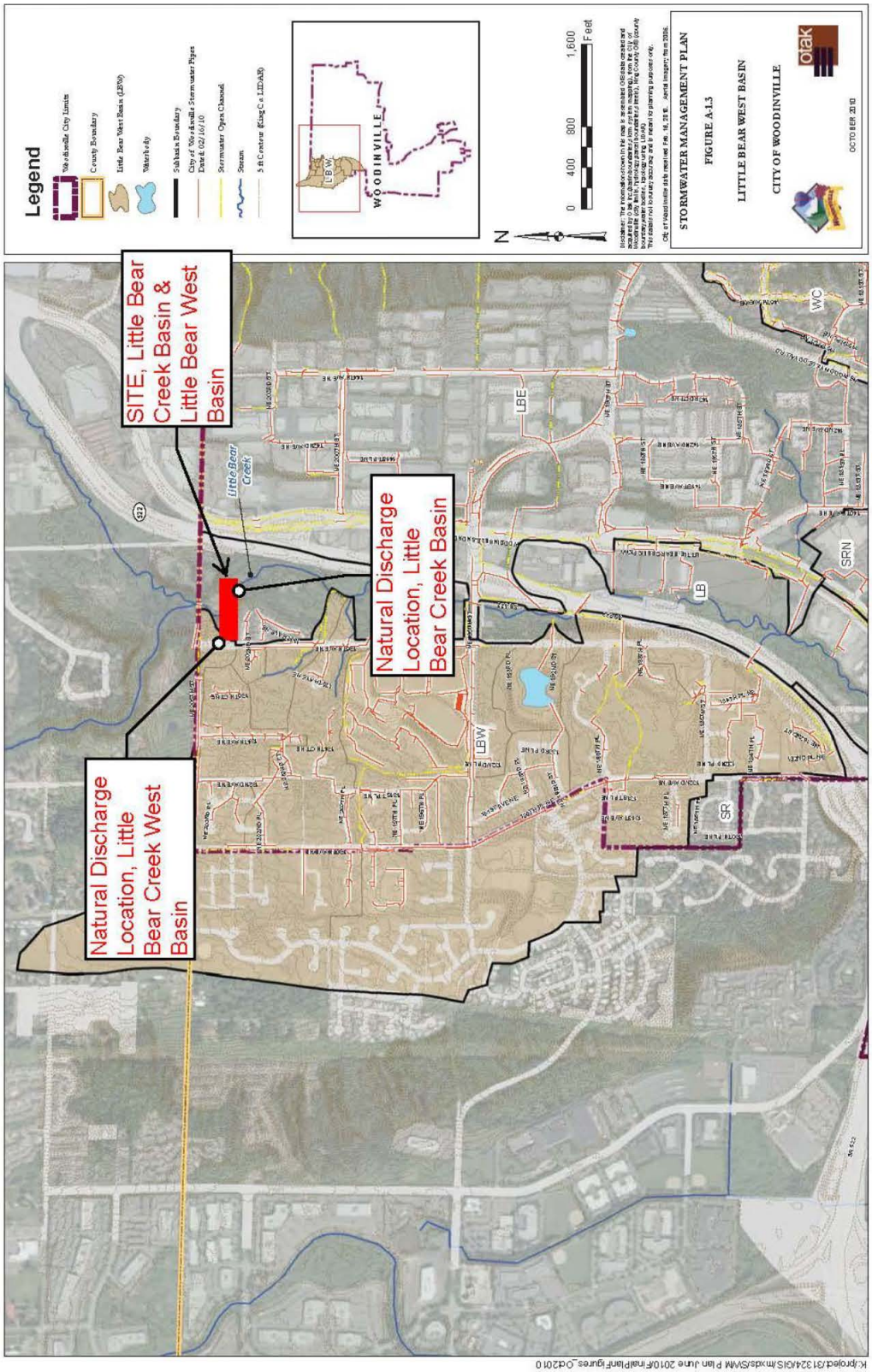


Figure 4. Soils Map

Tables — Hydrologic Soil Group — Summary By Map Unit

Summary by Map Unit — King County Area, Washington (WA633)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
EvC	Everett gravelly sandy loam, 5 to 15 percent slopes	A	0.7	60.0%
No	Norma sandy loam	A/D	0.5	40.0%
Totals for Area of Interest			**1.2**	**100.0%**

USDA **Natural Resources Conservation Service**

II. CONDITIONS AND REQUIREMENTS SUMMARY

Conditions and Requirements will be added and addressed during final engineering.

Review of Eight Core Requirements and Five Special Requirements

The following comments are a review of the Core and Special Requirements per the 2009 King County Surface Water Stormwater Manual and any additional requirements provided in the City of Woodinville Surface Water Overview.

Core Requirement No. 1 Discharge at the Natural Location

The project *site* is made up of two basins, Little Bear Creek and Little Bear West. Runoff within both basins from the project site end up at the same location within ¼ mi downstream. After discussions with Public Works. The project will be considered to be within one basin.

The project parcel is located in the Little Bear Creek Basin. Topography suggests that stormwater runoff from the site sheets down to Little Bear Creek that runs through the center of the property. Under developed conditions, stormwater is proposed to be managed from the converted surfaces by dispersing collected runoff toward the stream and wetland buffers. The site itself is within the Little Bear Creek Basin.

The area directly west of the property, 136th Ave Public ROW, is the located within the Little Bear West basin. This includes the proposed improvements within the 136th Ave NE right-of-way. The improvements within 136th Ave NE adjacent to the project property will continue to direct surface water north towards the natural discharge location.

Core Requirement No 2 Offsite Analysis

A downstream site visit and analysis was conducted on October 17, 2014. The site visit and analysis was used to prepare a narrative of the downstream system a minimum of ¼ mile downstream. The downstream description also assess potential offsite drainage impact associated with the site improvements. No known existing downstream problems were identified within the limits of the analysis. See Section III of this report.

Core Requirement No 3 Flow Control

Flow Control Facility (1.2.3.1.B):

The proposed project is located within the Conservation Flow Control Area – Matching Forested area per the King Manual. This requires runoff from developments to be detained and released at a rate that matches the flow duration of pre-developed rates. The above is required unless an exception applies to the proposed site conditions.

Exemption #1 per section 1.2.3.1.B of the King Manual applies to the project. The developed conditions of either threshold discharge area do not exceed a 0.1 cfs difference in the sum of developed 100-year peak flows for those target surfaces subject to the flow control facility requirement and the sum of forested site conditions 100-year peak flows for the same surface areas. Thus flow control is not required for this basin. See Section IV of this report for details and a table of the target areas.

Flow Control BMPs:

In addition to flow control facility requirements, projects subject to Core Requirement #3 must apply flow control BMPs to impervious surfaces on each individual lot. Flow control BMPs are methods and design for dispersing, infiltrating, or otherwise reducing development increases in runoff. Flow Control BMPs are proposed as a part of this short plat to satisfy the Flow Control BMP requirements, which includes full dispersion for the driveways and rooftops.

Core Requirement No. 4 Conveyance System
All new pipes systems will be designed with sufficient capacity to convey and contain at minimum the 25-year peak flow. A conveyance analysis will be included with the final engineering documents.

Core Requirement No. 5 Erosion and Sediment Control
This development will be constructed in one phase. An erosion and sediment control report will be included with the final engineering documents.

Core Requirement No. 6 Maintenance and Operations
The maintenance and Operations Manual will be provided upon request

Core Requirement No. 7 Financial Guarantees and Liability
Financial guarantees can be made available to the City upon request.

Core Requirement No. 8 Water Quality
This project falls within a Basic Water Quality treatment land use area as designated by the Manual and is not subject to Enhanced Basic WQ menu per Section 1.2.8.1.A. The goal of Basic WQ treatment is 80% removal of total suspended solids.

The project though falls under the Pollution Generating Impervious Surface (PGIS) threshold of 5,000 sf of PGIS that is not fully dispersed or infiltrated within a threshold discharge area. Stormwater treatment is not required for this project. See Section IV of this report for details and a table of the target areas.

Special Requirement No. 1 Other Adopted Area-Specific Requirements
This project is not in a designated Critical Drainage Area. This special requirement is not applicable.

Special Requirement No. 2 Flood Hazard Area Delineation
The project is adjacent to Little Bear Creek, but not within the 100-year floodplain elevation that is within the 100-year floodplain according to the King County February 1 2013 Flood Map (53033C0068H). The flood area around Little Bear Creek is within Zone AE, where the base flood elevations have been determined. The base flood elevation listed on the FIRM Map is between 86 to 87. All development will take place outside of the special flood hazard area subject to inundation by the 1% annual chance of flood. The 100-year flood boundary and been located on the preliminary site plan and the preliminary plat map.

Special Requirement No. 3 Flood Protection Facilities
This project does not rely on any flood protection facility such as a levee or revetment nor will construct a new flood protection facility.

Special Requirement No. 4 Source Control
This project does not require a commercial building or commercial site development permit. This special requirement is not applicable.

Special Requirement No. 5 Oil Control
This project is not defined as a high-use site nor is a redevelopment project proposing $100,000 or more of improvements to an existing high-use site. This special requirement is not applicable.

III. OFFSITE ANALYSIS

A preliminary offsite analysis report has been prepared per Section 1.2.2, Core Requirement #2. This is to identify and evaluate offsite flooding, erosion, and water quality problems that may be created or aggravated by the proposed project. The primary component of this offsite analysis report is the downstream analysis. The second component of the report is to evaluate the upstream drainage system to verify that significant flooding and erosion impact will not occur as a result of the project.

3.1 DOWNSTREAM ANALYSIS

The following Level 1 downstream analysis is a review of the drainage system in each threshold discharge area up to a mile downstream of the site.

The four tasks outlined under this review are:

Task 1 – Define and map the study area
Task 2 – Review all available information on the study area
Task 3 - Field inspect the study area
Task 4 - Drainage System Description and Problem Descriptions

3.1.1 Task 1 - Study Area Definition and Maps

The project is located in the Little Bear Creek and Little Bear West Drainage basins. Runoff within both basins from the project site end up at the same location within ¼ mi downstream. After discussions with Public Works. The project will be considered to be within one basin. The drainage study area is approximately a mile long path encompassing the site's downstream corridor.

The site is currently vacant, surrounded by 136th Ave NE to the west, HWY 522 to the East, and large developed single family parcels to the north and south.

3.1.2 Task 2 - Resource Review

The following resources have been reviewed for the downstream analysis. This is a review of all available information on the downstream area at least a mile downstream. Sources include the City of Woodinville maps, King County GIS maps, geotechnical studies, wetland studies.

Sensitive Area (See Appendix A for Sensitive Area Maps)

- Erosion- None Mapped
- Seismic – The project is located within a Seismic area according to Woodinville and King County Maps
- Landslide – None Mapped
- Coal Mine – None Mapped
- Streams and Wetlands Map – A category IV wetland and little Bear Creek is located on the property. See the wetland and stream assessment report prepared by Acera LLC, Dated May 2014.
- Susceptible to Groundwater Contamination – Low
- 100 year flood plain – According to King County Flood Maps, the 100 year flood plain for little bear creek is located on the property. See the preliminary site plans and preliminary plat map for location.
- Steep Slopes: Slopes in the range between 5 and 65 percent.

Drainage complaints and studies

King County –Relevant DNRP drainage complaints within 1 mile of the downstream corridor within the last 10 years were searched. There are currently no open complaints within the corridor or closed drainage complaints within the last 10 years.

3.1.3 Task 3 - Field Inspection

A site visit was performed on October 17, 2014 for the purpose of analyzing the proposed project site and its upstream and downstream corridor at least a quarter mile downstream of the site (1,320 ft) starting from the discharge point in ROW of 136th Ave NE (136th Discharge). All stormwater on the project parcel will be dispersed toward Little Bear Creek (Parcel Discharge). The 136th Discharge will join up with Parcel Discharge within a ¼ mi downstream. The downstream analysis follows the 136th Discharge.

The weather conditions cloudy and dry. A description of the drainage path is described below. See Appendix B for downstream reach locations.

3.1.3.1 Upstream and onsite runoff

136th Discharge, Frontage

The 136th Discharge will consist of stormwater generated on the east half of 136th Ave which includes the frontage improvements adjacent to the property. The west side of 136th Ave does not currently have a fomal stormwater conveyance system in place. As a result, there is will be no upstream runoff tributary to the frontage improvments proposed for the this parcel.

Stormwater will be collected in a catch basin to intercept the runoff from the east half of 136th Ave. There will be no contibuting runoff from the project parcel. At this point stormwater will be conveyed to the west side of 136th Ave and connect to the newly constructed conveyance system installed as a part of the Slocum Plat. The following subsection is a description of the downstream corridor.

Project parcel

Due to the heavy forest cover of the project parcel, it is likely that most stormwater is absorbed into the forest floor before turning into runoff/sheet flow. Most stormwater on or near the surface flows to Little Bear Creek running north-south through the middle of the site.

3.1.3.2 Downstream

136th Discharge

The following is a discussion of the downstream corridor. See Appendix B as well for a downstream summary table and map a map of each reach's location.

Reach 1

0-31' Collected stormwater from the project frontage is piped to an existing catch basin across the street installed as a part of the Slocum Plat.

Reach 2

31-235' Runoff continues north in a 12" pipe along the west side of 136th Ave in the conveyed system installed as a part of the Slocum Plat to the SW corner of the intersection of NE 195th and 136th Ave.

Reach 3

235-360' The 12" piped conveyance system continues across NE 195th to a catch basin on at the NW corner of the intersection of NE 195th and 136th Ave.

Reach 4

360-420' Stormwater then crosses 136th Ave NE through a 36" culvert and discharge to a wide swale which flows east along the north side of NE 195th.

Reach 5
420’ -720’ Runoff flows approximately 300 feet through the swale.

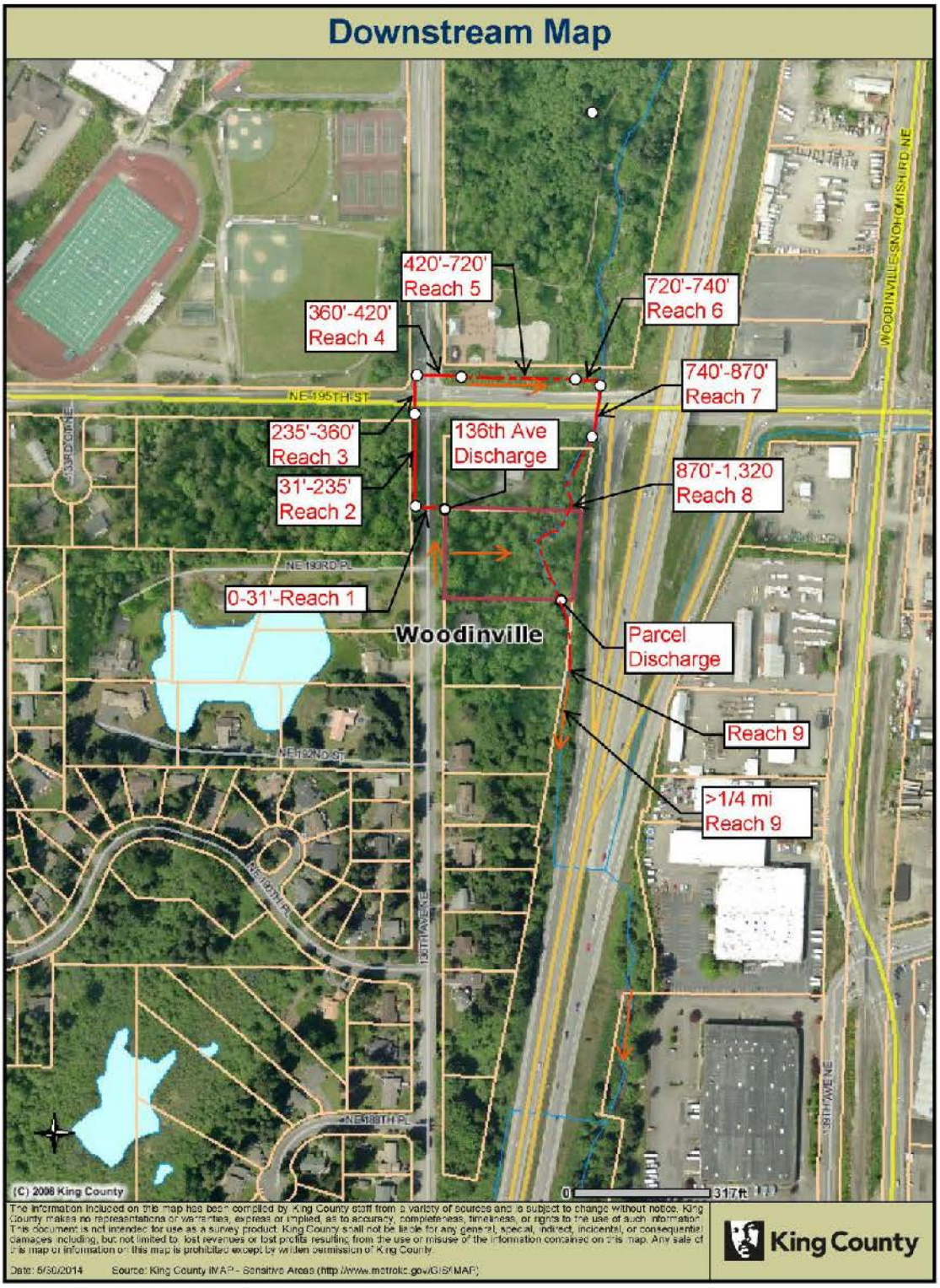
Reach 6
720’-740’ The swale enters an 18” culver pipe under a gravel access road, through a small ditch and intersects Little Bear Creek just north of a concrete culvert.

Reach 7
740’-870’ The concrete culvert conveys Little Bear Creek south under NE 195th.

Reach 8
870’-1320’ Stormwater continues south in Little Lear Creek meeting up with the ‘Parcel Discharge’.

Reach 9
>1320’ Stormwater continues south in Little Bear Creek for over one mile until it reaches the Sammamish River.

See the downstream map on the follow page.


Downstream Map
420'-720'
Reach 5
720'-740'
Reach 6
360'-420'
Reach 4
740'-870'
Reach 7
NE 195TH ST
235'-360'
Reach 3
136th Ave
Discharge
870'-1,320
Reach 8
31'-235'
Reach 2
NE 193RD PL
0-31'-Reach 1
Woodinville
Parcel
Discharge
Reach 9
NE 192ND ST
>1/4 mi
Reach 9
NE 190TH PL
136TH AVE NE
NE 188TH PL
WOODINVILLE-SNOHOMISH RD NE
(C) 2008 King County
0
317ft
King County
Date: 5/30/2014
Source: King County iMAP - Sensitive Areas (http://www.metrokc.gov/GIS/iMAP)

3.1.4 Task 4 - Drainage System Description and Problem Descriptions

The quarter mile downstream corridor is comprised entirely of Little Bear Creek. There were no problems identified within the downstream corridor. A capacity analysis is necessary to confirm the downstream pipes can handle the increased flow due to the short plat frontage improvements.

The project proposes to divide the generated runoff to the east and to the west. The downstream flow paths meet within a ¼ mile downstream, therefore the project has been analyzed with having a single discharge threshold. A portion of the project site, being the proposed rooftops, and onsite PGIS areas will be collected and tightlined to a single 50-foot dispersion trench flowing easterly towards little Bear Creek. The westerly portion will directly discharge the generated runoff to an existing conveyance system. The existing conveyance system will be analyzed per Table 3.2 of the 2009 Manual at time of final engineering. This table suggests that downstream analysis computation is to apply the Rational Method to determine peak flows. Per Core Requirement #4 of the 2009 Manual:

1) The existing system must be analyzed and shown to have sufficient capacity to convey and contain (at minimum) the 10-year peak flow. This is assuming developed conditions for onsite tributary areas and existing conditions for any offsite tributary areas.
2) It must be demonstrated that the 100-year flow to the existing system will not create or aggravate a severe flooding problem.

Further analysis will be provided at time of final engineering.

Flow Analysis & Capacity Analysis

To estimate the generated flow from each tributary area, the Rational Method will be based on Section 3.2.1 of the 2009 Manual:

- $Q_R = CI_RA$
- King county I.D.F. Family (2009 Manual)
- 25 and 100-year 24 storm event flow
- The runoff coefficients, 'C' values were taken from Table 3.2.1.A. A 'C' value of 0.9 was used for the impervious surfaces and a 'C' value of 0.25 for grass.
- T_c=6.3 minutes. This is a low (minimum) travel time, but will provide relatively higher flow rates.

Further analysis will be provided at time of final engineering.

3.1.5 Task 5 - Mitigation of Existing or Potential Problems

At this point, there has been no existing or potential problems identified in the downstream corridor.

IV. FLOW CONTROL AND WATER QUALITY FACILITY ANALYSIS AND DESIGN

The stormwater flow control and water quality facilities were designed in accordance with the 2009 King County Surface Water Design Manual (King Manual)

Existing Site Hydrology (Part A)

The site is currently is currently undeveloped and heavily forested with mixed native species and invasive shrub species. Through the middle of the site runs Little Bear Creek. The topography of the site shown the property slopes down from 136th Ave NE to Little Bear Creek and then back up again to the east toward HWY 522.

A stream and wetland assessment was performed by Acera LLC. Acera has indicated Little Bear Creek as a Type 1 stream with a 150 feet buffer. Also identified on the site is a 1,800 sf category IV wetland with an associated buffer of 50 feet. The applicant wishes to reduce the stream and wetland buffers to 100 feet and 25 feet through a buffer mitigation plans. All proposed development activity will remain outside of the reduced stream and wetland buffers.

The 136th Ave public right-of-way is currently unimproved without any formal drainage system installed on the east half of the road. Also, no sidewalk, planter strips, curb or gutter, has been installed.

According to the geotechnical report, the topsoil is approximately 1 foot thick. It is likely that with the thick topsoil cover and the large tree canopy cover, most stormwater is absorbed into the soil with very little turning into runoff.

Developed Site Hydrology (Part B)

The disturbance on site will include construction clearing and grading, frontage improvements, associated utilities, and eventually the three future residential structures. The project proposes to divide the generated runoff to the east and to the west. The downstream flow paths meet within a ¼ mile downstream, therefore the project has been analyzed with having a single discharge threshold.

The future driveways and rooftops have been included in the stormwater calculations. It is proposed that each driveway will slope toward the residential structures. The rooftops and driveways will be collected, tightlined, and conveyed to a single proposed 50-foot dispersion trench located next to the creek buffer within lot 3. Runoff will be dispersed toward Little Bear Creek. The vegetated flow path segment and surrounding area (from western stream buffer to eastern property boundary, plus some area in Lot 3) will be preserved in a native growth retention area (54,470 sf) to satisfy the requirements of Full Dispersion.

The frontage improvements will be graded such that the roadway, sidewalk, planter strip will be directed toward a proposed catch basin at the north end of the project within 136th Ave NE. It is then proposed to connect the new CB to the existing catch basin directly to the west within 136th Ave NE.

Tables 4.1 and 4.2 break down the historic and developed site conditions

TABLE 4.1 – Historic Conditions

			Till Forest sf (ac)	
Sub-basin	**Total Area sf (ac)**	**Impervious sf (ac)**	**Inside Buffer**	**Outside Buffer**
Project Parcel	71,101 (1.632)	0	53,084 (1.219)	18,017 (0.413)
Unimproved 136th Ave+	6,084 (0.140)	0		6,084 (0.140)
TOTAL	**77,185 (1.772)**	**0**	**53,084 (1.219)**	**24,101 (0.553)**

+Includes tapers

TABLE 4.2 – Developed Conditions

Sub-basin	**Total sf (ac)**	**Imperv. sf (ac)**	**Till Grass sf (ac)**	**Till Forest sf (ac)**	**Stormwater BMP**
Project Parcel	71,101 (1.632)				
Driveways (PGIS)*		1,350 (0.023)			Full Dispersion
Lot 1-3 Rooftop**		6,750 (0.186)			Full Dispersion
Lawn			9,917 (0.228)		
Critical Area Buffer				53,084 (1.219)	
136th Ave	6,084 (0.140)				
Roadway (PGIS)+		2,037 (0.047)			Direct Discharge
Sidewalk		1,010 (0.023)			Direct Discharge
Driveway Aprons (PGIS)*		569 (0.013)			Direct Discharge
Planter			2,468 (0.057)		
TOTAL	**77,185 (1.772)**	**11,716 (0.269)**	**12,385 (0.284)**	**53,084 (1.219)**	
TOTAL PGIS		**3,956 (0.091)**			
PGIS Not fully dispersed		**3,616 (0.083)**			

*Assuming 450 sf per driveway
**Assuming 2,250 sf rooftops per structure
+Includes tapers

Performance Standards (Part C)

Flow Control Facility (1.2.3.1.B):
The proposed project is located within the Conservation Flow Control area requiring runoff from developments to be detained and released at a rate that matches the flow duration of predeveloped rates. This is for a range of predeveloped discharge rates from 50% of the 2-year peak flow up to the full 50-year peak flow and applied to target surfaces only. The above is required unless an exception applies to the proposed site conditions.

The developed conditions do not exceed a 0.1 cfs difference in the sum of developed 100-year peak flows for those target surfaces subject to the flow control facility requirement and the sum of forested site conditions 100-year peak flows for the same surface areas. Thus flow control is not required for this basin per section 1.2.3.1.B of the Renton Manual. Part D of this section for analysis output comparing the pre and post flow rates.

Flow Control BMPs:
In addition to flow control facility requirements, projects subject to Core Requirement #3 must apply flow control BMPs to impervious surfaces on each individual lot. Flow control BMPs are methods and design for dispersing, infiltrating, or otherwise reducing development increases in runoff. See Flow Control System (Part D) below for more information pertaining to proposed flow control BMPs.

Water Quality
This project falls within a Basic Water Quality treatment land use area as designated by the Manual and is not subject to Enhanced Basic WQ menu per Section 1.2.8.1.A. The goal of Basic WQ treatment is 80% removal of total suspended solids.

The project though falls under the Pollution Generating Impervious Surface (PGIS) threshold of 5,000 sf of PGIS that is not fully dispersed or infiltrated within a threshold discharge area. Stormwater treatment is not required for this project. See Section IV of this report for details and a table of the target areas.

Stormwater Conveyance
The conveyance system capacity standards require that new conveyance systems contain the 25-year peak flow and ensure that the 100-year event does not create a severe flooding or erosion problem. See Section V of this report for the conveyance analysis per Core Requirement #4.

Flow Control Systems (Part D)
As discussed in Section The developed conditions of do not exceed a 0.1 cfs difference in the sum of developed 100-year peak flows for those target surfaces subject to the flow control facility requirement and the sum of forested site conditions 100-year peak flows for the same surface areas.

To compare the flow rates, the King County Runoff Time Series (KCRTS) analysis software was used. The project is located in the SeaTac 1 region according to Figure 3.2.2.A of the King Manual. The Predeveloped and developed values in Table 4.2 were input into KCRTS as summarized in Table 4.3 below and analysis results are below. Areas subject to full dispersion were applied a credit per Table 1.2.3.C of the King Manual. The Fully dispersed areas were modeled as forest. All areas are considered target as defined in Section 1.2.3.1.B in the Renton Manual. The total area modeled was the onsite area east of the western stream buffer and the offsite ROW improvements.

TABLE 4.3 – KCRTS Input

Condition	Forest	Grass	Impervious	Rooftop/ Driveway Full Dispersion	TOTAL (Ac)	100 yr flow (cfs)
KCRTS Input	**Forest (Ac)**	**Grass (Ac)**	**Impervious (Ac)**	**Forest (Ac)**		
Historic	0.553			0	0.553	0.045
Developed	0	0.284	0.083	0.186	0.553	0.113

Flow Frequency Analysis
Time Series File:predev.tsf
Project Location:Sea-Tac

---Annual Peak Flow Rates---			-----Flow Frequency Analysis-------			
Flow Rate (CFS)	Rank	Time of Peak	- - Peaks - - (CFS)	Rank	Return Period	Prob
0.035	2	2/09/01 18:00	0.045	1	100.00	0.990
0.010	7	1/06/02 3:00	0.035	2	25.00	0.960
0.026	4	2/28/03 3:00	0.027	3	10.00	0.900
0.001	8	3/24/04 19:00	0.026	4	5.00	0.800
0.015	6	1/05/05 8:00	0.022	5	3.00	0.667
0.027	3	1/18/06 20:00	0.015	6	2.00	0.500
0.022	5	11/24/06 4:00	0.010	7	1.30	0.231
0.045	1	1/09/08 9:00	0.001	8	1.10	0.091
Computed Peaks			0.041		50.00	0.980

Flow Frequency Analysis
Time Series File:dev.tsf
Project Location:Sea-Tac

---Annual Peak Flow Rates---			-----Flow Frequency Analysis-------			
Flow Rate (CFS)	Rank	Time of Peak	- - Peaks - - (CFS)	Rank	Return Period	Prob
0.052	4	2/09/01 2:00	0.110	1	100.00	0.990
0.033	6	1/05/02 16:00	0.062	2	25.00	0.960
0.062	2	2/27/03 7:00	0.055	3	10.00	0.900
0.025	8	8/26/04 2:00	0.052	4	5.00	0.800
0.032	7	10/28/04 16:00	0.050	5	3.00	0.667
0.055	3	1/18/06 16:00	0.033	6	2.00	0.500
0.050	5	11/24/06 3:00	0.032	7	1.30	0.231
0.110	1	1/09/08 6:00	0.025	8	1.10	0.091
Computed Peaks			0.094		50.00	0.980

Developed 0.110 CFS – Pre-developed 0.045 CFS = 0.065 CFS Difference
Exemption #1 per section 1.2.3.1.B of the King Manual applies to the project.

Flow Control BMPs

LOT 1

Lot 1 is approximately 5,315 sf with an approximate proposed impervious surface area of 2,700 sf. Because lot 1 is smaller than 22,000 sf, it must comply with the Small lot BMP requirements per Section C.1.3.1 of the King Manual. As mandated by these requirements, impervious area equal to 10% of the site area is targeted for application of flow control BMPs. This is a total of 532 sf.

To address the flow control BMP requirements, the applicability and feasibility of full dispersion was considered first. Full dispersion requires a flow path of 100 feet, however; the steep slope behind this lot renders an individual system infeasible. Therefore, stormwater will be tightlined to a dispersion trench on Lot 3, and dispersed over slopes less than 15% towards Little Bear Creek. All of the rooftop and driveway will be managed by Full dispersion satisfying the minimum impervious area that must be managed by a Flow Control BMP.

LOT 2

Lot 2 is approximately 5,469 sf with an approximate proposed impervious surface area of 2,700 sf. Because lot 2 is smaller than 22,000 sf, it must comply with the Small lot BMP requirements per Section C.1.3.1 of the King Manual. As mandated by these requirements, impervious area equal to 10% of the site area is targeted for application of flow control BMPs. This is a total of 547 sf.

To address the flow control BMP requirements, the applicability and feasibility of full dispersion was considered first. Full dispersion requires a flow path of 100 feet, however; the steep slope behind this lot renders an individual system infeasible. Therefore, stormwater will be tightlined to a dispersion trench on Lot 3, and dispersed over slopes less than 15% towards Little Bear Creek. All of the rooftop and driveway will be managed by Full dispersion satisfying the minimum impervious area that must be managed by a Flow Control BMP.

LOT 3

Lot 3 is approximately 7,202 sf with an approximate proposed impervious surface area of 2,700 sf. Because lot 3 is smaller than 22,000 sf, it must comply with the Small lot BMP requirements per Section C.1.3.1 of the King Manual. As mandated by these requirements, impervious area equal to 10% of the site area is targeted for application of flow control BMPs. This is a total of 720 sf.

To address the flow control BMP requirements, the applicability and feasibility of full dispersion was considered first. Full dispersion requires a flow path of 100 feet, however; the steep slope behind this lot renders an individual system infeasible. Therefore, stormwater will be tightlined to a dispersion trench on Lot 3, and dispersed over slopes less than 15% towards Little Bear Creek. All of the rooftop and driveway will be managed by Full dispersion satisfying the minimum impervious area that must be managed by a Flow Control BMP.

Appendix C.2.1.1 allows an impervious area equal to 15% of the total area preserved in a native vegetation covenant to be fully dispersed. A total of approximately 54,470 sf of area is proposed to bel be preserved as native vegetation. Fifteen percent of this area equals 8,170 sf. The total impervious area proposed to be conveyed to the dispersion is approximately 8,100 sf, under the maximum as allowed.

The location of the dispersion trench is in the area per the geotechnical report prepared by Robinson Noble for this short plat. Infiltration is not a feasible option for this project due to

the very small rates of infiltration. A Full Dispersion technique is an opportunity to utilize the large amount of native vegetation available on the property. This allows for full mitigation of stormwater due to the effects of development as stated in Section C.2.1 of the 2009 SWDM.

Water Quality System (Part E)

The project is located within a Basic Water Quality treatment area as discussed in Part C in this Section. The project though falls under the Pollution Generating Impervious Surface (PGIS) threshold of 5,000 sf within a threshold discharge area. See Table 4.2. Stormwater treatment is not required for this project.

V. CONVEYANCE SYSTEM ANALYSIS AND DESIGN

A conveyance analysis will be completed during final Engineering.

VI. SPECIAL REPORTS AND STUDIES

Geotechnical Report

3rd Revision Geotechnical Engineering Report, January 23, 2015; Prepared by Robinson Noble, Inc.

Sensitive Area Study

Stream and Wetland Assessment Report and Buffer Reduction Plan, May 2014; Prepared by ACERA, LLC.

VII. OTHER PERMITS

There are currently no other permits that effect the drainage submittal or the Technical Information Report.

VIII. CSWPPP ANALYSIS AND DESIGN

The CSWPPP will be included in Appendix C during final engineering.

IX. BOND QUANTITIES, FACILITY SUMMARIES, AND DECLARATION OF COVENANT

A completed Bond Quantities Worksheet can be made available to the City upon request.

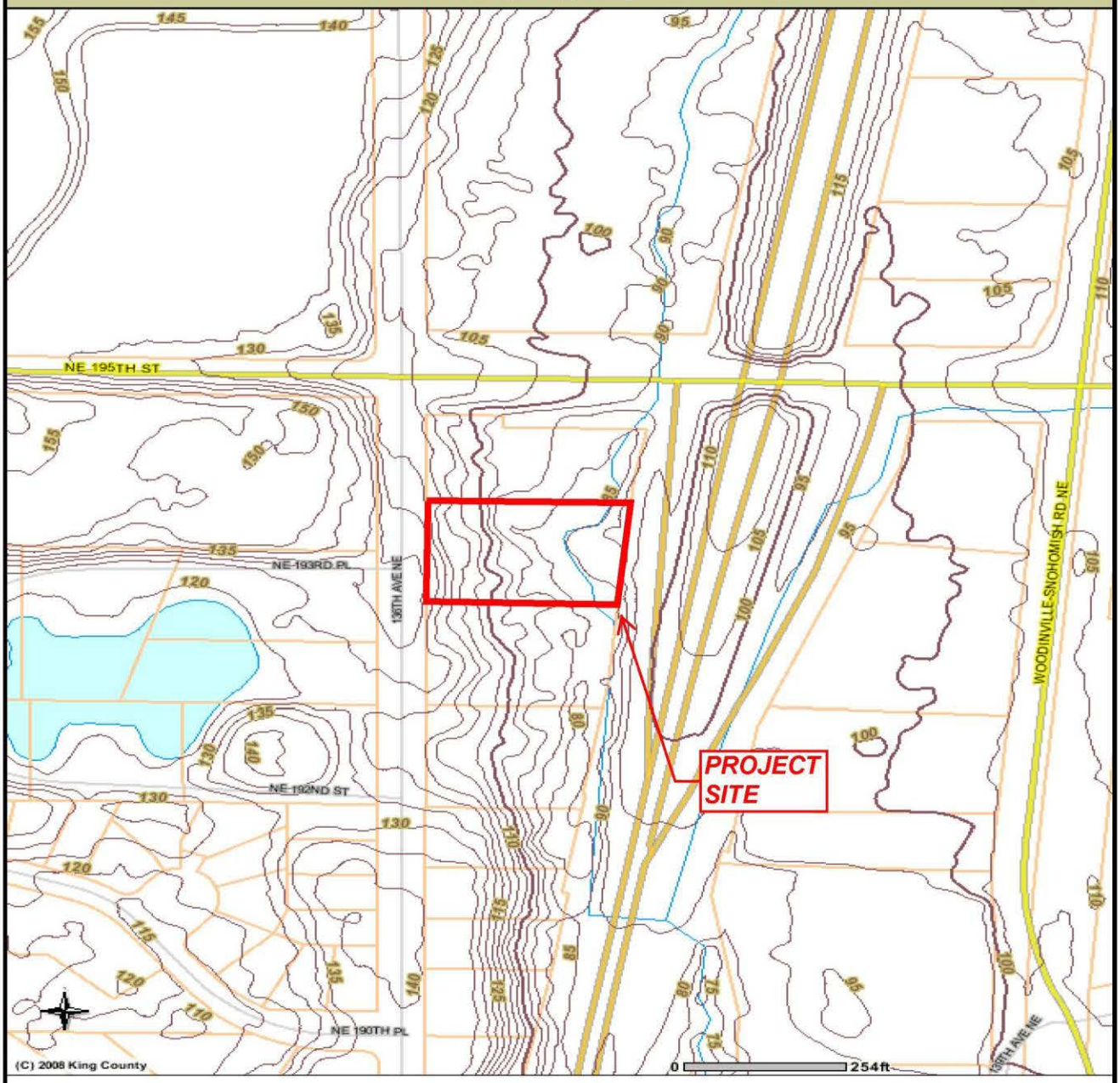
X. OPERATION AND MAINTENANCE MANUAL

The Operations and Maintenance Manual can be made available to the City upon request.

XI. Appendices

APPENDIX A – OFFSITE STUDY MAPS

iMAP - Topographic Map



Legend

- County Boundary
- Contours (5ft dark)
- 100; 500; 1000
- Other
- Zip codes
- Highways
- Streets
- Highway
- Arterials
- Local
- Parcels
- Lakes and Large Rivers
- Streams

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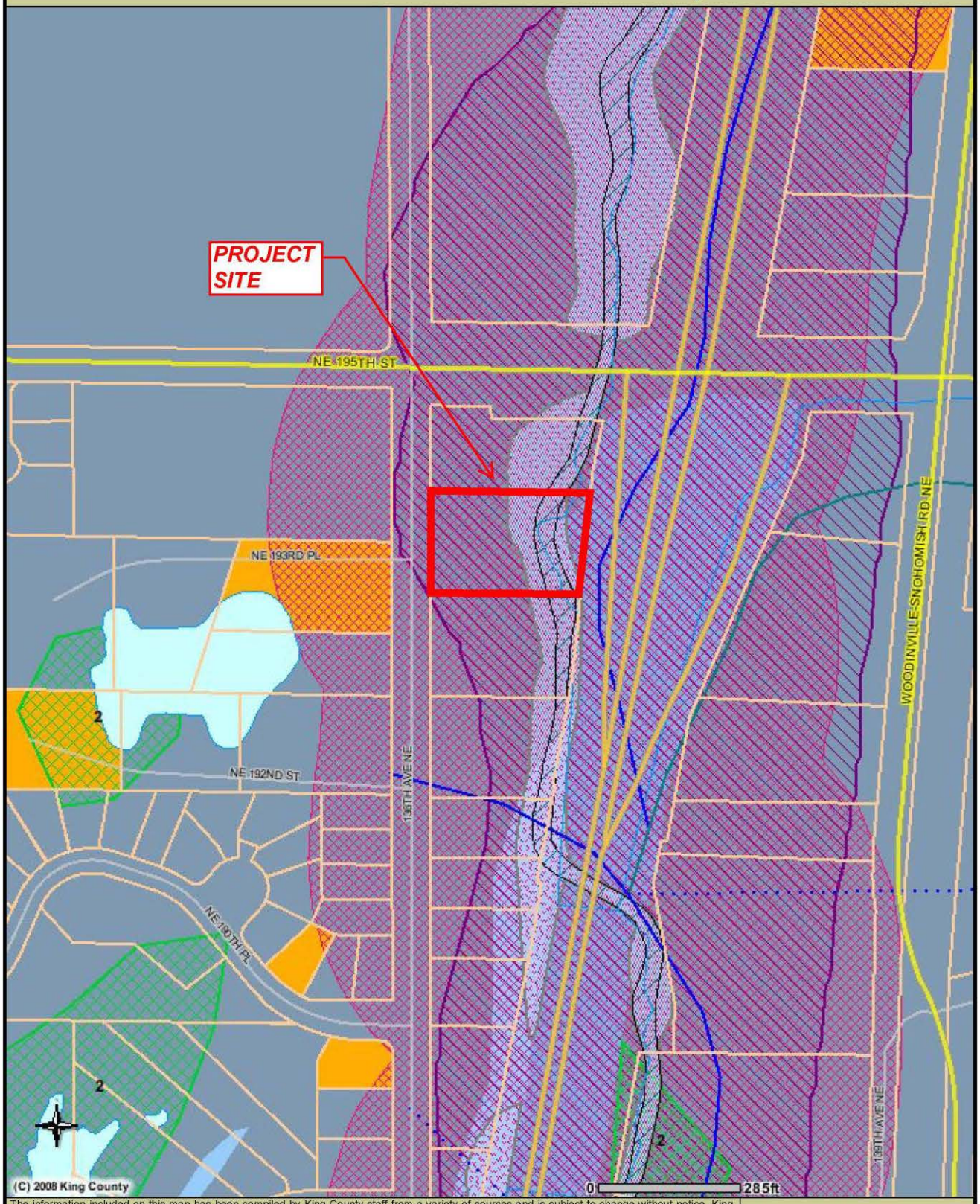
Date: 10/21/2014 Source: King County iMAP - Stormwater (http://www.metrokc.gov/GIS/iMAP)

King County

iMAP - Sensitive Area Map



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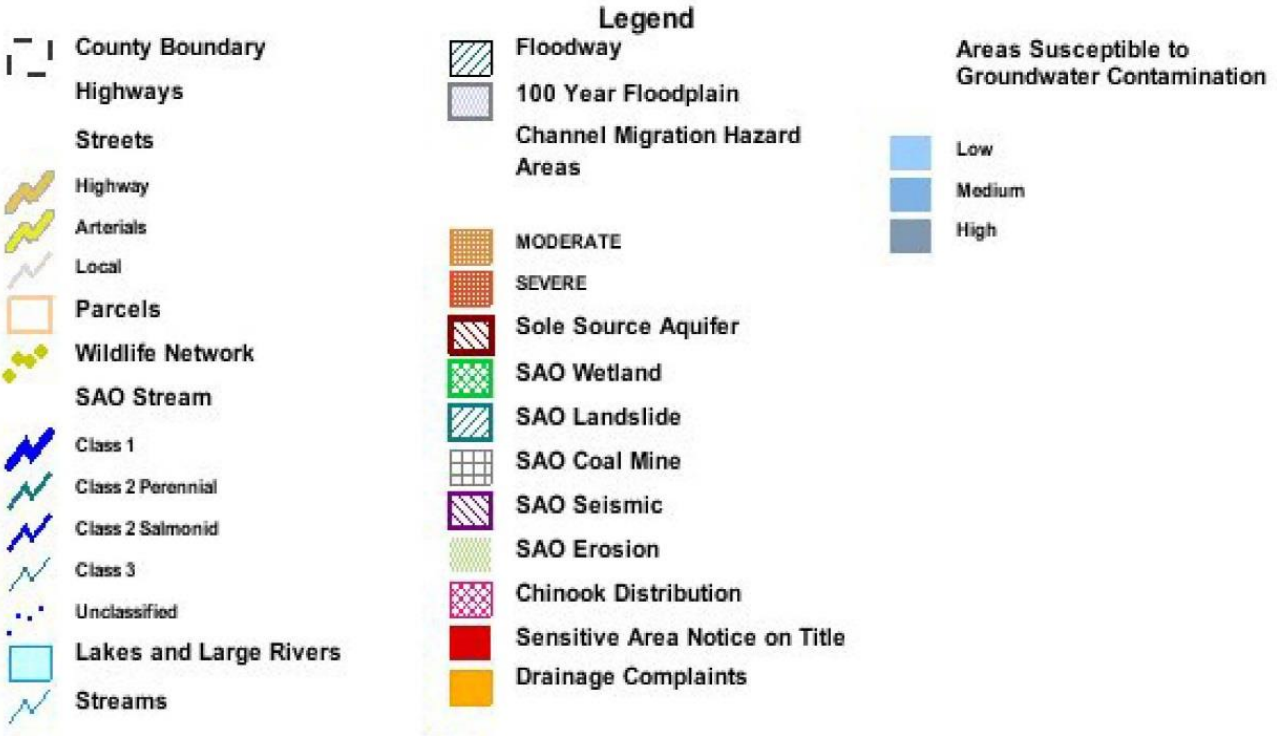
Date: 10/21/2014 Source: King County iMAP - Sensitive Areas (http://www.metrokc.gov/GIS/iMAP)

King County

iMAP - Sensitive Area Map



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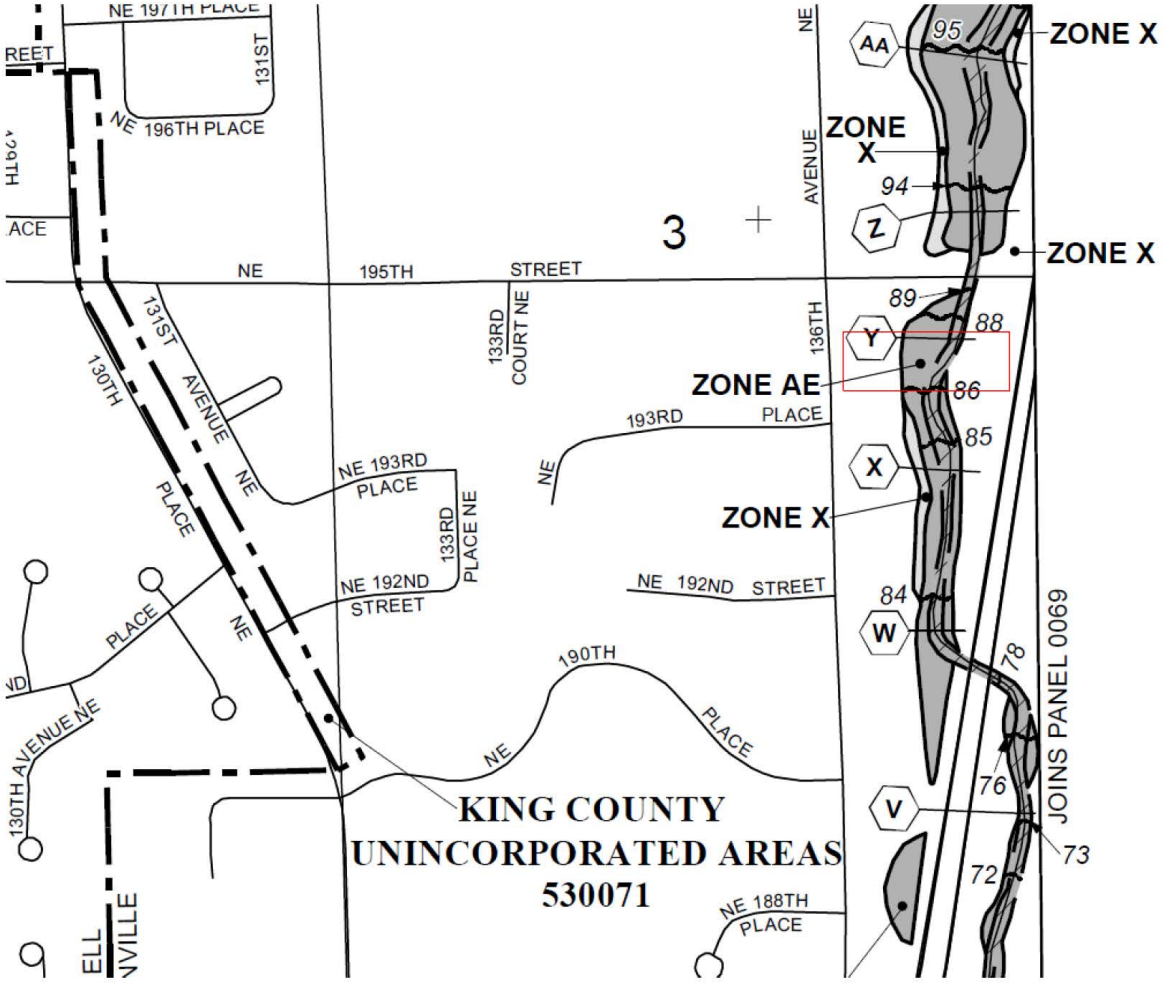
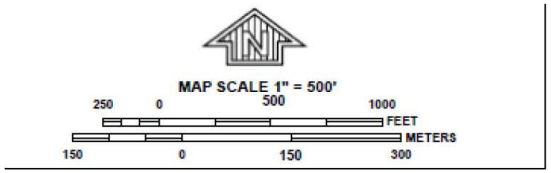
Date: 10/21/2014 Source: King County iMAP - Sensitive Areas (http://www.metrokc.gov/GIS/iMAP)

King County





NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0068H

FIRM

FLOOD INSURANCE RATE MAP

KING COUNTY, WASHINGTON AND INCORPORATED AREAS

PANEL 68 OF 1700

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BOTHELL, CITY OF	530075	0068	H
KING COUNTY	530071	0068	H
WOODINVILLE, CITY OF	530324	0068	H

PRELIMINARY
FEBRUARY 1, 2013

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
53033C0068H
MAP REVISED

Federal Emergency Management Agency

APPENDIX B – DOWNSTREAM SYSTEM TABLE AND MAPS

To be provided at time of final engineering

APPENDIX C – GEOTECHNICAL REPORT

Geotech Report has been provided separate from this TIR

APPENDIX D – ENVIRONMENTAL REPORT

Environmental/biologist Report has been provided separate from this TIR

APPENDIX E – CSWPPP

To be provided at time of final engineering