

Appendix H:

Preliminary Technical Information Report (Drainage) –
Montevallo, September 2005 Revision

Montevallo

City of Woodinville, Washington

Preliminary Technical Information Report

Date: 11/5/04

Job # 03-248

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9/27/05

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EXPIRES 06/02/06

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Date November 5, 2004

MONTEVALLO
Preliminary Technical Information Report

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LIST OF SUPPLEMENTAL INFORMATION

Note: Where applicable, supplemental information is located at the end of each section.

Section I:

TIR Worksheet

Section III:

Level 1 Downstream Analysis

Section IV:

Existing Basin Exhibit

Developed Basin Exhibit

1998 KCSWDM – Figure 3.2.2.A Rainfall Regions and Regional Scale Factors

Section V:

Offsite Pipe Capacity Calculations*

Section VI:

Geotechnical Engineering Study prepared by Earth Consultants Inc., dated September 22, 2004

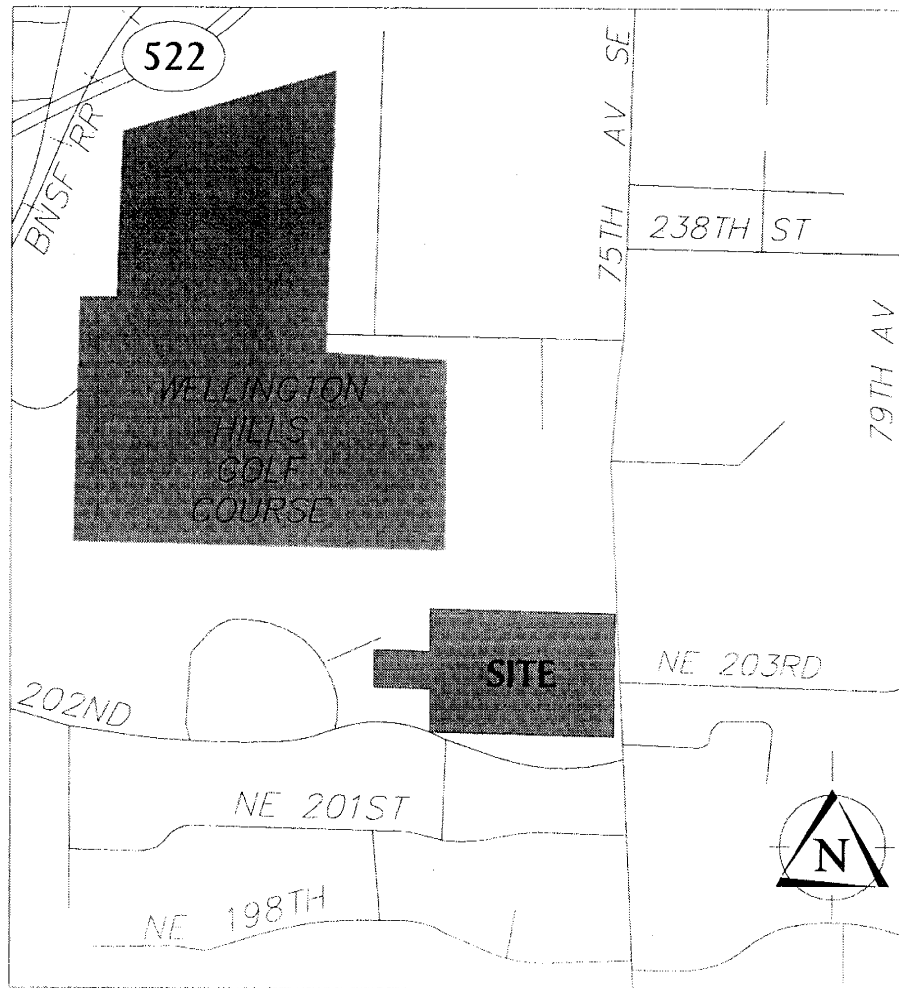
Section X:

Bond Quantity Worksheet*

*To be provided at Final Engineering Submittal

1 PROJECT OVERVIEW

The Montevallo Project proposes to construct 66 single family homes on approximately 13.5 acres of a 16.5 acre site. The site is located west of 156th Avenue NE and north of NE 202nd Street. In general, the site lies within Section 02, Township 26 North, Range 05 East, W.M., City of Woodinville, Washington. See the vicinity map below and the Developed Conditions Exhibit in the end of Section 4.



VICINITY MAP
Not to Scale

2 CONDITIONS AND REQUIREMENTS SUMMARY

2.1 Core Requirements

2.1.1 Core Requirement #1: Discharge at the Natural Location

Runoff from the site drains to the onsite wetland occupying the western portion of the site. The wetland drains offsite to the north via a vegetated ditch along the northwest property boundary of the site. Flow from the ditch enters a culvert / ditch system before discharging into a pond located within the Wellington Hills Golf Course approximately 350 ft downstream of the site. The proposed discharge location of the developed site will be to the existing onsite wetland.

2.1.2 Core Requirement #2: Offsite Analysis

See the Level 1 Downstream Analysis included in Section 3 of this TIR.

2.1.3 Core Requirement #3: Flow Control

Since site drainage is tributary to the Little Bear Creek (classified as salmonid-bearing stream), a detention vault designed to Level 2 flow control standards is proposed. See Section 4 – Flow Control and Water Quality Facility Analysis and Design.

2.1.4 Core Requirement #4: Conveyance System

See Section 6 – Conveyance System Analysis and Design.

2.1.5 Core Requirement #5: Erosion and Sediment Control

See Section 9 – Temporary Erosion and Sedimentation Control Analysis and Design.

2.1.6 Core Requirement #6: Maintenance and Operations

The storm system will be maintained by the City of Woodinville. Operations and Maintenance will be per King County Standards. See Section 10 – Operations and Maintenance Manual.

2.1.7 Core Requirement #7: Financial Guarantees and Liability

This requirement will be addressed during final engineering in Section 9 – Bond Quantity Work Sheet, Retention/Detention Facility Summary, and Declaration of Covenant.

2.1.8 Core Requirement #8: Water Quality

Water Quality BMPs from the Resource Stream Protection Menu will be provided. A treatment train system of wet vault followed by a leaf compost filter (StormFilter) is proposed for the site. The leaf compost filter will be the StormFilter system with leaf compost media by Stormwater Management Inc. See Section 4 – Flow Control and Water Quality Facility Analysis and Design.

2.2 Special Requirement #1: Other Adopted Area-Specific Requirements

2.2.1 Critical Drainage Areas

The site is not located within a Critical Drainage Area.

2.2.2 Master Drainage Plan

Not applicable.

2.2.3 Basin Plans

According to the King County Drainage Basins Map, the site is located within the Little Bear Creek sub-basin of the Sammamish River Drainage Basin.

2.2.4 Lake Management Plans

Not applicable.

2.2.5 Shared Facility Drainage Plans

Not applicable.

2.3 Special Requirement #2: Floodplain/Floodway Delineation

The limits of this project do not lie in a 100-year floodplain.

2.4 Special Requirement #3: Flood Protection Facilities

This special requirement is required for projects with Class 1 or 2 streams with an existing flood protection facility. The site does not contain the above-mentioned items.

2.5 Special Requirement #4: Source Controls

Not applicable. This project is not a commercial, industrial, multifamily or a redevelopment of a commercial, industrial or multifamily project.

3 OFFSITE ANALYSIS

3.1 Level 1 Downstream Analysis

Please refer to the attached Level 1 Downstream Analysis.

4 FLOW CONTROL AND WATER QUALITY DESIGN

4.1 Performance Standards, Flow Control System, W.Q. System

All stormwater facilities will be designed per the 1998 King County Surface Water Design Manual (KCSWDM). Since site drainage is tributary to the Little Bear Creek (classified as salmonid-bearing stream), a detention vault designed to Level 2 flow control standards along with water quality treatment from the Resource Stream Protection Menu is required for the site.

4.2 Drainage Concept

Runoff from the developed site will be collected and detained in a vault located adjacent to the wetland in the western portion of the site. Detained areas will also include the half street of 156th Avenue NE fronting the site to the east. Roof runoff from lots adjacent to the onsite wetland is proposed to bypass the detention vault and be dispersed at several locations along the wetland for recharge. Flows discharged from the vault are proposed to drain to the existing onsite wetland via a level spreader.

4.3 Detention

A detention vault with Level 2 flow control will be provided for the site. A Level 2 flow control facility requires, in addition to the Level 1 flow control requirement (match 2-year and 10-year peak discharge rates of the developed to the predeveloped conditions), that discharge durations from the developed site match those of the predeveloped durations for the range of the predeveloped discharge rates from 50% of the 2-year peak flow up to the full 50-year peak flow.

The King County Runoff Time Series (KCRTS) program (using hourly time steps) was used to size the Level 2 detention vault. The input parameters for the KCRTS program to estimate runoff for the site are Sea-Tac Rainfall Region with a Scale Factor of 1.0 and Till Soils conditions.

4.3.1 Existing Flows

The existing basin is modeled with developable portions of the site east of the onsite wetland including the half street of 156th Avenue NE fronting the site. The total existing basin area is 13.50 acres with 1.40 acres of till forest, 0.69 acres of impervious, 1.32 acres of till grass, and 10.09 acres of till pasture. Refer to the *Existing Basin Exhibit* at the end of this Section.

KCRTS Existing Peak Flows

Flow Frequency Analysis							
Time Series File:exst.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
1.02	3	2/09/01	15:00	1.92	1	100.00	0.990
0.496	7	1/05/02	16:00	1.02	2	25.00	0.960
1.02	2	2/28/03	3:00	1.02	3	10.00	0.900
0.241	8	8/26/04	2:00	0.967	4	5.00	0.800
0.574	6	1/05/05	8:00	0.908	5	3.00	0.667
0.967	4	1/18/06	16:00	0.574	6	2.00	0.500
0.908	5	11/24/06	4:00	0.496	7	1.30	0.231
1.92	1	1/09/08	6:00	0.241	8	1.10	0.091
Computed Peaks				1.62		50.00	0.980

The peak downstream flows from the detention vault will not exceed 0.57 cfs and 1.02 cfs for the 2 and 10-year storm events, respectively.

4.3.2 Developed Flows

The developed basin will not include the wetland recharge portion. The developed basin is 12.38 acres with 7.20 acres of impervious surfaces (58%) and 5.18 acres of till grass. Refer to the *Developed Basin Exhibit* at the end of this Section.

KCRTS Developed Peak Flows

Flow Frequency Analysis							
Time Series File:site-9-20.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
2.21	6	2/09/01	2:00	4.50	1	100.00	0.990
1.77	8	1/05/02	16:00	2.75	2	25.00	0.960
2.66	3	2/27/03	7:00	2.66	3	10.00	0.900
1.89	7	8/26/04	2:00	2.34	4	5.00	0.800
2.28	5	10/28/04	16:00	2.28	5	3.00	0.667
2.34	4	1/18/06	16:00	2.21	6	2.00	0.500
2.75	2	10/26/06	0:00	1.89	7	1.30	0.231
4.50	1	1/09/08	6:00	1.77	8	1.10	0.091
Computed Peaks				3.91		50.00	0.980

The 100-year peak developed flow rate generated from the detained area is 4.50 cfs.

4.3.3 Detention Vault Modeling

The following is the output from the KCRS program for the modeled Level 2 detention vault.

KCRTS Level 2 Vault

Retention/Detention Facility					
Type of Facility: Detention Vault					
Facility Length:		285.00	ft		
Facility Width:		50.00	ft		
Facility Area:		14250.	sq. ft		
Effective Storage Depth:		6.50	ft		
Stage 0 Elevation:		0.00	ft		
Storage Volume:		92625.	cu. ft		
Riser Head:		6.50	ft		
Riser Diameter:		12.00	inches		
Number of orifices:		3			
Orifice #	Height (ft)	Diameter (in)	Full Head Discharge (CFS)	Pipe Diameter (in)	
1	0.00	2.44	0.412		
2	3.10	2.63	0.346	6.0	
3	4.40	2.31	0.210	6.0	
Top Notch Weir: None					
Outflow Rating Curve: None					
Stage (ft)	Elevation (ft)	Storage (cu. ft)	Discharge (ac-ft) (cfs)	Percolation (cfs)	
0.00	0.00	0.	0.000	0.000	0.00

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0.03	0.03	428.	0.010	0.026	0.00
0.05	0.05	713.	0.016	0.036	0.00
0.08	0.08	1140.	0.026	0.045	0.00
0.10	0.10	1425.	0.033	0.051	0.00
0.13	0.13	1853.	0.043	0.058	0.00
0.15	0.15	2138.	0.049	0.063	0.00
0.18	0.18	2565.	0.059	0.068	0.00
0.20	0.20	2850.	0.065	0.073	0.00
0.33	0.33	4703.	0.108	0.093	0.00
0.46	0.46	6555.	0.150	0.109	0.00
0.59	0.59	8408.	0.193	0.124	0.00
0.71	0.71	10118.	0.232	0.136	0.00
0.84	0.84	11970.	0.275	0.148	0.00
0.97	0.97	13823.	0.317	0.159	0.00
1.10	1.10	15675.	0.360	0.169	0.00
1.22	1.22	17385.	0.399	0.179	0.00
1.35	1.35	19238.	0.442	0.188	0.00
1.48	1.48	21090.	0.484	0.196	0.00
1.61	1.61	22943.	0.527	0.205	0.00
1.73	1.73	24653.	0.566	0.213	0.00
1.86	1.86	26505.	0.608	0.220	0.00
1.99	1.99	28358.	0.651	0.228	0.00
2.12	2.12	30210.	0.694	0.235	0.00
2.24	2.24	31920.	0.733	0.242	0.00
2.37	2.37	33773.	0.775	0.249	0.00
2.50	2.50	35625.	0.818	0.255	0.00
2.62	2.62	37335.	0.857	0.262	0.00
2.75	2.75	39188.	0.900	0.268	0.00
2.88	2.88	41040.	0.942	0.274	0.00
3.01	3.01	42893.	0.985	0.280	0.00
3.10	3.10	44175.	1.014	0.284	0.00
3.13	3.13	44603.	1.024	0.287	0.00
3.15	3.15	44888.	1.030	0.294	0.00
3.18	3.18	45315.	1.040	0.304	0.00
3.21	3.21	45743.	1.050	0.317	0.00
3.24	3.24	46170.	1.060	0.333	0.00
3.26	3.26	46455.	1.066	0.353	0.00
3.29	3.29	46883.	1.076	0.375	0.00
3.32	3.32	47310.	1.086	0.382	0.00
3.35	3.35	47738.	1.096	0.389	0.00
3.47	3.47	49448.	1.135	0.416	0.00
3.60	3.60	51300.	1.178	0.439	0.00
3.73	3.73	53153.	1.220	0.461	0.00
3.86	3.86	55005.	1.263	0.480	0.00
3.98	3.98	56715.	1.302	0.499	0.00
4.11	4.11	58568.	1.345	0.516	0.00
4.24	4.24	60420.	1.387	0.533	0.00
4.37	4.37	62273.	1.430	0.549	0.00
4.40	4.40	62700.	1.439	0.553	0.00
4.42	4.42	62985.	1.446	0.557	0.00
4.45	4.45	63412.	1.456	0.564	0.00
4.47	4.47	63697.	1.462	0.574	0.00
4.50	4.50	64125.	1.472	0.586	0.00
4.52	4.52	64410.	1.479	0.601	0.00
4.54	4.54	64695.	1.485	0.617	0.00
4.57	4.57	65123.	1.495	0.632	0.00
4.59	4.59	65408.	1.502	0.639	0.00

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4.72	4.72	67260.	1.544	0.672	0.00
4.85	4.85	69113.	1.587	0.700	0.00
4.97	4.97	70823.	1.626	0.727	0.00
5.10	5.10	72675.	1.668	0.752	0.00
5.23	5.23	74528.	1.711	0.775	0.00
5.36	5.36	76380.	1.753	0.797	0.00
5.48	5.48	78090.	1.793	0.819	0.00
5.61	5.61	79943.	1.835	0.839	0.00
5.74	5.74	81795.	1.878	0.859	0.00
5.87	5.87	83648.	1.920	0.879	0.00
5.99	5.99	85358.	1.960	0.897	0.00
6.12	6.12	87210.	2.002	0.916	0.00
6.25	6.25	89063.	2.045	0.933	0.00
6.38	6.38	90915.	2.087	0.951	0.00
6.50	6.50	92625.	2.126	0.967	0.00
6.60	6.60	94050.	2.159	1.290	0.00
6.70	6.70	95475.	2.192	1.860	0.00
6.80	6.80	96900.	2.225	2.610	0.00
6.90	6.90	98325.	2.257	3.410	0.00
7.00	7.00	99750.	2.290	3.710	0.00
7.10	7.10	101175.	2.323	3.970	0.00
7.20	7.20	102600.	2.355	4.220	0.00
7.30	7.30	104025.	2.388	4.450	0.00
7.40	7.40	105450.	2.421	4.670	0.00
7.50	7.50	106875.	2.454	4.870	0.00
7.60	7.60	108300.	2.486	5.070	0.00
7.70	7.70	109725.	2.519	5.260	0.00
7.80	7.80	111150.	2.552	5.440	0.00
7.90	7.90	112575.	2.584	5.610	0.00
8.00	8.00	114000.	2.617	5.780	0.00
8.10	8.10	115425.	2.650	5.940	0.00
8.20	8.20	116850.	2.683	6.100	0.00
8.30	8.30	118275.	2.715	6.250	0.00
8.40	8.40	119700.	2.748	6.400	0.00
8.50	8.50	121125.	2.781	6.550	0.00

Hyd	Inflow	Outflow		Peak		Storage	
		Target	Calc	Stage	Elev	(Cu-Ft)	(Ac-Ft)
1	4.50	*****	3.14	6.87	6.87	97842.	2.246
2	2.21	*****	0.96	6.48	6.48	92311.	2.119
3	2.21	1.02	0.87	5.82	5.82	82903.	1.903
4	2.34	*****	0.79	5.34	5.34	76095.	1.747
5	2.66	*****	0.70	4.86	4.86	69219.	1.589
6	1.38	0.57	0.48	3.87	3.87	55158.	1.266
7	1.77	*****	0.28	2.95	2.95	42046.	0.965
8	1.89	*****	0.24	2.19	2.19	31166.	0.715

Duration Comparison Analysis

Base File: exst.tsf

New File: rdout.tsf

Cutoff Units: Discharge in CFS

-----Fraction of Time----- Check of Tolerance-----							
Cutoff	Base	New	%Change	Probability	Base	New	%Change
0.230	0.90E-02	0.54E-02	-40.1	0.90E-02	0.230	0.224	-2.7
0.283	0.63E-02	0.35E-02	-44.6	0.63E-02	0.283	0.229	-19.1
0.335	0.49E-02	0.32E-02	-34.3	0.49E-02	0.335	0.231	-31.1

0.388	0.37E-02	0.30E-02	-17.7	0.37E-02	0.388	0.267	-31.2
0.440	0.28E-02	0.27E-02	-6.3	0.28E-02	0.440	0.416	-5.6
0.493	0.21E-02	0.22E-02	0.8	0.21E-02	0.493	0.494	0.2
0.546	0.15E-02	0.17E-02	15.4	0.15E-02	0.546	0.564	3.3
0.598	0.10E-02	0.12E-02	14.1	0.10E-02	0.598	0.616	3.0
0.651	0.77E-03	0.80E-03	4.3	0.77E-03	0.651	0.654	0.5
0.703	0.44E-03	0.49E-03	11.1	0.44E-03	0.703	0.713	1.4
0.756	0.24E-03	0.24E-03	0.0	0.24E-03	0.756	0.762	0.9
0.808	0.16E-03	0.15E-03	-10.0	0.16E-03	0.808	0.804	-0.6
0.861	0.65E-04	0.00E+00	-100.0	0.65E-04	0.861	0.846	-1.7

Maximum positive excursion = 0.021 cfs (3.9%)
occurring at 0.526 cfs on the Base Data:exst.tsf
and at 0.546 cfs on the New Data:rdout.tsf

Maximum negative excursion = 0.129 cfs (-35.2%)
occurring at 0.365 cfs on the Base Data:exst.tsf
and at 0.236 cfs on the New Data:rdout.tsf

The outflow durations do not exceed the maximum 10% threshold. In addition, more than half of the flow duration curve is below the existing target duration curve. Therefore, the designed vault meets the Level 2 flow control requirement. The required detention volume is approximately 92,625 cf. The final vault will be designed to accommodate the required detention volume plus a 10% safety factor.

4.4 Wetland Recharge

The Montevallo site contains one wetland and buffer which is 2.82 acres. The wetland recharge will be provided by the back 20' of yards, roof, and footing drains dispersing runoff toward the wetland. The driveway and front yard will drain to the street. The roof and footing drains will be dispersed in a level spreaders outside of the wetland buffer. The selected lots to provide recharge are lots 10 - 21; see the *Wetland Recharge Exhibit* at the end of this section. The area break down is 0.70 acres of impervious and 0.42 acres of grass. This area was subtracted from the developed area going to the detention vault.

KCTRS Wetland Flows

Flow Frequency Analysis							
Time Series File:wet9-20.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
0.208	6	2/09/01	2:00	0.421	1	100.00	0.990
0.170	8	1/05/02	16:00	0.266	2	25.00	0.960
0.250	3	2/27/03	7:00	0.250	3	10.00	0.900
0.183	7	8/26/04	2:00	0.221	4	5.00	0.800
0.220	5	10/28/04	16:00	0.220	5	3.00	0.667
0.221	4	1/18/06	16:00	0.208	6	2.00	0.500
0.266	2	10/26/06	0:00	0.183	7	1.30	0.231
0.421	1	1/09/08	6:00	0.170	8	1.10	0.091
Computed Peaks				0.369		50.00	0.980

4.5 Water Quality

Selecting from the BMPs listed in the Resource Stream Protection Menu, water quality for the site will be provided by a two-facility treatment train system (Option 3). The proposed treatment train will be a basic wet vault followed by a leaf compost filter (StormFilter).

4.5.1 Wet Vault

The basic wet vault was sized per Chapter 6.4 of the 1998 KCSWDM.

Total Area = 12.38 acres

Impervious = 7.20 acres

Pervious = 5.18 acres (till grass)

$$V_r = (0.9A_i + 0.25A_{tg} + 0.10A_{tf} + 0.01A_o) \times 43,560 \times (R/12)$$

Where

V_r = volume of runoff from mean annual storm (cf)

A_i = area of impervious surface = 7.20 acres

A_{tg} = area of till soil covered with grass = 5.18 acres

A_{tf} = area of till soil covered with forest = 0 acres

A_o = area of outwash soil covered with grass or forest = 0 acres

R = rainfall from mean annual storm = 0.47" (Figure 6.4.1.A)

$$V_r = [(0.9)(7.20 \text{ ac}) + (0.25)(5.18 \text{ ac}) + (0.10)(0 \text{ ac}) + (0.01)(0 \text{ ac})] \times 43560 \times (0.47/12)$$
$$V_r = 13,264 \text{ cf}$$

$$V_b = fV_r \quad (\text{Equation 6-14})$$

Where V_b = wetpool volume (cf)
 f = volume factor = 3 (basic wet vault)
 V_r = runoff volume = 13,264 cf

$$V_b = (3)(13,264)$$

$$V_b = 39,794 \text{ cubic-feet}$$

The required wet vault volume is approximately 39,794 cf. The wet vault will be designed to provide the required water quality volume.

4.5.2 StormFilter

A StormFilter vault is proposed to provide additional water quality treatment required for Resource Stream Protection. This vault will treat flows downstream of the water quality / detention vault. The StormFilter vault will be sized to accommodate the number of StormFilter cartridges required to treat the 2-year outflow from the detention vault. As determined in Section 4.3.3 Detention Vault Modeling, the 2-year outflow is 0.48 cfs. A StormFilter cartridge can treat 0.0334 cfs (15 gal/min), therefore the required number of cartridges is 15. A 12' x 6' StormFilter vault is proposed to accommodate the required cartridges for treatment. Final StormFilter vault sizing will be done by Stormwater Management Inc.

Flows in excess of the 2-year peak flows released from the detention vault will bypass the StormFilter via a flow splitter.

5 CONVEYANCE SYSTEM ANALYSIS AND DESIGN

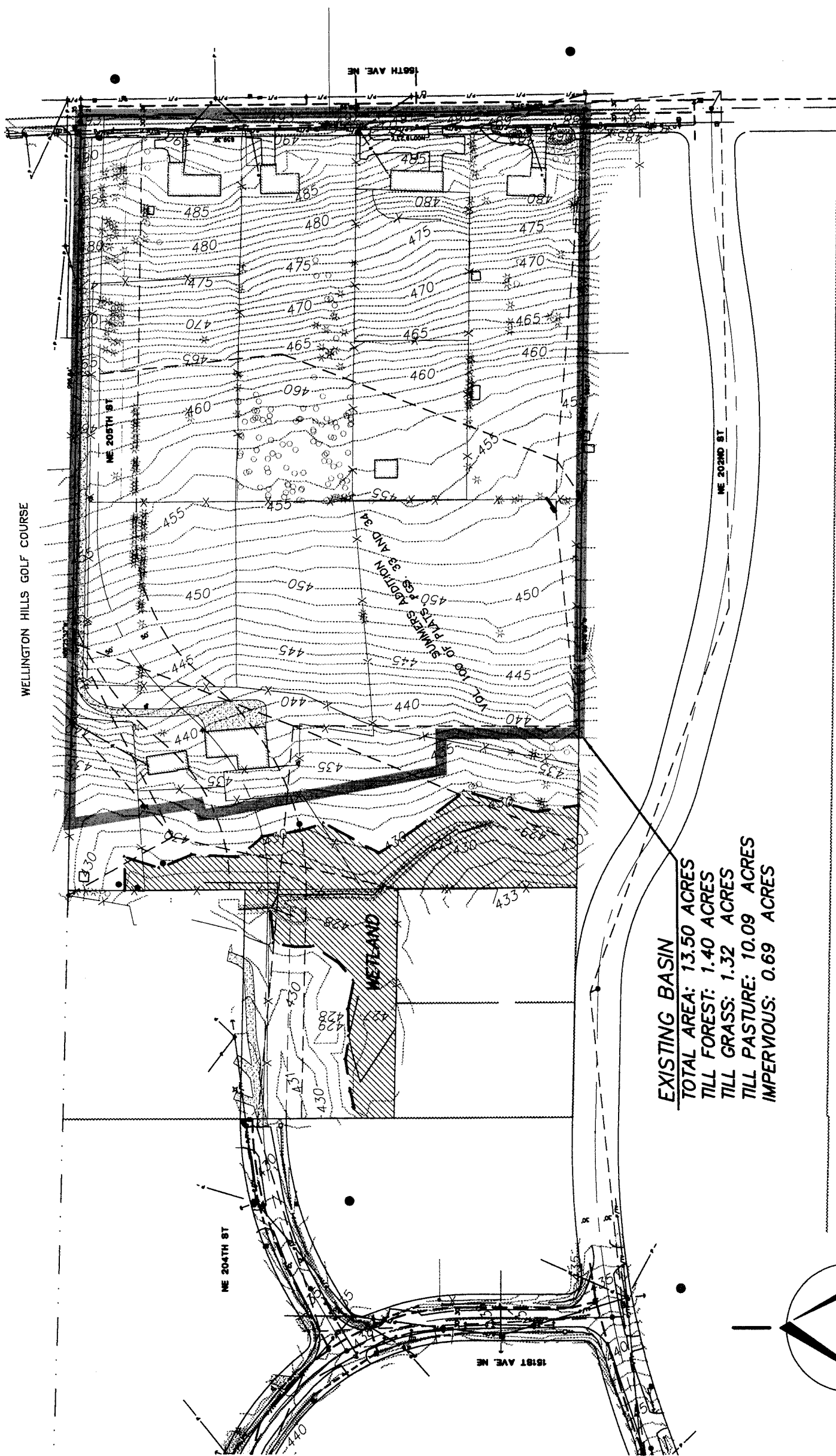
The onsite conveyance system will be designed per the 1998 King County Surface Water Design Manual (KCSWDM). Backwater analysis will be provided in final engineering.

5.1 Offsite Capacity

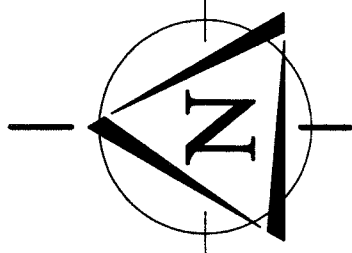
There do not appear to be any off-site capacity issues.

6 SPECIAL REPORTS AND STUDIES

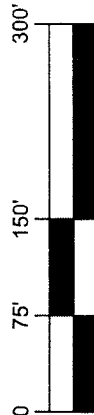
Please refer to the attached Geotechnical Engineering Study prepared by Earth Consultants Inc., dated September 22, 2004.

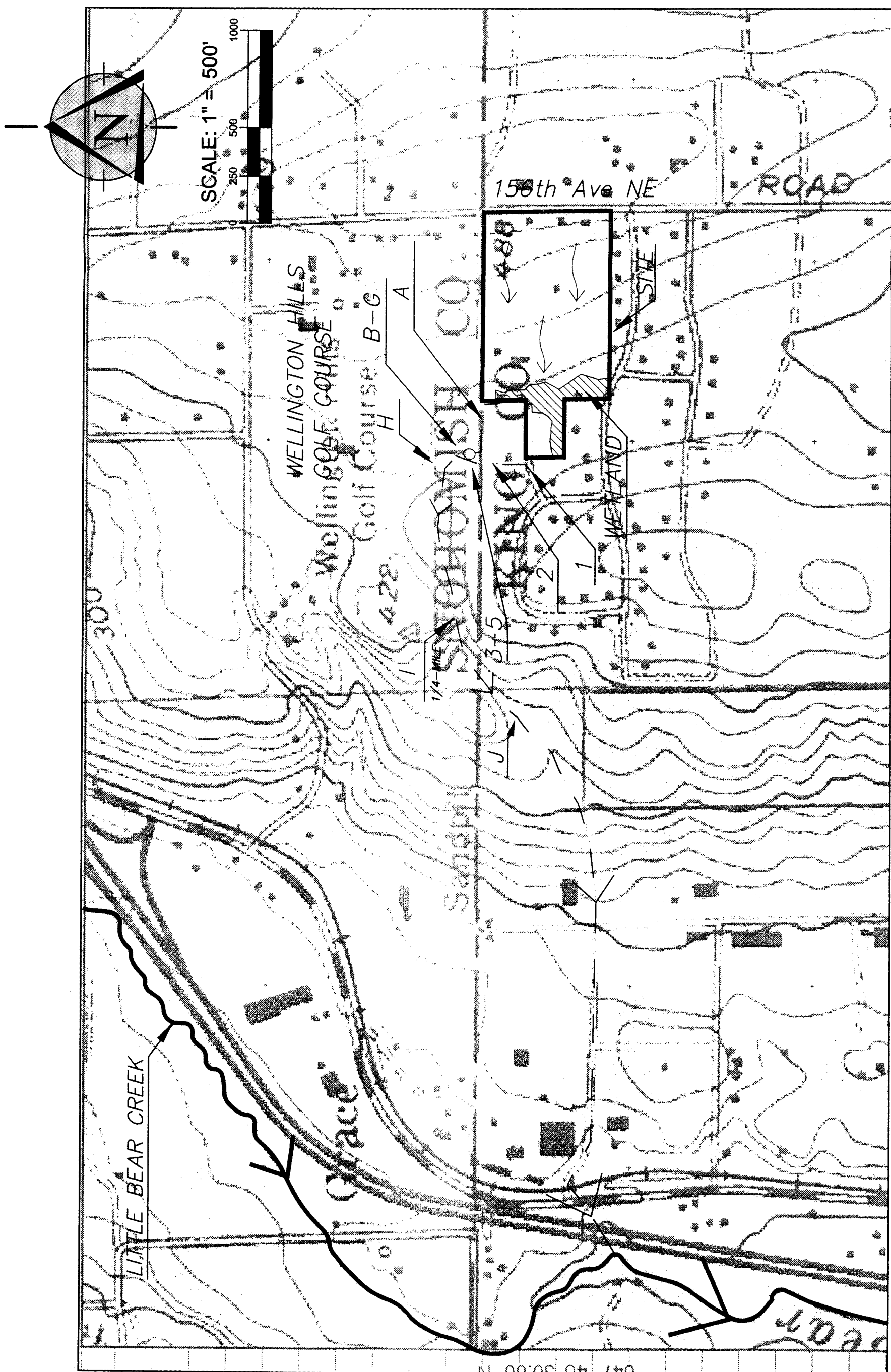


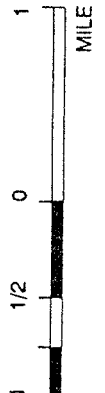
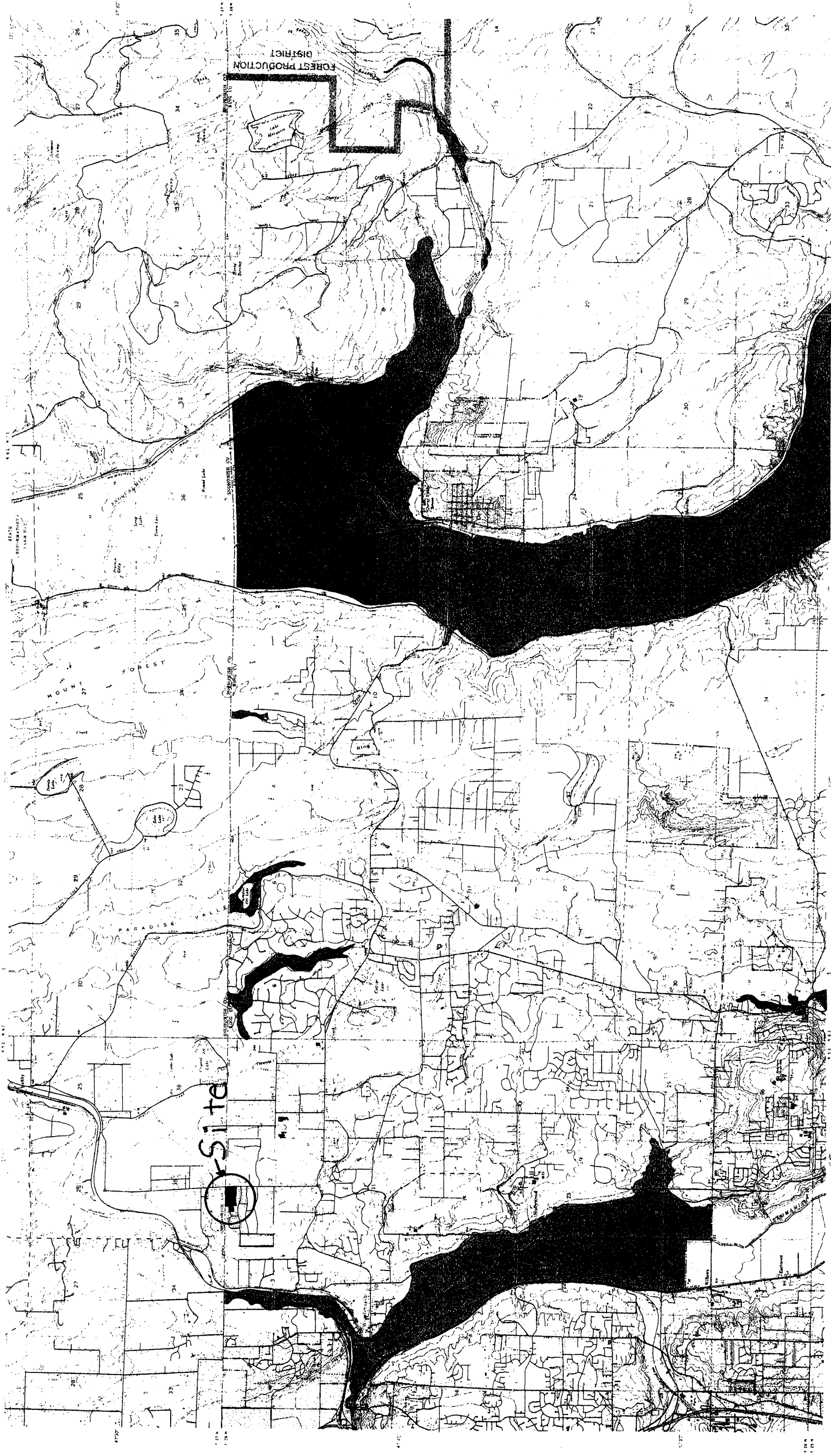
EXISTING BASIN
TOTAL AREA: 13.50 ACRES
TILL FOREST: 1.40 ACRES
TILL GRASS: 1.32 ACRES
TILL PASTURE: 10.09 ACRES
IMPERVIOUS: 0.69 ACRES



SCALE: 1" = 150'





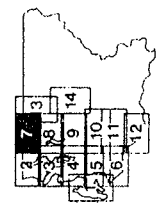


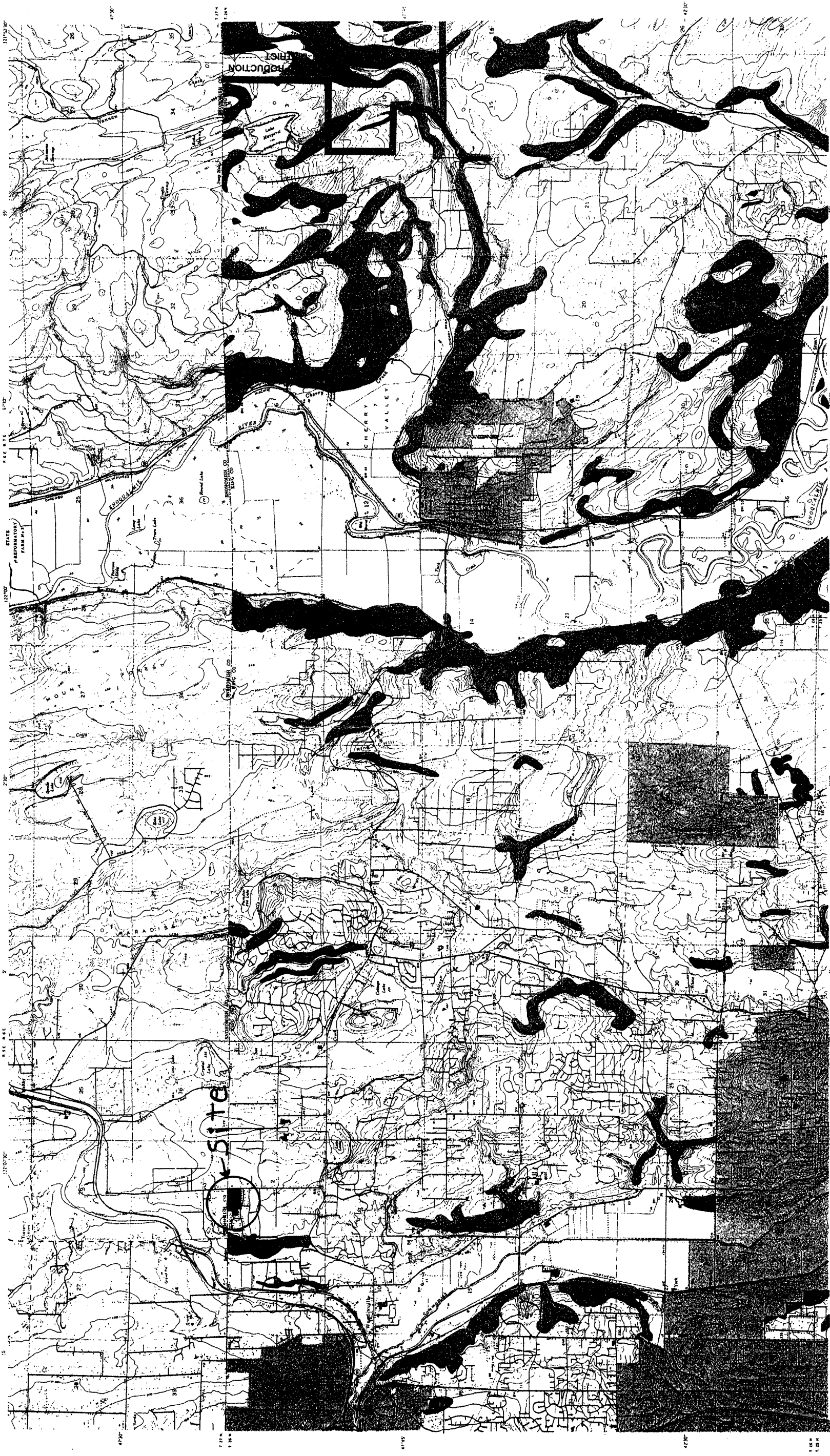
The boundaries of the sensitive areas displayed on these maps are approximate. Additional sensitive areas that have not been mapped may be present on a development proposal site. Where differences occur between what is illustrated on these maps and the site conditions, the actual presence or absence on the site of the sensitive area - as defined in the Sensitive Area Ordinance - is the legal control.

See wetlands and landslide hazard maps for additional potential seismic hazard areas. Wetlands and landslide areas are susceptible to failure during earthquakes. Other seismic hazard areas not shown on this map are shorelines underlain by lacustrine sediments; these are susceptible to liquefaction.

Seismic Hazard Areas

Duval

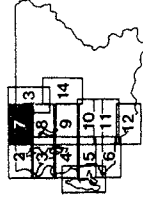
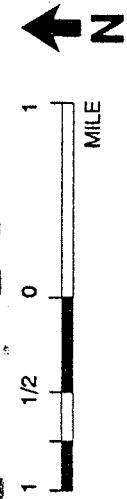


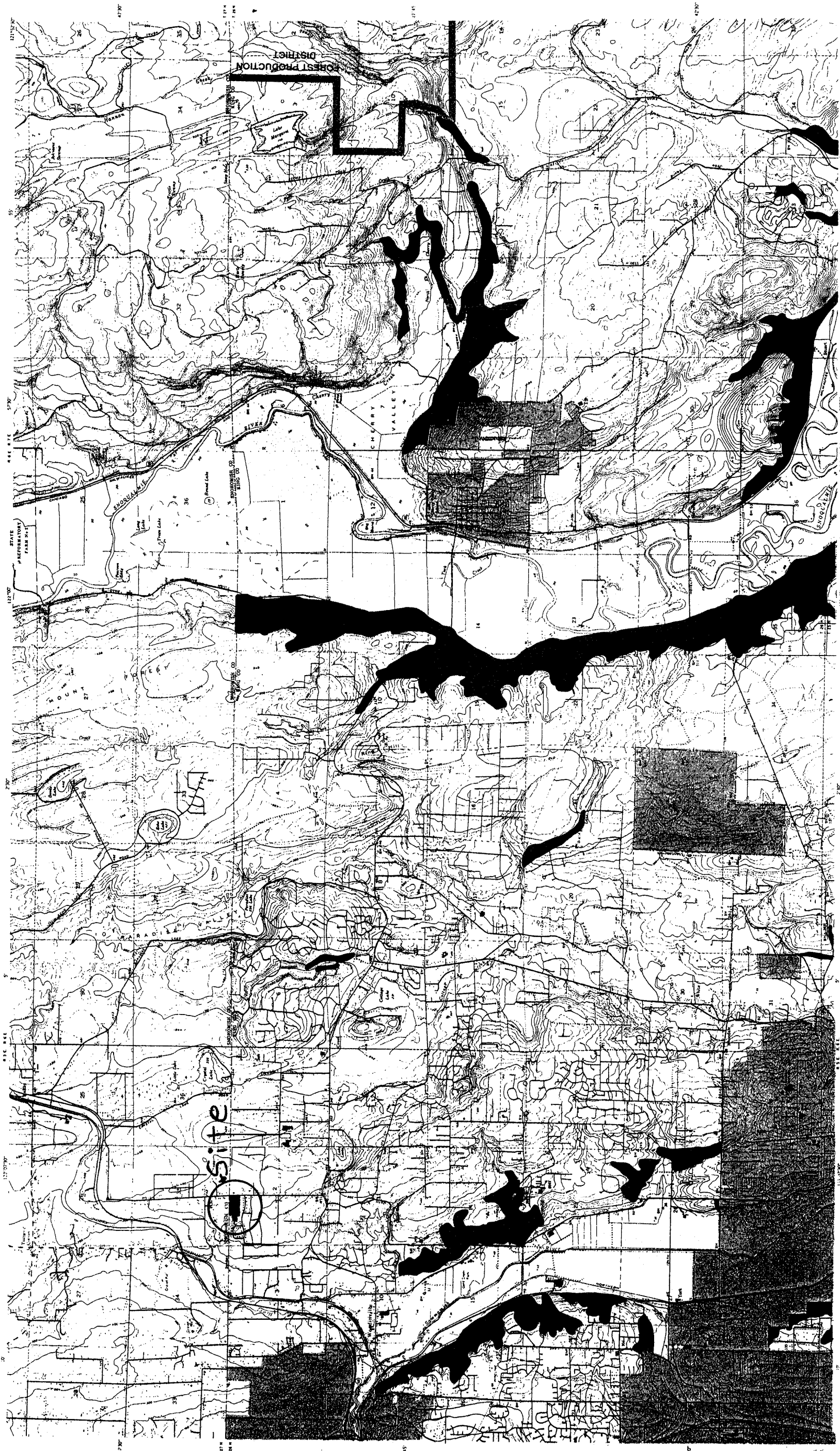


Duwall 7

Erosion Hazard Areas

The boundaries of the sensitive areas displayed on these maps are approximate. Additional sensitive areas that have not been mapped may be present on a development proposal site. Where differences occur between what is illustrated on these maps and the site conditions, the actual presence or absence on the site of the sensitive area - as defined in the Sensitive Area Ordinance - is the legal control.

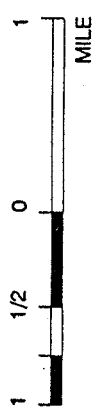
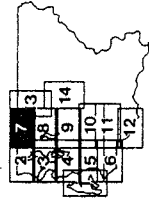


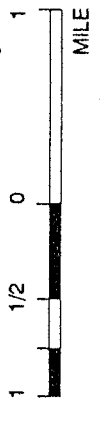
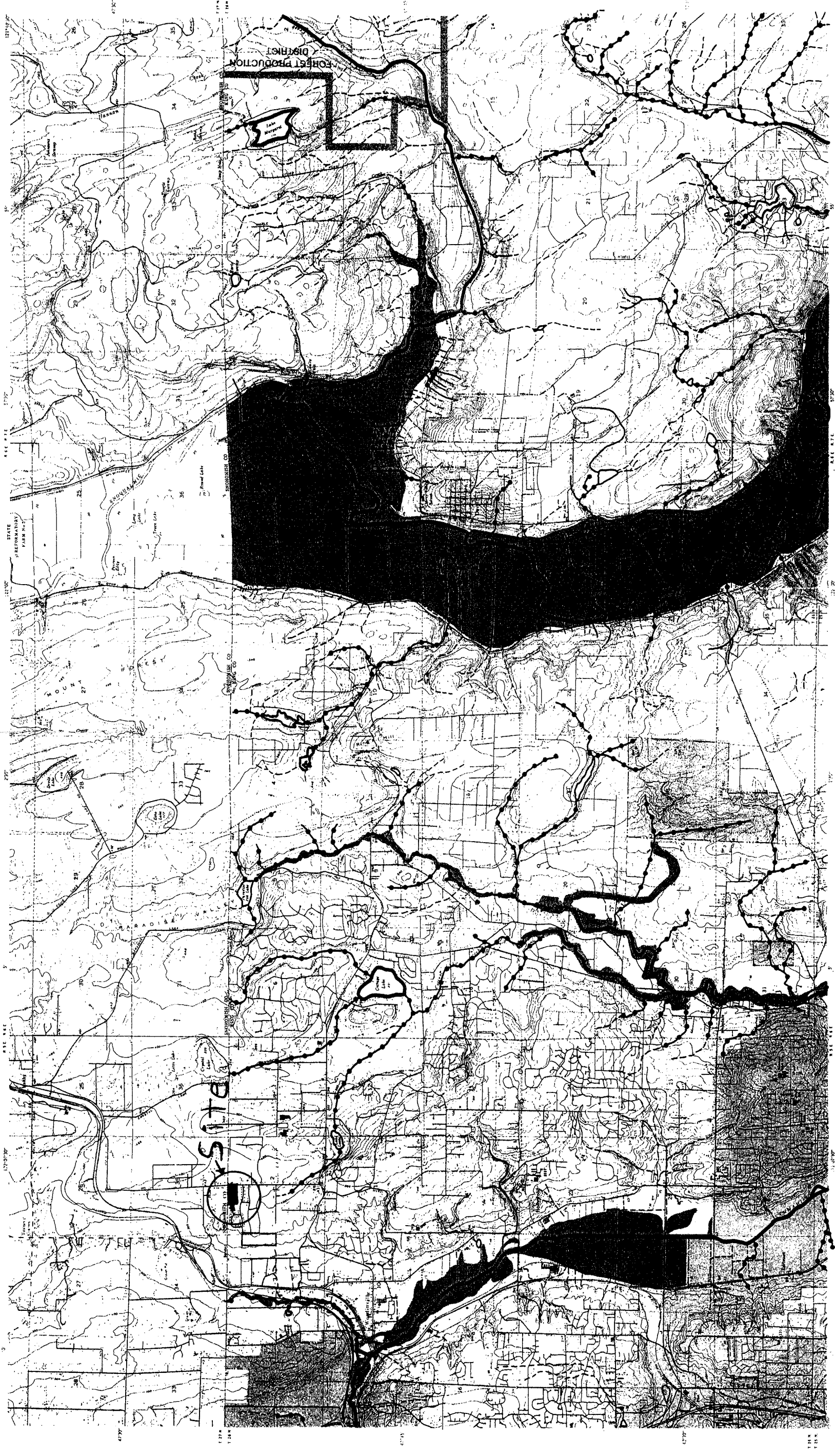


Duval

Landslide Hazard Areas

The boundaries of the sensitive areas displayed on these maps are approximate. Additional sensitive areas that have not been mapped may be present on a development proposal site. Where differences occur between what is illustrated on these maps and the site conditions, the actual presence or absence on the site of the sensitive area - as defined in the Sensitive Area Ordinance - is the legal control.





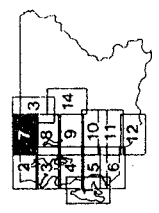
One- hundred-year floodplains extend beyond those shown on maps. Flood Insurance Rate Maps do not always show the floodplain to the headwaters of streams.

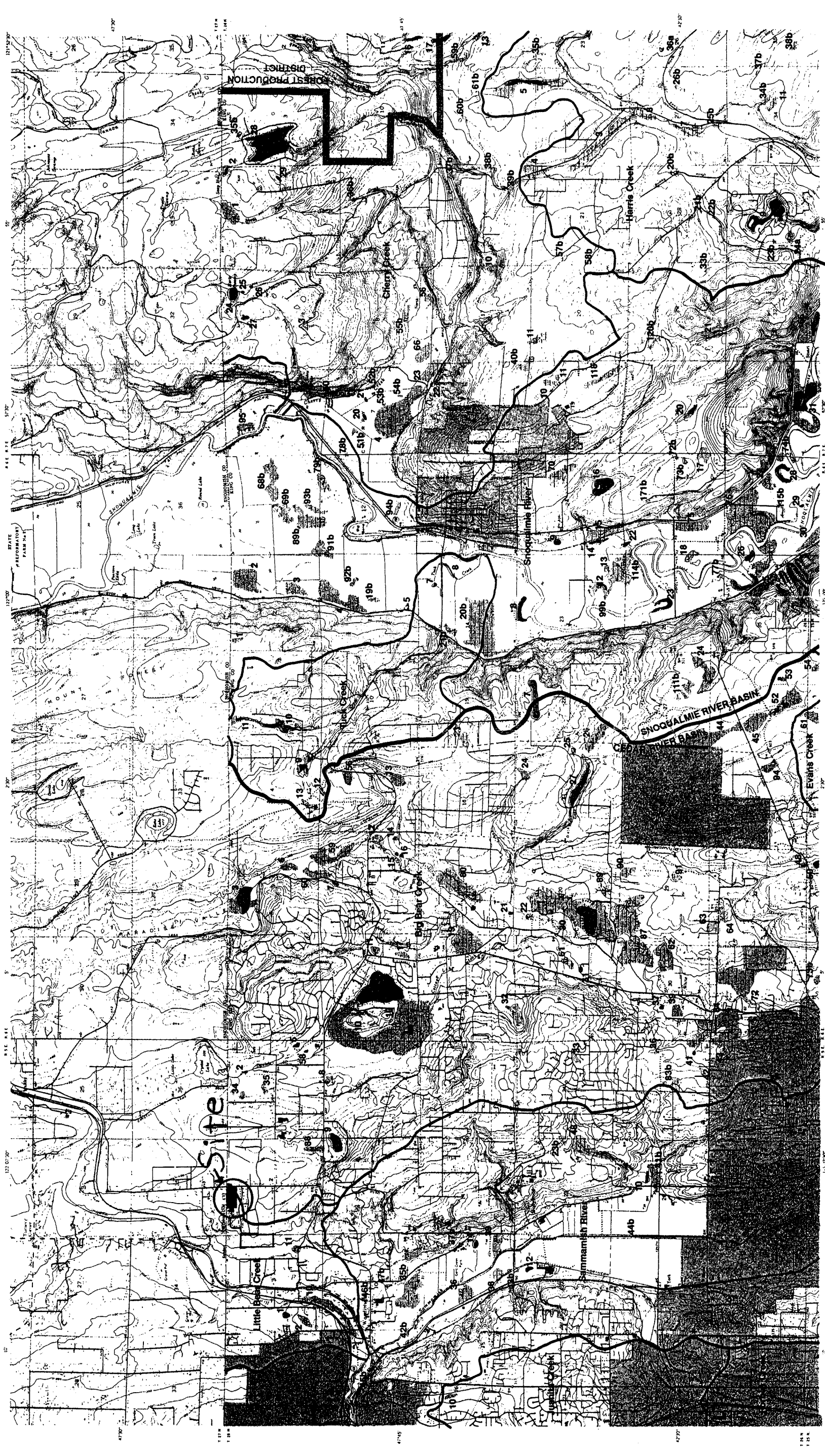
The boundaries of the sensitive areas displayed on these maps are approximate. Additional sensitive areas that have not been mapped may be present on a development proposal site. Where differences occur between what is illustrated on these maps and the site conditions, the actual presence or absence on the site of the sensitive area - as defined in the Sensitive Area Ordinance - is the legal control.

100-Year Floodplains

- Class 1
- Class 2 (with salmonids)
- Class 2 (perennial; salmonid use undetermined)
- Class 3
- Unclassified

Duvall





1 1/2 0 1
MILE

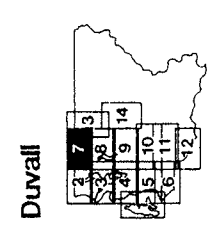


The boundaries of the sensitive areas displayed on these maps are approximate. Additional sensitive areas that have not been mapped may be present on a development proposal site. Where differences occur between what is illustrated on these maps and the site conditions, the actual presence or absence on the site of the sensitive area - as defined in the Sensitive Area Ordinance - is the legal control.

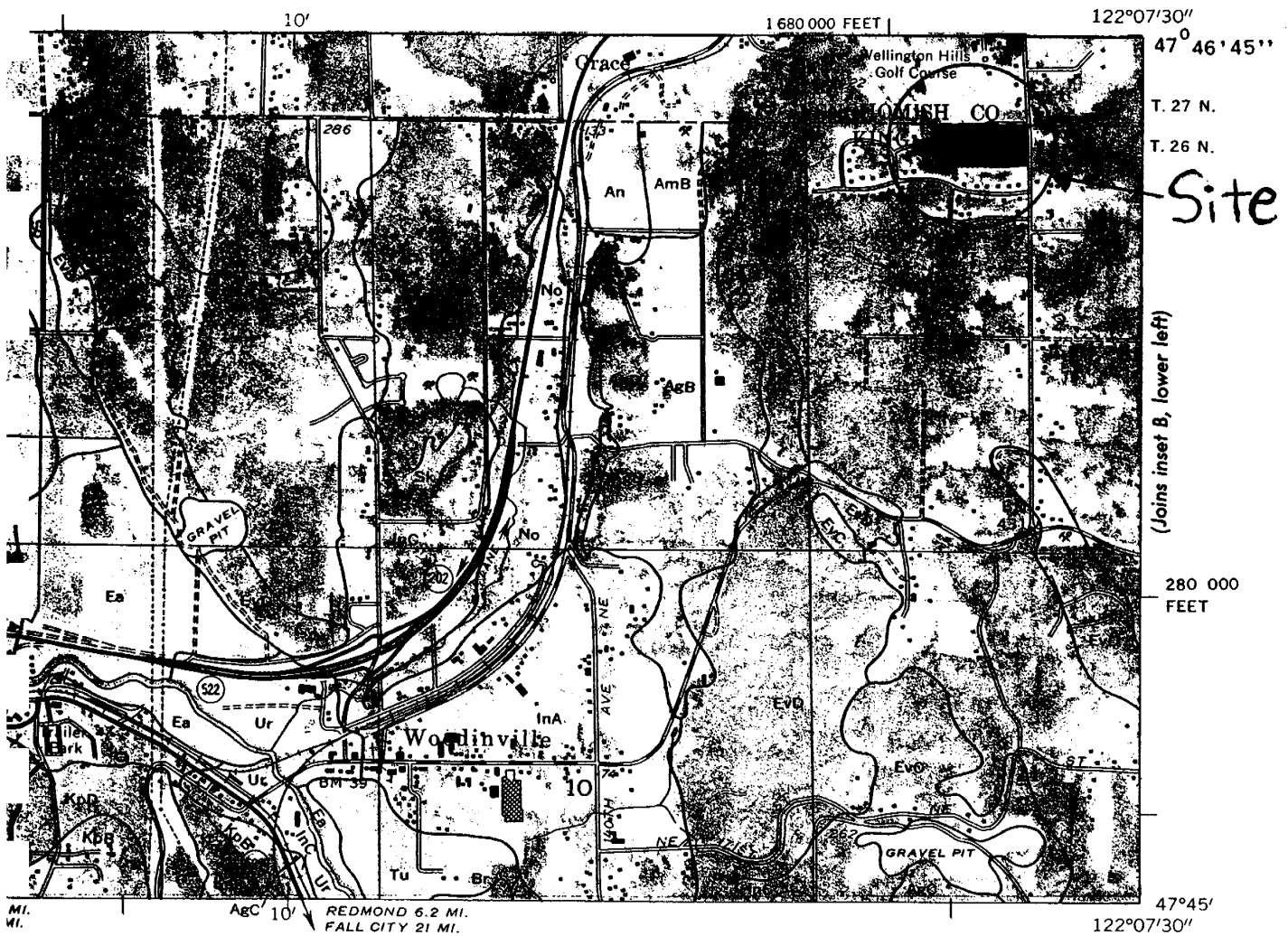
Numbered wetlands, except those with an "a" or "b" designation are included in the King County Wetlands Inventory. The locations of wetlands designated "a" have been verified on the site by a variety of sources. Wetlands designated "b" are mapped in the U.S. Fish and Wildlife Service National Wetlands Inventory, but their locations have not been field verified. There may be gaps in the numbering sequence within individual drainage basins.

Wetlands

- Wetlands
- Open Water
- Basin Boundaries
- Sub-basin Boundaries



SHEET NO. 4
KING COUNTY AREA, WASHINGTON
(PARTS OF BOTHELL
MALTBY AND MONROE QUADRANGLES)



GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both the description of the mapping unit and that of the soil series to which the mapping unit belongs. See table 6, page 70, for descriptions of woodland groups. Other information is given in tables as follows:

Acreage and extent, table 1, page 9.

Engineering uses of the soils, tables 2 and 3,
pages 36 through 55.

Town and country planning, table 4, page 57.

Recreational uses, table 5, page 64.

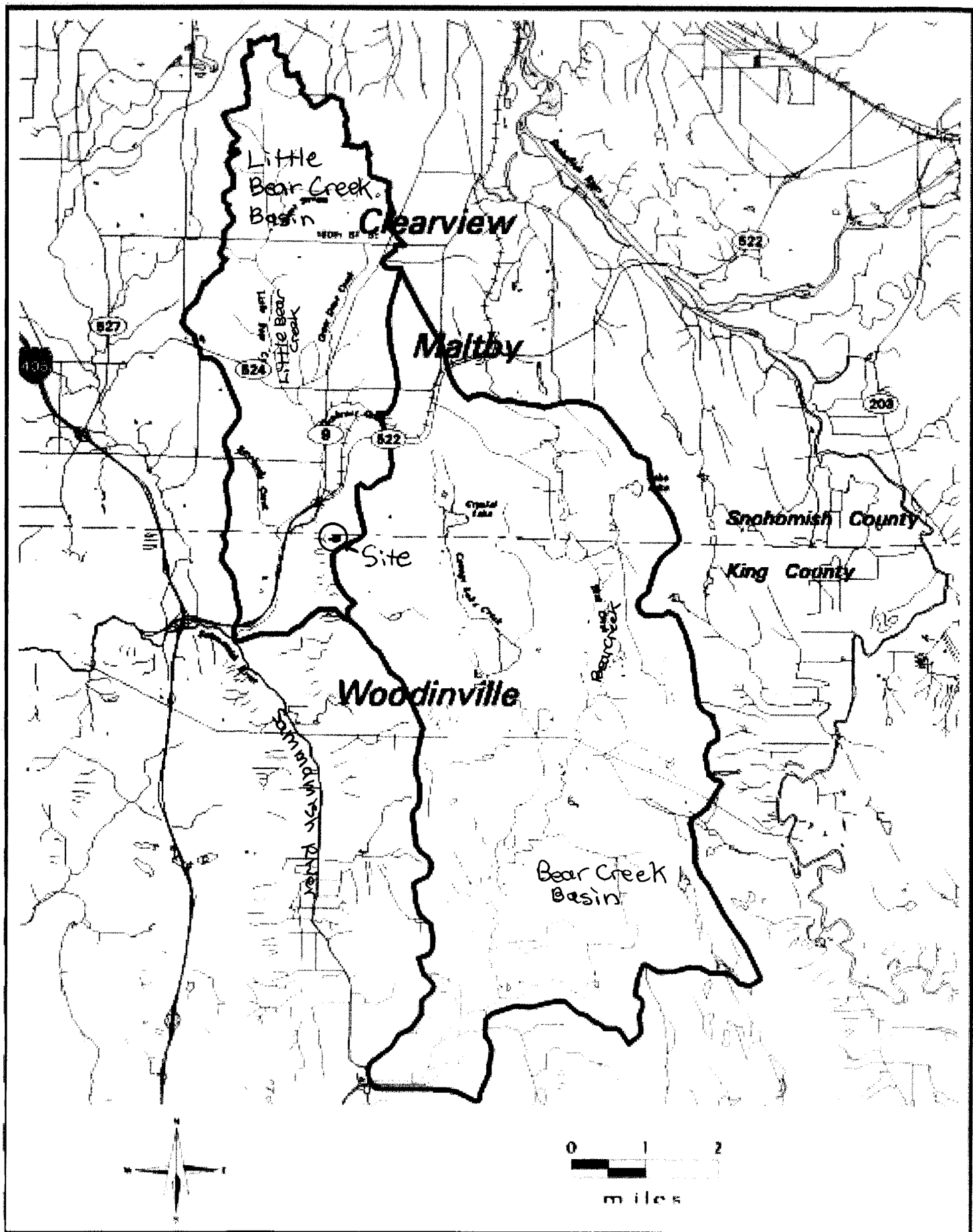
Estimated yields, table 7, page 79.

Map symbol	Mapping unit	Described on page	Capability unit		Woodland group
			Symbol	Page	Symbol
AgB	Alderwood gravelly sandy loam, 0 to 6 percent slopes-----	10	IVe-2	76	3d2
AgC	Alderwood gravelly sandy loam, 6 to 15 percent slopes-----	8	IVe-2	76	3d1
AgD	Alderwood gravelly sandy loam, 15 to 30 percent slopes-----	10	VIe-2	78	3d1
AkF	Alderwood and Kitsap soils, very steep-----	10	VIIe-1	78	2d1
AmB	Arents, Alderwood material, 0 to 6 percent slopes 1/-----	10	IVe-2	76	3d2
AmC	Arents, Alderwood material, 6 to 15 percent slopes 1/-----	10	IVe-2	76	3d2
An	Arents, Everett material 1/-----	11	IVs-1	77	3f3
BeC	Beausite gravelly sandy loam, 6 to 15 percent slopes-----	11	IVe-2	76	3d2
BeD	Beausite gravelly sandy loam, 15 to 30 percent slopes-----	12	VIe-2	78	3d1
BeF	Beausite gravelly sandy loam, 40 to 75 percent slopes-----	12	VIIe-1	78	3d1
Bh	Bellingham silt loam-----	12	IIIw-2	76	3w2
Br	Briscot silt loam-----	13	IIw-2	75	3w1
Bu	Buckley silt loam-----	13	IIIw-2	76	4w1
Cb	Coastal beaches-----	14	VIIIw-1	78	---
Ea	Earlmont silt loam-----	14	IIw-2	75	3w2
Ed	Edgewick fine sandy loam-----	15	IIIw-1	75	2o1
EvB	Everett gravelly sandy loam, 0 to 5 percent slopes-----	15	IVs-1	77	3f3
EvC	Everett gravelly sandy loam, 5 to 15 percent slopes-----	16	Vis-1	78	3f3
EvD	Everett gravelly sandy loam, 15 to 30 percent slopes-----	16	VIe-1	77	3f2
BwC	Everett-Alderwood gravelly sandy loams, 6 to 15 percent slopes-----	16	Vis-1	78	3f3
InA	Indianola loamy fine sand, 0 to 4 percent slopes-----	17	IVs-2	77	4s3
InC	Indianola loamy fine sand, 4 to 15 percent slopes-----	16	IVs-2	77	4s3
InD	Indianola loamy fine sand, 15 to 30 percent slopes-----	17	VIe-1	76	4s2
KpB	Kitsap silt loam, 2 to 8 percent slopes-----	17	IIIe-1	75	2d2
KpC	Kitsap silt loam, 8 to 15 percent slopes-----	18	IVe-1	76	2d2
KpD	Kitsap silt loam, 15 to 30 percent slopes-----	18	VIe-2	78	2d1
KsC	Klaus gravelly loamy sand, 6 to 15 percent slopes-----	18	Vis-1	78	3f1
Ma	Mixed alluvial land-----	18	VIw-2	78	2o1
NeC	Neilton very gravelly loamy sand, 2 to 15 percent slopes-----	19	Vis-1	78	3f3
Ng	Newberg silt loam-----	19	IIw-1	74	2o1
Nk	Nooksack silt loam-----	20	IIw-1	74	2o1
No	Norma sandy loam-----	20	IIIw-3	76	3w2
Or	Orcas peat-----	21	VIIIw-1	78	---
Os	Oridia silt loam-----	21	IIw-2	75	3w1
OvC	Ovall gravelly loam, 0 to 15 percent slopes-----	22	IVe-2	76	3d1
OvD	Ovall gravelly loam, 15 to 25 percent slopes-----	23	VIe-2	78	3d1
OvF	Ovall gravelly loam, 40 to 75 percent slopes-----	23	VIIe-1	78	3d1
Pc	Pilchuck loamy fine sand-----	23	VIw-1	78	2s1
Pk	Pilchuck fine sandy loam-----	23	IVw-1	76	2s1
Pu	Puget silty clay loam-----	24	IIIw-2	76	3w2
Py	Puyallup fine sandy loam-----	24	IIw-1	74	2o1
RaC	Ragnar fine sandy loam, 6 to 15 percent slopes-----	25	IVe-3	77	4s1
RaD	Ragnar fine sandy loam, 15 to 25 percent slopes-----	26	VIe-2	78	4s1
RdC	Ragnar-Indianola association, sloping: 1/-----	26	-----	---	---
	Ragnar soil-----	---	IVe-3	77	4s1
	Indianola soil-----	---	IVs-2	77	4s3
RdE	Ragnar-Indianola association, moderately steep: 1/-----	26	-----	---	---
	Ragnar soil-----	---	VIe-2	78	4s1
	Indianola soil-----	---	VIe-1	77	4s2

GUIDE TO MAPPING UNITS--Continued

Map symbol	Mapping unit	Described on page	Capability unit		Woodland group
			Symbol	Page	Symbol
Re	Renton silt loam-----	26	IIw-1	75	3w1
Rh	Riverwash-----	27	VIIw-1	78	---
Sa	Salal silt loam-----	27	IIw-1	74	2o1
Sh	Sammamish silt loam-----	27	IIw-2	75	3w1
Sk	Seattle muck-----	28	IIw-3	75	---
Sm	Shalcar muck-----	29	IIw-3	75	---
Sn	Si silt loam-----	29	IIw-1	74	2o1
So	Snohomish silt loam-----	30	IIw-2	75	3w2
Sr	Snohomish silt loam, thick surface variant-----	31	IIw-2	75	3w2
Su	Sultan silt loam-----	31	IIw-1	74	3w1
Tu	Tukwila muck-----	32	IIw-3	75	---
Ur	Urban land-----	33	-----	--	---
Wo	Woodinville silt loam-----	33	IIw-2	75	3w2

^{1/}
The composition of these units is more variable than that of the others in the Area, but it has been controlled well enough to interpret for the expected use of the soils.



OFF-SITE ANALYSIS DRAINAGE SYSTEM TABLE
SURFACE WATER DESIGN MANUAL, CORE REQUIREMENT #2

Basin: Sammamish River **Subbasin Name:** Little Bear Creek **Subbasin Number:**

Symbol	Drainage Component Type, Name, and Size	Drainage Component Description	Slope	Distance from site discharge	Existing Problems	Potential Problems	Observations of field inspector, resource reviewer, or resident
see map	Type: sheet flow, swale, stream, channel, pipe, pond; Size: diameter, surface area	drainage basin, vegetation, cover, depth, type of sensitive area, volume	%	1/4 mi = 1,320 ft	constrictions, under capacity, ponding, overtopping, flooding, habitat or organism destruction, scouring, bank sloughing, sedimentation, incision, other erosion		tributary area, likelihood of problem, overflow pathways, potential impacts
Natural	Discharge Path						
A	Ditch	Vegetated / Dirt lined	.5	0 – 300'	None	Vegetation blocking ditch and pipe entrance	
B	12" Concrete	Into golf course	1	300' – 320'	None	entrance	
C	3' Ditch	Earth lined	1	320' – 330'	None	None	
D	12" Concrete		.5	330' – 345'	None	None	
E	40' x 20' Pond	Cat tails	0	345' – 385'	None	None	
F	12" CMP		.5	385' – 395'	None	Grass blocking entrance	
G	2' Ditch	Tall grass	.5	395' – 400'	None	Vegetation blocking ditch and pipe entrance	
H	15" CMP	Angled pipe under fairway	2	400'-930'	None	None	
I	2' Ditch	Grass lined	2	930'-1430'	None	None	
J	Ravine	Forested	15	1430' – 1/2 mi	None	Erosion	



Proposed	Discharge Path								
1	24" CB	End of R-O-W		0	None	None			
2	12" concrete pipe	Drainage easement along property boundary	1	0-240'	None	Sediment			
3	2' Ditch	In golf course	1	240'-250'	None	Vegetation blocking ditch and pipe entrance			
4	12" concrete pipe	Brush covered	1	250'-260'	None	Entrance, sediment			
5	2' Ditch	Brush covered	1	260'-270'	None	Vegetation blocking ditch			
Joins	Natural Discharge	Path							



King County

Home

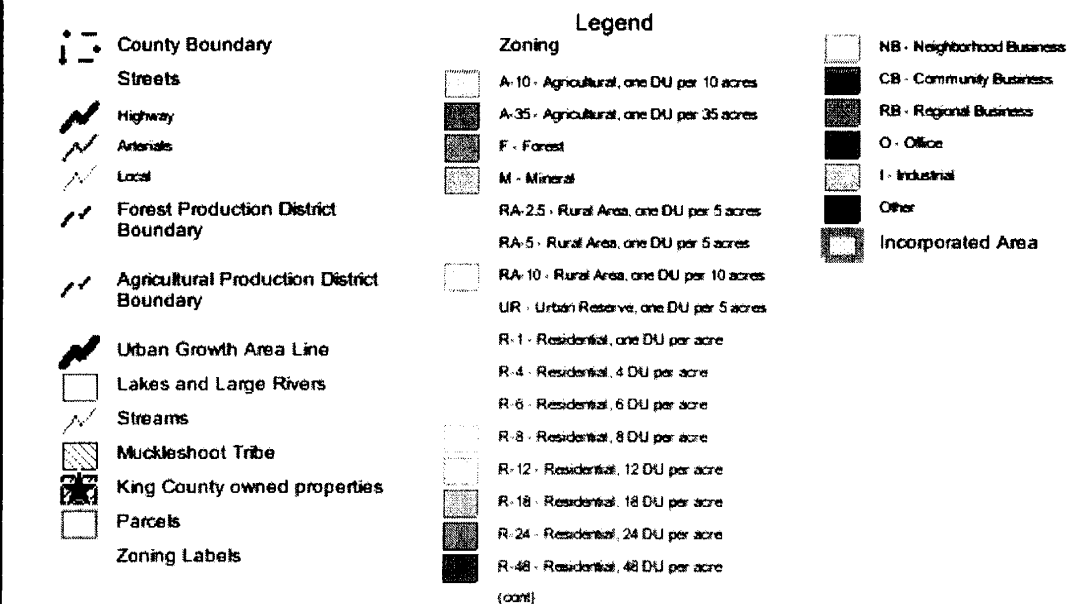
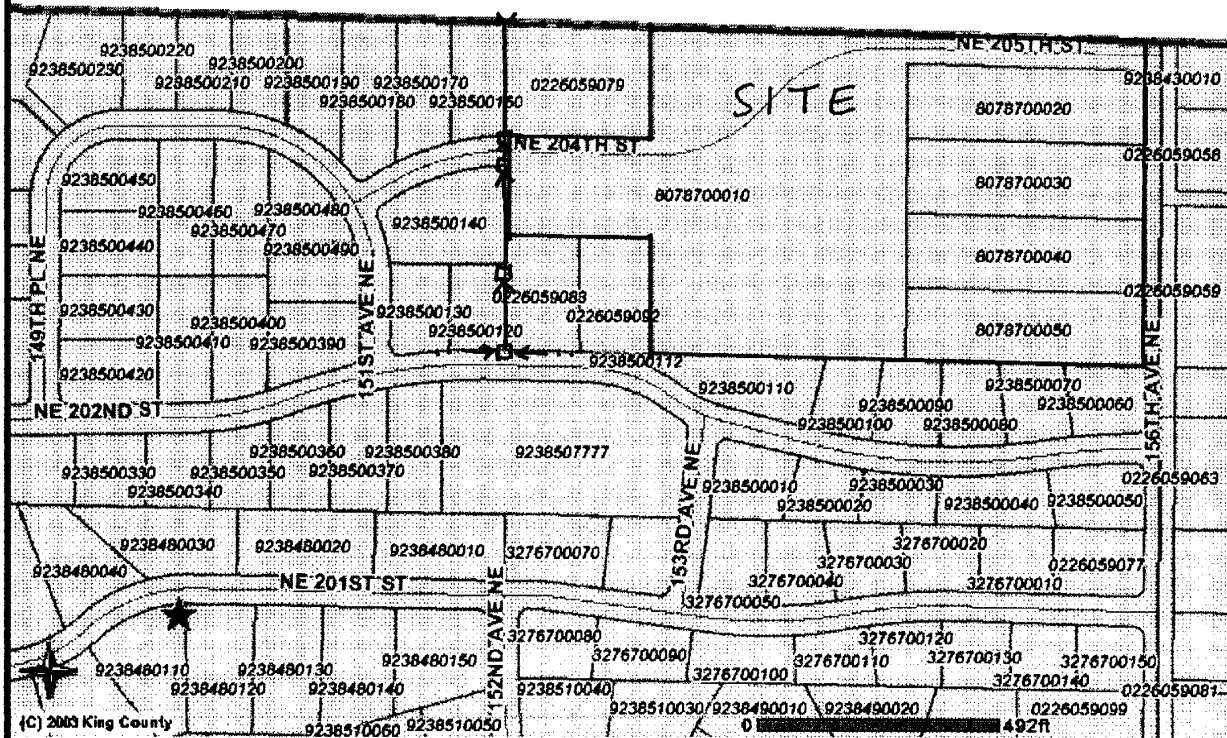
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Comments

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IMAP - Property Information (Planning)



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KING COUNTY SURFACE WATER MANAGEMENT DIVISION
DRAINAGE INVESTIGATION REPORT

Page 1: INVESTIGATION REQUEST

Type C

Received by: AED

Date: 1/8/96

OK'd by:

File No. 96-0018

Received from:

(Please print plainly for scanning).

(Day)

(Eve)

NAME: Ken + Lisa Toscano

PHONE 481-2753

ADDRESS: 15206 NE 202nd st.

City Woodinville

State

Zip 9807

Location of problem, if different:

Reported Problem:

- See attached -

Plat name:

Lot No:

Block No:

Other agencies involved:

No Field Investigation Needed

(initials)

*****TO BE COMPLETED BY COMPLAINT PROGRAM STAFF*****

NW 2 26 5
1/4 S T R

Parcel No. 0226059083

Kroll 502W

Th.Bros: New 477A4

Old 4E1, F1

Basin LBR

Council Dist 3

Charge No:

RESPONSE: Citizen notified on _____ by _____ phone _____ letter _____ in person

DISPOSITION: Turned to _____ on _____ by _____

OR: No further action recommended because

____ Lead agency has been notified:

____ Problem has been corrected. ____ No problem has been identified.

____ Prior investigation addresses problem
See File # _____

____ Private problem - NDAP will not consider because:

____ Water originates onsite and/or on neighboring parcel

____ Location is outside SWM Service Area.

____ Other (Specify):

DATE CLOSED: 01/26/96 by: [Signature]

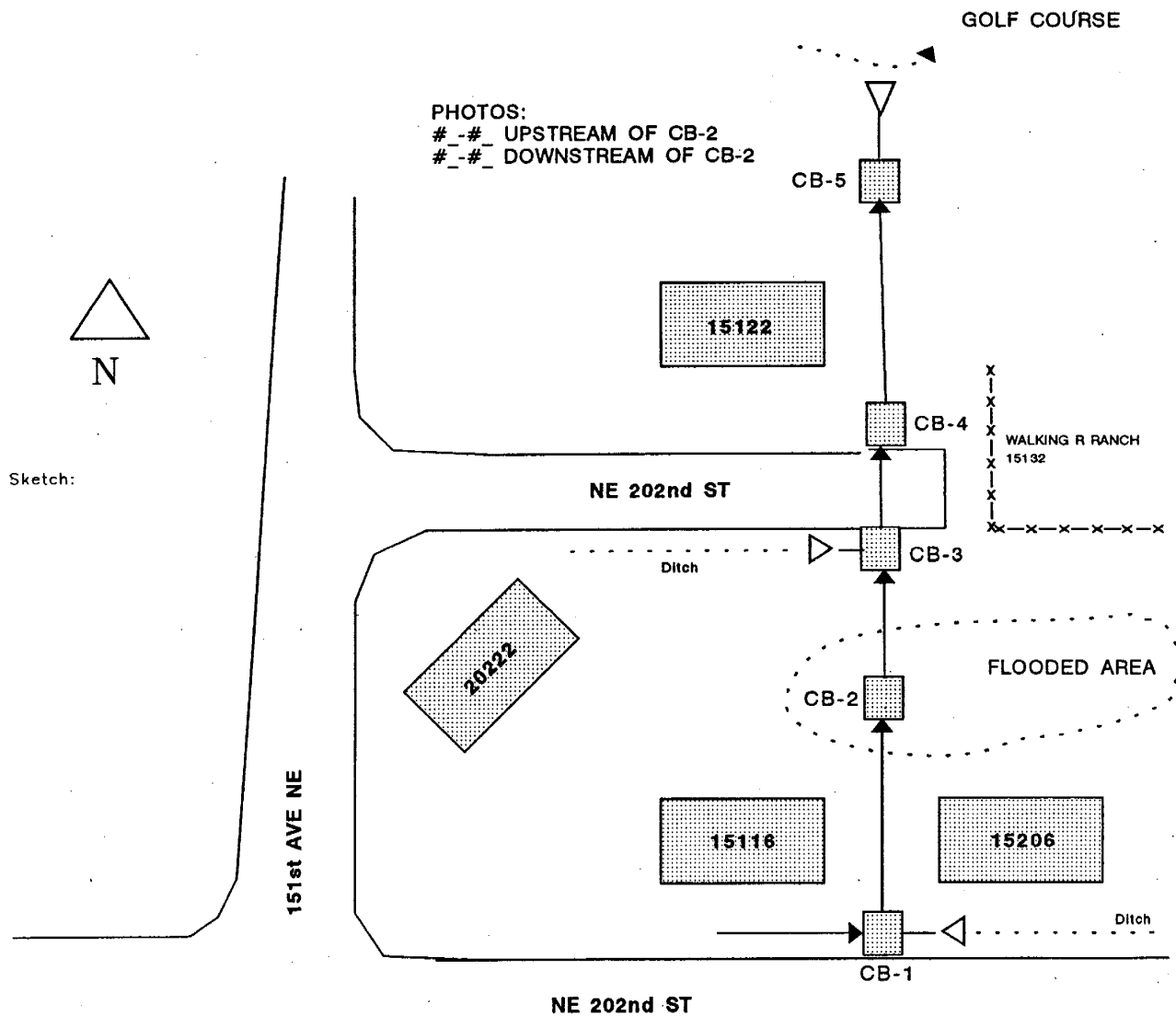
RFDTOWDUL

KING COUNTY SURFACE WATER MANAGEMENT DIVISION DRAINAGE INVESTIGATION REPORT

Page 2: FIELD INVESTIGATION

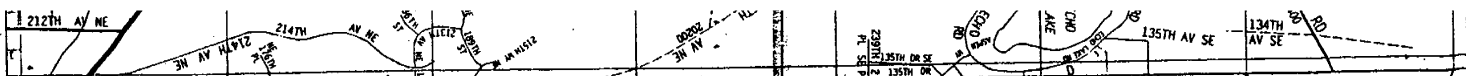
Details of Investigation: **KEN TOSCANO**

Site visit on 12/26/95. Met with Mr. and Mrs. Toscano. They indicated the water level during last major storm rose approx. 2' over CB-2. Weather at time of inspection was clear and dry in the upper 30's. All catchbasins except CB-2 had visible drainage flowing. The water level in CB-2 was at 2/3 full level of inlet/outlet pipe. All conveyance pipe is 12" CP. Evidence of some root intrusion was visible at inlet pipe opening in CB-2. Unable to candle pipes due to water level. There was no water moving in CB-2. Appears that there is a partial blockage between CB-1 and CB-3. CB-2 and CB-5 were full of sediment to invert of inlet/outlet pipes.



CITY OF WOODINVILLE

Investigated by **NIGEL KEIFFER** Date **12/26/95**



KING COUNTY SURFACE WATER MANAGEMENT DIVISION DRAINAGE INVESTIGATION REPORT

Page 2: FIELD INVESTIGATION

TYPE

File No.

File Name:

Details of Investigation: Date of Field Investigation: 12/22/93 Related Investigations:

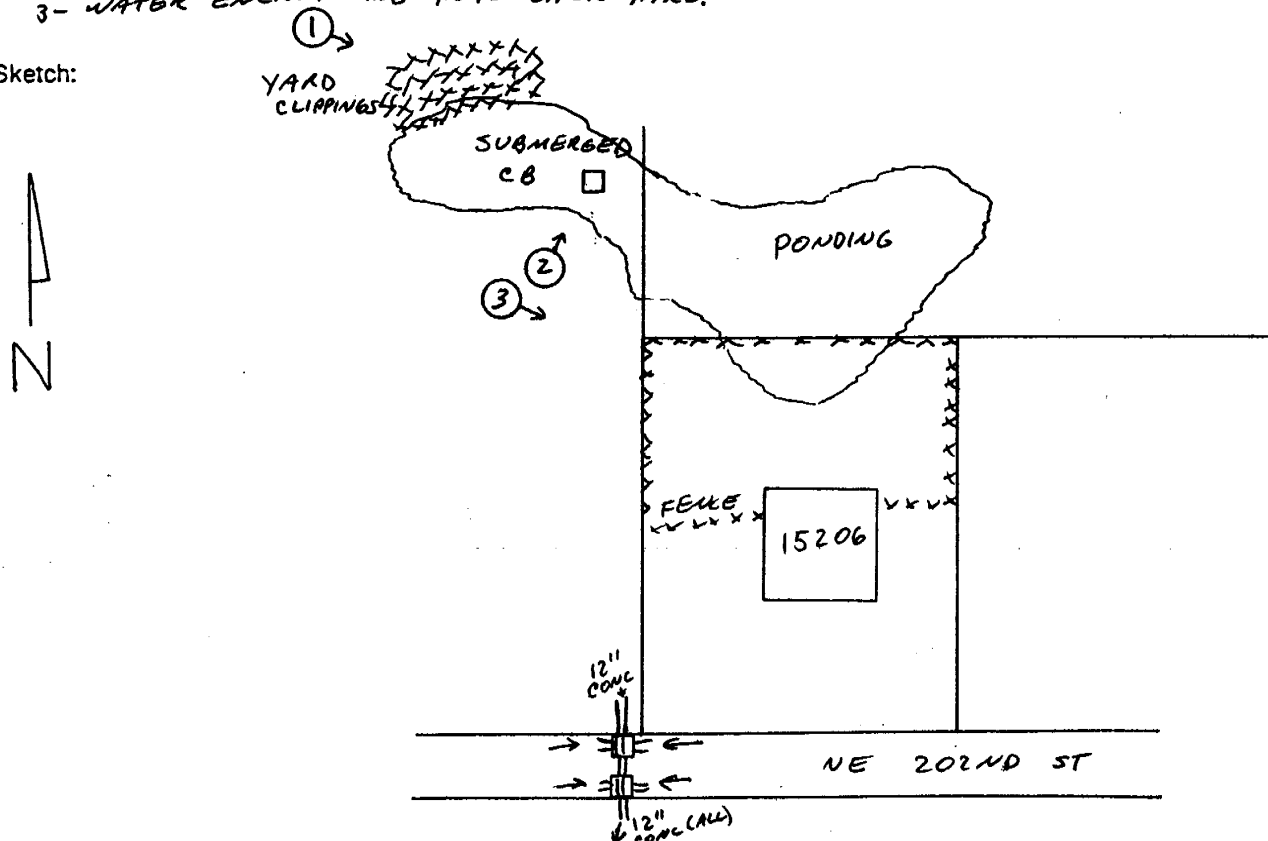
WATER FROM A POND BEHIND THE TOSANOS IS RISING AND ENCROACHING INTO THEIR BACK YARD. THE HOUSE IS NOT THREATENED AS IT IS SEVERAL FEET ABOVE THE WATER. FOUND A CB ABOUT 1 FOOT UNDERWATER. COULD NOT TELL WHERE IT WAS SUPPOSED TO DRAIN. ON NE 202ND ST THERE IS A X-CULVERT THAT FLOWS TO THE SOUTH INTO AN OPEN SPACE TRACT. THE CB ON THE NORTH SIDE OF THE ROAD HAS A PIPE LEADING INTO IT THAT COMES FROM THE DIRECTION OF THE SUBMERGED CB BUT A CONNECTION COULD NOT BE CONFIRMED. THE CBS IN FRONT HAD WATER PONDING IN THEM TO ALMOST ABOVE THE OUTLET PIPES.

1-10-94 CHECKED WITH FM. NOT COUNTY MAINTAINED R/D FACILITY.

PHOTOS:

- 1- AREA WHERE YARD CLIPPINGS HAVE BEEN DUMPED.
2- SUBMERGED CB.
3- WATER ENCROACHING INTO BACK YARD.

Sketch:



Date of Report: 12/27/93 By: W. L. L. L.

Complainant notified by BP by X phone letter personal contact. 1-10-94 - TOLD KEN TOSCANO NO COUNTRY OWNED OR MAINTAINED FACILITIES.

KING COUNTY SURFACE WATER MANAGEMENT DIVISION
DRAINAGE INVESTIGATION REPORT

Page 1: INVESTIGATION REQUEST

PROBLEM DRNG TYPE C
Received by: SANDY Date: 12/4/93 OK'd by: BJ File No. 93-1056
Received from: _____ (Please print plainly for scanning). (Day) (Eve)
NAME: LISA TOSCANO PHONE 481-2753
ADDRESS: 15206 NE 202nd ST. City WOODINVILLE State _____ Zip 98072
Description of problem, if different: _____ CHARGE # _____
Details of Problem: _____

A POND RUNNING THROUGH HER BACKYARD. THERE IS A
BRM DRAIN THAT IS ADJACENT TO IT.

~~THEY~~ THEY HAVE ALWAYS CLEANED OUT THE DRAINS, TAKING
OUT LEAVES.

WATER IS NOW CREEPING TOWARDS THE HOUSE.

THIS IS THE ~~1st~~ FIRST YEAR IT HAS NOT DRAINED.

CALL FIRST TO LET HER KNOW WHEN SOMEONE
WILL INVESTIGATE.

Other agencies involved: (Give details) called 12/9 - 1105 to acknowledge complaint.

Reported Impacts:	# Properties:	Dates/frequency of occurrences:
☐ Home	_____	
☐ Access road	_____	
☐ Septic system	_____	
☐ Outbuildings, garage	_____	
☐ Yard/landscaping	_____	
☐ Other property	_____	
☐ Stream, lake, wetland	_____	

Comments: _____

TO BE COMPLETED BY COMPLAINT PROGRAM STAFF

Location/Tracking Info: NW 1/4 S 2 T26 R 5 Parcel No. 022605-9083 Type _____
Basin LBR Council Dist 3 DIR Ref/Chg No: _____ City _____ Field investigation needed? _____
Plat name: _____ Block No: _____ Lot No: _____
Action taken: Assigned to: _____ Turned to _____ on _____ / _____ / _____ Initials: _____ KROLL _____
THOMAS BROS NEW: 477 AY DATE CLOSED: 1/10/94 OK'd: BJ
OLD: 4 E1

WELLINGTON HILLS GOLF COURSE

PROPOSED
DISCHARGE
PATH

EXISTING
DISCHARGE
PATH

TRACT D
Access and Utility

6'x12' STORM
FILTER VAULT

TRACT A
NGPA

LEVEL 2
RETENTION
WATER QUALITY
VAULT

TRACT B
Detention

Detention
TOP=442.8
L/D=433.8
DWS=440.8

NE 204TH ST

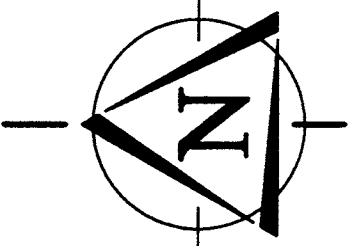
153RD AVE NE

154TH AVE NE

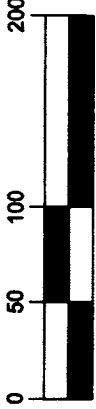
155TH AVE NE

NE 203RD
PLACE

DEVELOPED BASIN
TOTAL AREA: 12.38 ACRES
IMPERVIOUS: 7.20 ACRES (58%)
PERVIOUS: 5.18 ACRES (TILL GRASS)



SCALE: 1" = 100'



TRIAD
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DEVELOPED CONDITIONS
EXHIBIT

MONTESVALLO

CITY OF WOODVILLE
WASHINGTON

DATE: 10/2/05
REVISION: 1
PROJECT: MONTESVALLO
PROJECT NUMBER: 03-248
NAME & TITLE: J. R. HARRIS, P.E.
PROJECT MANAGER
PROJECT LANDSCAPE ARCHITECT
FIRST SUBMITTAL DATE:
SCALE: HORIZ. 1"=100' VERT. 1/4"=10'

STAMP NOT VALID
UNLESS SIGNED AND DATED
JOB NO. 03-248
SHEET NO. 1 OF 1

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