Section 4 Detention and Water Quality Design

Flow control and water quality treatment will be accommodated for in a combined detention/water quality vault. Live storage within the vault will be designed according to Level 2 Flow Control. Dead storage within the vault will be designed according to the Basic Water Quality Treatment Menu.

A. Hydraulic Analysis

The drainage analysis was modeled using the King County Runoff Time Series software. The site soils are Alderwood gravelly sandy loam (AgC), KCRTS group Till. See Soils Map on the following pages. The site is located in the Seatac rainfall region with a location scale factor of 1.0.

Map Unit Legend

King County Area, Washington (WA633)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AgC	Alderwood gravelly sandy loam, 6 to 15 percent slopes	7.8	100.0%
Totals for Area of Interest		**7.8**	**100.0%**

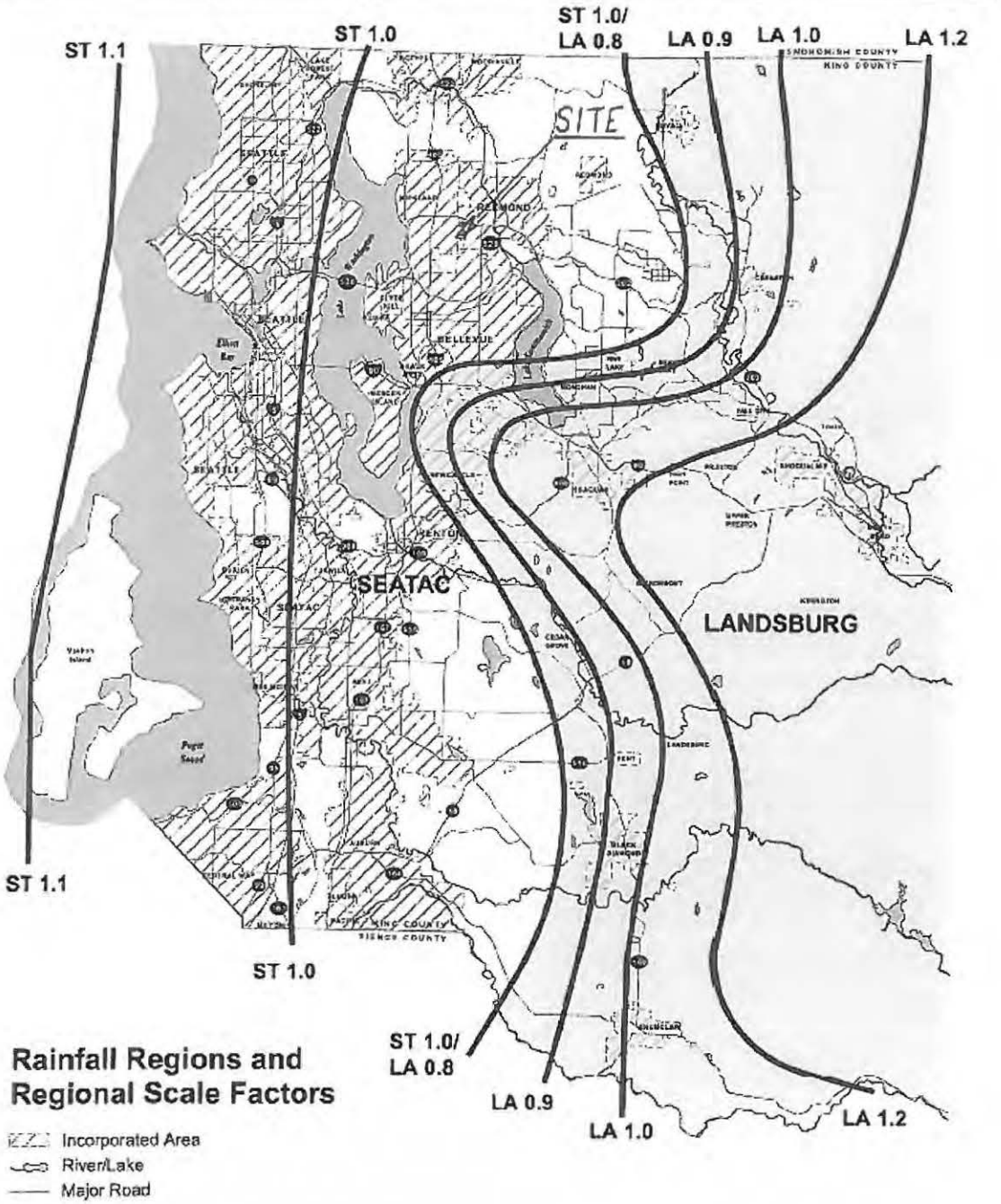
TABLE III-1
EQUIVALENCE BETWEEN SOIL TYPES CLASSIFIED BY U.S. SOIL CONSERVATION SERVICE AND KING COUNTY RUNOFF TIME SERIES

SCS Soil Type	SCS Hydrologic Soil Group	KCRTS Soil Group	Notes
* Alderwood (AgB, AgC, AgD)	C	Till	
Arents, Alderwood Material (AmB, AmC)	C	Till	
Arents, Everett Material (An)	B	Outwash	1
Beausite (BeC, BeD, BeF)	C	Till	2
Bellingham (Bh)	D	Till	3
Briscot (Br)	D	Till	3
Buckley (Bu)	D	Till	4
Earlmont (Ea)	D	Till	3
Edgewick (Ed)	C	Till	3
Everett (EvB, EvC, EvD, EwC)	A/B	Outwash	1
Indianola (InC, InA, InD)	A	Outwash	1
Kitsap (KpB, KpC, KpD)	C	Till	
Klaus (KsC)	C	Outwash	1
Neilton (NeC)	A	Outwash	1
Newberg (Ng)	B	Till	3
Nooksack (Nk)	C	Till	3
Norma (No)	D	Till	3
Orcas (Or)	D	Wetland	
Oridia (Os)	D	Till	3
Ovall (OvC, OvD, OvF)	C	Till	2
Pilchuck (Pc)	C	Till	3
Puget (Pu)	D	Till	3
Puyallup (Py)	B	Till	3
Ragnar (RaC, RaD, RaC, RaE)	B	Outwash	1
Renton (Re)	D	Till	3
Salal (Sa)	C	Till	3
Sammamish (Sh)	D	Till	3
Seattle (Sk)	D	Wetland	
Shalcar (Sm)	D	Till	3
Si (Sn)	C	Till	3
Snohomish (So, Sr)	D	Till	3
Sultan (Su)	C	Till	3
Tukwila (Tu)	D	Till	3
Woodinville (Wo)	D	Till	3

Key to Notes:

1. Where outwash soils are saturated or underlain at shallow depth (<5 feet) by glacial till, they should be treated as till soils.
2. These are bedrock soils, but calibration of HSPF (Hydrological Simulation Program–Fortran) by King County Surface Water Management shows bedrock soils to have similar hydrologic response to till soils.
3. These are alluvial soils, some of which are underlain by glacial till or have a seasonally high water table. In the absence of detailed study, these soils should be treated as till soils.
4. Buckley soils are formed on the low permeability Osceola mudflow. Hydrologic response is assumed to be similar to that for till soils.

FIGURE 3.2.2.A RAINFALL REGIONS AND REGIONAL SCALE FACTORS



EXISTING CONDITIONS

The existing basin boundary area, 6.59 acres, is defined as that area that will be improved through development of the subject property. The existing basin boundary will include the property area with the exception of the adverse possession area at the north end of the site defined by the existing fence, plus the NE 75th Street frontage improvement area between the property boundary and the existing edge of pavement which is generally located at the centerline of right-of-way, plus the offsite road improvement area along 128th Avenue NE excluding the areas of existing pavement. See attached Existing Conditions Exhibit on the following page. The following information was used for generating time series and flow frequencies.

EXISTING CONDITIONS (11070ex.tsf)	Total Area = 6.59 acres
GROUND COVER	AREA(acre)
Till-Forest	6.59

Flow Frequency Analysis
Time Series File:11070ex.tsf
Project Location:Sea-Tac

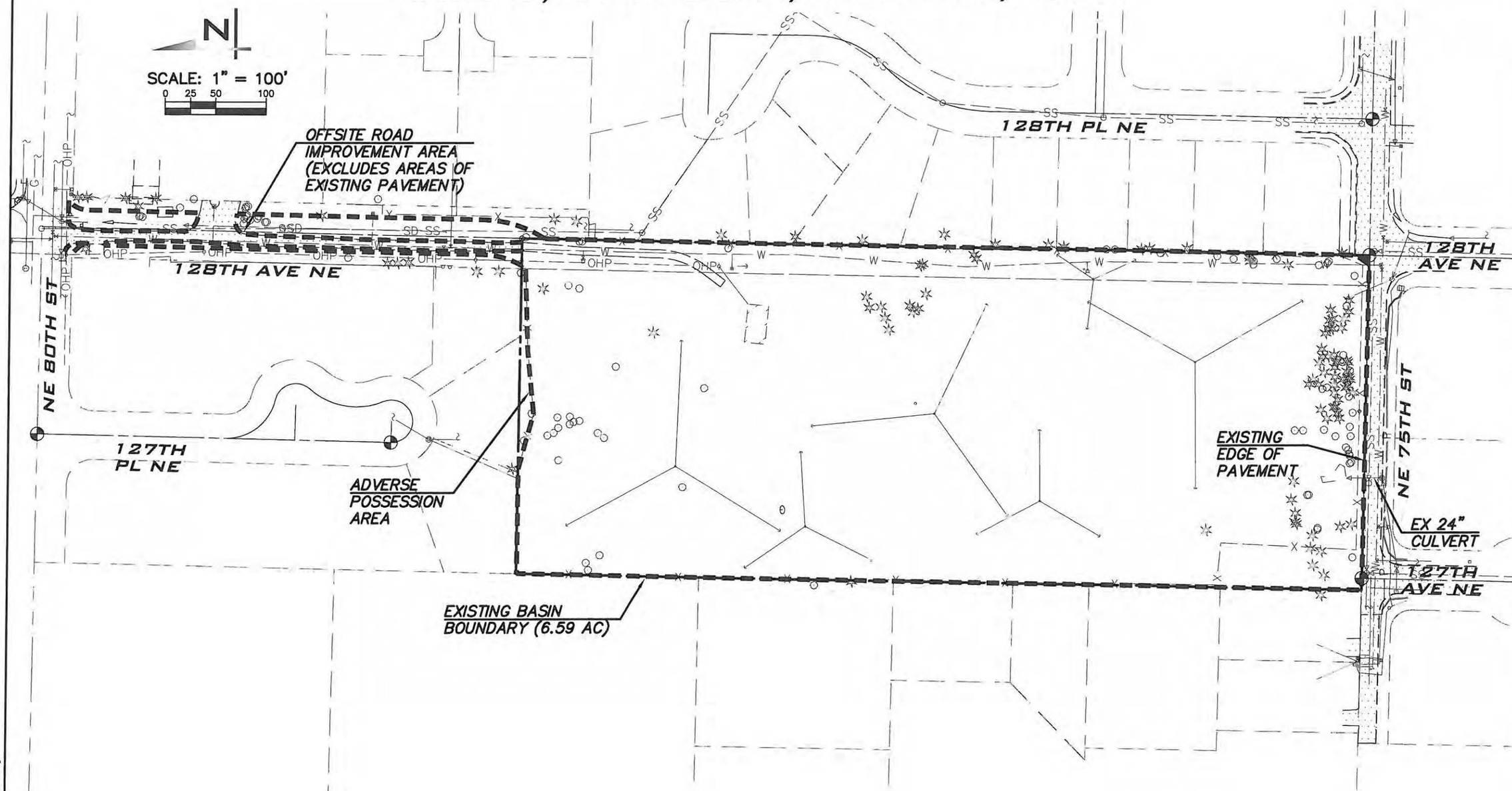
---Annual Peak Flow Rates---

Flow Rate (CFS)	Rank	Time of Peak
0.416	2	2/09/01 18:00
0.113	7	1/06/02 3:00
0.308	4	2/28/03 3:00
0.011	8	3/24/04 20:00
0.183	6	1/05/05 8:00
0.319	3	1/18/06 21:00
0.269	5	11/24/06 4:00
0.532	1	1/09/08 9:00
Computed Peaks		

-----Flow Frequency Analysis-------

- - Peaks - - (CFS)	Rank	Return Period	Prob
0.532	1	100.00	0.990
0.416	2	25.00	0.960
0.319	3	10.00	0.900
0.308	4	5.00	0.800
0.269	5	3.00	0.667
0.183	6	2.00	0.500
0.113	7	1.30	0.231
0.011	8	1.10	0.091
0.493		50.00	0.980

SEC 9, TWN 25 N, RGE 5 E, W.M.



BLUELINE

EXISTING CONDITIONS
C AND G PROPERTY

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SCALE	1" = 100'
PROJECT MANAGER	TODD A. OBERG, PE
DESIGNED BY	GINA R. BROOKS, PE
DRAWN BY	DOMINQUE GABALDON
DATE	January 10, 2013

JOB NUMBER: 11-070

FIGURE: EC-01

Jan 10, 2013 – 12:24pm – User dgabaldon
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DEVELOPED CONDITIONS

The developed basin boundary area is equal to the existing basin boundary area, 6.59 acres, though the boundary will be shifted along the NE 75th Street frontage and along 128th Avenue NE. The shifted boundary will include existing improvements east of the NE 75th Street frontage that will be tributary to the site. These existing improvements collected will offset those offsite road improvements not collected at the north end of the 128th Avenue NE. See attached Developed Conditions Exhibit on the following page.

The developed basin will include:

NE 75th Street/Interior ROW:	0.94 acre
Offsite 128th Avenue NE ROW:	0.18 acre
Access Tracts:	0.21 acre
Recreation/Open Space Tracts:	0.90 acre
Lots:	4.36 acres (189,821 square feet)
Total:	6.59 acres

The impervious coverage for the developed site is delineated below.

Impervious Coverage for the NE 75th Street/Interior ROW

The impervious coverage within the NE 75th Street/Interior ROW is 0.82 acre.

Impervious Coverage for the Offsite 128th Avenue NE ROW

The impervious coverage within the Offsite 128th Avenue NE ROW is 0.16 acre.

Impervious Coverage for the Access Tracts

The impervious coverage within the access tracts is 0.19 acre.

Impervious Coverage within the Recreation Tract

The impervious coverage assumed within the Recreation Tract is 0.10 acre.

Impervious Coverage for the Lots

The maximum impervious coverage (lot coverage) per lot is 50% for Zone RSX per Section 17.10 of the Kirkland Zoning Code. With a total lot area of 4.36 acres , the total maximum lot impervious coverage is 2.18 acres.

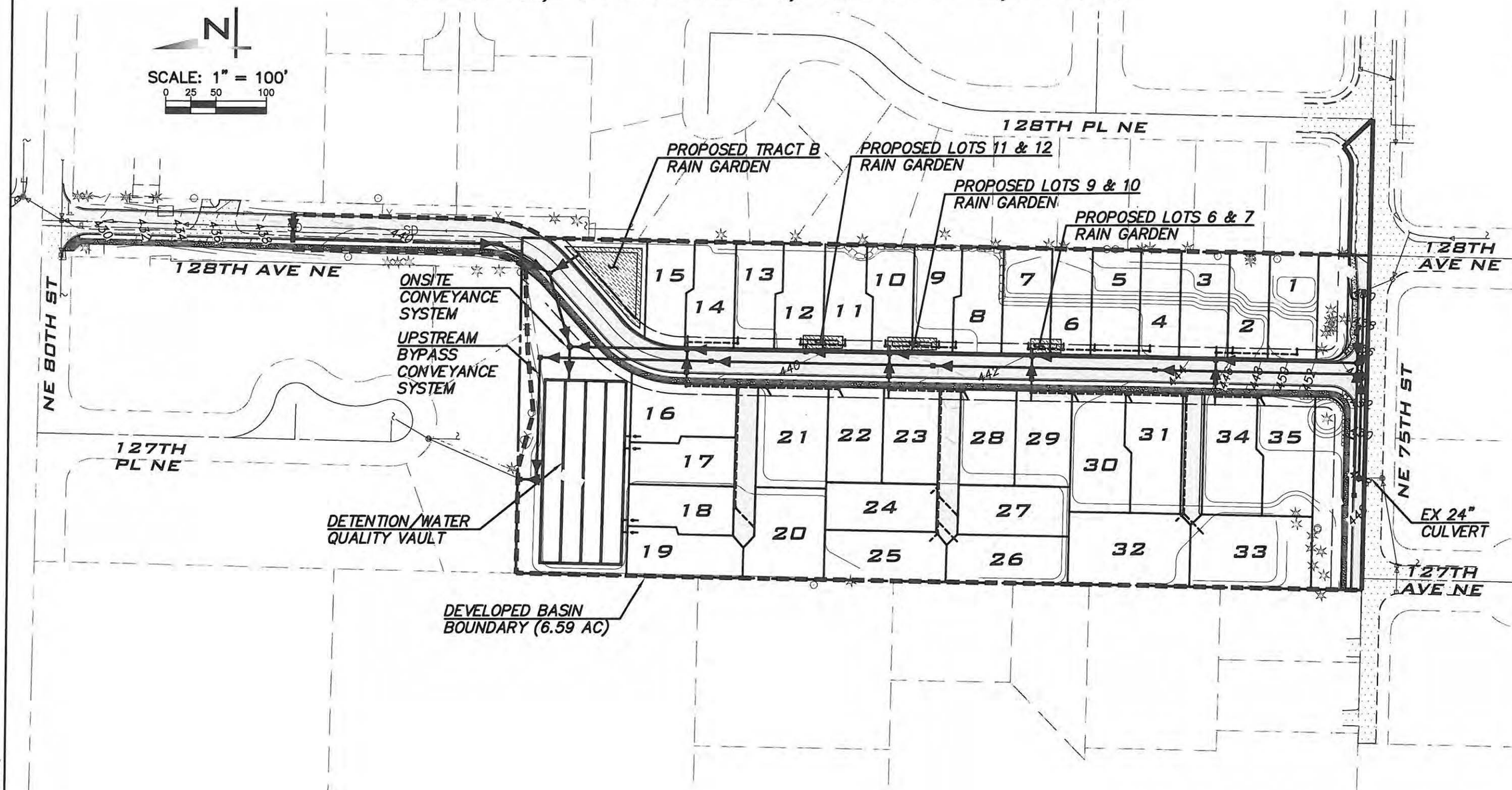
For preliminary design, the sizing for the proposed vault conservatively assumed no Flow Control BMP credits. See Flow Control BMP selection and design on the following pages. The following information was used for generating time series and flow frequencies.

DEVELOPED CONDITIONS (11070d.tsf)	Total Area = 6.59 acres
GROUND COVER	AREA(acre)
Till-Grass	3.14
Impervious	3.45

Flow Frequency Analysis
Time Series File:11070d.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
1.12	5	2/09/01 2:00	2.29	1	100.00	0.990
0.880	8	1/05/02 16:00	1.35	2	25.00	0.960
1.35	2	2/27/03 7:00	1.33	3	10.00	0.900
0.918	7	8/26/04 2:00	1.18	4	5.00	0.800
1.11	6	10/28/04 16:00	1.12	5	3.00	0.667
1.18	4	1/18/06 16:00	1.11	6	2.00	0.500
1.33	3	10/26/06 0:00	0.918	7	1.30	0.231
2.29	1	1/09/08 6:00	0.880	8	1.10	0.091
Computed Peaks			1.98		50.00	0.980

SEC 9, TWN 25 N, RGE 5 E, W.M.



BLUELINE

DEVELOPED CONDITIONS
C AND G PROPERTY

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SCALE	1" = 100'
PROJECT MANAGER	TODD A. OBERG, PE
DESIGNED BY	GINA R. BROOKS, PE
DRAWN BY	DOMINQUE GABALDON
DATE	January 10, 2013

JOB NUMBER:
11-070

FIGURE:
DC-01

Jan 10, 2013 - 12:24pm - User dgabaldon
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FLOW CONTROL BMPs

Per City Policy L-2 or Section 1.2.3.3 in the 2009 KCSWDM, projects subject to Core Requirement #3 must apply flow control BMPs to impervious surfaces as directed by Section 1.2.3.3 to either supplement the flow mitigation provided by required flow control facilities or provide flow mitigation where flow control facilities are not required. Flow control BMPs must be selected and applied according to the basic requirements, procedures, and provisions detailed in Section 5.2 and the design specifications for each BMP in Appendix C, Section C.2. Since approval will be required for the subdivision as well as the building permits for the newly created lots, both kinds of flow control BMP implementation are required as described in Section 5.2.

Per Section 5.2, for individual lots, implementation shall be in accordance with the "Individual Lot BMP Requirements" in Section 5.2.1. The individual lots on the subject project are smaller than 22,000 square feet and therefore, fall under the Section 5.2.1.1 "Small Lot BMP Requirements". Since full dispersion and full infiltration are not feasible, one or more of the following BMPs listed under Section 5.2.1.1 (3.) must be applied to an impervious area equal to at least 10% of the lot for lot areas up to 11,000 square feet. Since the proposed recreation space tract, Tract C, is not required for the subject development and could have been incorporated within the lot areas, the total lot area for assessing required BMP requirements will include Tract C. The total area requiring BMPs is therefore, equal to 10%*217,301 square feet = 21,730 square feet.

Maximum Allowed Impervious Coverage for the Lots and Tract C

The maximum lot impervious coverage is also, adjusted to include Tract C. As stated previously, the maximum impervious coverage (lot coverage) per lot is 50% for Zone RSX per Section 17.10 of the Kirkland Zoning Code. With a total lot area of 217,301 square feet, the total maximum lot impervious coverage is 108,651 square feet.

Proposed BMPs

A combination of the "Native Growth Retention Credit" per Appendix C, Section C.2.10 will be applied to the sidewalk along NE 75th Street, "Rain Garden" per Appendix C, Section C.2.5 will be applied to the interior right-of-way impervious surfaces, and "Reduced Impervious Surface Credit" per Appendix C, Section C.2.9 will be applied to the lots. The sum of these BMPs treats the required 21,730 square feet. The project therefore, meets the requirements for flow control BMPs.

For the "Native Growth Retention Credit", an impervious area of 1,288 square feet is treated. The proposed sidewalk along NE 75th Street will be tilted towards the adjacent open space. The area of open space provided exceeds the required 3.5 times the area of impervious area tributary to it.

For the "Rain Garden", an impervious area of 12,032 square feet is treated. A total of 12,032 square feet * 0.25 feet = 3,008 cubic feet of raingarden storage is provided. The raingardens will be 1.5-feet deep with 1-foot of water and 0.5-foot of freeboard. The raingardens will have 3:1 side slopes. The Tract B raingarden will store 2,347 cubic feet of water storage. The Lot 11 & 12 raingarden will store 214 cubic feet of water storage. The Lot 9 & 10 raingarden will store 262 cubic feet of water storage. The Lot 6 & 7 raingarden will store 185 cubic feet of water storage.

For the "Reduced Impervious Surface Credit", an impervious area of 8,410 square feet is eliminated from the lots/Tract C. The adjusted maximum impervious area allowed on the Lots and Tract C is therefore, 108,651 square feet - 8,410 square feet = 100,241 square feet. The total impervious coverage allowed for construction of the lots/Tract C will be delineated on the final plat documents.

B. Flow Control Analysis and Design

Flow control will be accommodated for in a combined detention/water quality vault. Live storage within the vault will be designed according to Level 2 Flow Control. See KCRTS printout below. The required storage at the 100-year water surface elevation of 435.22 is 74,303 cubic feet. The proposed vault will have a surface area of 76 feet by 180 feet = 13,680 square feet which exceeds the required 13,456 square feet. The provided depth will match the required depth of 5.52 feet. The vault meets the requirements for Level 2 Flow Control.

Required Flow Control Volume = 74,303 cubic feet

Provided Flow Control Volume = 75,514 cubic feet

Retention/Detention Facility

```
        Type of Facility: Detention Vault
        Facility Length:       116.00  ft
         Facility Width:       116.00  ft
          Facility Area:     13456.    sq. ft
Effective Storage Depth:         5.30  ft
      Stage 0 Elevation:       429.70  ft
         Storage Volume:     71317.    cu. ft
             Riser Head:         5.30  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	1.34	0.113	
2	3.45	2.30	0.195	6.0
3	4.30	1.75	0.083	4.0

```
        Top Notch Weir: None
   Outflow Rating Curve: None
```

Stage (ft)	Elevation (ft)	Storage (cu. ft)	(ac-ft)	Discharge (cfs)	Percolation (cfs)
0.00	429.70	0.	0.000	0.000	0.00
0.01	429.71	135.	0.003	0.006	0.00
0.03	429.73	404.	0.009	0.008	0.00
0.04	429.74	538.	0.012	0.010	0.00
0.06	429.76	807.	0.019	0.012	0.00
0.07	429.77	942.	0.022	0.013	0.00
0.08	429.78	1077.	0.025	0.014	0.00
0.10	429.80	1346.	0.031	0.015	0.00
0.11	429.81	1480.	0.034	0.016	0.00
0.22	429.92	2960.	0.068	0.023	0.00

0.32	430.02	4306.	0.099	0.028	0.00
0.42	430.12	5652.	0.130	0.032	0.00
0.53	430.23	7132.	0.164	0.036	0.00
0.63	430.33	8477.	0.195	0.039	0.00
0.74	430.44	9957.	0.229	0.042	0.00
0.84	430.54	11303.	0.259	0.045	0.00
0.94	430.64	12649.	0.290	0.048	0.00
1.05	430.75	14129.	0.324	0.050	0.00
1.15	430.85	15474.	0.355	0.053	0.00
1.26	430.96	16955.	0.389	0.055	0.00
1.36	431.06	18300.	0.420	0.057	0.00
1.46	431.16	19646.	0.451	0.059	0.00
1.57	431.27	21126.	0.485	0.061	0.00
1.67	431.37	22472.	0.516	0.063	0.00
1.77	431.47	23817.	0.547	0.065	0.00
1.88	431.58	25297.	0.581	0.067	0.00
1.98	431.68	26643.	0.612	0.069	0.00
2.09	431.79	28123.	0.646	0.071	0.00
2.19	431.89	29469.	0.677	0.072	0.00
2.29	431.99	30814.	0.707	0.074	0.00
2.40	432.10	32294.	0.741	0.076	0.00
2.50	432.20	33640.	0.772	0.077	0.00
2.61	432.31	35120.	0.806	0.079	0.00
2.71	432.41	36466.	0.837	0.081	0.00
2.81	432.51	37811.	0.868	0.082	0.00
2.92	432.62	39292.	0.902	0.084	0.00
3.02	432.72	40637.	0.933	0.085	0.00
3.13	432.83	42117.	0.967	0.087	0.00
3.23	432.93	43463.	0.998	0.088	0.00
3.33	433.03	44808.	1.029	0.089	0.00
3.44	433.14	46289.	1.063	0.091	0.00
3.45	433.15	46423.	1.066	0.091	0.00
3.47	433.17	46692.	1.072	0.093	0.00
3.50	433.20	47096.	1.081	0.097	0.00
3.52	433.22	47365.	1.087	0.104	0.00
3.55	433.25	47769.	1.097	0.114	0.00
3.57	433.27	48038.	1.103	0.126	0.00
3.59	433.29	48307.	1.109	0.140	0.00
3.62	433.32	48711.	1.118	0.152	0.00
3.64	433.34	48980.	1.124	0.156	0.00
3.75	433.45	50460.	1.158	0.173	0.00
3.85	433.55	51806.	1.189	0.187	0.00
3.95	433.65	53151.	1.220	0.199	0.00
4.06	433.76	54631.	1.254	0.210	0.00
4.16	433.86	55977.	1.285	0.221	0.00
4.27	433.97	57457.	1.319	0.231	0.00
4.30	434.00	57861.	1.328	0.234	0.00
4.32	434.02	58130.	1.334	0.236	0.00
4.34	434.04	58399.	1.341	0.240	0.00
4.35	434.05	58534.	1.344	0.244	0.00
4.37	434.07	58803.	1.350	0.250	0.00
4.39	434.09	59072.	1.356	0.257	0.00
4.41	434.11	59341.	1.362	0.266	0.00
4.43	434.13	59610.	1.368	0.275	0.00

4.45	434.15	59879.	1.375	0.278	0.00
4.46	434.16	60014.	1.378	0.282	0.00
4.57	434.27	61494.	1.412	0.299	0.00
4.67	434.37	62840.	1.443	0.315	0.00
4.78	434.48	64320.	1.477	0.330	0.00
4.88	434.58	65665.	1.507	0.343	0.00
4.98	434.68	67011.	1.538	0.356	0.00
5.09	434.79	68491.	1.572	0.368	0.00
5.19	434.89	69837.	1.603	0.379	0.00
5.30	435.00	71317.	1.637	0.391	0.00
5.40	435.10	72662.	1.668	0.709	0.00
5.50	435.20	74008.	1.699	1.280	0.00
5.60	435.30	75354.	1.730	2.020	0.00
5.70	435.40	76699.	1.761	2.820	0.00
5.80	435.50	78045.	1.792	3.110	0.00
5.90	435.60	79390.	1.823	3.380	0.00
6.00	435.70	80736.	1.853	3.620	0.00
6.10	435.80	82082.	1.884	3.850	0.00
6.20	435.90	83427.	1.915	4.060	0.00
6.30	436.00	84773.	1.946	4.260	0.00
6.40	436.10	86118.	1.977	4.460	0.00
6.50	436.20	87464.	2.008	4.640	0.00
6.60	436.30	88810.	2.039	4.820	0.00
6.70	436.40	90155.	2.070	4.990	0.00
6.80	436.50	91501.	2.101	5.150	0.00
6.90	436.60	92846.	2.131	5.310	0.00
7.00	436.70	94192.	2.162	5.470	0.00
7.10	436.80	95538.	2.193	5.620	0.00
7.20	436.90	96883.	2.224	5.760	0.00
7.30	437.00	98229.	2.255	5.910	0.00

Hyd	Inflow	Outflow Target	Outflow Calc	Peak Stage	Peak Elev	Storage (Cu-Ft)	Storage (Ac-Ft)
1	2.29	*******	1.44	5.52	435.22	74303.	1.706
2	1.12	0.42	0.44	5.32	435.02	71519.	1.642
3	1.35	*******	0.31	4.66	434.36	62762.	1.441
4	1.33	*******	0.30	4.56	434.26	61344.	1.408
5	1.18	*******	0.18	3.80	433.50	51122.	1.174
6	1.11	*******	0.09	3.47	433.17	46674.	1.071
7	0.88	*******	0.09	3.03	432.73	40762.	0.936
8	0.92	*******	0.07	1.86	431.56	25043.	0.575

```
----------------------------------
Route Time Series through Facility
  Inflow Time Series File:11070d.tsf
 Outflow Time Series File:vltout

Inflow/Outflow Analysis
   Peak Inflow Discharge:        2.29 CFS at  6:00 on Jan  9 in Year 8
  Peak Outflow Discharge:        1.44 CFS at 10:00 on Jan  9 in Year 8
    Peak Reservoir Stage:        5.52  Ft
     Peak Reservoir Elev:      435.22  Ft
  Peak Reservoir Storage:    74303.    Cu-Ft
                        :        1.706 Ac-Ft
```

Flow Duration from Time Series File:vltout.tsf

Cutoff CFS	Count	Frequency %	CDF %	Exceedence %	Probability
0.006	31266	50.988	50.988	49.012	0.490E+00
0.019	8534	13.917	64.905	35.095	0.351E+00
0.031	6248	10.189	75.095	24.905	0.249E+00
0.043	5696	9.289	84.384	15.616	0.156E+00
0.056	4336	7.071	91.455	8.545	0.855E-01
0.068	2124	3.464	94.918	5.082	0.508E-01
0.080	1563	2.549	97.467	2.533	0.253E-01
0.093	1157	1.887	99.354	0.646	0.646E-02
0.105	57	0.093	99.447	0.553	0.553E-02
0.117	25	0.041	99.488	0.512	0.512E-02
0.130	17	0.028	99.516	0.484	0.484E-02
0.142	14	0.023	99.538	0.462	0.462E-02
0.154	27	0.044	99.583	0.417	0.417E-02
0.167	37	0.060	99.643	0.357	0.357E-02
0.179	45	0.073	99.716	0.284	0.284E-02
0.191	28	0.046	99.762	0.238	0.238E-02
0.203	24	0.039	99.801	0.199	0.199E-02
0.216	21	0.034	99.835	0.165	0.165E-02
0.228	21	0.034	99.870	0.130	0.130E-02
0.240	14	0.023	99.892	0.108	0.108E-02
0.253	4	0.007	99.899	0.101	0.101E-02
0.265	2	0.003	99.902	0.098	0.978E-03
0.277	3	0.005	99.907	0.093	0.930E-03
0.290	10	0.016	99.923	0.077	0.766E-03
0.302	10	0.016	99.940	0.060	0.603E-03
0.314	11	0.018	99.958	0.042	0.424E-03
0.327	7	0.011	99.969	0.031	0.310E-03
0.339	2	0.003	99.972	0.028	0.277E-03
0.351	3	0.005	99.977	0.023	0.228E-03
0.364	3	0.005	99.982	0.018	0.179E-03
0.376	4	0.007	99.989	0.011	0.114E-03
0.388	4	0.007	99.995	0.005	0.489E-04
0.401	2	0.003	99.998	0.002	0.163E-04
0.413	0	0.000	99.998	0.002	0.163E-04
0.425	0	0.000	99.998	0.002	0.163E-04
0.438	0	0.000	99.998	0.002	0.163E-04

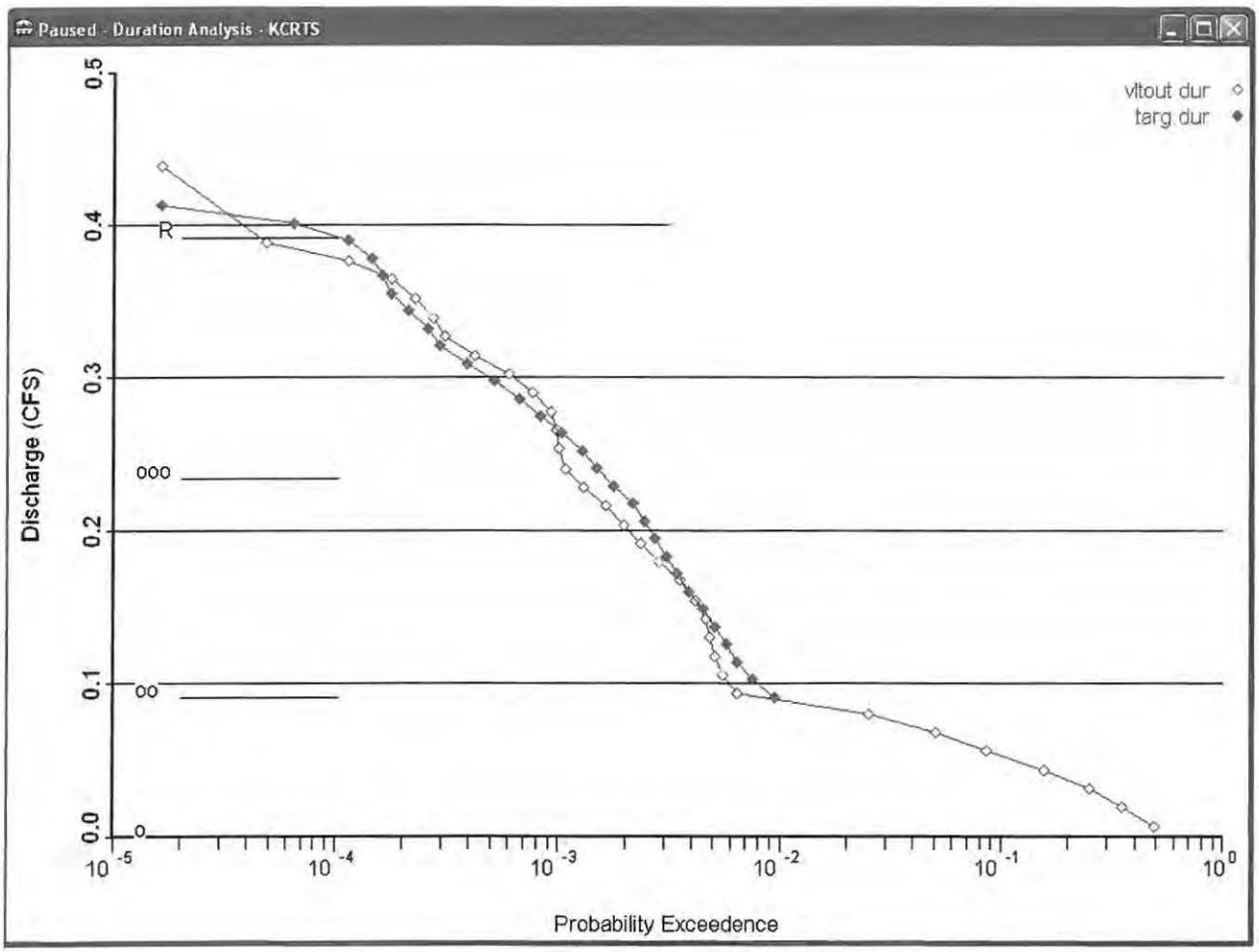
Duration Comparison Anaylsis
Base File: 11070ex.tsf
New File: vltout.tsf
Cutoff Units: Discharge in CFS

	-----Fraction of Time-----			---------Check of Tolerance-------			
Cutoff	Base	New	%Change	Probability	Base	New	%Change
0.091	0.95E-02	0.67E-02	-29.3	0.95E-02	0.091	0.089	-2.9
0.116	0.63E-02	0.52E-02	-18.1	0.63E-02	0.116	0.093	-19.8
0.141	0.49E-02	0.47E-02	-5.6	0.49E-02	0.141	0.126	-10.5
0.166	0.37E-02	0.36E-02	-3.1	0.37E-02	0.166	0.163	-1.6
0.191	0.29E-02	0.24E-02	-16.6	0.29E-02	0.191	0.179	-6.3

0.216	0.22E-02	0.16E-02	-25.7	0.22E-02	0.216	0.198	-8.5
0.241	0.15E-02	0.11E-02	-26.7	0.15E-02	0.241	0.222	-7.6
0.266	0.10E-02	0.98E-03	-4.8	0.10E-02	0.266	0.251	-5.6
0.291	0.62E-03	0.77E-03	23.7	0.62E-03	0.291	0.301	3.5
0.316	0.34E-03	0.42E-03	23.8	0.34E-03	0.316	0.323	2.3
0.341	0.21E-03	0.28E-03	30.8	0.21E-03	0.341	0.360	5.7
0.365	0.16E-03	0.16E-03	0.0	0.16E-03	0.365	0.368	0.6
0.390	0.11E-03	0.33E-04	-71.4	0.11E-03	0.390	0.377	-3.4
0.415	0.16E-04	0.16E-04	0.0	0.16E-04	0.415	0.438	5.4

Maximum positive excursion = 0.027 cfs (6.6%)
occurring at 0.411 cfs on the Base Data:11070ex.tsf
and at 0.438 cfs on the New Data:vltout.tsf

Maximum negative excursion = 0.026 cfs (-20.8%)
occurring at 0.125 cfs on the Base Data:11070ex.tsf
and at 0.099 cfs on the New Data:vltout.tsf



C. WATER QUALITY ANALYSIS AND DESIGN

Water quality treatment will be accommodated for in a combined detention/water quality vault. Dead storage within the vault will be designed according to the Basic Water Quality Treatment Menu.

WETVAULT (DEAD STORAGE)

The required dead storage within the vault was determined using procedures provided in Section 6.4.1.1 of the 2009 KCSWDM. Areas tabulated below are the subject site's developed areas tributary to the each pond.

$V_B = f\,V_r$

where: f = volume correction factor = 3 (Basic)

V_r = volume of runoff from mean annual storm, ft^3

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

where: A_i = area of impervious surface, ft^2

A_{tg} = area of till grass and pasture, ft^2

A_{tf} = area of till forest, ft^2

A_o = area of outwash soils, ft^2

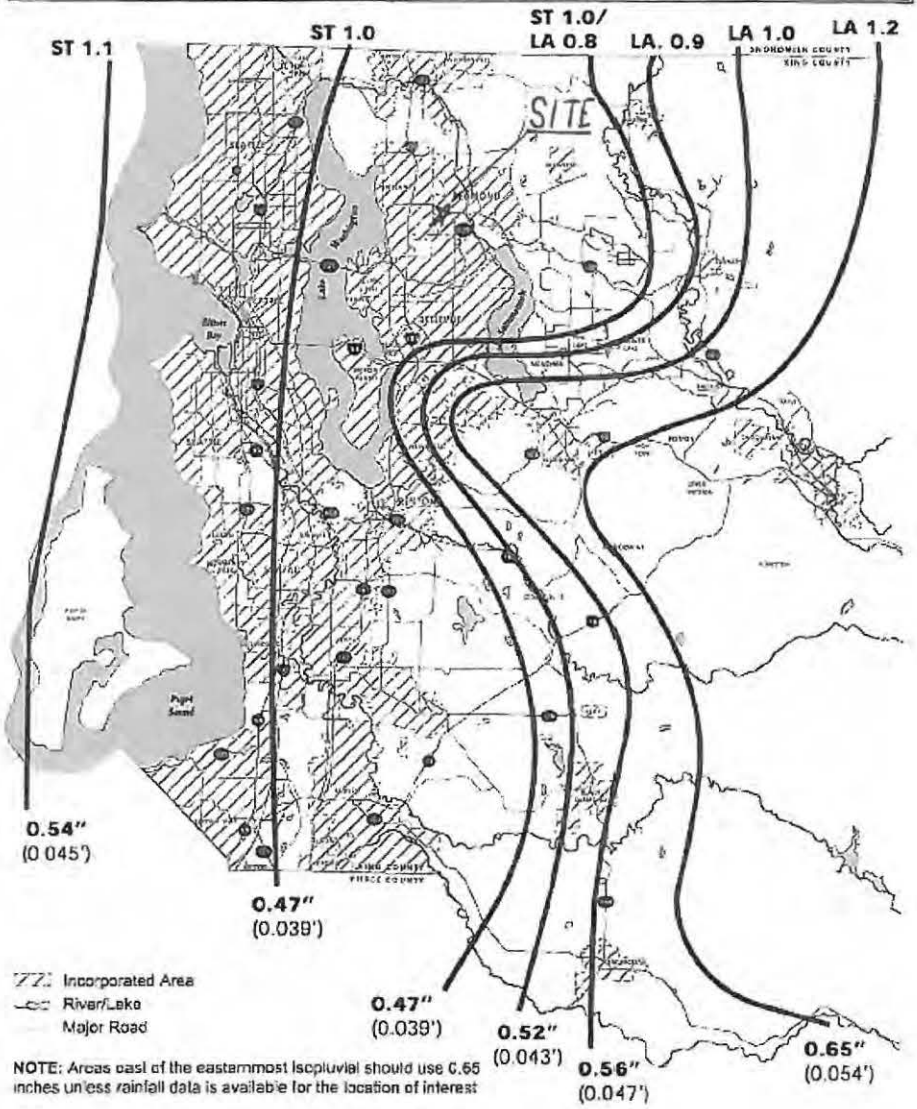
R = rainfall from mean annual storm = 0.039 feet

$V_B = 3[(0.9(3.45) + 0.25(3.14)]*43{,}560*0.039 = 19{,}825$ cubic feet

Dead storage within the vault will either be located within the entire vault or a portion of the vault. Details of how the required dead storage will be accommodated for within the vault will be completed at final design.

Required Water Quality Volume = 19,825 cubic feet
Provided Water Quality Volume ≥ 19,825 cubic feet

FIGURE 6.4.1.A PRECIPITATION FOR MEAN ANNUAL STORM IN INCHES (FEET)



result, generates large amounts of runoff. For this application, till soil types include Buckley and bedrock soils, and alluvial and outwash soils that have a seasonally high water table or are underlain at a shallow depth (less than 5 feet) by glacial till. U.S. Soil Conservation Service (SCS) hydrologic soil groups that are classified as till soils include a few B, most C, and all D soils. See Chapter 3 for classification of specific SCS soil types.