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BELL APARTMENTS

Stormwater Site Plan

Preliminary Drainage Report

FOR: Bell Place, LLC
409 E Pioneer
Puyallup, WA 98372

BY: Azure Green Consultants
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DATE: March 29, 2023

JOB NO: 3256

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Section I - Project Overview

Overview:

The project site is located on the northwest corner of the intersection of W Pioneer and 4th St SW. The site address is 204 4th St SW. The project will develop tax parcel numbers 5745001631, 5745001632, and 5745001641. Total site area is 32,085 sf = 0.737 acres. The project is an apartment building.

Improvements for the project will include the building, with in-building parking, storm connection at 5th St SW and W Meeker, utility services, and frontage improvements on W Pioneer, 4th St SW, and W Meeker.

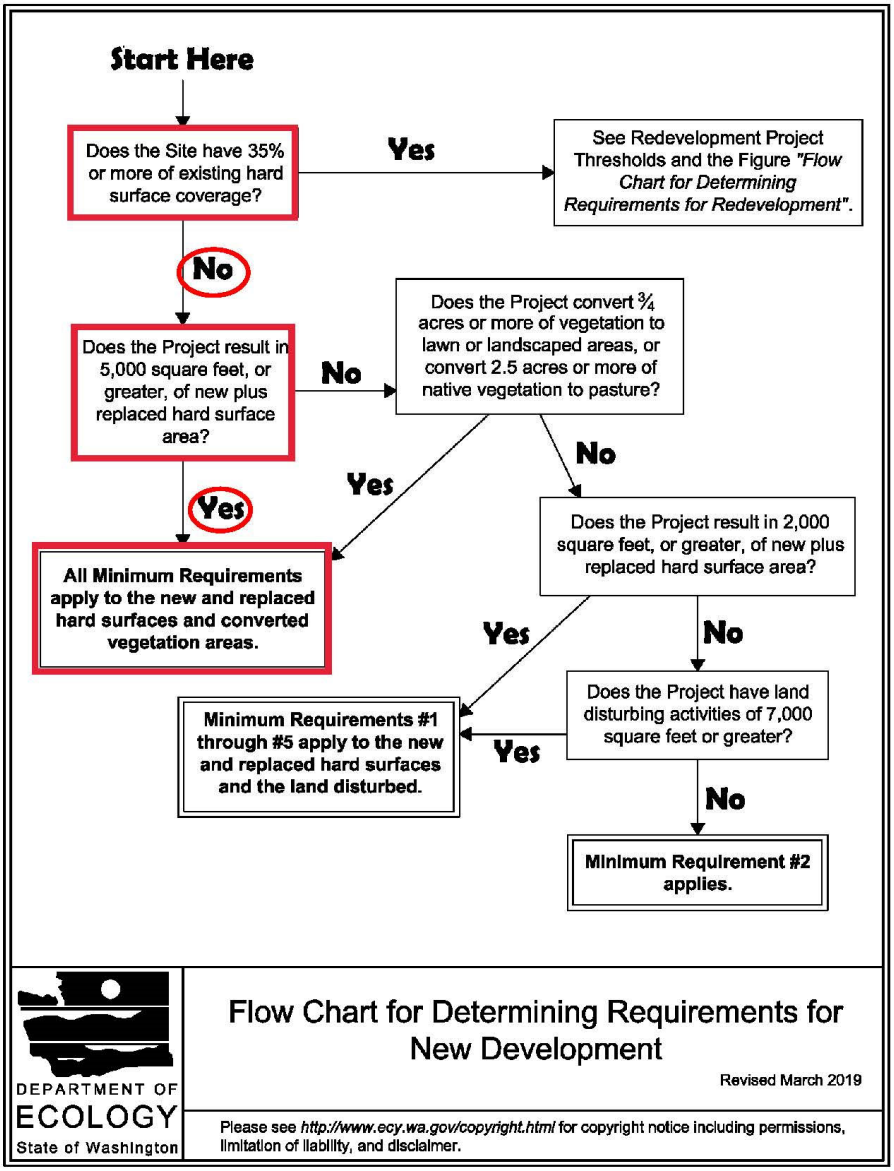
Project Requirements:

Determination of Applicable Minimum Requirements

Per PMC 21.10.040 the City of Puyallup has adopted the Washington State Department of Ecology Stormwater Management Manual for Western Washington (SMMWW), with the version in effect being "the most current version approved for city use by the council." The city adopted the 2019 DOE Manual on July 1, 2022, and it is the controlling regulation and is referred to as "the Manual" or "SMMWW" hereinafter.

The project consists of 28,532 sf of new roof and 5,741 sf of paving overlay, 8,765 sf of new plus replaced sidewalk, and 564 sf of new plus replaced driveway. The existing hard surfaces onsite are 4,986 sf or approximately 15% of the project site and therefore, the project is considered new development. Since the total new plus replaced onsite hard surfaces for the project are greater than 5,000 square feet, and the value of improvements exceed 50% of the assessed value of the existing site improvements, all minimum requirements apply to the new and replaced onsite hard surfaces and converted vegetation areas. Note that all of the existing vegetated areas are already lawn/landscaping so therefore there are no converted vegetation areas. Therefore, the minimum requirements only apply to the new and replaced hard surfaces.

Figure I-3.1: Flow Chart for Determining Requirements for New Development



Discussion of Minimum Requirements

The Minimum Requirements per Section I-2.5 of the Manual:

Minimum Requirement #1: Preparation of Stormwater Site Plans

The Stormwater Site Plan consists of a report and construction plans. This report and the attached preliminary storm plan are preliminary versions of the Drainage Report and the site improvement plans that will be submitted for construction permits and will satisfy Minimum Requirement #1.

Minimum Requirement #2: Construction Stormwater Pollution Prevention (SWPPP)

The SWPPP consists of a narrative and drawings. The narrative will be addressed in Section V of the final version of the Drainage Report. The drawings will include a TESC plan, notes, and details as part of the site development construction plans. The narrative and drawings will be prepared and submitted at time of civil permit application.

Minimum Requirement #3: Source Control of Pollution

A Pollution Source Control Plan will be prepared in conformance with requirements of Volume IV of the Manual and will be submitted as a separate document at time of civil permit application.

Minimum Requirement #4: Preservation of Natural Drainage Systems and Outfalls

Currently, drainage from the site sheet flows both north into W Meeker and south into W Pioneer. Drainage in both roads flows west along the curb line into catch basins in 5th St SW. These catch basins are tied through 8-inch laterals into a 15-inch storm main that flows south. The proposed design will connect to this same closed conveyance system to preserve existing drainage systems and outfalls.

Minimum Requirement #5: On-site Stormwater Management

Typically a project that triggers MR #1-9, and is inside the urban growth area, is required to either meet the Low Impact Development Performance Standard, or use List #2 to determine applicable On-Site Stormwater Management BMPs. BMP T5.13, Post Construction Soil Quality and Depth will be used for lawn and landscaped areas to address MR #5, but all other surfaces will be tightlined to the existing public storm system per upcoming Municipal Code revisions, with payment required on a pro rata basis to improve the downstream conveyance system.

Minimum Requirement #6: Runoff Treatment

The only new PGHS for the project is 564 sf of driveway. Since this area is less than 5,000 sf, no runoff treatment is required.

Minimum Requirement #7: Flow Control

Runoff from all hard surfaces will be tightlined to the existing public storm system per upcoming Municipal Code revisions, with payment required on a pro rata basis to improve the downstream conveyance system.

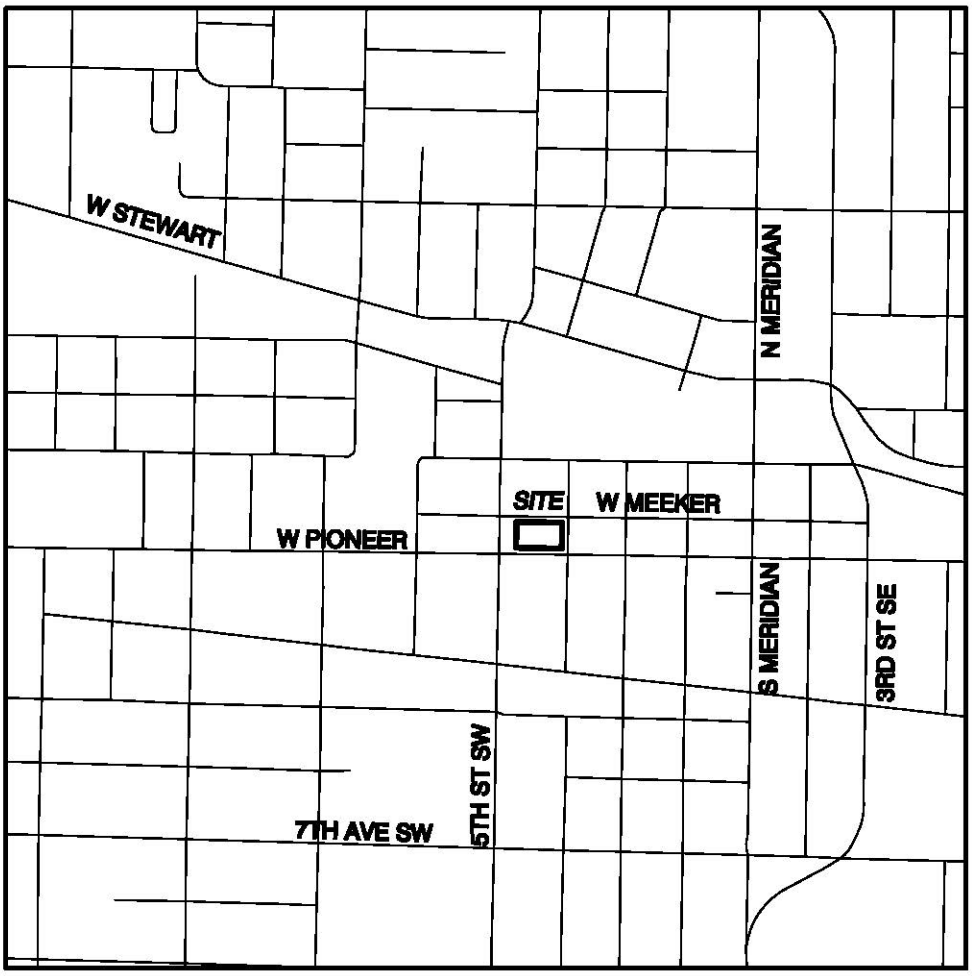
Minimum Requirement #8: Wetlands Protection

There are no wetlands on or near the site.

Minimum Requirement #9: Operation and Maintenance

The stormwater facilities required for this project that require a maintenance plan are: conveyance system. Only a short run of roof drain from the building to the right-of-way will be on private property. All other stormwater facilities will be within the right-of-way and therefore owned, operated, and maintained by the City of Puyallup. Because the stormwater facilities consist of a typical closed conveyance system, commonly maintained by the City, an O&M plan is not required.

Figure 1. Site Location:



Section II – Existing Conditions Summary

Topography:
In existing conditions, the site is nearly flat, slightly sloping to the north and south, while overall dropping from east to west.

Ground Cover:
The site is developed as a single-family residence. The non-hard surface areas are covered with lawn and landscaping.

Drainage:
There is no defined drainage course onsite. Any surface runoff that does not infiltrate sheet flows north into W Meeker or south into W Pioneer.

Soils:
The NRCS Soil Survey of Pierce County indicates the soils on the site are Puyallup fine sandy loam (31A). Puyallup soils are hydrologic group A. Per the soils report for the site by GeoResources, the soils match the mapped soil type, primarily being sand. Groundwater monitoring was performed during the winter of 2022 with peak groundwater reaching elevation 42.0, approximately 3 feet deep. Infiltration testing was performed by GeoResources with a resulting long-term design infiltration rate of 1 in/hr. See Appendix B for soils reports. While the design infiltration rate is marginal for typical infiltration design, the depth to groundwater of 3 feet makes all infiltration BMPs infeasible given the proposed development.

Floodplain
The project site does not include a floodplain based on latest FIRM and Pierce County flood data.

Section III – Off-Site Analysis

Upstream

Existing topography and curbs in adjacent road result in no upstream area contributing drainage to the site.

Downstream

From the project site, runoff sheet flows north into W Meeker or south into West Pioneer, then west approximately 80 feet along curbing and into catch basins in 5th St SW. These catch basins have 8-inch leaders into a 15-inch storm main that flows south for about 640 feet into a 24-inch pipe in 4th Ave SW that flows west. The 24-inch pipe continues west, reaching the ¼ mile downstream point approximately 150 feet west of 6th St SW.

Problems

There are no known drainage problems along this downstream route.

Section IV – Permanent Stormwater Control Plan

Existing Site Hydrology

WWHM2012 is used for hydrologic analysis. The project site is within the 42-inch, East rainfall zone and WWHM is run with 15-minute intervals. Due to the high groundwater, and marginal infiltration rate, the soils are classified as "C". The basin in existing conditions is delineated per the following table. See Appendix A for WWHM analysis.

Existing		
	sf	acre
C, Lawn, Flat	27347	0.6278
Impervious	sf	acre
Road, Flat	8732	0.2005
Roof	4986	0.1145
Sidewalk, Flat	3754	0.0862
Total Impervious	17472	0.4011
Total Area	44819	1.0289

The peak runoff rates calculated by WWHM2012 for existing conditions are:

```
   Flow Frequency
 Flow(cfs)  0501 15m
2 Year   =    0.1782
5 Year   =    0.2553
10 Year  =    0.3141
25 Year  =    0.3981
50 Year  =    0.4678
100 Year =    0.5442
```

Developed Site Hydrology

Drainage Basin

The drainage basin for developed conditions is delineated per the following table.

Developed Conditions		
	sf	acre
C, Lawn, Flat	1217	0.0279
Impervious	sf	acre
Road, Flat	5741	0.1318
Roof	28532	0.6550
Driveway, Flat	564	0.0129
Sidewalk, Flat	8765	0.2012
Total Impervious	43602	1.0010
Total Area	44819	1.0289

The peak runoff rates calculated by WWHM2012 for developed conditions (prior to detention) are:

```
   Flow Frequency
 Flow(cfs)  0801 15m
2 Year   =    0.3679
5 Year   =    0.4931
10 Year  =    0.5839
25 Year  =    0.7081
50 Year  =    0.8077
100 Year =    0.9136
```

Conveyance System

The existing lateral to which the project will connect is 8-inch. For this preliminary report, Manning's Equation will be used to confirm if an 8-inch pipe at 0.5% slope is adequate to convey the 100-year runoff from the project area. This is simply to show feasibility. The final report will include a more precise analysis of runoff and pipe capacity.

Manning's Equation Analysis								
100-year flow:	0.91 cfs							
Pipe Dia.	radius	n	slope	flow depth	Area	Hyd. Rad.	Q	V
in	ft		ft/ft	ft	sf	ft	cfs	fps
8	0.333	0.012	0.005	0.5383	0.3020	0.2029	0.9130	3.0231

Conclusions

The analysis shows that the project will result in an increase in flow of 0.37 cfs for the 100-year event and that an 8-inch pipe at 0.5% has adequate capacity to convey the 100-year event from the project area.

Section V – Construction Stormwater Pollution Prevention Plan

An SWPPP will be prepared and submitted for this project with the final engineering.

Section VI – Special Reports and Studies

See Geotech reports in Appendix B.

Section VII – Other Permits

A building permit will be required for construction of the future buildings. Water and sewer service permits will be required.

Section VIII – Operation and Maintenance Manual

An Operations and Maintenance Manual is required for all storm drainage improvements. The O&M Manual will be prepared and submitted with the final engineering.

Section IX – Bond Quantities Worksheet

Any required bond amounts will be calculated when required for permit issuance.

APPENDIX A

WWHM Analysis

WWHM2012

PROJECT REPORT

General Model Information

Project Name:	Bell
Site Name:	Bell
Site Address:	
City:	Puyallup
Report Date:	3/29/2023
Gage:	42 IN EAST
Data Start:	10/01/1901
Data End:	09/30/2059
Timestep:	15 Minute
Precip Scale:	1.000
Version Date:	2019/09/13
Version:	4.2.17

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C, Lawn, Flat	0.6278
Pervious Total	0.6278

Impervious Land Use	acre
ROADS FLAT	0.2005
ROOF TOPS FLAT	0.1145
SIDEWALKS FLAT	0.0862
Impervious Total	0.4012
Basin Total	1.029

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C, Lawn, Flat	0.0279
Pervious Total	0.0279

Impervious Land Use	acre
ROADS FLAT	0.1318
ROOF TOPS FLAT	0.655
DRIVEWAYS FLAT	0.0129
SIDEWALKS FLAT	0.2012
Impervious Total	1.0009
Basin Total	1.0288

Element Flows To:

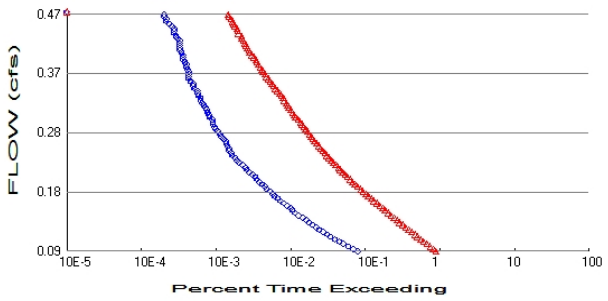
Surface	Interflow	Groundwater

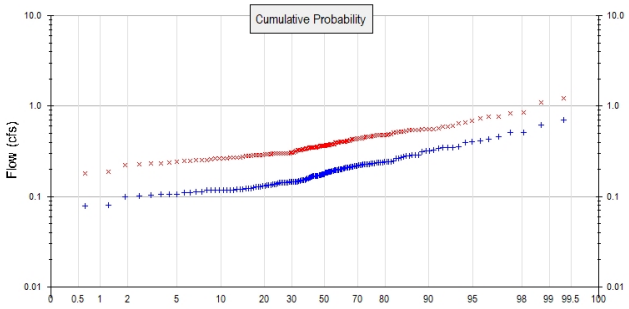
Routing Elements
Predeveloped Routing

Mitigated Routing

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.6278
Total Impervious Area: 0.4012

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.0279
Total Impervious Area: 1.0009

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.178196
5 year	0.255256
10 year	0.31414
25 year	0.39805
50 year	0.467833
100 year	0.544173

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.367928
5 year	0.493081
10 year	0.58393
25 year	0.708145
50 year	0.807747
100 year	0.9136

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1902	0.176	0.434
1903	0.198	0.479
1904	0.339	0.549
1905	0.111	0.245
1906	0.111	0.268
1907	0.211	0.367
1908	0.147	0.302
1909	0.153	0.371
1910	0.209	0.354
1911	0.209	0.400

1912	0.511	0.664
1913	0.120	0.289
1914	0.700	1.227
1915	0.117	0.250
1916	0.190	0.460
1917	0.078	0.187
1918	0.149	0.368
1919	0.113	0.231
1920	0.167	0.306
1921	0.138	0.261
1922	0.244	0.407
1923	0.152	0.283
1924	0.215	0.525
1925	0.106	0.225
1926	0.172	0.428
1927	0.149	0.365
1928	0.128	0.263
1929	0.280	0.526
1930	0.232	0.542
1931	0.129	0.269
1932	0.139	0.287
1933	0.141	0.284
1934	0.289	0.464
1935	0.102	0.252
1936	0.170	0.345
1937	0.231	0.459
1938	0.117	0.251
1939	0.127	0.301
1940	0.241	0.552
1941	0.229	0.556
1942	0.239	0.412
1943	0.196	0.405
1944	0.325	0.587
1945	0.201	0.441
1946	0.190	0.345
1947	0.117	0.268
1948	0.173	0.370
1949	0.241	0.567
1950	0.133	0.331
1951	0.197	0.490
1952	0.404	0.549
1953	0.348	0.507
1954	0.145	0.299
1955	0.118	0.286
1956	0.104	0.259
1957	0.136	0.297
1958	0.229	0.372
1959	0.226	0.370
1960	0.130	0.297
1961	0.456	0.835
1962	0.164	0.355
1963	0.106	0.262
1964	0.432	0.774
1965	0.200	0.348
1966	0.134	0.289
1967	0.236	0.409
1968	0.160	0.340
1969	0.151	0.308

1970	0.194	0.348
1971	0.205	0.341
1972	0.613	1.092
1973	0.266	0.652
1974	0.240	0.476
1975	0.348	0.491
1976	0.311	0.522
1977	0.099	0.223
1978	0.248	0.378
1979	0.208	0.402
1980	0.231	0.394
1981	0.175	0.379
1982	0.137	0.299
1983	0.223	0.406
1984	0.214	0.404
1985	0.278	0.461
1986	0.117	0.231
1987	0.217	0.417
1988	0.119	0.243
1989	0.112	0.261
1990	0.155	0.298
1991	0.218	0.427
1992	0.175	0.426
1993	0.194	0.476
1994	0.190	0.326
1995	0.119	0.256
1996	0.187	0.341
1997	0.146	0.305
1998	0.203	0.365
1999	0.166	0.403
2000	0.171	0.345
2001	0.117	0.290
2002	0.348	0.512
2003	0.144	0.294
2004	0.201	0.441
2005	0.394	0.860
2006	0.169	0.396
2007	0.223	0.445
2008	0.182	0.367
2009	0.117	0.277
2010	0.163	0.357
2011	0.141	0.352
2012	0.168	0.350
2013	0.177	0.327
2014	0.142	0.324
2015	0.356	0.548
2016	0.135	0.310
2017	0.241	0.537
2018	0.211	0.323
2019	0.318	0.482
2020	0.218	0.393
2021	0.170	0.329
2022	0.262	0.555
2023	0.288	0.692
2024	0.509	0.741
2025	0.145	0.361
2026	0.236	0.468
2027	0.186	0.437

2028	0.070	0.174
2029	0.147	0.283
2030	0.268	0.599
2031	0.081	0.180
2032	0.123	0.301
2033	0.151	0.377
2034	0.119	0.296
2035	0.221	0.366
2036	0.128	0.298
2037	0.160	0.398
2038	0.229	0.381
2039	0.318	0.769
2040	0.144	0.299
2041	0.183	0.378
2042	0.227	0.435
2043	0.196	0.482
2044	0.170	0.331
2045	0.132	0.267
2046	0.144	0.297
2047	0.147	0.366
2048	0.122	0.300
2049	0.183	0.446
2050	0.169	0.333
2051	0.285	0.471
2052	0.143	0.357
2053	0.123	0.300
2054	0.409	0.609
2055	0.159	0.352
2056	0.200	0.481
2057	0.105	0.236
2058	0.182	0.454
2059	0.280	0.554

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.6998	1.2272
2	0.6131	1.0923
3	0.5106	0.8603
4	0.5090	0.8345
5	0.4558	0.7736
6	0.4319	0.7690
7	0.4088	0.7410
8	0.4036	0.6922
9	0.3944	0.6644
10	0.3561	0.6518
11	0.3485	0.6093
12	0.3481	0.5989
13	0.3478	0.5874
14	0.3394	0.5668
15	0.3254	0.5561
16	0.3184	0.5548
17	0.3177	0.5542
18	0.3114	0.5520
19	0.2892	0.5488
20	0.2881	0.5486
21	0.2847	0.5481
22	0.2804	0.5424

23	0.2798	0.5365
24	0.2779	0.5262
25	0.2682	0.5247
26	0.2655	0.5218
27	0.2618	0.5121
28	0.2476	0.5071
29	0.2436	0.4914
30	0.2415	0.4896
31	0.2409	0.4818
32	0.2405	0.4816
33	0.2398	0.4809
34	0.2392	0.4792
35	0.2357	0.4763
36	0.2355	0.4759
37	0.2322	0.4712
38	0.2314	0.4684
39	0.2311	0.4640
40	0.2294	0.4611
41	0.2292	0.4603
42	0.2289	0.4592
43	0.2274	0.4542
44	0.2261	0.4459
45	0.2230	0.4448
46	0.2226	0.4411
47	0.2212	0.4407
48	0.2181	0.4367
49	0.2178	0.4347
50	0.2172	0.4342
51	0.2148	0.4279
52	0.2145	0.4265
53	0.2114	0.4256
54	0.2106	0.4174
55	0.2093	0.4115
56	0.2089	0.4091
57	0.2076	0.4075
58	0.2048	0.4060
59	0.2025	0.4052
60	0.2010	0.4041
61	0.2005	0.4027
62	0.2005	0.4017
63	0.2002	0.3995
64	0.1980	0.3981
65	0.1966	0.3961
66	0.1965	0.3944
67	0.1963	0.3929
68	0.1944	0.3809
69	0.1938	0.3788
70	0.1905	0.3783
71	0.1897	0.3781
72	0.1896	0.3771
73	0.1866	0.3723
74	0.1859	0.3706
75	0.1832	0.3703
76	0.1831	0.3700
77	0.1824	0.3682
78	0.1821	0.3672
79	0.1773	0.3666
80	0.1764	0.3662

81	0.1753	0.3655
82	0.1751	0.3650
83	0.1735	0.3648
84	0.1722	0.3612
85	0.1709	0.3571
86	0.1700	0.3571
87	0.1700	0.3553
88	0.1697	0.3542
89	0.1692	0.3520
90	0.1691	0.3517
91	0.1682	0.3497
92	0.1671	0.3478
93	0.1662	0.3476
94	0.1635	0.3453
95	0.1629	0.3450
96	0.1604	0.3449
97	0.1596	0.3410
98	0.1594	0.3405
99	0.1547	0.3399
100	0.1529	0.3330
101	0.1521	0.3307
102	0.1513	0.3305
103	0.1512	0.3291
104	0.1494	0.3271
105	0.1489	0.3257
106	0.1470	0.3243
107	0.1468	0.3227
108	0.1467	0.3105
109	0.1459	0.3079
110	0.1450	0.3056
111	0.1449	0.3046
112	0.1440	0.3020
113	0.1437	0.3009
114	0.1436	0.3008
115	0.1433	0.3001
116	0.1416	0.3000
117	0.1412	0.2995
118	0.1412	0.2993
119	0.1388	0.2986
120	0.1376	0.2983
121	0.1373	0.2982
122	0.1362	0.2973
123	0.1347	0.2971
124	0.1336	0.2967
125	0.1328	0.2957
126	0.1317	0.2936
127	0.1301	0.2902
128	0.1285	0.2892
129	0.1283	0.2886
130	0.1281	0.2871
131	0.1266	0.2860
132	0.1231	0.2839
133	0.1229	0.2828
134	0.1218	0.2825
135	0.1195	0.2771
136	0.1191	0.2693
137	0.1189	0.2685
138	0.1187	0.2679

139	0.1181	0.2673
140	0.1173	0.2633
141	0.1172	0.2620
142	0.1171	0.2615
143	0.1170	0.2611
144	0.1169	0.2587
145	0.1167	0.2556
146	0.1128	0.2515
147	0.1120	0.2510
148	0.1110	0.2496
149	0.1109	0.2453
150	0.1061	0.2433
151	0.1055	0.2357
152	0.1049	0.2312
153	0.1038	0.2312
154	0.1015	0.2253
155	0.0987	0.2232
156	0.0808	0.1871
157	0.0781	0.1797
158	0.0699	0.1740

Duration Flows

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0891	4345	48703	1120	Fail
0.0929	3812	45212	1186	Fail
0.0967	3267	40886	1251	Fail
0.1006	2819	36997	1312	Fail
0.1044	2478	33517	1352	Fail
0.1082	2143	30382	1417	Fail
0.1121	1888	27473	1455	Fail
0.1159	1730	25512	1474	Fail
0.1197	1506	23135	1536	Fail
0.1235	1334	21052	1578	Fail
0.1274	1214	19152	1577	Fail
0.1312	1085	17451	1608	Fail
0.1350	973	15811	1624	Fail
0.1388	889	14786	1663	Fail
0.1427	797	13396	1680	Fail
0.1465	705	12199	1730	Fail
0.1503	630	11136	1767	Fail
0.1541	579	10166	1755	Fail
0.1580	549	9490	1728	Fail
0.1618	495	8659	1749	Fail
0.1656	444	7944	1789	Fail
0.1694	401	7252	1808	Fail
0.1733	371	6637	1788	Fail
0.1771	335	6094	1819	Fail
0.1809	319	5690	1783	Fail
0.1847	296	5185	1751	Fail
0.1886	262	4801	1832	Fail
0.1924	247	4370	1769	Fail
0.1962	229	4007	1749	Fail
0.2000	210	3695	1759	Fail
0.2039	195	3472	1780	Fail
0.2077	186	3200	1720	Fail
0.2115	170	2965	1744	Fail
0.2153	155	2750	1774	Fail
0.2192	142	2572	1811	Fail
0.2230	138	2407	1744	Fail
0.2268	126	2240	1777	Fail
0.2306	113	2070	1831	Fail
0.2345	105	1953	1860	Fail
0.2383	100	1805	1804	Fail
0.2421	91	1688	1854	Fail
0.2459	89	1598	1795	Fail
0.2498	83	1487	1791	Fail
0.2536	82	1397	1703	Fail
0.2574	78	1317	1688	Fail
0.2613	76	1232	1621	Fail
0.2651	74	1150	1554	Fail
0.2689	69	1097	1589	Fail
0.2727	64	1047	1635	Fail
0.2766	62	988	1593	Fail
0.2804	59	933	1581	Fail
0.2842	55	876	1592	Fail
0.2880	53	832	1569	Fail
0.2919	50	794	1588	Fail

0.2957	50	750	1500	Fail
0.2995	49	698	1424	Fail
0.3033	45	646	1435	Fail
0.3072	44	616	1400	Fail
0.3110	43	589	1369	Fail
0.3148	41	557	1358	Fail
0.3186	40	526	1315	Fail
0.3225	38	505	1328	Fail
0.3263	36	483	1341	Fail
0.3301	34	458	1347	Fail
0.3339	34	440	1294	Fail
0.3378	32	416	1300	Fail
0.3416	31	395	1274	Fail
0.3454	31	368	1187	Fail
0.3492	28	344	1228	Fail
0.3531	27	327	1211	Fail
0.3569	27	311	1151	Fail
0.3607	25	293	1172	Fail
0.3645	24	277	1154	Fail
0.3684	24	263	1095	Fail
0.3722	24	250	1041	Fail
0.3760	24	236	983	Fail
0.3798	23	227	986	Fail
0.3837	22	215	977	Fail
0.3875	22	203	922	Fail
0.3913	21	195	928	Fail
0.3951	20	189	945	Fail
0.3990	20	180	900	Fail
0.4028	20	167	835	Fail
0.4066	19	156	821	Fail
0.4104	18	153	850	Fail
0.4143	18	145	805	Fail
0.4181	18	139	772	Fail
0.4219	18	133	738	Fail
0.4258	18	129	716	Fail
0.4296	17	122	717	Fail
0.4334	16	121	756	Fail
0.4372	15	111	740	Fail
0.4411	15	108	720	Fail
0.4449	15	105	700	Fail
0.4487	14	97	692	Fail
0.4525	13	96	738	Fail
0.4564	12	92	766	Fail
0.4602	12	88	733	Fail
0.4640	11	82	745	Fail
0.4678	11	80	727	Fail

The development has an increase in flow durations from 1/2 Predeveloped 2 year flow to the 2 year flow or more than a 10% increase from the 2 year to the 50 year flow.
The development has an increase in flow durations for more than 50% of the flows for the range of the duration analysis.

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	0 acre-feet
On-line facility target flow:	0 cfs.
Adjusted for 15 min:	0 cfs.
Off-line facility target flow:	0 cfs.
Adjusted for 15 min:	0 cfs.

LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
Total Volume Infiltrated		0.00	0.00	0.00		0.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Failed

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic

Mitigated Schematic

Basin 1
1.03ac

Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1901 10 01        END    2059 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM        26   Bell.wdm
MESSU      25   PreBell.MES
           27   PreBell.L61
           28   PreBell.L62
           30   POCBell1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      16
      IMPLND       1
      IMPLND       4
      IMPLND       8
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Basin  1                   MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                      in  out           ***
   16     C, Lawn, Flat           1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   16         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
```

```
 16         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
 16         0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
 16             0       4.5      0.03       400      0.05       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
 16             0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
 16            0.1      0.25      0.25         6       0.5      0.25
  END PWAT-PARM4

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
             ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS       AGWS       GWVS
 16             0         0         0         0       2.5          1          0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
    1      ROADS/FLAT             1    1    1   27    0
    4      ROOF TOPS/FLAT         1    1    1   27    0
    8      SIDEWALKS/FLAT         1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    1         0    0    1    0    0    0
    4         0    0    1    0    0    0
    8         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    1         0    0    4    0    0    0    1    9
    4         0    0    4    0    0    0    1    9
    8         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    1         0    0    0    0    0
    4         0    0    0    0    0
    8         0    0    0    0    0
  END IWAT-PARM1
```

```
  IWAT-PARM2
    <PLS >       IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    1            400      0.01       0.1       0.1
    4            400      0.01       0.1       0.1
    8            400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >       IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    1              0         0
    4              0         0
    8              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    1              0         0
    4              0         0
    8              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                 <--Area-->     <-Target->   MBLK   ***
<Name>   #                 <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND  16                     0.6278     COPY   501     12
PERLND  16                     0.6278     COPY   501     13
IMPLND   1                     0.2005     COPY   501     15
IMPLND   4                     0.1145     COPY   501     15
IMPLND   8                     0.0862     COPY   501     15

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG           ***
                                       in  out                              ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ******************* PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                  ***
```

```
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
             FG FG FG FG  possible  exit  *** possible  exit      possible  exit
              *  *  *  *    *  *  *  *  *       *  *  *  *  *         ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                          ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1             PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1             IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1             PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1             IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    501 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13

  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1901 10 01        END    2059 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   Bell.wdm
MESSU       25   MitBell.MES
            27   MitBell.L61
            28   MitBell.L62
            30   POCBell1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      16
      IMPLND       1
      IMPLND       4
      IMPLND       5
      IMPLND       8
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Basin  1                   MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
   16     C, Lawn, Flat           1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   16         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
```

```
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   16         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   16         0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   16              0       4.5      0.03       400      0.05       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   16              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   16            0.1      0.25      0.25         6       0.5      0.25
  END PWAT-PARM4

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
             ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   16              0         0         0         0       2.5         1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
    1      ROADS/FLAT             1    1    1   27    0
    4      ROOF TOPS/FLAT         1    1    1   27    0
    5      DRIVEWAYS/FLAT         1    1    1   27    0
    8      SIDEWALKS/FLAT         1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    1         0    0    1    0    0    0
    4         0    0    1    0    0    0
    5         0    0    1    0    0    0
    8         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    1         0    0    4    0    0    0    1    9
    4         0    0    4    0    0    0    1    9
    5         0    0    4    0    0    0    1    9
    8         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    1         0    0    0    0    0
```

```
    4         0    0    0    0    0
    5         0    0    0    0    0
    8         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    1            400      0.01       0.1       0.1
    4            400      0.01       0.1       0.1
    5            400      0.01       0.1       0.1
    8            400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    1              0         0
    4              0         0
    5              0         0
    8              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    1              0         0
    4              0         0
    5              0         0
    8              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND  16                      0.0279     COPY   501     12
PERLND  16                      0.0279     COPY   501     13
IMPLND   1                      0.1318     COPY   501     15
IMPLND   4                       0.655     COPY   501     15
IMPLND   5                      0.0129     COPY   501     15
IMPLND   8                      0.2012     COPY   501     15

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<----------------><---> User T-series  Engl Metr LKFG             ***
                                        in  out                             ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
```

```
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                    ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
           FG FG FG FG  possible  exit  *** possible  exit      possible  exit
            *  *  *  *    *  *  *  *  *       *  *  *  *  *        ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                       ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1             PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1             IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1             PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1             IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY     1 OUTPUT MEAN   1 1     48.4      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    801 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13

  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

Disclaimer

Legal Notice

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APPENDIX B

Soil Reports

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August 5, 2022

Azure Green Consultants
409 E Pioneer
Puyallup, WA 98372
(253) 770-3144

Attn: Jim Job
jim@mailagc.com

Soils Report
Proposed Redevelopment
204 4th Street SW
Puyallup, Washington
PN: 57450016-31, -32, -41
Doc ID: AGC.4thStSW.SR

INTRODUCTION

This *Soils Report* summarizes our site observations and geotechnical data review and addresses the feasibility of stormwater infiltration for the proposed residential redevelopment to be constructed at 204 – 4th Street SW in Puyallup, Washington. The approximate site location is shown on Figure 1.

Our understanding of the project is based on our correspondence with Azure Green Consultants, our understanding of the City of Puyallup's development codes, and our experience in the site area. We understand that the site is currently developed with a single-family residence. Furthermore, we understand that you propose to demolish the existing residence and construct a new mixed use building at the site. We have not been provided with conceptual plans for the proposed structure at the time of this report, but we anticipate the new structure will consist of one to two stories of concrete construction with two to four stories of wood-framing above. Support for the proposed structure will likely consist of shallow foundations bearing on improved ground, or deep foundations such as continuous flight auger piles.

SCOPE

The purpose of our services was to evaluate the surface and subsurface conditions across the site as a basis for providing geotechnical recommendations and design criteria for the proposed restaurant. Specifically, the scope of services for this project included the following:

1. Reviewing the available geologic, hydrogeologic, and geotechnical data for the site area;
2. Exploring the subsurface conditions by observing four direct push Geoprobes and installing groundwater monitoring wells in each exploration at selected locations at the site;
3. Installing Leveloggers in each well and monitoring of groundwater levels within each groundwater monitoring well during the prescriptive wet season (December 21 through April 1);

4. Providing our opinion about the feasibility of onsite infiltration in accordance with the 2014 SWMMWW, including a preliminary design infiltration rate based on grain size analysis and in-situ testing, as applicable; and,
5. Preparing a *Soils Report* that satisfies the 2014 SWMMWW requirements and summarizes our site observations and conclusions, our geotechnical recommendations and design criteria, along with the supporting data.

The above scope of work was summarized in our *Proposal for Geotechnical Engineering Services* dated December 2, 2021. We received authorization to proceed from you the same day.

SITE CONDITIONS

Surface Conditions

As stated, the site is located at 204 – 4th Street SW in Puyallup, Washington. The site consists of three tax parcels that, when combined, are generally rectangular in shape, measure approximately 135 feet wide (north to south) by approximately 240 feet long (east to west), and encompasses approximately 0.74 acres. The site is bounded by existing residential development to the west, West Pioneer Avenue to the south, West Meeker to the north, and 4th Street SW to the east.

Based on topographic information obtained from Pierce County Public GIS and our site observations, the ground surface of the site is generally level with small rises and falls in elevation on the order of approximately 1 foot. The total topographic relief of the site is on the order of approximately 2 feet. The existing site configuration and topography are shown on the Site Vicinity Map, Figure 3.

Vegetation across the site generally consisted of maintained grass with typical residential landscaping. No seeps or springs were observed at the site however some small areas of standing water were observed. No signs of erosion or soil instability were observed during our site reconnaissance.

Site Soils

The Natural Resource Conservation Service (NRCS) Web Soil Survey maps the site as being underlain by Puyallup fine sandy loam (31A) soils. These soils are derived from alluvium, form on slopes of 0 to 3 percent, are considered to have a “slight” erosion hazard when exposed, and are included in hydrologic soils group A. A copy of the NRCS soils map is included as Figure 3.

Site Geology

According to the *draft Geologic map of the Puyallup 7.5-minute Quadrangle, Washington* by Troost, (in review) the site is mapped as being underlain by Quaternary Alluvium (Qal). Alluvial soils generally consist of normally consolidated, stratified deposits of sand, silt, clay, and occasional peat that were deposited along the Puyallup River channel. The existing topography, as well as the surficial and shallow soils in the area, are the result of fluvial action, including down-cutting by the river, channel meandering and migration, and flood deposits. An excerpt from the geologic map is included as Figure 4.

Subsurface Explorations

On December 22, 2021, a field representative from GeoResources visited the site and monitored 4 direct push probes (GeoProbes) to a depth of approximately 15 feet, logged the

subsurface conditions, and obtained representative soils samples. The probes were completed by a licensed drilling company working for GeoResources. The approximate locations of the probes are indicated in the attached Site & Exploration Plan, Figure 2.

A representative from GeoResources continuously monitored the borings, maintained logs of the subsurface conditions encountered, and obtained representative samples in sealed containers for transportation to our laboratory. The soil densities presented on the logs were based on the difficulty of excavation and our experience. The number and location of the explorations were selected in the field based on project information provided by Azure Green Consultants, consideration for underground utilities, existing site conditions, and current site usage. Each exploration was completed as a groundwater monitoring well.

The subsurface explorations excavated as part of this evaluation indicate the subsurface conditions at specific locations only, as actual subsurface conditions can vary across the site. Furthermore, the nature and extent of such variation would not become evident until additional explorations are performed or until construction activities have begun. Based on our experience in the area and extent of prior explorations in the area, it is our opinion that the soils encountered in the explorations are generally representative of the soils at the site.

The soils encountered were visually classified in accordance with the Unified Soil Classification System (USCS) and ASTM D: 2488. The approximate locations of our explorations are indicated on the attached Site & Exploration Map, Figure 2. The USCS is included in Appendix A as Figure A-1, while the descriptive logs of our explorations are included as Figures A-2 through A-5.

Subsurface Conditions

At the locations of our explorations, we encountered relatively uniform subsurface conditions that in our opinion generally confirmed the mapped stratigraphy at the site. Our explorations encountered approximately ¾ to 1 foot of topsoil. Underlying the topsoil we encountered approximately 2¼ to 3 feet of brown poorly graded sand with some silt to brown sandy silt in a loose to medium dense/medium stiff, moist to wet condition. We interpret these soils to be weathered alluvium. Underlying the weathered alluvium we encountered brown-grey sand with varying amounts of silt interbedded with silt and varying amounts of sand. We interpret these soils to be alluvium. The alluvial soils were encountered to the full depth explored in each exploration.

Laboratory Testing

Geotechnical laboratory tests were performed on two samples retrieved from the explorations to estimate index engineering properties of the soils encountered. Laboratory testing included visual soil classification per ASTM D:2487 and ASTM D:2488, moisture content determinations per ASTM D:2216, and grain size analyses per ASTM D:6913 standard procedures. The results of the laboratory tests are included in Appendix B.

Groundwater Conditions

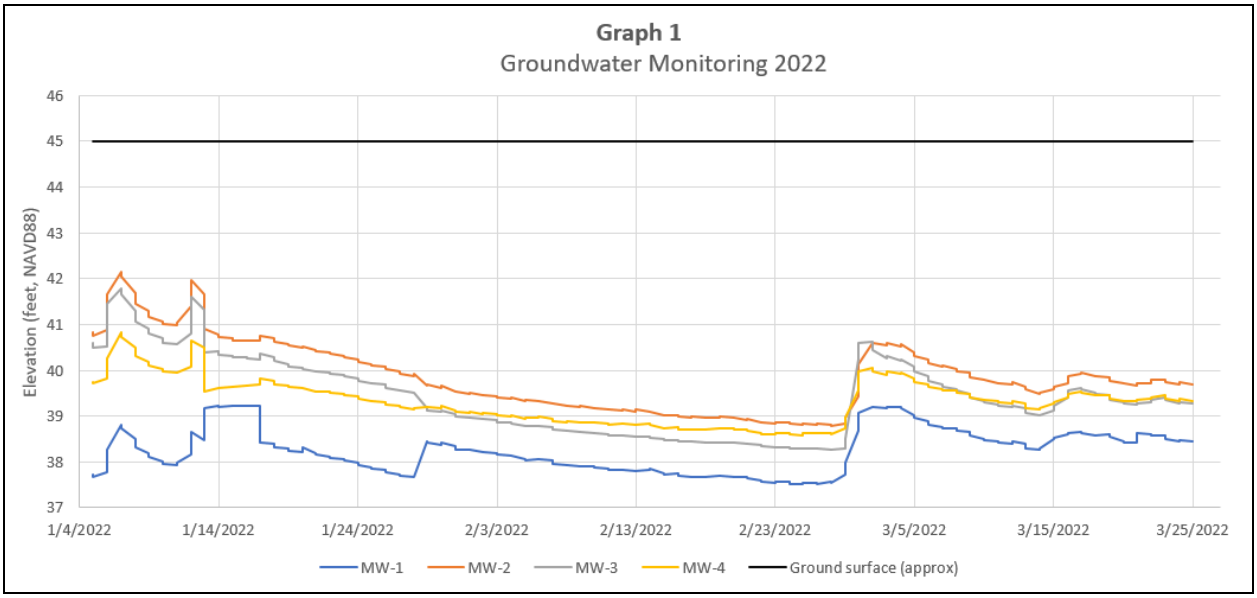
We encountered ground water in all explorations at approximately 3.7 to 6.2 feet below existing ground surface at the time of drilling. Additionally, mottling was encountered as shallow as 1 to 2½ feet below existing ground surface. Mottling may be indicative of a seasonal or fluctuating groundwater surface, often associated with perched groundwater. Perched groundwater table develops when the vertical infiltration of precipitation through a more permeable soil, is slowed at depth by a deeper, less permeable soil type. We anticipate fluctuations in the local groundwater levels will occur in response to precipitation patterns, off-site construction activities, and site

utilization. Analysis or modeling of anticipated groundwater levels during construction is beyond the scope of this report.

We installed downhole pressure transducers in each groundwater monitoring well on January 5, 2022. Water temperature and pressure were collected on 12-hour intervals on each instrument. An additional pressure transducer was installed in one monitoring well above the water line to record barometric pressure. All instruments were removed on March 25, 2022.

Data sets were uploaded into Solinst Levelogger Software (v 4.40), where water level measurements captured by the deployed instruments were adjusted to compensate for barometric pressure variations. The resulting compensated water level dataset provides a barometrically corrected record of groundwater levels within each groundwater monitoring well.

Based on our groundwater monitoring over the wet season, it appears that seasonal high groundwater levels occurred between elevation 39 to 42 feet (NAVD 88) in early to mid-January. Graph 1, below, summarizes the groundwater levels recorded as part of our groundwater monitoring program during our monitoring period.



CONCLUSIONS AND RECOMMENDATIONS

Based on the results of our data review, site reconnaissance, and subsurface explorations, it is our opinion that soil conditions and shallow groundwater levels preclude the use of conventional infiltration facilities at the site. Low-impact development methods may be feasible, depending on site configuration. Additional discussion regarding stormwater management methods is included in the following sections.

Infiltration Recommendations

Low Impact Development (LID) BMPs

LID infiltration BMPs such as pervious pavement could be considered to manage stormwater for this project. Per the 2014 SWMMWW, Volume V, Chapter 5, BMP T5.15, permeable pavements are infeasible if saturated conditions would be created within 1 foot of the bottom elevation of the lowest layer and the seasonal high groundwater table or an underlying impermeable/low permeable layer.

Based on our groundwater monitoring measurements, the bottom of the proposed infiltration facilities should be no greater than 1.5 feet below existing grades, in order to meet the minimum 1 foot of vertical separation. We do not recommend infiltration in the area of MW-3. The surficial silty alluvium soils encountered at the surficial elevation of each exploration contain a significant amount of fines that will not support infiltration. The silty sands located at the surficial elevation in MW-1, MW-2, and MW-4 should be suitable for infiltration

Infiltration BMPs

Per the 2014 SWMMWW, Volume V, Chapter 4, BMP T5.10A, downspout infiltration is feasible on sites where 3 feet or more of permeable soil from the proposed final grade to the seasonal high-water table is available, and/or at least 1 foot of clearance from the bottom elevation of the infiltration trench to the seasonal high groundwater table is available. We observed 3 feet or more of permeable soil in MW-1, MW-2, and MW-4, however, based on our groundwater monitoring measurements to date, the vertical separation requirement from groundwater is not able to be met. Therefore, downspout infiltration does not appear feasible for this project. Stormwater runoff generated by the proposed impermeable surfaces should be collected and routed to an appropriate discharge location.

Design Infiltration Rate

We completed a soil gradation analyses on three representative soil sample from the site per the 2014 SWMMWW, Volume III, Section 3.3.6, Method 3 and in accordance with ASTM D6913. Based on our gradation analyses, we recommend a design infiltration rate of 0.5 inches per hour for permeable pavements or bio swales founded no greater than 1.5 feet below existing grades in the shallow silty sand alluvium soils encountered in the areas of MW-1, MW-2, and MW-4. Appropriate correction factors have been applied to these values in accordance with the 2014 SWMMWW, Volume III, Section 3.3.6, Table 3.3.1, including correction factors 0.33 for site variability ($F_{variability}$), 0.4 for testing method ($F_{testing}$) and 0.9 for maintenance for situation biofouling ($F_{maintenance}$).

Construction Considerations

We recommend that a representative from our firm be onsite at the time of excavation of the proposed infiltration facilities to verify that the soils encountered during construction are consistent with the soils observed in our subsurface explorations. Verification infiltration testing should also be performed at the time of construction to verify the recommended infiltration rates for infiltration facilities such as infiltration trenches and permeable pavements per the 2014 SWMMWW.

Appropriate design, construction and maintenance measures will be required to ensure the infiltration rate can be effectively maintained over time. Appropriate temporary erosion and sediment control methods should be included in the project plans and specifications to minimize the potential for fines contamination of infiltration facility utilized at the site. To further reduce the potential for fines migration, the infiltration system should not be connected to the stormwater runoff system until after construction is complete and the site area is landscaped, paved or otherwise protected.

Additional measures may also be taken during construction to minimize the potential of fines contamination of the proposed infiltration system, such as utilizing an alternative storm water management location during construction or leaving the bottom of the permanent systems 1 to 2 feet high, and subsequently excavating to the finished grade once the site soils have been stabilized. All contractors working on the site (builders and subcontractors) should divert sediment laden

stormwater away from proposed infiltration facilities during construction and landscaping activities. No concrete trucks should be washed or cleaned, and washout areas should not be within the vicinity of the proposed infiltration facilities. After construction activities have been completed, periodic sweeping of the paved areas will help extend the life of the infiltration system.

LIMITATIONS

We have prepared this report for use by Azure Green Consultants and other members of the design team, for use in the permitting and design of a portion of this project. The data used in preparing this report and this report should be provided to prospective contractors for their bidding or estimating purposes only. Our report, conclusions and interpretations are based on subsurface explorations and data from others and limited site reconnaissance, and should not be construed as a warranty of the subsurface conditions.

Variations in subsurface conditions are possible between the explorations and may also occur with time. A contingency for unanticipated conditions should be included in the budget and schedule. Sufficient monitoring, testing and consultation should be provided by our firm during construction to confirm that the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes should the conditions revealed during the work differ from those anticipated, and to evaluate whether earthwork and foundation installation activities comply with contract plans and specifications.

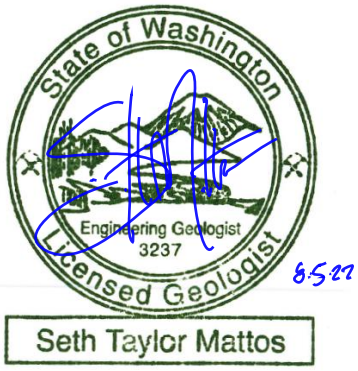
The scope of our services does not include services related to environmental remediation and construction safety precautions. Our recommendations are not intended to direct the contractor's methods, techniques, sequences or procedures, except as specifically described in our report for consideration in design.

If there are any changes in the loads, grades, locations, configurations or type of facilities to be constructed, the conclusions and recommendations presented in this report may not be fully applicable. If such changes are made, we should be given the opportunity to review our recommendations and provide written modifications or verifications, as appropriate.

◆ ◆ ◆

We have appreciated the opportunity to be of service to you on this project. If you have any questions or comments, please do not hesitate to call at your earliest convenience.

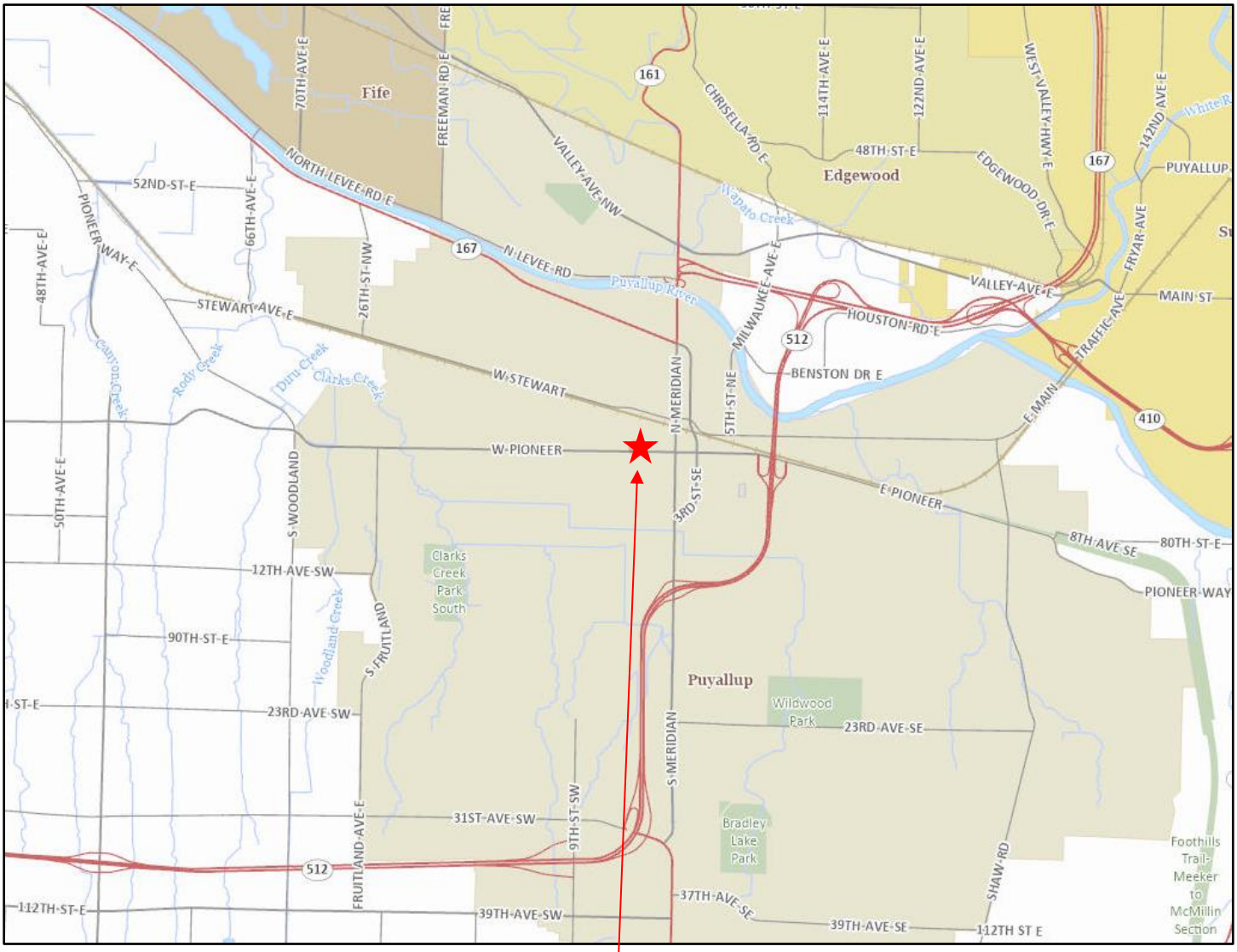
Respectfully submitted,
GeoResources, LLC



Andrew Schnitger, EIT
Staff Engineer

Seth Mattos, LEG
Associate

AES:STM/aes
DocID: AGC.4thStSW.SR.U
Attachments: Figure 1: Site Vicinity Map
Figure 2: Site & Exploration Map
Figure 3: NRCS Soils Map
Figure 4: Geologic Map
Appendix A – Subsurface Explorations
Appendix B – Laboratory Test Results



Approximate Site Location

Map created from Peirce County Public GIS (https://matterhornwab.co.pierce.wa.us/publicgis/)

N
W
E
S

Not to Scale

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Site Location Map

Proposed Redevelopment
204 4th Street SW
Puyallup, Washington
PN: 57450016-31,-32,-41

DocID: AGC.4thStSW.F	August 2022	Figure 1

Exploration number and approximate locations (GeoResources 2021)

Additional Notes:
Imagery and topography accessed from Pierce County Public GIS, not to scale, NAVD88
Downhole pressure transducers installed in all wells, suspended via mason line secured under well cap
Barometric pressure transducer installed in MW-1, suspended 18-inches below well cap
Must secure mason line before removing well cap
All instruments set to record at 1200 and 2400 hours daily

N W E S

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Site & Exploration Plan

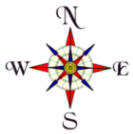
Proposed Mixed-use Development
204 – 4th St SW
Puyallup, Washington
PN: 5745001631, -32, -41

Doc ID: AGC.4thStSW.F2	December 2021	Figure 2

Approximate Site Location

Map created from Web Soil Survey (http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx)

Soil Type	Soil Name	Parent Material	Slopes	Erosion Hazard	Hydrologic Soils Group
31A	Puyallup fine sandy loam	Alluvium	0 to 3	Slight	A



Not to Scale

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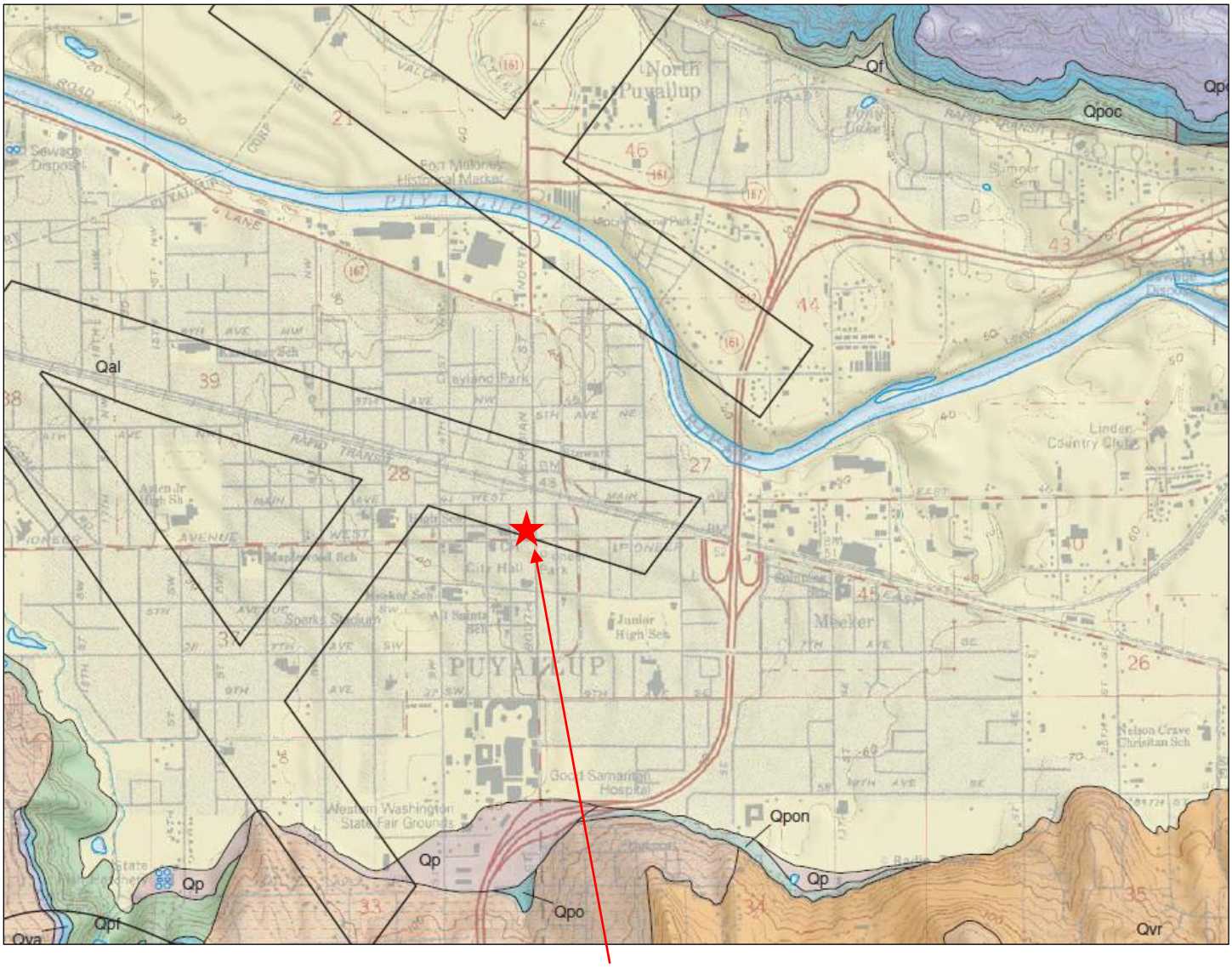
NRCS Soils Map

Proposed Redevelopment
204 4th Street SW
Puyallup, Washington
PN: 57450016-31,-32,-41



Approximate Site Location

Excerpt from the draft *Geologic Map of the Puyallup 7.5-Minute Quadrangle, Washington*
By Troost, K.G. (in review)

Qal	Alluvium

Not to Scale

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Geologic Map

Proposed Redevelopment
204 4th Street SW
Puyallup, Washington
PN: 57450016-31,-32,-41

DocID: AGC.4thStSW.F	August 2022	Figure 4

Appendix A

Subsurface Explorations

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LOG OF BORING

MW-1

AGC.4thStSW
204 4th Street SW
Puyallup, WA

1. Refer to log key for definition of symbols, abbreviations, and codes
2. USCS disination is based on visual manual classification and selected lab testing
3. Groundwater level, if indicated, is for the date shown and may vary
4. NE = Not Encountered
5. ATD = At Time of Drilling
6. HWM = Highest Groundwater Level

Notes: East side of site

Drilling Company:	ESN NW	**Logged By:**	DC
Drilling Method:	Direct push/Geoprobe	**Drilling Date:**	12/22/2021
Drilling Rig:	Truck	**Datum:**	NAVD 88
Sampler Type:	Dual Tube	**Elevation:**	42
Hammer Type:		**Termination Depth:**	15
Hammer Weight:		**Latitude:**	
		Longitude:	

Depth (feet)	Elevation (feet)	Soil description
0	42	Topsoil
		Brown poorly graded snad with some silt (loose to medium dense, moist to wet) (SP-SM) (Weathered Alluvium)
2.5	40	Poorly graded SAND with some silt (SP-SM)
		Brown-grey SILT with trace sand (medium stiff, moist) (ML) (Alluvium)
5	37.5	Brown poorly graded SAND with some SILT (loose to medium dense, moist to wet) (SP-SM) (Alluvium)
7.5	35	Brown sandy SILT (medium stiff, wet) (ML) (Alluvium)
		Grey SILT, trace organics (stiff, moist) (ML) (Alluvium)
10	32.5	Brown silty SAND (medium dense, moist to wet) (SM) (Alluvium)
12.5	30	
15	27.5	*(Termination Depth - 12/22/2021)*

Exploration notes

STP Blowcounts

Sampler

Symbol

Test Results
Plastic Limit — Liquid Limit
% Fines (<0.075mm) ◇
% Water Content ●
Penetration - ▲ (blows per foot)
10 20 30 40 50

Groundwater
ATD

Topsoil
Poorly graded sand with silt
Silt

Sheet 1 of 1	JOB:	FIG.

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LOG OF BORING

MW-2

AGC.4thStSW
204 4th Street SW
Puyallup, WA

1. Refer to log key for definition of symbols, abbreviations, and codes
2. USCS disination is based on visual manual classification and selected lab testing
3. Groundwater level, if indicated, is for the date shown and may vary
4. NE = Not Encountered
5. ATD = At Time of Drilling
6. HWM = Highest Groundwater Level

Notes: Southern portion of site

Drilling Company:	ESN NW	**Logged By:**	DC
Drilling Method:	Direct push/geoprobe	**Drilling Date:**	12/22/2021
Drilling Rig:	truck	**Datum:**	NAVD 88
Sampler Type:	Dual Tube	**Elevation:**	42
Hammer Type:		**Termination Depth:**	15
Hammer Weight:		**Latitude:**	
		Longitude:	

Depth (feet)	Elevation (feet)	Soil description
0	42	Topsoil
		Brown poorly graded SAND interbedded with thin silt layers (loose to medium dense, moist to wet) (SP-SM) (Weathered Alluvium)
2.5	40	Silty SAND (SM)
5	37.5	Brown sandy SILT (medium stiff, wet) (ML) (Alluvium)
7.5	35	Grey SILT with trace organics (stiff, moist) (ML) (Alluvium)
10	32.5	Brown silty SAND (medium dense, moist) (SM) (Alluvium)
12.5	30	Brown sandy SILT (medium stiff, wet) (Alluvium)
15	27.5	*(Termination Depth - 12/22/2021)*

Exploration notes

STP Blowcounts

Sampler

Symbol

Test Results
Plastic Limit — Liquid Limit
% Fines (<0.075mm) ◇
% Water Content ●
Penetration - ▲ (blows per foot)
10 20 30 40 50

Groundwater
ATD

Topsoil
Poorly graded sand with silt
Silt
Silty sand

Sheet 1 of 1	JOB:	FIG.

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LOG OF BORING

MW-3

AGC.4thStSW
204 4th Street SW
Puyallup, WA

1. Refer to log key for definition of symbols, abbreviations, and codes
2. USCS disination is based on visual manual classification and selected lab testing
3. Groundwater level, if indicated, is for the date shown and may vary
4. NE = Not Encountered
5. ATD = At Time of Drilling
6. HWM = Highest Groundwater Level

Notes: Northern portion of site

Drilling Company:	ESN NW	**Logged By:**	DC
Drilling Method:	Direct push/Geoprobe	**Drilling Date:**	12/22/2021
Drilling Rig:	truck	**Datum:**	NAVD 88
Sampler Type:	Dual Tube	**Elevation:**	42
Hammer Type:		**Termination Depth:**	15
Hammer Weight:		**Latitude:**	
		Longitude:	

Depth (feet)	Elevation (feet)	Soil description
0	40	Topsoil
2.5	37.5	Brown sandy SILT (medium stiff, moist to wet) (ML) (Weathered Alluvium)
5	35	Brown poorly graded SAND with some SILT (loose to medium dense, moist to wet) (SP-SM) (Alluvium)
7.5	32.5	grey-blue SILT, trace organics (Stiff, moist) (ML) (Alluvium)
10	30	Brown-grey sandy silt (medium stiff, wet) (ML) (Alluvium)
12.5	27.5	
15		*(Termination Depth - 12/22/2021)*

Exploration notes

STP Blowcounts

Sampler

Symbol

Test Results
Plastic Limit — Liquid Limit
% Fines (<0.075mm) ◇
% Water Content ●
Penetration - ▲ (blows per foot)
10 20 30 40 50

Groundwater
ATD

Topsoil
Poorly graded sand with silt
Silt
Silty sand

Sheet 1 of 1

JOB:

FIG.

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LOG OF BORING

MW-4

AGC.4thStSW
204 4th Street SW
Puyallup, WA

1. Refer to log key for definition of symbols, abbreviations, and codes
2. USCS disination is based on visual manual classification and selected lab testing
3. Groundwater level, if indicated, is for the date shown and may vary
4. NE = Not Encountered
5. ATD = At Time of Drilling
6. HWM = Highest Groundwater Level

Drilling Company:	ESN NW	**Logged By:**	DC
Drilling Method:	Direct push/geprobe	**Drilling Date:**	12/22/2021
Drilling Rig:	truck	**Datum:**	NAVD 88
Sampler Type:	Dual Tube	**Elevation:**	42
Hammer Type:		**Termination Depth:**	15
Hammer Weight:		**Latitude:**	
		Longitude:	

Notes: Southwest portion of the Site

Depth (feet)	Elevation (feet)	Soil description
0	40	Topsoil
		Dark brown poorly graded SAND with some silt (loose to medium dense, moist to wet) (SP-SM) (Weathered Alluvium)
2.5	37.5	Brown poorly graded SAND with some silt (loose to medium dense, moist to wet) (SP-SM) (Alluvium)
		Brown sandy SILT (medium stiff, wet) (ML) (Alluvium)
5	35	Brown silty SAND (medium dense, moist, wet) (SM) (Alluvium)
7.5	32.5	Grey-blue SILT with trace organics, thin sand lenses (stiff, moist) (ML) (Alluvium)
10	30	
12.5	27.5	
15		*(Termination Depth - 12/22/2021)*

Exploration notes

STP Blowcounts

Sampler

Symbol

Test Results
Plastic Limit — Liquid Limit
% Fines (<0.075mm) ◇
% Water Content ●
Penetration - ▲ (blows per foot)
10 20 30 40 50

Groundwater
ATD

Topsoil | Poorly graded sand with silt | Silt | Silty sand

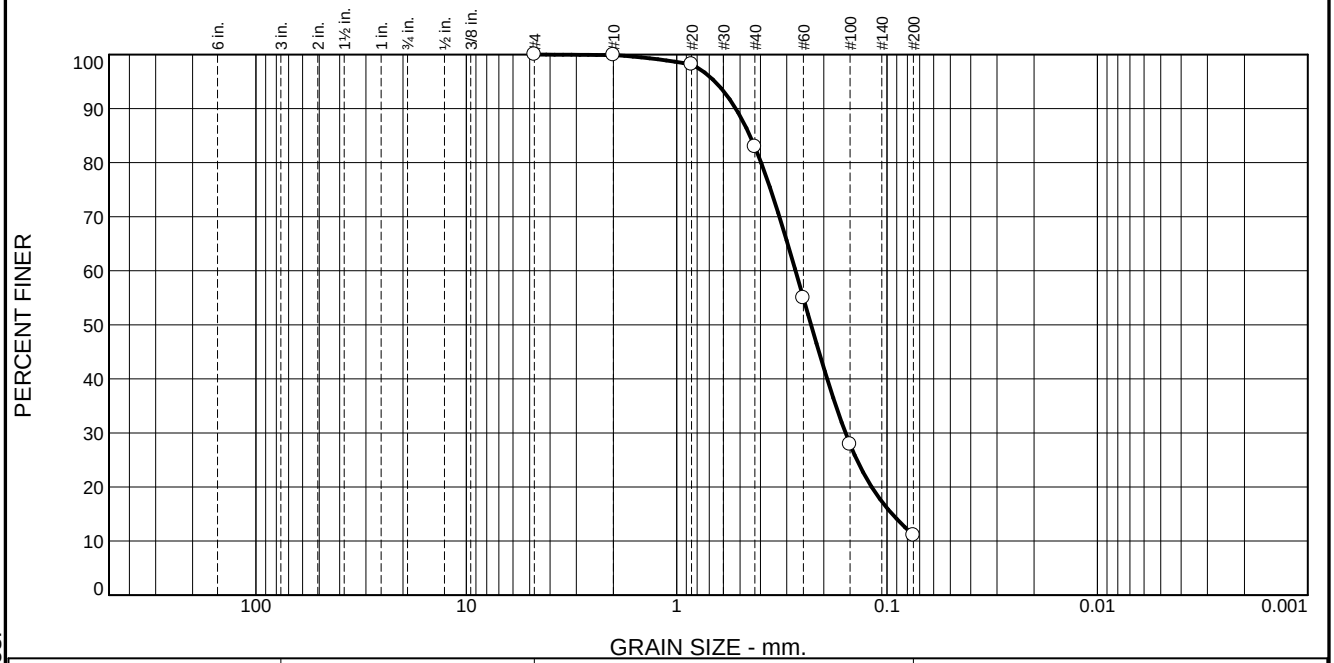
JOB:

FIG.

Appendix B

Laboratory results

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	17.0	71.8	11.1	

Test Results (ASTM D 6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#4	100.0		
#10	99.9		
#20	98.2		
#40	82.9		
#60	55.0		
#100	27.9		
#200	11.1		

* (no specification provided)

Material Description

Poorly graded SAND with some silt (SP-SM)

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SP-SM **AASHTO (M 145)=** A-2-4(0)

Coefficients

D_{90}= 0.5235 D_{85}= 0.4483 D_{60}= 0.2724
D_{50}= 0.2297 D_{30}= 0.1576 D_{15}= 0.0946
D_{10}= C_u= C_c=

Remarks

Natural Moisture: 15.7%

Date Received: 12/22/21 **Date Tested:** 12/28/21

Tested By: MAW

Checked By: STM

Title: PM

Source of Sample: B-1 **Depth:** 3 **Date Sampled:** 12/22/21

GeoResources, LLC

Fife, WA

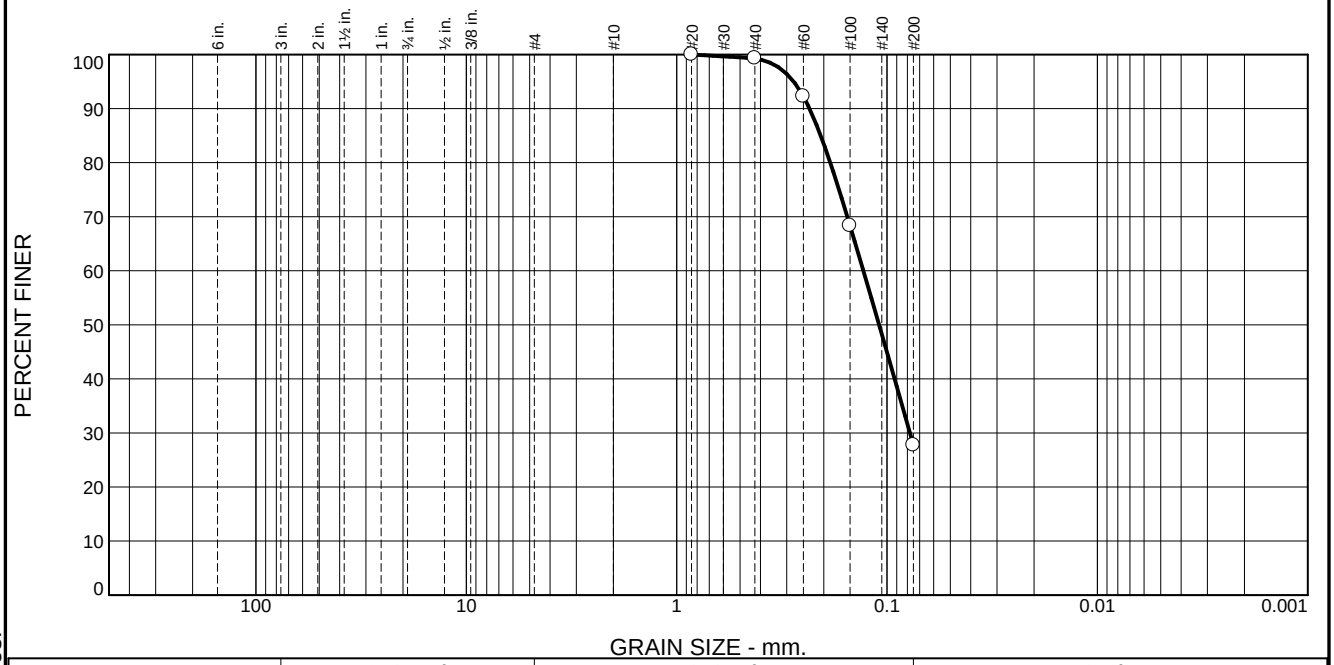
Client: Azure Green Consultants
Project: AGC.4thStSW

Project No: **Figure** B-1

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicitive of apparently identical samples.

Tested By: _____ **Checked By:** _____

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.7	71.6	27.7	

Test Results (ASTM D 6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#20	100.0		
#40	99.3		
#60	92.2		
#100	68.3		
#200	27.7		

* (no specification provided)

Material Description

Silty SAND (SM)

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-2-4(0)

Coefficients

D_{90}= 0.2337 D_{85}= 0.2067 D_{60}= 0.1296
D_{50}= 0.1091 D_{30}= 0.0779 D_{15}=
D_{10}= C_u= C_c=

Remarks

Natural Moisture: 31.5%

Date Received: 12/22/21 **Date Tested:** 12/28/21

Tested By: MAW

Checked By: STM

Title: PM

Source of Sample: B-2 **Depth:** 3

Date Sampled: 12/22/21

GeoResources, LLC

Fife, WA

Client: Azure Green Consultants
Project: AGC.4thStSW

Project No: **Figure** B-2

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicitive of apparently identical samples.

Tested By: _____ **Checked By:** _____

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September 27, 2022

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CC: Azure Green Consultants

Soils Report Addendum:
Infiltration Testing
Proposed Redevelopment
204 – 4th Street Southwest
Puyallup, Washington
PN: 5745001631, -32, -41
Doc ID: JodyMillerConst.4thStSW.SRa

INTRODUCTION

This *Addendum* to our soils report summarizes the results of our in-situ infiltration testing performed at 204 – 4th Stret Southwest in Puyallup, Washington. The site consists of a three adjacent tax parcels.

On September 23, 2022, we performed two small-scale Pilot Infiltration Tests (PITs) in accordance with the 2019 Ecology Manual at two locations at the site. The location of our PITs is shown on Figure 1. Our PITs were performed at about 1.0 to 1.5 feet below existing grades in the silty sand which we had initially provided a preliminary design infiltration rate of 0.5 inches per hour based on grain size analysis in our *Soils Report* dated August 5, 2022. The exploration logs of our PITs are included in Appendix A.

During our PITs, we measured an infiltration rate of 8.0 inches per hour. Applying correction factors of 0.5 for test method, 0.3 for site variability and 0.9 for maintenance gives a design infiltration rate of 1.0 inch per hour. We over excavated the PIT and observed a restrictive layer at about 2.7 feet below existing grades. Groundwater was observed at 2.5 feet below existing grades in PIT-2. No groundwater was observed in PIT-1 during the over excavation.

LIMITATIONS

We have prepared this report for use by Jody Miller Construction, Azure Green Consultants, and other members of the design team, for use in the design of a portion of this project. The data used in preparing this report and this report should be provided to prospective contractors for their bidding or estimating purposes only. Our report, conclusions and interpretations are based on our subsurface explorations, data from others and limited site reconnaissance, and should not be construed as a warranty of the subsurface conditions.

Variations in subsurface conditions are possible between the explorations and may also occur with time. A contingency for unanticipated conditions should be included in the budget and schedule. Sufficient monitoring, testing and consultation should be provided by our firm during construction to confirm that the conditions encountered are consistent with those indicated by the explorations, to

provide recommendations for design changes should the conditions revealed during the work differ from those anticipated, and to evaluate whether earthwork and foundation installation activities comply with contract plans and specifications.

The scope of our services does not include services related to environmental remediation and construction safety precautions. Our recommendations are not intended to direct the contractor's methods, techniques, sequences or procedures, except as specifically described in our report for consideration in design.

If there are any changes in the loads, grades, locations, configurations or type of facilities to be constructed, the conclusions and recommendations presented in this report may not be fully applicable. If such changes are made, we should be given the opportunity to review our recommendations and provide written modifications or verifications, as appropriate.

◆ ◆ ◆

We have appreciated working for you on this project. Please do not hesitate to call at your earliest convenience if you have any questions or comments.

Respectfully submitted,
GeoResources, LLC

State of Washington
Engineering Geologist
3237
Licensed Geologist
9.27.22
Seth Taylor Mattos

Seth T. Mattos, LEG
Associate

Andrew Schnitger, EIT
Staff Engineer

AES:STM/aes
Doc ID: JodyMillerConst.4thStSW.SRa
Attachments: Figure 1: Site & Exploration Map
Appendix A – Subsurface Explorations

Notes:

An excerpt from the Pierce County Public GIS

Approximate location of PITs

Scale: Not to scale

North:

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Site & Exploration Map

Proposed Redevelopment

204 – 4th Street Southwest

Puyallup, Washington

PN: 57450016-31, -32, -41

Doc:ID: JodyMillerConst.4thStSW.Fa	September 2022	Figure 1

Appendix A

Subsurface Explorations

SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOL	GROUP NAME
COARSE GRAINED SOILS More than 50% Retained on No. 200 Sieve	GRAVEL More than 50% Of Coarse Fraction Retained on No. 4 Sieve	CLEAN GRAVEL	GW	WELL-GRADED GRAVEL, FINE TO COARSE GRAVEL
			GP	POORLY-GRADED GRAVEL
		GRAVEL WITH FINES	GM	SILTY GRAVEL
			GC	CLAYEY GRAVEL
	SAND More than 50% Of Coarse Fraction Passes No. 4 Sieve	CLEAN SAND	SW	WELL-GRADED SAND, FINE TO COARSE SAND
			SP	POORLY-GRADED SAND
		SAND WITH FINES	SM	SILTY SAND
			SC	CLAYEY SAND
FINE GRAINED SOILS More than 50% Passes No. 200 Sieve	SILT AND CLAY Liquid Limit Less than 50	INORGANIC	ML	SILT
			CL	CLAY
		ORGANIC	OL	ORGANIC SILT, ORGANIC CLAY
	SILT AND CLAY Liquid Limit 50 or more	INORGANIC	MH	SILT OF HIGH PLASTICITY, ELASTIC SILT
			CH	CLAY OF HIGH PLASTICITY, FAT CLAY
		ORGANIC	OH	ORGANIC CLAY, ORGANIC SILT
HIGHLY ORGANIC SOILS			PT	PEAT

NOTES:

1. Field classification is based on visual examination of soil in general accordance with ASTM D2488-90.
2. Soil classification using laboratory tests is based on ASTM D2487-90.
3. Description of soil density or consistency are based on interpretation of blow count data, visual appearance of soils, and or test data.

SOIL MOISTURE MODIFIERS:

Dry- Absence of moisture, dry to the touch

Moist- Damp, but no visible water

Wet- Visible free water or saturated, usually soil is obtained from below water table

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Unified Soils Classification System

Proposed Redevelopment
204 – 4th Street Southwest
Puyallup, Washington
PN: 57450016-31, -32, -41

Pilot Infiltration Test PIT-1

Location: North portion of site
Approximate Elevation: 42’

Depth (ft)			Soil Type	Soil Description
0	-	0.5	-	Topsoil
0.5	-	2.7	SM	Brown silty SAND (loose, moist to wet)
2.7	-	4.0	SM	Gray, orange iron oxide stained silty SAND (loose to medium dense, moist)

PIT performed at 1.0 feet below existing grades.
Measured 8 inches per hour.
PIT overdug to 4.0 feet below ground surface.
No caving observed at the time of excavation.
No groundwater seepage observed.

Pilot Infiltration Test PIT-2

Location: East portion of site
Approximate Elevation: 42’

Depth (ft)			Soil Type	Soil Description
0	-	0.5	-	Topsoil
0.5	-	2.7	SM	Brown to black poorly graded silty SAND (loose, moist to wet)
2.7	-	3.0	SM	Gray, orange iron oxide stained silty SAND (loose to medium dense, moist)

PIT performed at 1.5 feet below existing grades.
Measured 8 inches per hour.
PIT overdug to 3.0 feet below ground surface.
No caving observed at the time of excavation.
Static groundwater observed at 2.5 feet below existing grades during overdig.

Logged by: AES **Excavated on: September 23, 2022**