AZURE | GREEN
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May 8, 2024

Re: Easton Manor Preliminary Drainage Report
Parcel #042026-7-027, 7-003, 7-028, 7-008, 7-007, & 7-001

Overview:

The project site is located south of E Pioneer, between 21st Ave SE & 25th Ave SE. The site address is 1115 E Main. Tax parcel numbers are 042026-7-027, 7-003, 7-028, 7-008, 7-007, & 7-001. Total parcel area is 11.684 acres. The site is currently developed with multiple residences. The project consists of the construction of four new multi-family buildings and incorporation of all parcels and existing buildings into a senior living development. One existing residence and multiple accessory buildings will be demolished.

Improvements for the project will include the new buildings, parking lot, storm drainage facilities, low pressure sanitary sewer system, water main extension, and utility services.

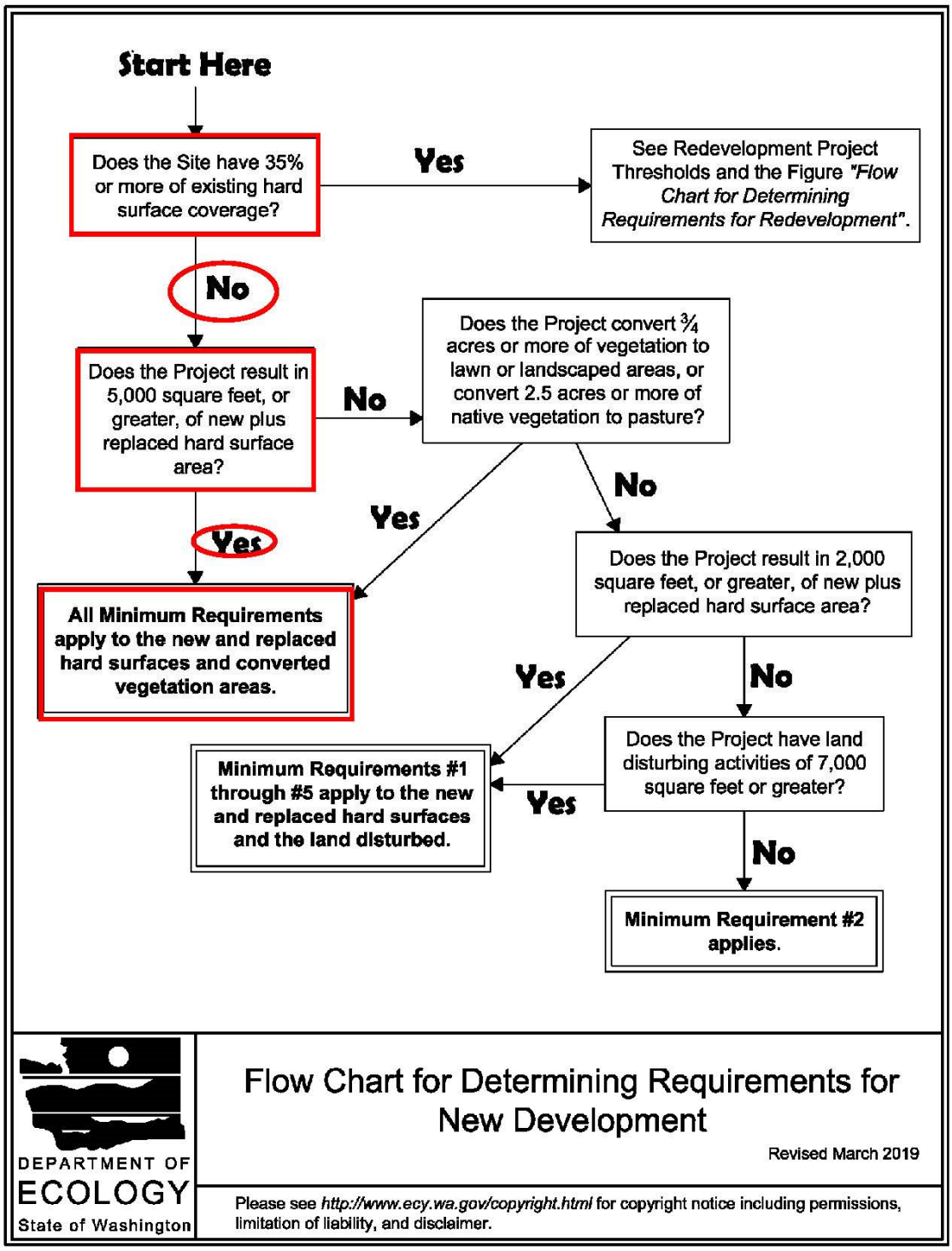
Project Requirements:

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 2019 DOE Manual has been adopted by the City and is the controlling regulation and is referred to as "the Manual" or "SMMWW" hereinafter.

The project consists of over 190,000 sf of new plus replaced hard surfaces onsite. The existing hard surfaces are less than 35% of the project site and therefore, the project is considered new development. Since the total new plus replaced hard surfaces for the project are greater than 5,000 square feet, all minimum requirements apply to the new and replaced hard surfaces and converted vegetation areas.

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 conceptual 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 Section 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 to the northwest, ultimately to E Pioneer and the ditch on the north side of the street. Runoff from the development will be routed through a detention system and released into the existing drainage system in E Pioneer to maintain the natural drainage systems.

Provide a downstream analysis to ensure both onsite and off-site has capacity to convey at a minimum the 25 year storm flow event, assuming developed conditions for onsite tributary areas, and existing conditions for any offsite tributary areas. [drainage report, pg 3]

Section 2.6.2 of the Volume 1 of the SMMWW requires: An initial qualitative analysis shall extend downstream for the entire flow path from the project site to the receiving water or up to one mile, whichever is less. If a receiving water is within one-quarter mile, the analysis shall extend within the receiving water to one-quarter mile from the project site. The analysis shall extend one-quarter mile beyond any improvements proposed as mitigation. The analysis must extend upstream to a point where any backwater effects created by the project cease. Upon review of the qualitative analysis, the local project reviewer may require that a quantitative analysis be performed. [drainage report, pg 3]

Minimum Requirement #5: On-site Stormwater Management

Because the project triggers MR #1-9, and is inside the urban growth area, the project must either meet the Low Impact Development Performance Standard, or use List #2 to determine applicable On-Site Stormwater Management BMPs. This project will use List #2. For each surface the BMP's must be considered in the order listed for that type of surface and use the first BMP that is considered feasible.

Lawn and Landscaped Areas:

- All lawn and landscaped areas will meet the requirements of BMP T5.13, Post Construction Soil Quality and Depth with notes on the plans to this effect.

Roofs:

1. BMP T5.30: Full Dispersion is not feasible due to lack of native vegetation flowpath meeting requirements; BMP T5.10: Downspout Full Infiltration – is not feasible due to high groundwater.
2. Bioretention is not feasible due to high groundwater
3. BMP T5.10B: Downspout dispersion system is not feasible due to lack of space for flowpath and requirement to meet MR #7, Flow Control.
4. BMP T5.10C: Perforated stub-out connections are not feasible due to high groundwater.

Because no BMPs are feasible, roof runoff will be routed to detention facilities to meet MR #7, Flow Control.

Other Hard Surfaces:

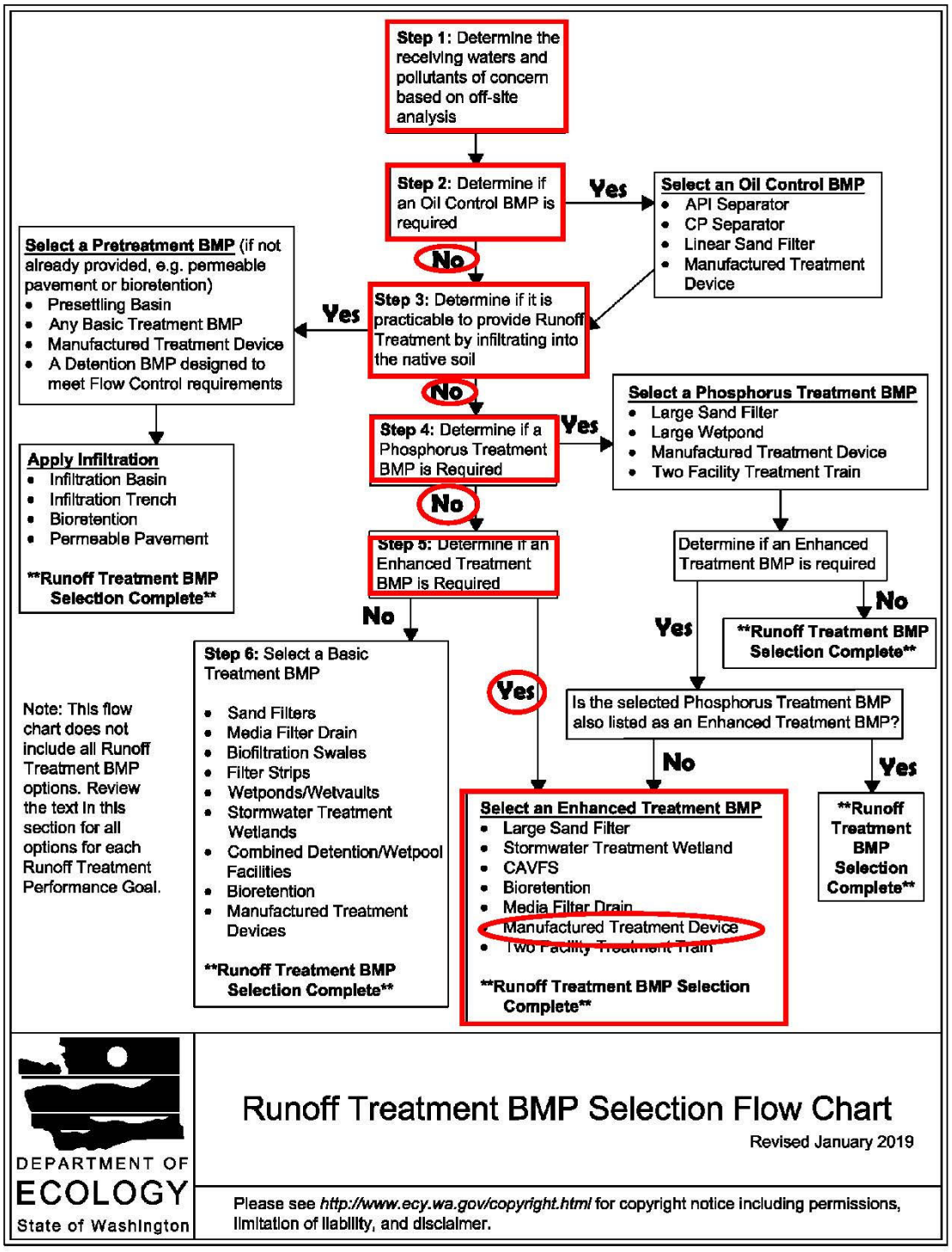
1. BMP T5.30: Full Dispersion – infeasible due to inadequate vegetated area to meet the 65:10 ratio
2. BMP T5.15: Permeable pavement – infeasible due to high groundwater.
3. Bioretention is not feasible due to high groundwater
4. BMP T5.12: Sheet Flow Dispersion is not feasible due to lack of space for vegetated flowpath and requirement to meet MR #7, Flow Control

Because no BMPs are feasible, runoff from other hard surfaces will be routed to detention to meet MR#7, Flow Control.

Minimum Requirement #6: Runoff Treatment

New plus replaced pollution generating hard surfaces (PGHS) consists of the parking lot paving. The total area is well over 5,000 square feet and therefore runoff treatment is required. As a commercial development, enhanced treatment is required. Filterra or Biopod systems will be used for to meet enhanced treatment requirements.

Figure III-1.1: Runoff Treatment BMP Selection Flow Chart



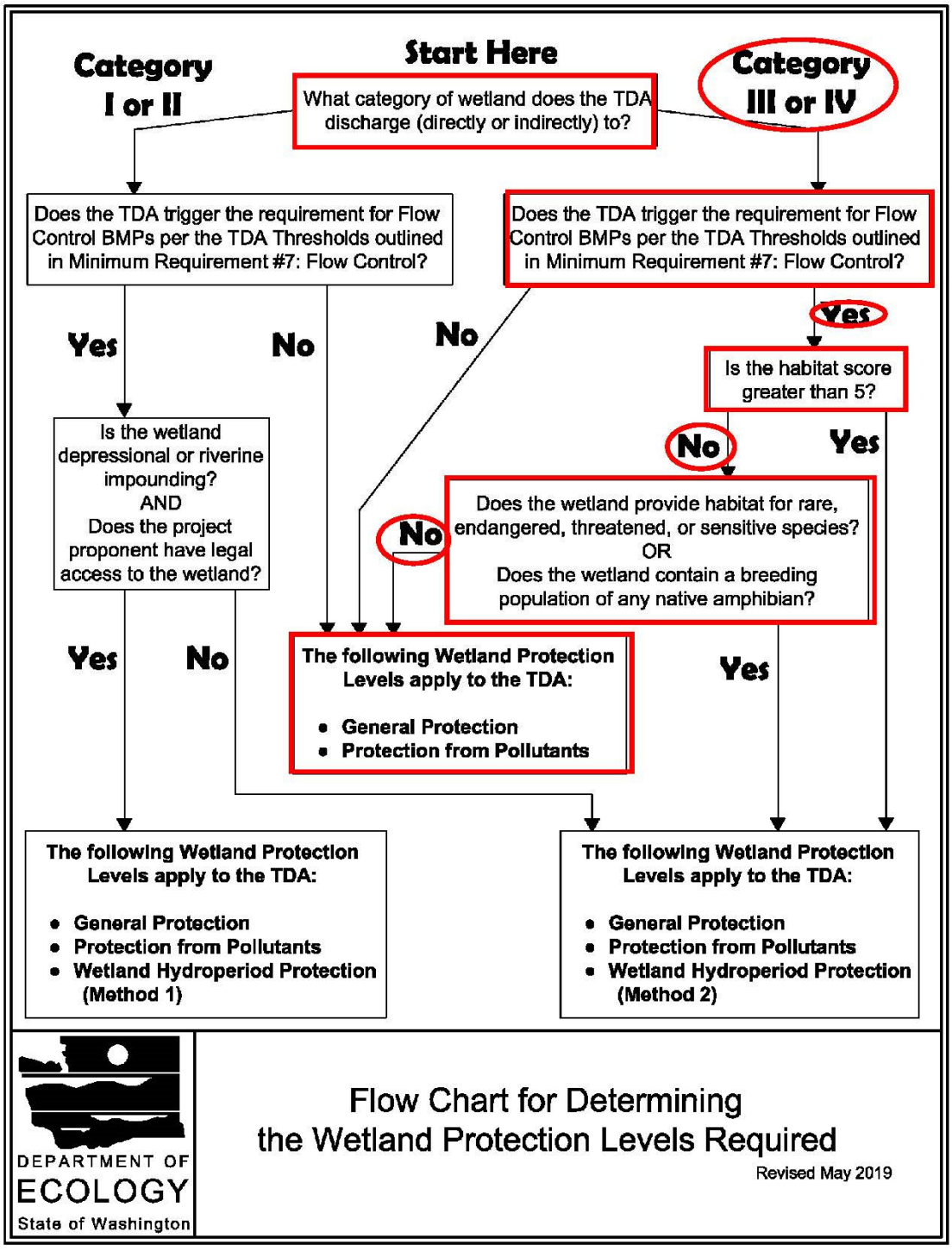
Minimum Requirement #7: Flow Control

The total new plus replaced hard surface for the project is well over 10,000 sf, therefore, flow control is required. The project's stormwater discharges shall match developed discharge durations to pre-developed durations for the range of pre-developed discharge rates from 50% of the 2-year peak flow up to the full 50-year peak flow. The pre-developed condition to be matched shall be a forested land cover. However, because the existing permeable surfaces are lawn and landscaping and will not be converted, the permeable areas are not subject to Minimum Requirements, and therefore may be modeled as lawn/landscaping for pre-developed conditions. The flow control requirement will be met through the use of a detention system made up of interconnected detention ponds and below grade detention storage using StormTank or similar material.

Minimum Requirement #8: Wetlands Protection

An adjacent man-made channel has been designated a wetland. The hydrology for this wetland is primarily through a culvert that connects to Deer Creek on the east side of 25th Ave SE. This project will not impact that hydrology. A 40-foot buffer will be established with required enhancement though the sensitive areas review process to provide wetland protection. Per the following flowchart, the wetland only requires general protection. The wetland buffer, proposed buffer restoration, and standard flow control and treatment requirements are adequate to provide this protection.

Figure I-3.5: Flow Chart for Determining Wetland Protection Level Requirements



Minimum Requirement #9: Operation and Maintenance

The stormwater facilities required for this project that require a maintenance plan are: detention pond, underground detention system, outlet control structure, dispersion trench, Filterra or Biopod treatment systems, and conveyance system. All onsite stormwater facilities will be owned, operated, and maintained by the property owner. An O&M plan will be submitted with civil plan application in the future.

Soils:
The NRCS Soil Survey of Pierce County indicates the soils on the site are Briscot loam (6A) and Puyallup fine sandy loam (31A). These soils are classified as hydrologic group B/D and A, respsectively. A geotechnical report was prepared for this project by GeoResources. Groundwater was found and ground surface elevation and therefore is is concluded that infiltration of runoff is infeasible. Based on this data, soils are modeled as C for the WWHM analysis.

Floodplain
The project site is mapped with an AE floodplain covering much of the site ranging in elevation from about 62.5 on the northwest portion of the site to 65 at the southeast corner of the site. The development will result in filling of most of this floodplain. Compensatory storage equaling the filled volume will be provided in the southwest portion of the site where the site is currently not covered by a floodplain. The fill proposed for the project will naturally divert any upstream run-on to this compensatory storage area. A tightline to a dispersion trench at the north edge of proposed fill will provide hydraulic connection to the northern portion of the floodplain.

Compensatory Storage

Elev Range	Existing Flood Storage (cy)	Total Fill (cy)	Fill Outside floodplain (cy)	Flood Storage eliminated (cy)	Comp storage provided (cy)
61-62	581.2	99.5	0	99.5	1507.3
62-63	2330.5	2014.2	730.9	1283.3	1603.3
63-64	1498.5	6171.2	4964.3	1206.9	1721.2
64-65	337.5	6916	6744.1	171.9	1870.7

The grading fill volume shown on the preliminary grading and storm plan does not match the total fill. The site plan shows 32,272CY of fill whereas, the total fill within this chart is about half of that at 15,200CY. [drainage report, pg 9]

Provide a basin map to supplement the floodplain compensatory storage table. [drainage report, pg 9]

Flow Control

Detention will be used to meet flow control requirements. Two detention ponds plus underground storage lattice structure such as StormTank will be used to provide detention. The systems will be interconnected to act as a single system. WWHM2012 is used for the duration control analysis. The project site is in the 42-inch, east rainfall zone. 15-minute time steps are used. Soils are modeled as C, Flat. Per MR #7, Because the existing lawn/landscape will be restored to lawn/landscape, those areas can be modeled as lawn/landscape in existing conditions. Therefore, only the areas to be converted to impervious and pond are required to be modeled as forest in existing conditions. The development will eliminate the dispersion trenches installed for the roof and standard pavement of the existing house on Lot 2 of the Short Plat. So, those areas are also included in the drainage analysis.

Pre-Developed	sf	acres
C, Forest, Flat	223813	5.1380
C, Pasture, Flat	66483	1.5262
Total	290296	6.6643

For developed conditions, the roof areas and parking lot areas are delineated per the plans. Small portions of the driveways, at the connections to existing roads, will discharge directly into the street and are modeled as bypass. Landscaped areas will meet soil amendment requirements and therefore may be modeled as pasture.

Developed	To Detention		Bypass			
	sf	acres	sf	acres		
C, Pasture, Flat	57542	1.3210	4041	0.0928		
Impervious						
Roof	75813	1.7404	0	0.0000		
Parking	115000	2.6400	4900	0.1125		
Pond (Assumed)	33000	0.7576	0	0.0000		
Sub-Total	223813	5.1380	4900	0.1125	TOTAL	
					sf	acre
Total	281355	6.4590	8941	0.2053	290296	6.6643

The resulting peak flows for pre-developed and developed (pre-detention) are:

Flow Frequency

Flow(cfs)	0501 15m	0701 15m
2 Year =	0.1644	1.9002
5 Year =	0.2560	2.5449
10 Year =	0.3179	3.0126
25 Year =	0.3959	3.6518
50 Year =	0.4535	4.1642
100 Year =	0.5104	4.7086

Create an additional map to supplement the MR 7 table WWHM calculation. [drainage report, pg 64

Runoff will be routed into a detention system consisting of an interconnected system of detention ponds and underground detention storage in the form of a lattice structure such as StormTank. For this preliminary analysis, the system is modeled as a pond to determine required storage volume. The detention volume required is 3.245 ac-ft or 141,352 cf. The layout as shown on the preliminary storm plan provides adequate footprint to meet the storage volume requirement. The resulting discharge flows from the detention system are:

```
     Flow Frequency
 Flow(cfs)   0801 15m
2 Year    =     0.1094
5 Year    =     0.1581
10 Year   =     0.1988
25 Year   =     0.2612
50 Year   =     0.3168
100 Year  =     0.3810
```

Runoff Treatment

Because the project is commercial, enhanced treatment of runoff is required. Filterra, Biopod, or other GULD enhanced treatment device will be used precedent to infiltration. Multiple devices throughout the project site will be needed to minimize loss of depth to conveyance. The exact configuration of treatment facilties will be determined at time of civil plan submittal.

Downstream Analysis

¼ Mile Qualitative Analysis

Runoff from the project site enters the City's storm system on the south side of E Pioneer. This system consists of a 12-inch pipe flowing north across the street, then west for about 242 feet along the north side of the street. At this point, the system converges with an 18-inch pipe from the west and parallel 10-inch pipes from the south, one gravity, one pressure. Discharge is to the north for 8 feet in 2 parallel 12-inch pipes. Flow then splits with 15 feet of 24-inch pipe flowing east into Deer Creek/roadside ditch, and 65 feet of 12-inch pipe flowing north, also into Deer Creek, approximately where the creek returns to it's natural channel. From the 24-inch pipe, Deer Creek flows north, through a 5'x4' box culvert under the railroad tracks, then converges with a ditch on the north side of the railroad tracks. From this point, Deer Creek flows 24 feet ro the northwest converging with the 65 foot long 12-inch pipe referred to above. Deer Creek continues northwest for about 50 feet before reaching a 54-inch culvert crossing the main railroad tracks. From this point, Deer Creek flows north, then west, the southwest, in an essentially natural streambed, for approximately 750 feet to the ¼ mile downstream point.

Quantitative Analysis

Per the hydrologic analysis above, the flow rate associated with the project for the 25-year event is 0.40 cfs in existing conditions, and 0.26 cfs in developed conditions. Because the project results in a 0.14 cfs reduction in the 25-year event, no additional quantitative analysis is warranted. A quantitative analysis would only be warranted if additional restrictive flow control measures were to be imposed. Since the project results in a 35% reduction in the 25-year flow rate, no additional restrictions in allowed release rates would be reasonable. Note that per the flood study done to establish the floodplain that includes the project site, it was found that the culverts under the railroad tracks are the restrictive features in the downstream flowpath.

Provide a map showing the downstream analysis. [drainage report, pg 11]

Conclusions

The preliminary analysis shows the required detention volume and the preliminary plan shows the layout of required detention and treatment facilities to meet Minimum Requirements. Full design and analysis will be prepared and submitted with civil permit application.

Please contact us if you require further information.

Sincerely,

Robert Trivitt, P.E.
Project Manager
rob@mailagc.com

WWHM2012

PROJECT REPORT

General Model Information

Project Name:	Easton Manor 2023 0808
Site Name:	Easton Manor
Site Address:	
City:	
Report Date:	8/8/2023
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, Forest, Flat	5.138
C, Pasture, Flat	1.5262
Pervious Total	6.6642
Impervious Land Use	acre
Impervious Total	0
Basin Total	6.6642

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C, Pasture, Flat	1.321
Pervious Total	1.321

Impervious Land Use	acre
ROOF TOPS FLAT	1.7404
PARKING FLAT	2.64
POND	0.7576
Impervious Total	5.138
Basin Total	6.459

Element Flows To:

Surface	Interflow	Groundwater
Trapezoidal Pond 1	Trapezoidal Pond 1	

Basin 2

Bypass:	Yes
GroundWater:	No

Pervious Land Use	acre
C, Pasture, Flat	0.0928
Pervious Total	0.0928

Impervious Land Use	acre
PARKING FLAT	0.1125
Impervious Total	0.1125
Basin Total	0.2053

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Routing

Trapezoidal Pond 1

Bottom Length: 220.00 ft.
Bottom Width: 195.00 ft.
Depth: 4 ft.
Volume at riser head: 3.2451 acre-feet.
Side slope 1: 3 To 1
Side slope 2: 3 To 1
Side slope 3: 3 To 1
Side slope 4: 3 To 1
Discharge Structure
Riser Height: 3 ft.
Riser Diameter: 12 in.
Notch Type: Rectangular
Notch Width: 0.125 ft.
Notch Height: 1.300 ft.
Orifice 1 Diameter: 1.5625 in Elevation: 0 ft.
Element Flows To:
Outlet 1 Outlet 2

Pond Hydraulic Table

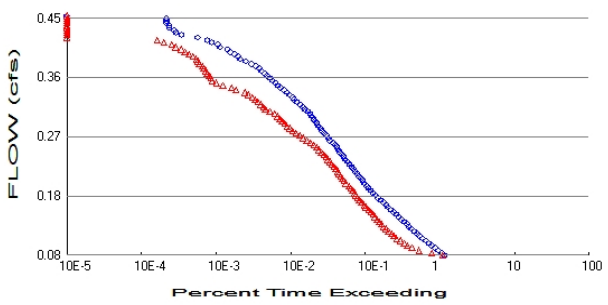
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.984	0.000	0.000	0.000
0.0444	0.987	0.043	0.014	0.000
0.0889	0.989	0.087	0.019	0.000
0.1333	0.992	0.131	0.024	0.000
0.1778	0.995	0.176	0.027	0.000
0.2222	0.997	0.220	0.031	0.000
0.2667	1.000	0.264	0.034	0.000
0.3111	1.002	0.309	0.037	0.000
0.3556	1.005	0.353	0.039	0.000
0.4000	1.007	0.398	0.041	0.000
0.4444	1.010	0.443	0.044	0.000
0.4889	1.013	0.488	0.046	0.000
0.5333	1.015	0.533	0.048	0.000
0.5778	1.018	0.578	0.050	0.000
0.6222	1.020	0.623	0.052	0.000
0.6667	1.023	0.669	0.054	0.000
0.7111	1.025	0.714	0.055	0.000
0.7556	1.028	0.760	0.057	0.000
0.8000	1.031	0.806	0.059	0.000
0.8444	1.033	0.852	0.060	0.000
0.8889	1.036	0.898	0.062	0.000
0.9333	1.038	0.944	0.064	0.000
0.9778	1.041	0.990	0.065	0.000
1.0222	1.044	1.036	0.067	0.000
1.0667	1.046	1.083	0.068	0.000
1.1111	1.049	1.129	0.069	0.000
1.1556	1.052	1.176	0.071	0.000
1.2000	1.054	1.223	0.072	0.000
1.2444	1.057	1.270	0.073	0.000
1.2889	1.059	1.317	0.075	0.000
1.3333	1.062	1.364	0.076	0.000
1.3778	1.065	1.411	0.077	0.000

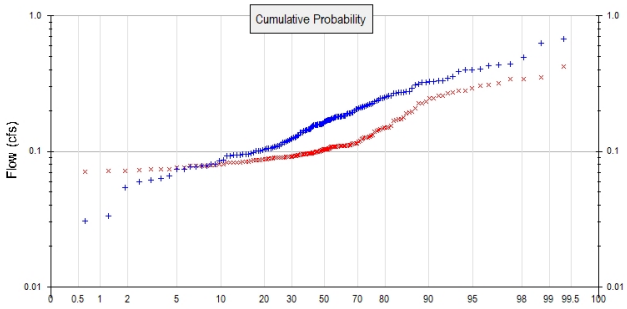
1.4222	1.067	1.459	0.079	0.000
1.4667	1.070	1.506	0.080	0.000
1.5111	1.073	1.554	0.081	0.000
1.5556	1.075	1.602	0.082	0.000
1.6000	1.078	1.650	0.083	0.000
1.6444	1.081	1.698	0.085	0.000
1.6889	1.083	1.746	0.086	0.000
1.7333	1.086	1.794	0.089	0.000
1.7778	1.089	1.842	0.097	0.000
1.8222	1.091	1.891	0.106	0.000
1.8667	1.094	1.939	0.117	0.000
1.9111	1.097	1.988	0.130	0.000
1.9556	1.099	2.037	0.143	0.000
2.0000	1.102	2.086	0.158	0.000
2.0444	1.105	2.135	0.173	0.000
2.0889	1.107	2.184	0.188	0.000
2.1333	1.110	2.233	0.205	0.000
2.1778	1.113	2.283	0.222	0.000
2.2222	1.116	2.332	0.239	0.000
2.2667	1.118	2.382	0.257	0.000
2.3111	1.121	2.432	0.275	0.000
2.3556	1.124	2.482	0.293	0.000
2.4000	1.126	2.532	0.312	0.000
2.4444	1.129	2.582	0.331	0.000
2.4889	1.132	2.632	0.350	0.000
2.5333	1.135	2.682	0.369	0.000
2.5778	1.137	2.733	0.388	0.000
2.6222	1.140	2.784	0.407	0.000
2.6667	1.143	2.834	0.427	0.000
2.7111	1.145	2.885	0.447	0.000
2.7556	1.148	2.936	0.471	0.000
2.8000	1.151	2.987	0.495	0.000
2.8444	1.154	3.038	0.519	0.000
2.8889	1.156	3.090	0.544	0.000
2.9333	1.159	3.141	0.569	0.000
2.9778	1.162	3.193	0.595	0.000
3.0222	1.165	3.245	0.643	0.000
3.0667	1.167	3.296	0.791	0.000
3.1111	1.170	3.348	1.000	0.000
3.1556	1.173	3.401	1.248	0.000
3.2000	1.176	3.453	1.519	0.000
3.2444	1.179	3.505	1.796	0.000
3.2889	1.181	3.558	2.061	0.000
3.3333	1.184	3.610	2.298	0.000
3.3778	1.187	3.663	2.494	0.000
3.4222	1.190	3.716	2.645	0.000
3.4667	1.192	3.769	2.755	0.000
3.5111	1.195	3.822	2.869	0.000
3.5556	1.198	3.875	2.966	0.000
3.6000	1.201	3.928	3.059	0.000
3.6444	1.204	3.982	3.148	0.000
3.6889	1.207	4.035	3.235	0.000
3.7333	1.209	4.089	3.318	0.000
3.7778	1.212	4.143	3.400	0.000
3.8222	1.215	4.197	3.479	0.000
3.8667	1.218	4.251	3.556	0.000
3.9111	1.221	4.305	3.631	0.000
3.9556	1.223	4.359	3.704	0.000

4.0000	1.226	4.414	3.775	0.000
4.0444	1.229	4.468	3.845	0.000

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 6.6642
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 1.4138
Total Impervious Area: 5.2505

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.16442
5 year	0.256022
10 year	0.317868
25 year	0.395922
50 year	0.453529
100 year	0.510444

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.109392
5 year	0.158132
10 year	0.198821
25 year	0.261247
50 year	0.316772
100 year	0.380964

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1902	0.157	0.103
1903	0.105	0.089
1904	0.231	0.110
1905	0.092	0.108
1906	0.054	0.078
1907	0.259	0.115
1908	0.181	0.090
1909	0.176	0.095
1910	0.247	0.114
1911	0.165	0.090

1912	0.671	0.147
1913	0.254	0.144
1914	0.065	0.172
1915	0.116	0.108
1916	0.166	0.104
1917	0.061	0.078
1918	0.169	0.191
1919	0.145	0.091
1920	0.169	0.094
1921	0.183	0.113
1922	0.180	0.108
1923	0.145	0.112
1924	0.080	0.082
1925	0.100	0.080
1926	0.160	0.095
1927	0.131	0.091
1928	0.125	0.102
1929	0.250	0.109
1930	0.160	0.096
1931	0.158	0.097
1932	0.119	0.096
1933	0.142	0.104
1934	0.333	0.307
1935	0.153	0.194
1936	0.149	0.098
1937	0.224	0.110
1938	0.145	0.088
1939	0.020	0.089
1940	0.156	0.110
1941	0.101	0.092
1942	0.238	0.310
1943	0.113	0.097
1944	0.274	0.179
1945	0.188	0.093
1946	0.116	0.090
1947	0.086	0.082
1948	0.346	0.112
1949	0.313	0.197
1950	0.102	0.083
1951	0.127	0.093
1952	0.442	0.232
1953	0.406	0.258
1954	0.151	0.098
1955	0.131	0.074
1956	0.077	0.074
1957	0.215	0.109
1958	0.427	0.342
1959	0.268	0.318
1960	0.078	0.079
1961	0.272	0.278
1962	0.158	0.102
1963	0.078	0.069
1964	0.095	0.110
1965	0.309	0.258
1966	0.097	0.084
1967	0.142	0.095
1968	0.159	0.099
1969	0.144	0.089

1970	0.218	0.105
1971	0.321	0.266
1972	0.209	0.150
1973	0.277	0.151
1974	0.159	0.108
1975	0.332	0.343
1976	0.184	0.115
1977	0.094	0.073
1978	0.294	0.226
1979	0.092	0.089
1980	0.178	0.109
1981	0.170	0.095
1982	0.094	0.080
1983	0.270	0.125
1984	0.137	0.107
1985	0.205	0.110
1986	0.169	0.100
1987	0.329	0.227
1988	0.195	0.149
1989	0.181	0.091
1990	0.213	0.092
1991	0.172	0.097
1992	0.204	0.207
1993	0.220	0.093
1994	0.321	0.109
1995	0.080	0.100
1996	0.354	0.279
1997	0.158	0.087
1998	0.182	0.110
1999	0.033	0.081
2000	0.139	0.103
2001	0.074	0.072
2002	0.272	0.132
2003	0.207	0.111
2004	0.177	0.110
2005	0.397	0.127
2006	0.110	0.086
2007	0.118	0.104
2008	0.180	0.088
2009	0.123	0.087
2010	0.107	0.123
2011	0.096	0.082
2012	0.176	0.096
2013	0.106	0.076
2014	0.077	0.078
2015	0.157	0.100
2016	0.063	0.082
2017	0.235	0.173
2018	0.436	0.352
2019	0.491	0.273
2020	0.138	0.104
2021	0.225	0.169
2022	0.096	0.094
2023	0.190	0.120
2024	0.631	0.126
2025	0.171	0.100
2026	0.270	0.149
2027	0.110	0.086

2028	0.095	0.071
2029	0.179	0.128
2030	0.328	0.141
2031	0.109	0.072
2032	0.074	0.079
2033	0.103	0.072
2034	0.101	0.084
2035	0.389	0.423
2036	0.199	0.105
2037	0.060	0.085
2038	0.180	0.110
2039	0.031	0.126
2040	0.105	0.090
2041	0.122	0.086
2042	0.400	0.294
2043	0.195	0.139
2044	0.245	0.154
2045	0.160	0.117
2046	0.191	0.245
2047	0.145	0.101
2048	0.191	0.084
2049	0.172	0.100
2050	0.126	0.091
2051	0.210	0.131
2052	0.108	0.087
2053	0.183	0.246
2054	0.222	0.170
2055	0.095	0.076
2056	0.085	0.095
2057	0.129	0.089
2058	0.157	0.098
2059	0.259	0.114

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.6706	0.4227
2	0.6312	0.3525
3	0.4909	0.3427
4	0.4423	0.3416
5	0.4357	0.3183
6	0.4268	0.3104
7	0.4063	0.3067
8	0.3996	0.2937
9	0.3973	0.2794
10	0.3889	0.2783
11	0.3539	0.2725
12	0.3461	0.2665
13	0.3328	0.2580
14	0.3317	0.2579
15	0.3288	0.2459
16	0.3284	0.2449
17	0.3208	0.2325
18	0.3206	0.2270
19	0.3125	0.2260
20	0.3089	0.2071
21	0.2939	0.1966
22	0.2765	0.1941

23	0.2740	0.1908
24	0.2716	0.1789
25	0.2716	0.1731
26	0.2705	0.1717
27	0.2697	0.1695
28	0.2681	0.1690
29	0.2588	0.1539
30	0.2585	0.1509
31	0.2535	0.1502
32	0.2504	0.1491
33	0.2466	0.1488
34	0.2452	0.1466
35	0.2381	0.1442
36	0.2352	0.1413
37	0.2315	0.1390
38	0.2249	0.1322
39	0.2242	0.1306
40	0.2217	0.1279
41	0.2204	0.1273
42	0.2176	0.1264
43	0.2151	0.1263
44	0.2128	0.1251
45	0.2100	0.1230
46	0.2094	0.1197
47	0.2073	0.1171
48	0.2045	0.1147
49	0.2045	0.1147
50	0.1987	0.1144
51	0.1949	0.1141
52	0.1947	0.1135
53	0.1911	0.1120
54	0.1905	0.1115
55	0.1896	0.1109
56	0.1879	0.1102
57	0.1838	0.1101
58	0.1830	0.1100
59	0.1830	0.1098
60	0.1822	0.1097
61	0.1812	0.1097
62	0.1810	0.1097
63	0.1802	0.1096
64	0.1802	0.1094
65	0.1797	0.1088
66	0.1791	0.1088
67	0.1778	0.1086
68	0.1765	0.1084
69	0.1755	0.1082
70	0.1755	0.1080
71	0.1721	0.1076
72	0.1716	0.1074
73	0.1708	0.1052
74	0.1700	0.1047
75	0.1695	0.1040
76	0.1689	0.1038
77	0.1685	0.1037
78	0.1663	0.1036
79	0.1653	0.1034
80	0.1599	0.1031

81	0.1599	0.1025
82	0.1596	0.1021
83	0.1590	0.1014
84	0.1589	0.1004
85	0.1582	0.1000
86	0.1581	0.0997
87	0.1575	0.0996
88	0.1572	0.0996
89	0.1568	0.0988
90	0.1567	0.0984
91	0.1557	0.0982
92	0.1532	0.0978
93	0.1510	0.0972
94	0.1488	0.0969
95	0.1450	0.0967
96	0.1449	0.0964
97	0.1449	0.0961
98	0.1445	0.0961
99	0.1442	0.0953
100	0.1424	0.0951
101	0.1424	0.0947
102	0.1386	0.0947
103	0.1381	0.0946
104	0.1370	0.0942
105	0.1315	0.0938
106	0.1309	0.0935
107	0.1287	0.0931
108	0.1272	0.0928
109	0.1261	0.0922
110	0.1253	0.0919
111	0.1233	0.0914
112	0.1217	0.0913
113	0.1192	0.0908
114	0.1184	0.0907
115	0.1163	0.0902
116	0.1158	0.0902
117	0.1125	0.0902
118	0.1102	0.0897
119	0.1101	0.0894
120	0.1088	0.0894
121	0.1083	0.0893
122	0.1069	0.0892
123	0.1055	0.0886
124	0.1055	0.0883
125	0.1046	0.0876
126	0.1034	0.0873
127	0.1016	0.0870
128	0.1014	0.0865
129	0.1008	0.0864
130	0.1001	0.0857
131	0.0974	0.0857
132	0.0960	0.0854
133	0.0955	0.0840
134	0.0954	0.0838
135	0.0950	0.0835
136	0.0945	0.0825
137	0.0940	0.0824
138	0.0937	0.0824

139	0.0925	0.0822
140	0.0924	0.0822
141	0.0856	0.0806
142	0.0849	0.0803
143	0.0802	0.0796
144	0.0800	0.0789
145	0.0783	0.0786
146	0.0780	0.0784
147	0.0767	0.0777
148	0.0766	0.0776
149	0.0737	0.0760
150	0.0735	0.0758
151	0.0654	0.0741
152	0.0628	0.0736
153	0.0612	0.0734
154	0.0595	0.0722
155	0.0540	0.0717
156	0.0335	0.0717
157	0.0308	0.0707
158	0.0197	0.0689

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0822	63489	60387	95	Pass
0.0860	58503	43074	73	Pass
0.0897	52531	29080	55	Pass
0.0935	47218	23324	49	Pass
0.0972	42531	20099	47	Pass
0.1010	39440	18266	46	Pass
0.1047	35817	16332	45	Pass
0.1085	32454	14648	45	Pass
0.1122	29534	13307	45	Pass
0.1160	27584	12432	45	Pass
0.1197	25163	11374	45	Pass
0.1235	23041	10460	45	Pass
0.1272	21124	9634	45	Pass
0.1310	19883	9080	45	Pass
0.1347	18271	8487	46	Pass
0.1385	16770	7872	46	Pass
0.1422	15352	7390	48	Pass
0.1460	14399	7053	48	Pass
0.1497	13241	6598	49	Pass
0.1535	12183	6144	50	Pass
0.1572	11202	5679	50	Pass
0.1610	10532	5334	50	Pass
0.1647	9667	4954	51	Pass
0.1685	8847	4618	52	Pass
0.1722	8100	4337	53	Pass
0.1760	7612	4173	54	Pass
0.1797	7014	3948	56	Pass
0.1835	6532	3743	57	Pass
0.1872	6100	3532	57	Pass
0.1910	5806	3329	57	Pass
0.1947	5442	3062	56	Pass
0.1985	5116	2877	56	Pass
0.2022	4801	2715	56	Pass
0.2060	4577	2606	56	Pass
0.2097	4313	2485	57	Pass
0.2135	4026	2365	58	Pass
0.2172	3799	2232	58	Pass
0.2210	3609	2116	58	Pass
0.2247	3360	1965	58	Pass
0.2285	3171	1846	58	Pass
0.2322	2969	1732	58	Pass
0.2360	2831	1651	58	Pass
0.2397	2678	1541	57	Pass
0.2435	2533	1425	56	Pass
0.2472	2411	1314	54	Pass
0.2510	2321	1229	52	Pass
0.2547	2189	1127	51	Pass
0.2585	2027	1018	50	Pass
0.2622	1866	910	48	Pass
0.2660	1765	807	45	Pass
0.2697	1661	729	43	Pass
0.2735	1558	651	41	Pass
0.2772	1457	590	40	Pass

0.2810	1393	540	38	Pass
0.2847	1308	492	37	Pass
0.2885	1245	463	37	Pass
0.2922	1180	424	35	Pass
0.2960	1119	397	35	Pass
0.2998	1069	372	34	Pass
0.3035	1007	336	33	Pass
0.3073	936	290	30	Pass
0.3110	850	254	29	Pass
0.3148	804	238	29	Pass
0.3185	736	219	29	Pass
0.3223	668	202	30	Pass
0.3260	616	183	29	Pass
0.3298	586	169	28	Pass
0.3335	534	149	27	Pass
0.3373	497	134	26	Pass
0.3410	446	102	22	Pass
0.3448	408	89	21	Pass
0.3485	371	68	18	Pass
0.3523	344	56	16	Pass
0.3560	314	49	15	Pass
0.3598	292	47	16	Pass
0.3635	268	45	16	Pass
0.3673	248	42	16	Pass
0.3710	225	40	17	Pass
0.3748	210	38	18	Pass
0.3785	188	36	19	Pass
0.3823	165	33	20	Pass
0.3860	137	32	23	Pass
0.3898	117	30	25	Pass
0.3935	108	27	25	Pass
0.3973	97	24	24	Pass
0.4010	85	21	24	Pass
0.4048	78	19	24	Pass
0.4085	63	16	25	Pass
0.4123	58	14	24	Pass
0.4160	48	11	22	Pass
0.4198	42	9	21	Pass
0.4235	31	0	0	Pass
0.4273	19	0	0	Pass
0.4310	16	0	0	Pass
0.4348	15	0	0	Pass
0.4385	13	0	0	Pass
0.4423	13	0	0	Pass
0.4460	12	0	0	Pass
0.4498	12	0	0	Pass
0.4535	12	0	0	Pass

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
Trapezoidal Pond 1 POC	☐	2116.69			☐	0.00			
Total Volume Infiltrated		2116.69	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 = Passed

Model Default Modifications

Total of 0 changes have been made.

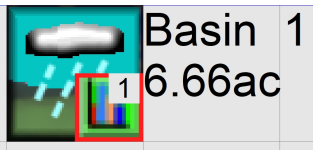
PERLND Changes

No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Mitigated Schematic

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   Easton Manor 2023 0808.wdm
MESSU       25   PreEaston Manor 2023 0808.MES
            27   PreEaston Manor 2023 0808.L61
            28   PreEaston Manor 2023 0808.L62
            30   POCEaston Manor 2023 08081.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:15
      PERLND      10
      PERLND      13
      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           ***
   10     C, Forest, Flat         1    1    1    1   27    0
   13     C, Pasture, 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 ***
   10         0    0    1    0    0    0    0    0    0    0    0    0
   13         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  *********
```

```
   10         0    0    4    0    0    0    0    0    0    0    0    0    1    9
   13         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 ***
   10         0    0    0    0    0    0    0    0    0    0    0
   13         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
   10              0       4.5      0.08       400      0.05       0.5     0.996
   13              0       4.5      0.06       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
   10              0         0         2         2         0         0         0
   13              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   10            0.2       0.5      0.35         6       0.5       0.7
   13           0.15       0.4       0.3         6       0.5       0.4
  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
   10              0         0         0         0       2.5         1         0
   13              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           ***
  END GEN-INFO
  *** Section IWATER***

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

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
  END PRINT-INFO

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

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
  END IWAT-PARM2

  IWAT-PARM3
```

```
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
  END IWAT-PARM3

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

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND  10                       5.138     COPY   501     12
PERLND  10                       5.138     COPY   501     13
PERLND  13                      1.5262     COPY   501     12
PERLND  13                      1.5262     COPY   501     13

******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


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   Easton Manor 2023 0808.wdm
MESSU       25   MitEaston Manor 2023 0808.MES
            27   MitEaston Manor 2023 0808.L61
            28   MitEaston Manor 2023 0808.L62
            30   POCEaston Manor 2023 08081.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:15
      PERLND      13
      IMPLND       4
      IMPLND      11
      IMPLND      14
      RCHRES       1
      COPY         1
      COPY       501
      COPY       601
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title---------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Trapezoidal Pond  1         MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  601         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           ***
   13     C, Pasture, 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 ***
   13         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  *********
   13         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 ***
   13         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
   13              0       4.5      0.06       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
   13              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                                 ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   13          0.15       0.4       0.3         6       0.5       0.4
  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
   13              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           ***
    4      ROOF TOPS/FLAT         1    1    1   27    0
   11      PARKING/FLAT           1    1    1   27    0
   14      POND                   1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    4         0    0    1    0    0    0
   11         0    0    1    0    0    0
   14         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    4         0    0    4    0    0    0    1    9
   11         0    0    4    0    0    0    1    9
   14         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     ***
    4         0    0    0    0    0
```

```
   11         0    0    0    0    0
   14         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    4            400      0.01       0.1       0.1
   11            400      0.01       0.1       0.1
   14            400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    4              0         0
   11              0         0
   14              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    4              0         0
   11              0         0
   14              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                 <--Area-->     <-Target->   MBLK   ***
<Name>   #                 <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND  13                      1.321     RCHRES   1      2
PERLND  13                      1.321     RCHRES   1      3
IMPLND   4                     1.7404     RCHRES   1      5
IMPLND  11                       2.64     RCHRES   1      5
IMPLND  14                     0.7576     RCHRES   1      5
Basin  2***
PERLND  13                     0.0928     COPY   501     12
PERLND  13                     0.0928     COPY   601     12
PERLND  13                     0.0928     COPY   501     13
PERLND  13                     0.0928     COPY   601     13
IMPLND  11                     0.1125     COPY   501     15
IMPLND  11                     0.1125     COPY   601     15

******Routing******
PERLND  13                      1.321     COPY     1     12
IMPLND   4                     1.7404     COPY     1     15
IMPLND  11                       2.64     COPY     1     15
IMPLND  14                     0.7576     COPY     1     15
PERLND  13                      1.321     COPY     1     13
RCHRES   1                          1     COPY   501     16
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                              ***
    1     Trapezoidal Pond-008    1    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ****************** Print-flags ******************* PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
  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
            *  *  *  *    *  *  *  *  *       *  *  *  *  *        ***
    1        0  1  0  0    4  0  0  0  0       0  0  0  0  0       2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
    1               1      0.04       0.0       0.0       0.5       0.0
  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
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
    1           0         4.0  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
  FTABLE      1
   91    4
     Depth      Area    Volume  Outflow1 Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.984848  0.000000  0.000000
  0.044444  0.987391  0.043828  0.013967
  0.088889  0.989936  0.087768  0.019753
  0.133333  0.992485  0.131822  0.024192
  0.177778  0.995037  0.175989  0.027934
  0.222222  0.997592  0.220270  0.031231
  0.266667  1.000151  0.264664  0.034212
  0.311111  1.002712  0.309172  0.036954
  0.355556  1.005277  0.353794  0.039505
  0.400000  1.007846  0.398530  0.041901
  0.444444  1.010417  0.443380  0.044168
  0.488889  1.012992  0.488345  0.046324
  0.533333  1.015570  0.533424  0.048384
  0.577778  1.018152  0.578618  0.050359
  0.622222  1.020736  0.623927  0.052260
  0.666667  1.023324  0.669350  0.054095
  0.711111  1.025915  0.714889  0.055869
  0.755556  1.028510  0.760543  0.057588
  0.800000  1.031107  0.806312  0.059258
  0.844444  1.033708  0.852197  0.060881
  0.888889  1.036313  0.898197  0.062463
  0.933333  1.038920  0.944314  0.064005
  0.977778  1.041531  0.990546  0.065512
```

```
  1.022222  1.044145  1.036894  0.066984
  1.066667  1.046762  1.083359  0.068425
  1.111111  1.049383  1.129940  0.069836
  1.155556  1.052007  1.176637  0.071219
  1.200000  1.054634  1.223452  0.072575
  1.244444  1.057264  1.270383  0.073907
  1.288889  1.059898  1.317431  0.075215
  1.333333  1.062534  1.364596  0.076501
  1.377778  1.065175  1.411878  0.077766
  1.422222  1.067818  1.459278  0.079010
  1.466667  1.070465  1.506795  0.080235
  1.511111  1.073115  1.554431  0.081442
  1.555556  1.075768  1.602183  0.082631
  1.600000  1.078424  1.650054  0.083803
  1.644444  1.081084  1.698044  0.084959
  1.688889  1.083747  1.746151  0.086099
  1.733333  1.086413  1.794377  0.089741
  1.777778  1.089083  1.842721  0.097224
  1.822222  1.091756  1.891184  0.106785
  1.866667  1.094432  1.939766  0.117896
  1.911111  1.097111  1.988467  0.130260
  1.955556  1.099793  2.037287  0.143674
  2.000000  1.102479  2.086226  0.157987
  2.044444  1.105168  2.135285  0.173079
  2.088889  1.107861  2.184464  0.188849
  2.133333  1.110556  2.233762  0.205214
  2.177778  1.113255  2.283180  0.222100
  2.222222  1.115958  2.332718  0.239442
  2.266667  1.118663  2.382376  0.257182
  2.311111  1.121372  2.432155  0.275268
  2.355556  1.124084  2.482054  0.293652
  2.400000  1.126799  2.532073  0.312289
  2.444444  1.129517  2.582214  0.331139
  2.488889  1.132239  2.632475  0.350164
  2.533333  1.134964  2.682857  0.369326
  2.577778  1.137692  2.733361  0.388594
  2.622222  1.140424  2.783986  0.407934
  2.666667  1.143159  2.834732  0.427316
  2.711111  1.145897  2.885600  0.447652
  2.755556  1.148638  2.936589  0.471109
  2.800000  1.151383  2.987701  0.495039
  2.844444  1.154131  3.038935  0.519433
  2.888889  1.156882  3.090291  0.544281
  2.933333  1.159636  3.141769  0.569575
  2.977778  1.162394  3.193369  0.595306
  3.022222  1.165155  3.245093  0.643905
  3.066667  1.167919  3.296939  0.791836
  3.111111  1.170687  3.348908  1.000278
  3.155556  1.173457  3.401000  1.248592
  3.200000  1.176231  3.453215  1.519773
  3.244444  1.179009  3.505554  1.796476
  3.288889  1.181789  3.558016  2.061227
  3.333333  1.184573  3.610602  2.298009
  3.377778  1.187360  3.663311  2.494615
  3.422222  1.190150  3.716145  2.645531
  3.466667  1.192944  3.769103  2.755262
  3.511111  1.195741  3.822185  2.869459
  3.555556  1.198541  3.875391  2.966103
  3.600000  1.201344  3.928722  3.058979
  3.644444  1.204151  3.982177  3.148498
  3.688889  1.206961  4.035757  3.235000
  3.733333  1.209774  4.089463  3.318775
  3.777778  1.212591  4.143293  3.400065
  3.822222  1.215410  4.197248  3.479081
  3.866667  1.218233  4.251329  3.556005
  3.911111  1.221059  4.305536  3.630995
  3.955556  1.223889  4.359868  3.704190
  4.000000  1.226722  4.414326  3.775716
  END FTABLE  1
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
WDM      1 EVAP     ENGL    1             RCHRES   1     EXTNL  POTEV

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
COPY   601 OUTPUT MEAN   1 1     48.4      WDM    901 FLOW     ENGL      REPL
RCHRES   1 HYDR   RO     1 1        1      WDM   1000 FLOW     ENGL      REPL
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1001 STAG     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        2
PERLND     PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    2

  MASS-LINK        3
PERLND     PWATER IFWO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    3

  MASS-LINK        5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    5

  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

  MASS-LINK       16
RCHRES     ROFLOW                          COPY           INPUT  MEAN
  END MASS-LINK   16


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

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November 4, 2022

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Soils Report
Proposed Easton Manor Senior Housing Facility
xxx – 25th Street Southeast
Puyallup, Washington
PN: 04202670-01, -03, -07, -08, -13, -27
Doc ID: Sekyra.25thStSE.SR

INTRODUCTION

This *soils report* summarizes our site observations, subsurface explorations, laboratory testing and engineering analyses, and provides geotechnical recommendations and design criteria for the proposed Easton Manor senior housing facility to be constructed on the above referenced parcels in the City of Puyallup, Washington. The site location is shown on the attached Site Location Map, Figure 1.

Our understanding of the project is based on our meeting with Azure Green Consultants, our review of the provided *Site Plan* by Azure Green Consultants dated July 15, 2021, our understanding of the City of Puyallup development codes, our December 20, 2021 site visit and subsurface explorations, our bi-weekly site visits through the wet season, and our experience in the project area. The site is currently developed with a single family residence on each of the parcels. We understand that you propose to demolish the easternmost residence and develop the open 11 acres into senior housing consisting of 4 apartment buildings, drive lanes consisting of permeable pavement, parking stalls, detention pond, and associated utilities. The proposed development is shown on the Site & Exploration Plan, Figure 2.

The City of Puyallup required continuous groundwater monitoring at the site between December 21, 2021 and March 21, 2022. In order to confirm vertical separation from the bottom of storm water facilities to potential impermeable layers, and to determine seasonal high groundwater levels, we explored the subsurface conditions using hand borings at select locations across the site. Drive Point Piezometers (DPPs) piezometers were installed in each hand boring.

PURPOSE & 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 residence. 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 surface and subsurface conditions by reconnoitering the site and advancing six hand auger explorations at selected locations at the site;
3. Installing six drive point piezometers (DPPs) in our hand auger explorations at the site;
4. Describing surface and subsurface conditions, including soil type, depth to groundwater, if encountered, and an estimate of seasonal high groundwater levels;
5. Monitoring ground water levels throughout the prescriptive wet season;
6. Providing our opinion about the feasibility of onsite stormwater infiltration in accordance with the 2014 SWMMWW, including a preliminary design infiltration rate based on grain size analysis, as applicable; and,
7. Preparing this *Soils Report* that satisfies the 2014 SWMMWW requirements and summarizes our site observations and conclusions, and our geotechnical recommendations, along with the supporting data.

The above scope of work was summarized in our *Proposal for Geotechnical Engineering Services* dated November 4, 2021. We received written authorization to proceed from you on December 16, 2021.

SITE CONDITIONS

Surface Conditions

As previously stated, the site consists of six adjacent tax parcels generally centered around 629 – 21st Street East in Puyallup, Washington, in an area of existing residential and commercial development. According to Pierce County GIS, when combined, the site is irregular in shape and measures approximately 320 to 775 feet wide (north to south) by approximately 1250 feet long (east to west) and encompasses approximately 11.12 acres. The site is bounded by existing residential development and East Pioneer to the north by 25th Street Southeast to the east, by 21st Street Southeast to the west, and by Cascade Christian Junior High and High School to the south.

Based on topographic information obtained from Pierce County GIS and our site observations the ground surface of the site is relatively level with small rises and falls in elevation on the order of 1 to 2 feet. The total topographic relief of the site is on the order of 2 feet. The existing site configuration is shown on Figure 3.

Vegetation across the site generally consists of maintained grass with low lying bushes and shrubs scattered across the site. Ornamental plants and shrubs surrounded the residences. A stream was observed to be flowing from east to west near the northeast property boundary of the site during our initial site visit and also during our subsequent groundwater monitoring visits. Standing water was observed on the surface throughout the site during the wet season.

Site Soils

The Natural Resource Conservation Service (NRCS) Web Soil Survey maps the site as underlain by Briscot Loam (6A) and 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 B/D and A, respectively. An excerpt of the NRCS soils map for the site vicinity is included as Figure 4.

Site Geology

According to the Geologic Map of Tacoma1: 100,000-scale Quadrangle, Washington by J. Eric Schuster, Ashley A. Cabibbo, Joseph F. Schilter, and Ian J. Hubert (in review) the site is mapped as being underlain by Holocene Alluvium (Qa). 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 subsurface 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 5.

Subsurface Explorations

On December 20, 2021, a field representative from GeoResources visited the site and excavated 6 hand augers at selected locations to depths of 1.5 to 4 feet below the existing ground surface.

Our representatives logged the subsurface conditions encountered in each hand auger and obtained representative soil samples. The number and locations of the explorations were selected in the field based on project information provided by you at the time of excavation, our understanding of the proposed development, consideration for underground utilities, existing site conditions, and current site usage. Soil densities presented on the logs were based on the difficulty of excavation and our experience. Each hand auger was backfilled with the excavated soils and tamped into place, but not otherwise compacted. Stainless steel drive point piezometers (DPPs) were installed at the location of each hand auger exploration to depths of 4.0 to 7.0 feet below existing grades to monitor groundwater levels at the site throughout the wet season.

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 hand augers are indicated on the attached Site and Exploration Plan, Figure 2. The USCS is included in Appendix A as Figure A-1, while the descriptive logs of our hand augers are included as Figures A-2 and A-3.

Subsurface Conditions

At the locations of our hand augers, we encountered relatively uniform subsurface conditions that in our opinion generally confirmed the mapped stratigraphy at the site. Our hand augers generally encountered approximately 0.5 feet of topsoil, mantling about 1.0 to 2.5 feet of soft gray, orange iron oxide stained silt or loose gray, orange iron oxide stained silty sand in a moist to wet condition. Beneath the surficial silty soils we generally encountered loose gray orange iron oxide sand in a wet condition to the termination depth. We encountered a 2-foot thick layer of fill mantling relict topsoil in hand auger HA-3. We interpret the soils at the site to be consistent with the mapped alluvium soils.

Laboratory Testing

Geotechnical laboratory tests were performed the soils retrieved from our hand auger explorations. Laboratory testing included visual soil classification per ASTM D: 2488.

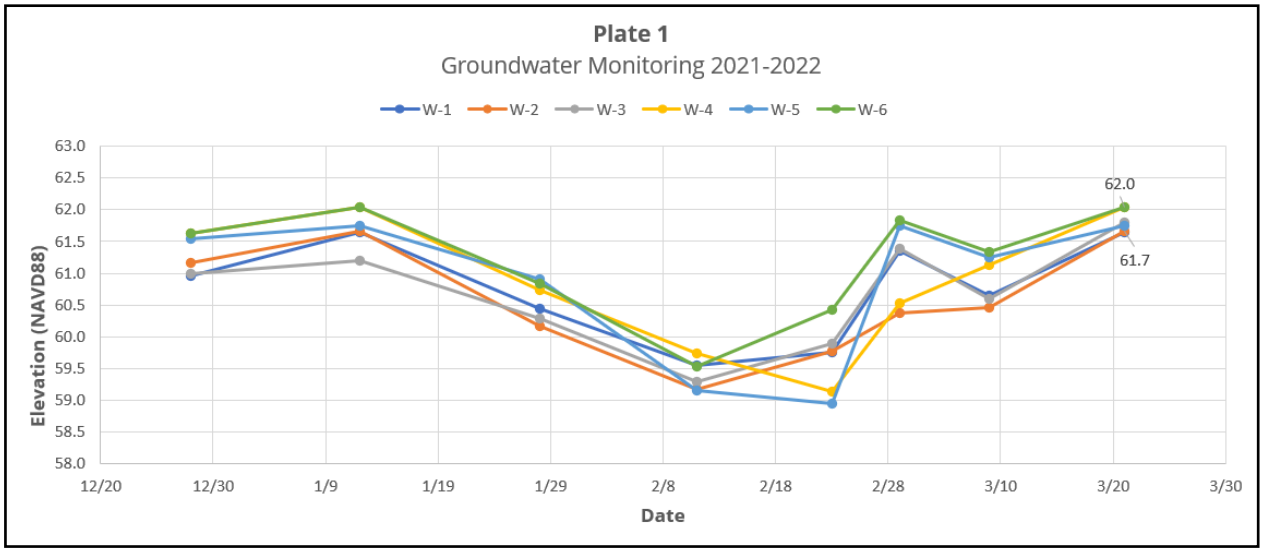
Groundwater Conditions

DPPs were installed at the site on December 20, 2021. At the time of digging, groundwater was encountered at about 1.0 to 1.5 feet (Elevation 60.5-61.0 feet) below the ground surface at each hand auger. Groundwater readings for the observation wells were manually measured on a bi-monthly basis from December 21, 2021 to March 21, 2022.

Based on our wet season monitoring, it appears that seasonal high groundwater occurs at about the ground surface elevation to about 0.3 feet below grades at the locations monitored. These levels were recorded on March 21, 2022. Plate 1, below, summarizes the groundwater levels recorded as part of our groundwater monitoring program during our monitoring period.

We anticipate fluctuations in the local groundwater levels will occur in response to precipitation patterns, off site construction activities, and site utilization. As such, water level observations made at the time of our field investigation may vary from those encountered during the construction phase. Analysis or modeling of anticipated groundwater levels during construction is beyond the scope of this report.

CONCLUSIONS AND RECOMMENDATIONS



Based on the results of our data review, site reconnaissance, and subsurface explorations, it is our opinion that the infiltration of stormwater runoff generated onsite by the new impervious surfaces is <u>not</u> feasible for this project because of the measured depths to seasonal high groundwater levels.

Infiltration Recommendations

Groundwater was encountered between the surface and 4 inches below grade. It is our opinion that infiltration is not feasible at the site because the 1 foot required vertical separation from the bottom of the proposed infiltration facility to the seasonal high groundwater levels is unable to be met. Alternative stormwater management methods should be used for this project.

All proposed stormwater facilities should be designed and constructed in accordance with the 2014 SWMMWW. All minimum separations, setback requirements, and infeasibility criteria per 2014

SWMMWW should be considered prior to the selection, design and location of any stormwater facility for the proposed development.

LIMITATIONS

We have prepared this report for use by Kilcha Sekyra and Azure Green Consultants 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.

◆ ◆ ◆

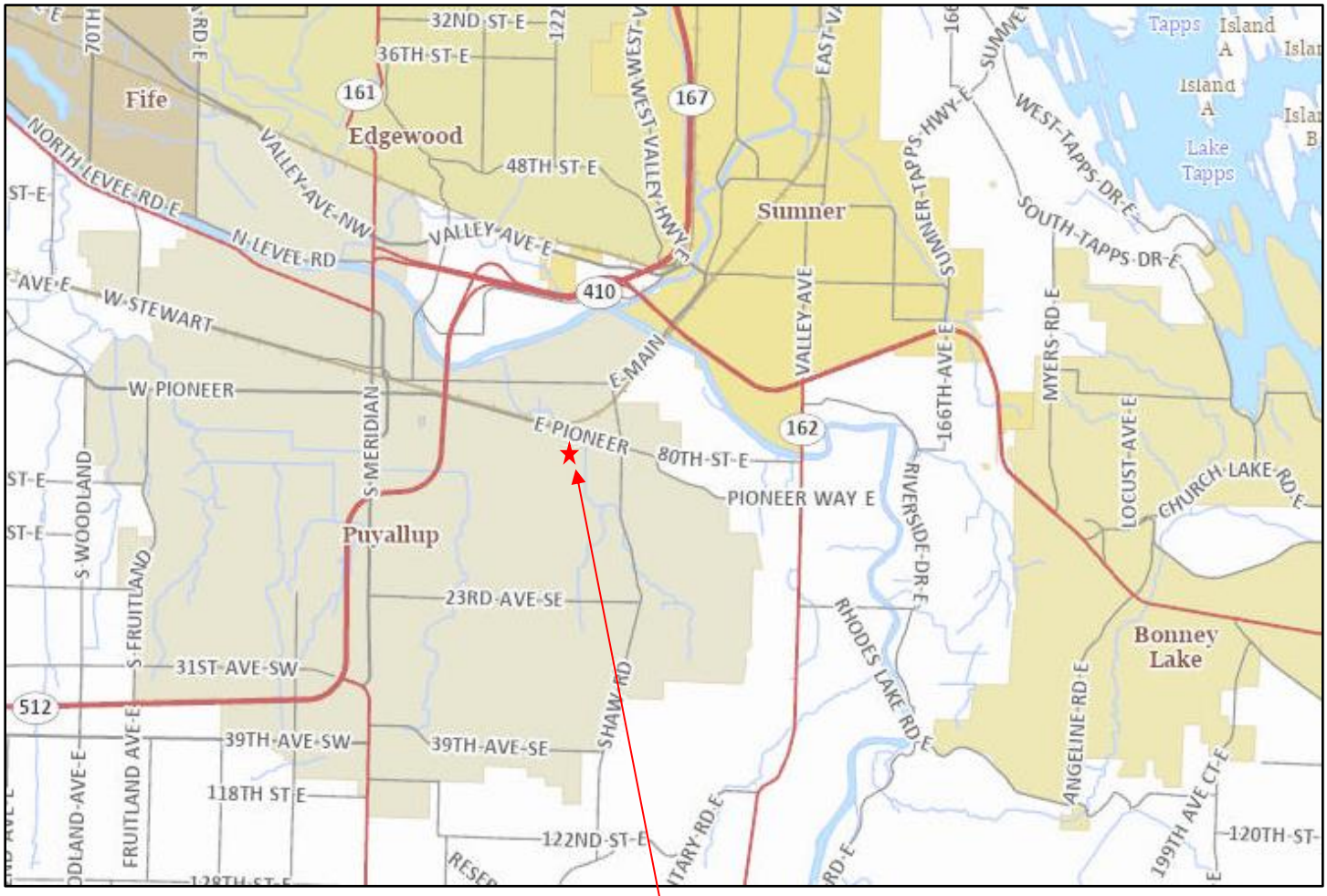
We have appreciated the opportunity to be of service to you on this project. If you have any questions or comments, please do not hesitate to call at your earliest convenience.

Respectfully submitted,
GeoResources, LLC

Andrew Schnitger, EIT
Staff Engineer

Eric W. Heller, PE, LG
Senior Geotechnical Engineer

AES:STM:EWH/aes
DocID: Sekyra.25thStSE.SR
Attachments: Figure 1: Site Location Map
Figure 2: Site & Exploration Plan
Figure 3: Site Vicinity Map
Figure 4: NRCS Soils Map
Figure 5: Geologic Map
Appendix A – Subsurface Explorations



Approximate Site Location

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

N W E S

Not to Scale

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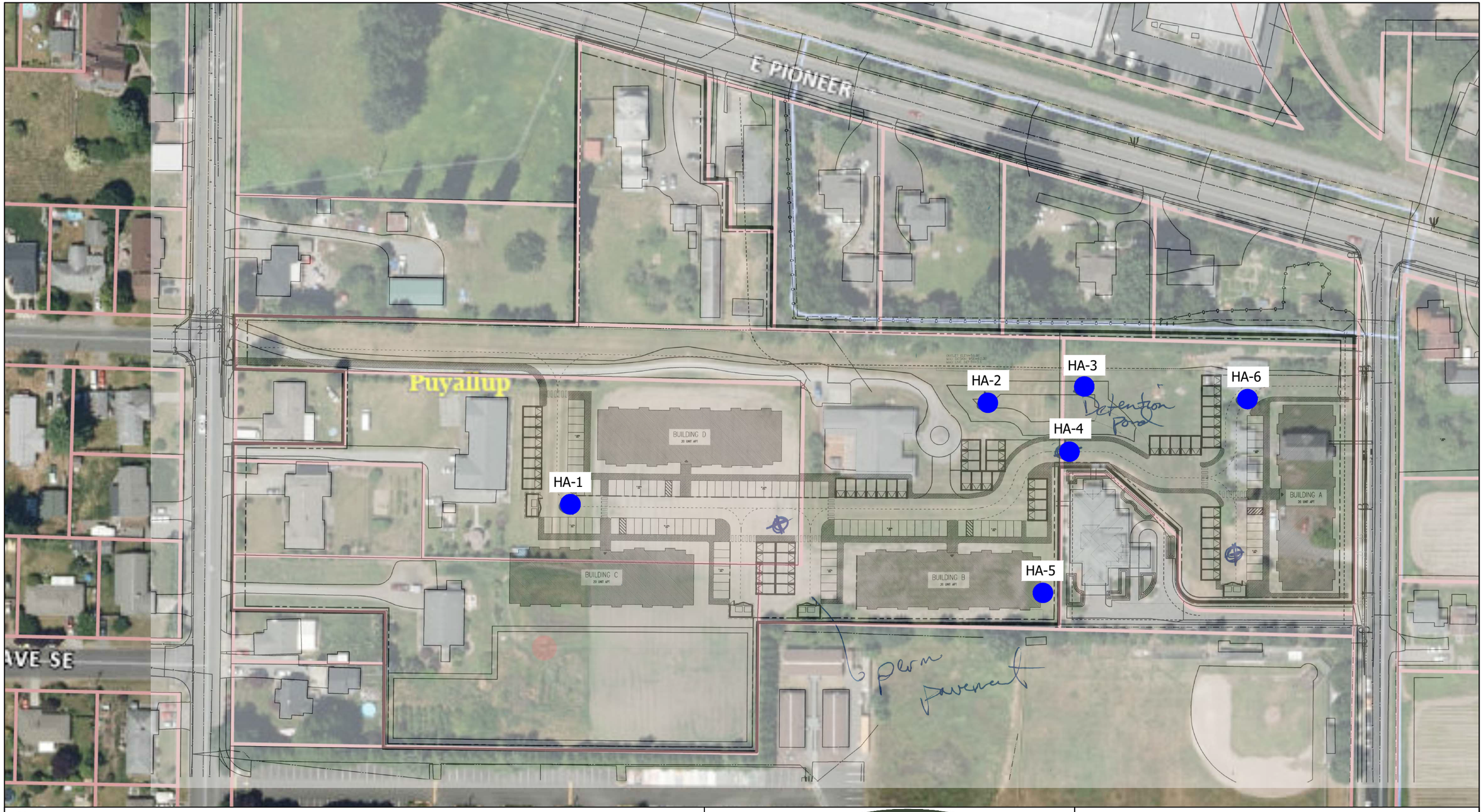
Site Location Map

Proposed Easton Manor Senior Housing Facility
xxx – 25th Street Southeast
Puyallup, Washington
PN: 04202670-01, -03, -07, -08, -13, -27

DocID: Sekyra.25thStSe.F	November 2022	Figure 1



Notes:
Proposed Site Plan by Azure Green Consultants dated July 15, 2021, underlain by Pierce County Public GIS Aerial Background (https://matterhornwab.co.pierce.wa.us/publicgis/)

● Number and approximate location of hand auger/drive point piezometer

0 100' 200'

Scale:1" = 100'

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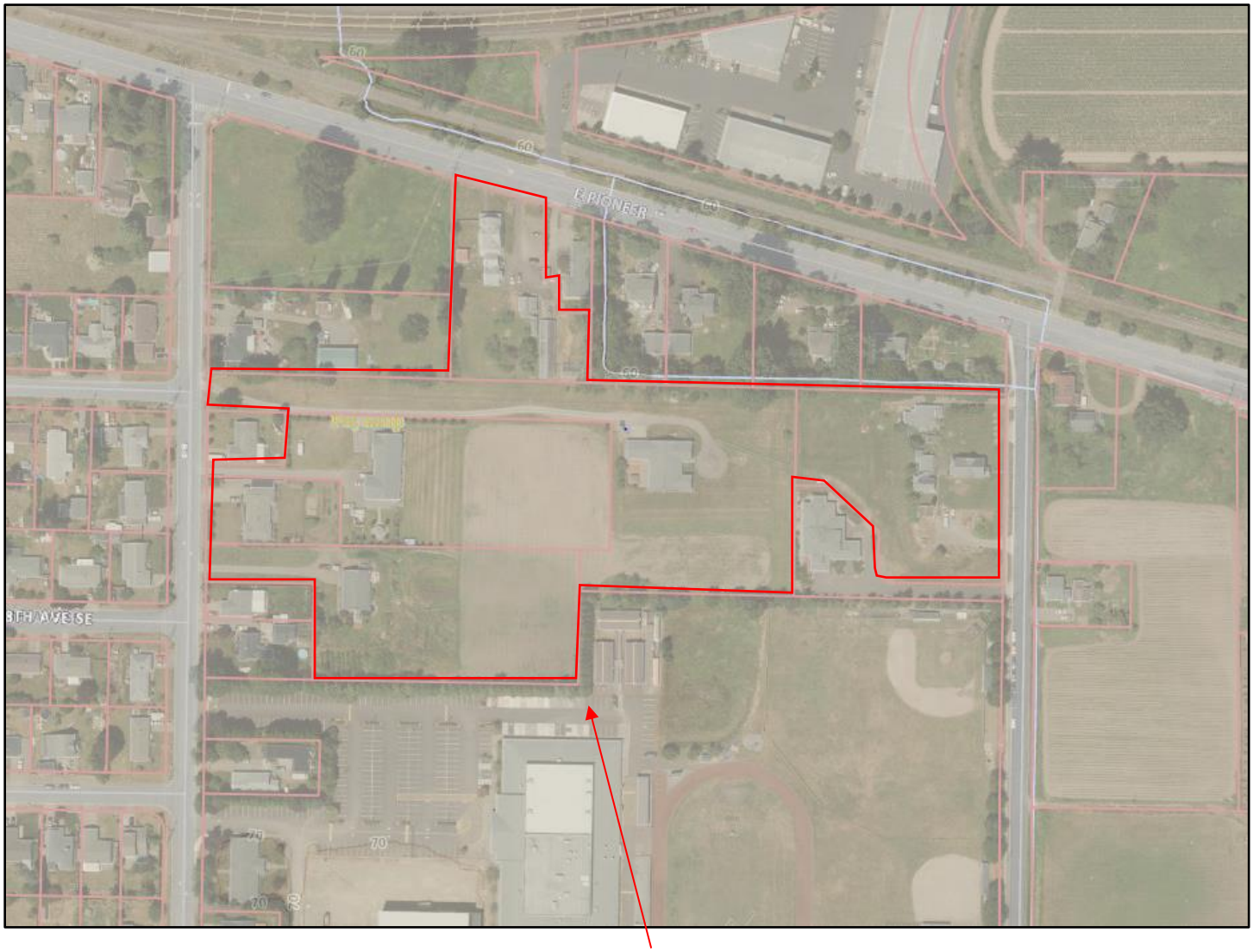
Site & Exploration Plan
Proposed Easton Manor Senior Housing Facility
xxx - 25th Street SE
Puyallup, Washington
PN: 04202670-01, -03, -07, -08, -13, -27

Doc ID: Sekyra.25thStE.F	Nov 2022	Figure 2



Approximate Site Location

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

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S

Not to Scale

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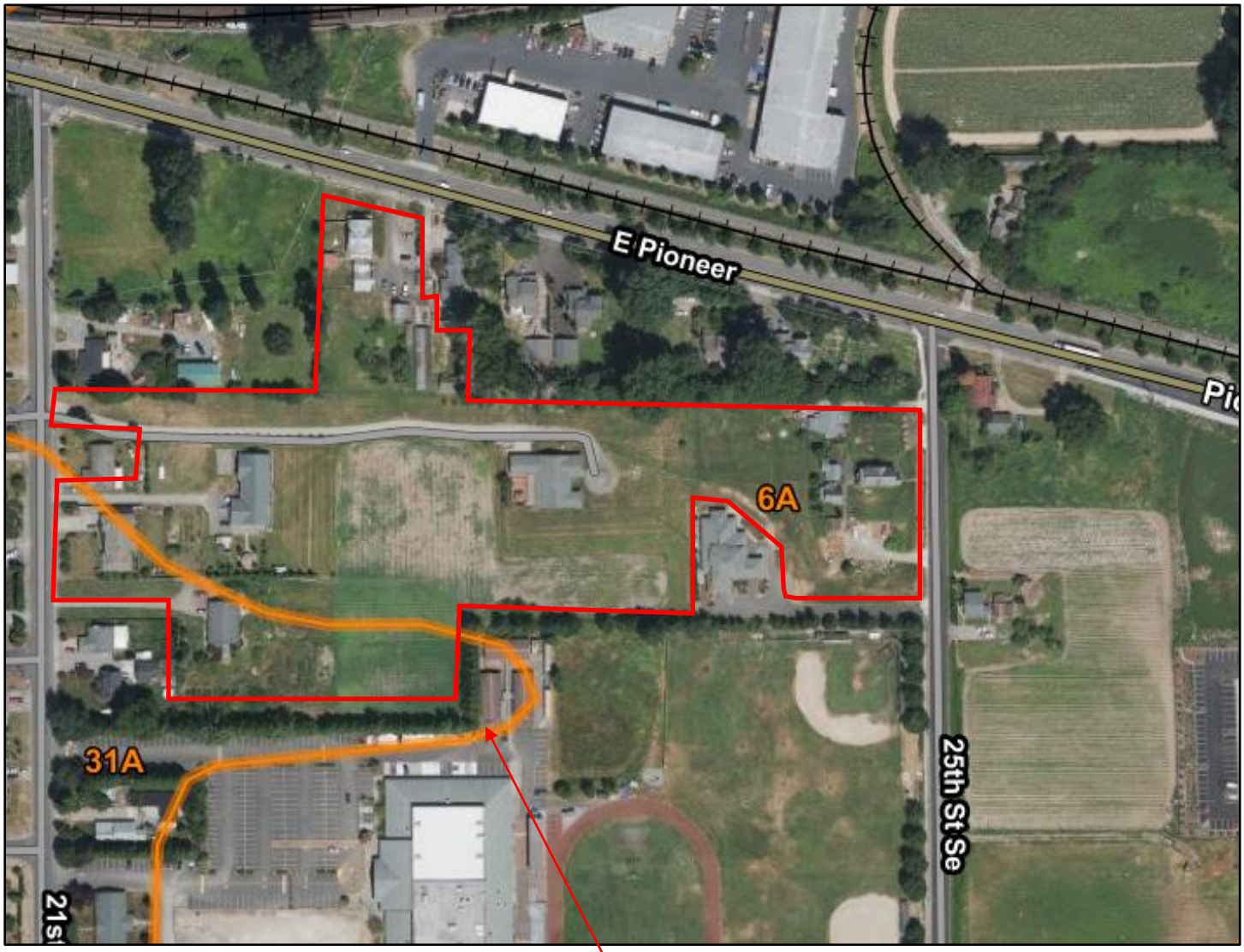
Site Vicinity

Proposed Easton Manor Senior Housing Facility
xxx – 25th Street Southeast
Puyallup, Washington
PN: 04202670-01, -03, -07, -08, -13, -27

DocID: Sekyra.25thStSe.F	November 2022	Figure 3



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
6A	Briscot loam	Alluvium	0 to 2	Slight	B/D
31A	Puyallup fine sandy loam	Alluvium	0 to 3	Slight	A

Not to Scale

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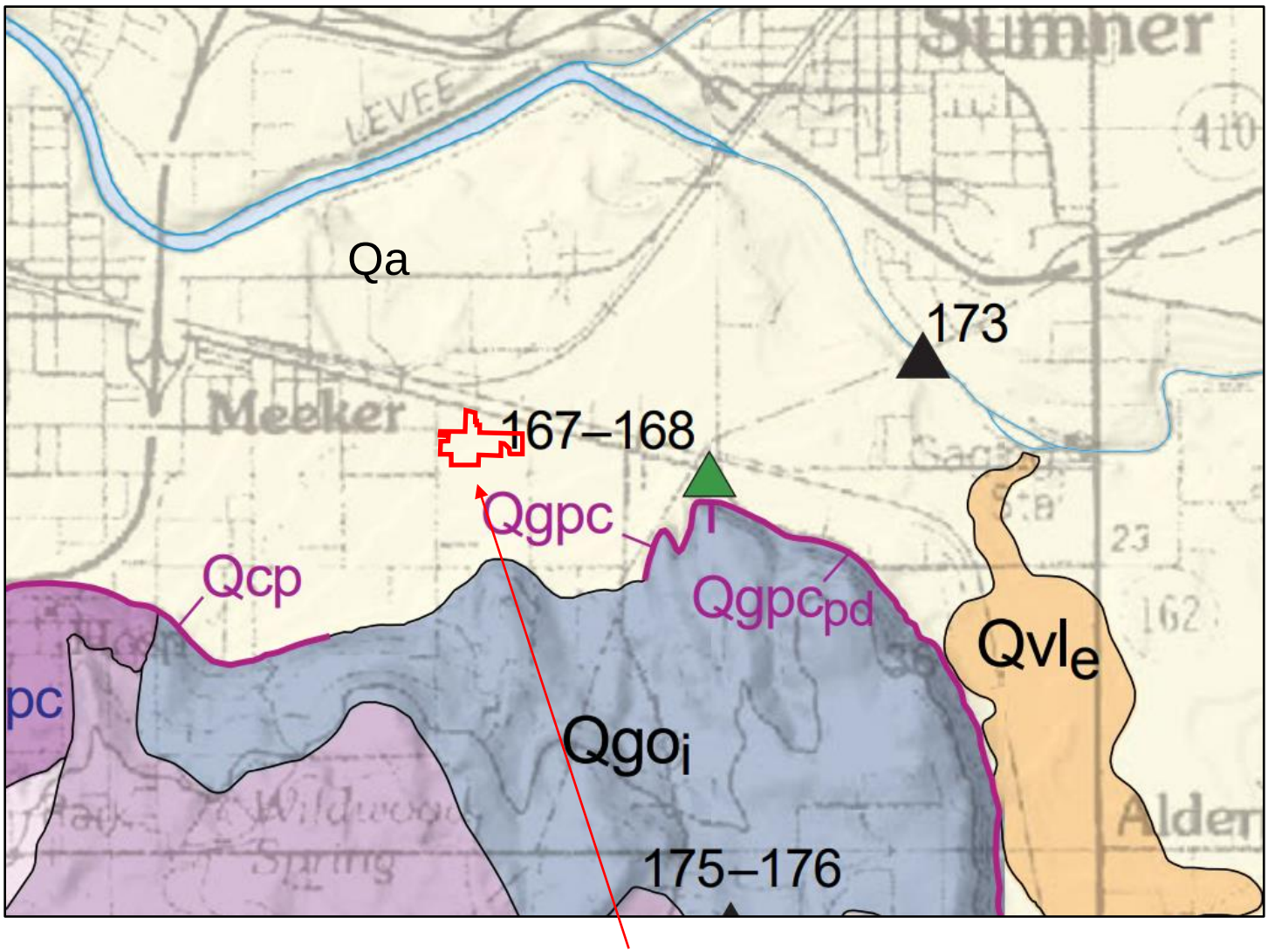
NRCS Soils Map

Proposed Easton Manor Senior Housing Facility
xxx – 25th Street Southeast
Puyallup, Washington
PN: 04202670-01, -03, -07, -08, -13, -27



Approximate Site Location

An excerpt from the *Geologic Map of Tacoma1: 100,000-scale Quadrangle, Washington* by J. Eric Schuster, Ashley A. Cabibbo, Joseph F. Schilter, and Ian J. Hubert (November 2015).

Qa	Alluvium (Holocene)

Not to Scale

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Geologic Map

Proposed Easton Manor Senior Housing Facility
xxx – 25th Street Southeast
Puyallup, Washington
PN: 04202670-01, -03, -07, -08, -13, -27

DocID: Sekyra.25thStSe.F	November 2022	Figure 5

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 Easton Manor Senior Housing Facility
xxx – 25th Street Southeast
Puyallup, Washington
PN: 04202670-01, -03, -07, -08, -13, -27

Hand Auger HA-1

Location: West portion of site
Approximate Elevation: 62 feet (Datum NAVD88)

Depth (ft)			Soil Type	Soil Description
0	-	0.5	-	Topsoil
0.5	-	1.5	ML	Gray SILT (soft, moist) (alluvium)
1.5	-	2.0	SP	Gray, orange iron oxide stained SAND (loose, wet) (alluvium)

Hand auger terminated at 2.0 feet below ground surface.
Drive Point Piezometer driven to 4.0 feet below existing grades.
Rapid groundwater seepage observed at 1.5 feet below existing grades.
Caving/heave observed at 1.5 feet below existing grades.

Hand Auger HA-2

Location: Proposed detention pond
Approximate Elevation: 62 feet (Datum NAVD88)

Depth (ft)			Soil Type	Soil Description
0	-	0.5	-	Topsoil
0.5	-	3.0	ML	Gray SILT with sand (soft, moist to wet) (alluvium)
3.0	-	4.0	SP	Gray, orange iron oxide stained SAND (loose, wet) (alluvium)

Hand auger terminated at 4.0 feet below ground surface.
Drive Point Piezometer driven to 7.0 feet below existing grades.
Rapid groundwater seepage observed at 1.0 feet below existing grades.
Caving/heave observed at 1.0 foot below existing grades.

Hand Auger HA-3

Location: Proposed detention pond
Approximate Elevation: 62 feet (Datum NAVD88)

Depth (ft)			Soil Type	Soil Description
0	-	0.5	-	Topsoil
0.5	-	1.5	SP	Gray, orange iron oxide stained SAND (loose, moist) (fill)
1.5	-	2.0	-	Relict topsoil
2.0	-	3.5	SM	Gray, orange iron oxide stained silty SAND (loose, wet) (alluvium)
3.5	-	4.0	SP	Gray SAND (loose, wet) (alluvium)

Hand auger terminated at 4.0 feet below ground surface.
Drive Point Piezometer driven to 7.0 feet below existing grades.
Rapid groundwater seepage observed at 1.5 feet below existing grades.
Caving/heave observed at 1.5 feet below existing grades.

Logged by: AES **Excavated on: December 20, 2021**

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Hand Auger Logs

Proposed Easton Manor Senior Housing Facility
xxx – 25th Street Southeast
Puyallup, Washington
PN: 04202670-01, -03, -07, -08, -13, -27

Hand Auger HA-4

Location: Proposed roadway
Approximate Elevation: 62 feet (Datum NAVD88)

Depth (ft)			Soil Type	Soil Description
0	-	0.5	-	Topsoil
0.5	-	1.5	SM	Brown to gray silty SAND (loose, moist to wet) (alluvium)

Hand auger terminated at 1.5 feet below ground surface.
Drive Point Piezometer driven to 4.0 feet below existing grades.
Rapid groundwater seepage observed at 1.0 feet below existing grades.
Caving/heave observed at 1.0 feet below existing grades.

Hand Auger HA-5

Location: East portion of Building B
Approximate Elevation: 62 feet (Datum NAVD88)

Depth (ft)			Soil Type	Soil Description
0	-	0.5	-	Topsoil
0.5	-	1.5	SM	Brown to gray silty SAND (loose, moist to wet) (alluvium)

Hand auger terminated at 1.5 feet below ground surface.
Drive Point Piezometer driven to 4.0 feet below existing grades.
Rapid groundwater seepage observed at 1.0 feet below existing grades.
Caving/heave observed at 1.0 feet below existing grades.

Hand Auger HA-6

Location: Proposed eastern entrance to the site
Approximate Elevation: 62 feet (Datum NAVD88)

Depth (ft)			Soil Type	Soil Description
0	-	0.5	-	Topsoil
0.5	-	1.5	SM	Brown to gray silty SAND (loose, moist to wet) (alluvium)

Hand auger terminated at 1.5 feet below ground surface.
Drive Point Piezometer driven to 4.0 feet below existing grades.
Rapid groundwater seepage observed at 1.0 feet below existing grades.
Caving/heave observed at 1.0 feet below existing grades.

Logged by: AES **Excavated on: December 20, 2021**

Easton Manor Senior Housing Complex

Section 26, Township 20 N, Range 4 E, Willamette Meridian, Pierce County, Washington

GRAPHIC SCALE 1"=50'

0 50 100 150

Provide a basin map/additional information proving why the project can model 1.53 acres as pasture instead of forested for the pre-developed conditions. [drainage report, pg 64]

N

W E

S

= DRAINAGE AREA TO DETENTION = 6.4590 AC

= BYPASS DRAINAGE AREA = 0.2053 AC

TOTAL DRAINAGE AREA = 6.6643 AC

E PIONEER

AV SE

21ST ST SE

25TH ST SE

ROBERT A. IRVITT
5/6/2024
STATE OF WASHINGTON
EXPIRES 9/19/2024
REGISTERED PROFESSIONAL ENGINEER

REVISION

	DATE
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

JOB NO: 2243
DATE: May 2024
DESIGNED BY: Rob Triviet
DRAWN BY: Rob Triviet
CHECKED BY: Jim Job
APPROVED BY: Paul Green

AZURE GREEN CONSULTANTS
+feasibility +planning +engineering +surveying

409 East Pioneer, Suite A - Puyallup, WA 98372 phone 253.770.3144 fax 253.770.3142

Drainage Basin Map

Sekyra Senior Housing Complex

Klicha Sekyra
629 21st St. SE
Puyallup, WA 98372
Phone 253.381.7098 email sklicha@live.com

DRAWING

D-1

SHEET 1
OF 1

Project Desc.: Easton Manor Senior Housing Complex Path: F:\Jobs\2243 - Sekyra Retirement\Tmain\Sekyra2024 0508.dro Plot Date/Time: 5/6/2024/7:01:15PM