Received 12-11-2024

Drainage Report
CHAMPIONS CENTRE
DuPont, Washington

For

Mustard Seed Legacy Dev. LLC
32706 Mountain Hwy E
Eatonville, WA 98328

By

LeRoy Surveyors & Engineers, Inc.
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December 2024
Job No: 12895

I hereby state that this Drainage Report for the Champions Centre Project has been prepared by me or under my supervision and meets the standard of care and expertise which is usual and customary in this community for professional engineers. I understand the City of DuPont does not and will not assume liability for the sufficiency, suitability, or performance of drainage facilities prepared by me.

12/3/24

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Section 1 – Proposed Project Description

Project Name: Champions Centre

Permit Number(s): TBD

Project Site Address: XXX Barksdale Ave.
DuPont, WA 98237

Parcel Number(s): 0119362039, 0119362009, 0119362012, & 0119362043

Property Zoning: Commercial (COM)

Legal Description:

PARCEL A:

TAX PARCEL NUMBERS 0119362039, 0119362009 & 0119362012

THAT PORTION OF THE NORTHWEST QUARTER OF SECTION 36, TOWNSHIP 19 NORTH, RANGE 1 EAST, W.M., IN PIERCE COUNTY, WASHINGTON, LYING SOUTHEASTERLY OF WILMINGTON DRIVE (RE-ALIGNED DUPONT-STEILACOOM ROAD), DESCRIBED AS FOLLOWS:

COMMENCING AT THE BRONZE MONUMENT AT THE INTERSECTION OF THE CENTERLINE OF BARKSDALE AVENUE AND THE NORTHERLY LINE OF THE NORTHERN PACIFIC RAILROAD COMPANY'S RIGHT OF WAY, AS SHOWN ON THE PLAT OF REPLAT OF THE VILLAGE DUPONT, ACCORDING TO PLAT RECORDED IN VOLUME 15 OF PLATS, PAGE 65; THENCE NORTH 69°47'46" EAST 41.36 FEET ALONG SAID RAILROAD RIGHT OF WAY TO THE NORTHERLY LINE OF SAID BARKSDALE AVENUE; THENCE ALONG SAID NORTHERLY LINE OF BARKSDALE AVENUE, NORTH 63°41'54" WEST 679.50 FEET TO THE POINT OF BEGINNING; THENCE NORTH 54°19'24" WEST 6.81 FEET TO THE SOUTHEASTERLY CORNER OF BLOCK "L" IN SAID REPLAT OF THE VILLAGE OF DUPONT; THENCE NORTH 35°40'36" EAST 45.10 FEET TO THE SOUTHERLY LINE OF A 15 FOOT EASEMENT GRANTED TO THE PIERCE COUNTY SCHOOL DISTRICT 7 FOR PATH;
THENCE ON SAID SOUTHERLY LINE OF EASEMENT, EASTERLY 521.53 FEET TO THE WESTERLY LINE OF DUPONT-STEILACOOM HIGHWAY, AS ESTABLISHED IN DEED RECORDED DECEMBER 11, 1942 UNDER RECORDING NO. 1311721; THENCE SOUTHERLY ALONG SAID WESTERLY LINE 219 FEET, MORE OR LESS, TO THE NORTHERLY LINE OF BARKSDALE AVENUE; THENCE NORTH 63°41'54" WEST, ALONG SAID NORTHERLY LINE TO THE POINT OF BEGINNING;

EXCEPT THAT PORTION AS CONDEMNED IN DECREE OF APPROPRIATION ENTERED MARCH 11, 1988, IN PIERCE COUNTY SUPERIOR COURT CAUSE NO. 87-2-08765-1.

PARCEL B:

TAX PARCEL NUMBER 0119362043:

THAT PORTION OF THE SOUTHWEST QUARTER OF SECTION 25 AND OF THE NORTHWEST QUARTER OF SECTION 36, TOWNSHIP 19 NORTH, RANGE 1 EAST, W.M., CITY OF DUPONT, PIERCE COUNTY, WASHINGTON, BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT FORT LEWIS MONUMENT NO. 262, BEING A 6"X6" CONCRETE MONUMENT WITH LEAD AND TACK, AS SHOWN ON THAT RECORD OF SURVEY BY ESM, INC. RECORDED UNDER PIERCE COUNTY RECORDING NO. 9303050249; THENCE SOUTH 87°57'04" EAST, 572.46 FEET TO THE WESTERLY RIGHT-OF-WAY MARGIN OF DUPONT - STEILACOOM ROAD;THENCE ALONG SAID WESTERLY MARGIN, SOUTH 01°42'01" WEST 1,488.92 FEET TO THE SOUTHEASTERLY CORNER OF THE PLAT OF "BELL HILL" AS ECORDED UNDER PIERCE COUNTY RECORDING NO. 9109060562 AND THE TRUE POINT OF BEGINNING; THENCE CONTINUING ALONG SAID WESTERLY MARGIN THE FOLLOWING COURSES: SOUTH 01°42'01" WEST, 74.27 FEET TO A POINT OF CURVATURE; SOUTHWESTERLY 589.42 FEET ALONG THE ARC OF A TANGENT CURVE TO THE RIGHT, HAVING A RADIUS OF 1846.32 FEET, THROUGH A CENTRAL ANGLE OF 19°49'02" TO A POINT OF TANGENCY; SOUTH 21°31'03" WEST, 234.08 FEET; SOUTH 31°28'47" WEST, 758.44 FEET TO THE SOUTHERLY LINE OF A 15 FOOT WIDE EASEMENT GRANTED TO PIERCE COUNTY SCHOOL DISTRICT NO. 7 FOR A PATH BY INSTRUMENT RECORDED UNDER PIERCE COUNTY RECORDING NO. 1604647; THENCE ALONG SAID SOUTHERLY LINE, THE FOLLOWING COURSES: N 73°58'12" W, 6.14 FEET; N 76°55'56" W, 137.26 FEET; N 80°45'26" W, 149.55 FEET; NORTH 83°19'26" WEST, 3.52 FEET TO THE SOUTHEASTERLY LINE OF BLOCK "L" AS SHOWN ON THE "REPLAT OF THE VILLAGE OF DUPONT" AS RECORDED IN VOLUME 15 OF PLATS, PAGE 66, RECORDS OF PIERCE COUNTY, WASHINGTON; THENCE ALONG THE SOUTHEASTERLY LINE OF SAID BLOCK "L" AND ALONG THE EASTERLY LINE OF THAT TRACT OF LAND CONVEYED BY DEED RECORDED UNDER RECORDING NO. 8609160527, NORTH 37°31'09" EAST, 421.17 FEET; THENCE ALONG THE EASTERLY AND NORTHEASTERLY LINES OF SAID TRACT, THE FOLLOWING COURSES: N 50°54'48" W, 39.71 FEET; N 20°15'28" E, 177.79 FEET; N 08°06'30" E, 148.69 FEET; N 18°28'36" E, 97.46 FEET; N 10°27'09" W, 109.27 FEET; N 10°49'00" E, 83.70 FEET; N 39°55'59" W, 402,16 FEET; N 49°44'03" W, 138.48 FEET; N 41°21'42" W, 83.79 FEET;

NORTH 47°49'04" WEST, 99.24 FEET TO THE SOUTHERLY LINE OF SAID PLAT OF "BELL HILL"; THENCE ALONG SAID SOUTHERLY LINE, THE FOLLOWING COURSES: N 86°09'51" E, 566.26 FEET; S 30°02'50" E, 66.31 FEET; N 81°03'07" E, 56.42 FEET; N 76°19'50" E, 49.78 FEET; S 80°24'24" E, 25.68 FEET; S 86°11'31" E, 41.36 FEET; S 77°20'45" E, 37.53 FEET; N 82°37'33" E, 40.92 FEET; N 83°03'30" E, 29.71 FEET; S 71°21'32" E, 35.46 FEET; S 73°42'35" E, 28.67 FEET; S 61°30'59" E, 58.65 FEET; N 87°41'02" E, 42.60 FEET; S 37°31'32" E, 35.01 FEET; N 74°09'45" E, 57.08 FEET; S 88°17'59" E, 24.03 FEET TO THE TRUE POINT OF BEGINNING.

The Champions Centre project contains 4 existing parcels. The overall combined parcel area of the 4 parcels is 927,027 square feet (21.28 acres). This commercial project consists of a Boundary Line Adjustment to reduce the number of lots from 4 parcels into 3 parcels. Parcels A, B & C.

Parcel A will be 139,369 square feet (3.20 acre). This will be a commercial lot that will include the construction of approximately 26,000 square foot Religious Assembly that will have a maximum congregation occupancy of 350 people. The architectural footprint for this Religious Assembly is unique to allow for the existing grove of Landmark Oregon White Oak Trees that sit on an existing knoll to be protected and remain on-site. This property will also have a total of 136 parking stalls. The parking stalls will include 8 electric vehicle stalls, 5 standard ADA stalls, 1 van ADA stall and 122 standard stalls. This property will be served by Public Sewer & Water and will have on-site storm filter system(s) that will provide quality treatment of on-site stormwater runoff. After treatment onsite stormwater runoff will be conveyed to an on-site infiltration system which will provide quantity mitigation.

Parcel B will be 34,601 square feet (0.79 acres). This will be a commercial lot that will include the construction of approximately 3,000 square foot Eating and Drinking Establishment. The maximum occupancy is unknown at this time. This property will also have a total of 39 parking stalls. The parking stalls will include 11 electric vehicle stalls, 1 standard ADA stall, 1 van ADA stall and 26 standard stalls. This property will be served by Public Sewer & Water and will have an on-site cartridge-style storm filter system which will provide quality mitigation. Treated stormwater runoff will then be conveyed to and on-site stormwater infiltration system.

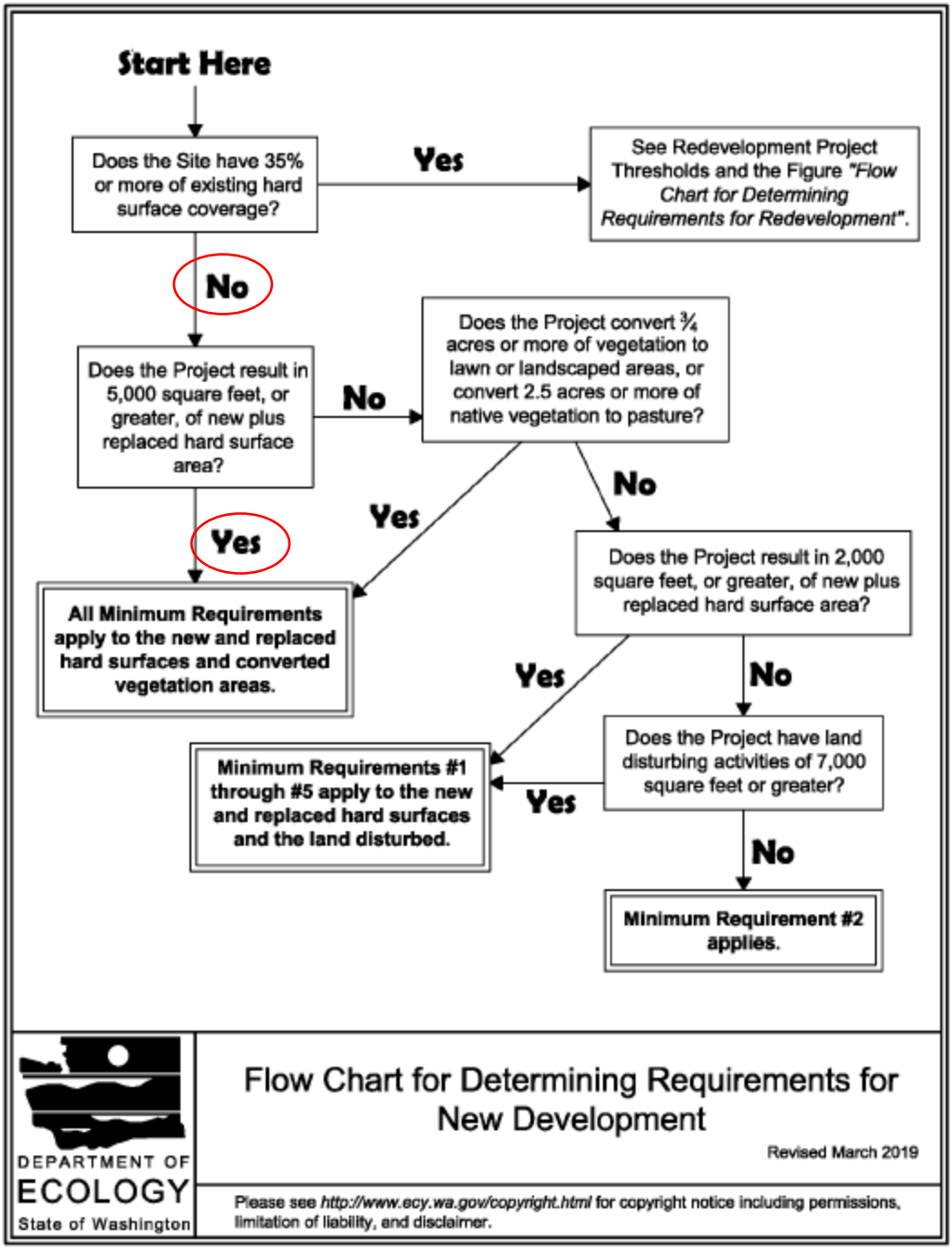
Parcel C will be 753,056 square feet (17.29 acres). This will include an existing wetland, wetland buffer, stream, stream buffer and Fema Flood Zone A per panel 53053C0526E effective date 3/7/2017. This parcel will be deeded to the City of DuPont.

Storm Drainage Requirements

In accordance with the City of DuPont Municipal Code Section 22.01.090 *General Requirements* the stormwater design for the project is required to meet the *2019 State of Washington Department of Ecology's Stormwater Management Manual* referred to as the "Manual", which sets the methodology and design criteria for the project.

According to Volume 1, *Figure I-3.1: Flow Chart for Determining Requirements for New Development* minimum requirements #1-10 apply to the new and replaced hard surfaces and converted vegetation areas. See the below flow chart for more information.

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

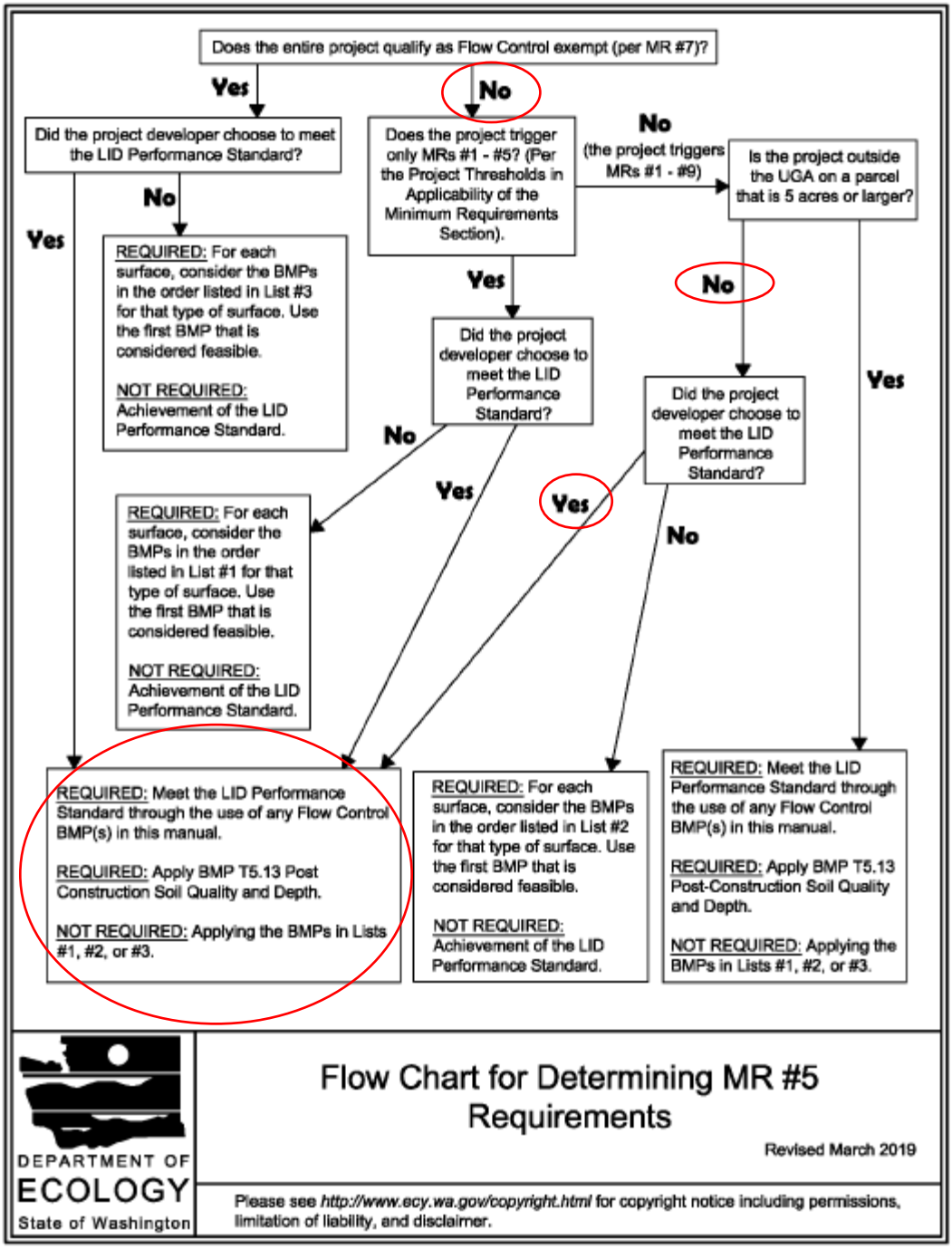


Minimum Requirements

Minimum requirements #1 through #10 apply to this new development.

- Minimum Requirement #1: Preparation of Stormwater Site Plans
    - In accordance with Volume I, Section I-3.4.1 of the Manual, Stormwater Site Plan documents are required for this the proposed project. This report and accompanying plans satisfy this requirement.
- Minimum Requirement #2: Construction Stormwater Pollution Prevention
    - In accordance with Volume I, Section I-3.4.2 of the Manual, a Construction Stormwater Pollution Prevention Plan (Construction SWPPP) is required for the proposed project addressing each of the 13 elements, unless site conditions render the element unnecessary and the exemption from that element is clearly justified in the narrative of the SWPPP. The SWPPP narrative is included as a separate report with this submittal.
- Minimum Requirement #3: Source Control of Pollution
    - In accordance with Volume I, Section I-3.4.3 of the Manual, all known, available, and reasonable source control BMPs will be applied to the project. Applicable operational and structural source control BMPs, as described in Volume IV of the Manual will be implemented and are addressed in the Maintenance and Source Control Manual. Applicable construction BMPs, as described in Volume II of the Manual, will be applied and discussed in the Construction SWPPP.
- Minimum Requirement #4: Preservation of Natural Drainage Systems and Outfalls
    - In accordance with Volume I, Section I-3.4.4 of the Manual, the project will maintain and preserve the natural site drainage. In the existing condition, runoff from the project area generally infiltrates.
- Minimum Requirement #5: Onsite Stormwater Management
    - In accordance with Volume I, Section I-3.4.5 and following *Figure I-3.3: Flow Chart for Determining MR #5 Requirements Flow Chart* (see below), the project chose to meet Low Impact Design (LID) Performance Standard in order to satisfy the standards of Minimum Requirement #5.
        - LID allows the engineer/designer to choose which BMPs will be utilized in order to meet the Low Impact Design Criteria.
    - **Lawn and Landscaped Areas** shall follow the soil preservation and amendment BMP T5.13: Post-Construction Soil Quality and Depth.
    - **Roofs** will be collected and conveyed to an infiltration facility.
    - **Other Hard Surfaces,** such as the parking area, will receive quality mitigation via cartridge-style stormwater runoff treatment and then be conveyed to an infiltration facility.

Figure I-3.3: Flow Chart for Determining MR #5 Requirements



- This project is proposing on-site Pollution Minimum Requirement #6: Runoff Treatment
    - In accordance with Volume I, Section I-3.4.6 of the Manual all pollution generating hard surfaces (PGHS) will receive enhanced water quality mitigation.
    - Generating Hard Surfacing (PGHS) consisting of:
        - Parcel A – Parking: 72,727 SF
        - Parcel B – Parking: 17,365 SF

      This is more than the 5,000 square foot threshold indicated in Volume I, Section I-3.4.6 of the manual. Thus, runoff treatment is required.

      Enhanced quality runoff treatment for PGHS is provided through the proposed cartridge-style water quality treatment system.

- Minimum Requirement #7: Flow Control
    - In accordance with Volume 1, Section I-3.4.7 of the Manual the following thresholds are to be utilized when determining if flow control is required for a project. For each threshold, a response in bold lettering provides the reviewer with the applicability of that particular threshold as it relates to this project.
        - Projects in which the total of effective impervious surfaces is 10,000 square feet or more in a threshold discharge area. **The proposed on-site impervious surfaces will be completely infiltrated, meaning there are no effective hard surfaces proposed for the on-site project. The project does not exceed this threshold.**
        - Projects that convert three-fourths of an acre or more of vegetation to lawn or landscape or convert 2.5 acres or more of native vegetation to pasture in a threshold discharge area, and from which there is a surface discharge in a natural or man-made conveyance system from the site. **In the developed condition, the on-site project proposes less than three-fourths of an acre of on-site lawn/landscaping nor is the project converting 2.5 acres or more of native vegetation to pasture therefore this threshold has not been exceeded.**
        - Projects that through a combination of effective hard surfaces and converted vegetation area cause a 0.15 cubic feet per second (cfs) increase in the 100-year recurrence interval flow frequency from a threshold discharge area as estimated using the WWHM, or other approved continuous simulation model and using 15-minute time steps. **The 100-year pre-developed runoff from the project is 0.193 cfs. The 100-year developed runoff from the project is 0.000 cfs. The project results in a decrease of 0.193 cfs, which is less than the 0.15 cfs increase threshold. The project does not exceed this threshold. Calculations are provided within Appendix C of this report.**
    - The project does not exceed any of the thresholds for Minimum Requirement #7. Therefore, achievement of the Standard Flow Control requirement is not required.

However, the project does meet the Standard Flow Control requirement as well as the Low Impact Development Standard.

- Minimum Requirement #8: Wetlands Protection
    - In accordance with Volume I, Section I-3.4.8 of the Manual, the requirements in this section only apply to projects whose stormwater discharges into a wetland, either directly or indirectly through a conveyance system. Stormwater runoff from the site generally infiltrates and therefore is not conveyed to the wetland. The project site has no channelization that would indicate stormwater runoff is conveyed to the wetland via a conveyance system; therefore, the project does not need to meet wetlands protection requirements.
    - An existing 84-inch diameter storm drainage pipe releases to the wetland from the south. The pipe and headwall will remain in existing condition. The project site does not release stormwater runoff to this pipe.
    - An existing 15-inch diameter corrugated metal pipe flows directly onto the project site from approximately 4.33 acres of roadway. Approximately 850-feet of Steilacoom Dupont Road SW which runs across the frontage of the property as well as approximately 2,370-feet of Wilmington Dr. The project is proposing to extend this pipe through the site and release to the wetland buffer via a quarry spall outfall protection rock lining.
- Minimum Requirement #9: Operations and Maintenance
    - In accordance with Volume I, Section I-3.4.9 of the Manual, an Operations and Maintenance Manual consistent with the provisions in Volume V of the Manual will be provided to ensure that stormwater control facilities are adequately maintained and operated properly. An Operations and Maintenance Manual is included with this submittal and is provided as a separate document.
- Minimum Requirement #10: Financial Liability

  In accordance with Volume I, Section I-3.5.2 of the Manual, the Owner/Developer of this project is responsible for all financial guarantees required by the City of DuPont which may include bu is not limited to:
    - Reclamation Guarantee
    - Construction Guarantee
    - Defect and Maintenance Guarantee

Section 2 - Existing Conditions Summary

Topography

This group of properties (the Site) comprise approximately 21 acres, of which the proposed development will occur within a contiguous area located on the south and east portions of the site comprising approximately 4.75 acres. The site is generally undeveloped containing an existing wetland. An existing asphalt pad is located at the southeast corner as well as a few large power poles running through the site in an existing easement. In addition, a Pierce County Sewer Utilities Pump Station is located near the middle of the property on the east side immediately adjacent to Dupont-Steilacoom Road. It is

also worth noting that the site also contains existing storm pipelines which convey stormwater runoff from offsite through the property and exiting near the existing wetland. The project site is bounded on the Southeast side and the Southwest side by Steilacoom Dupont Road Southwest and Barksdale Avenue respectively. The site topography contains gentle to moderate slopes which descend westward into the site from Steilacoom Dupont Road and dip slightly northward from Barksdale Avenue. The project site, in the area of development, slopes from a high point of 246' in the south corner of the site to a low of approximately 232' near the wetland buffer.

Ground Cover

Ground cover, in the undisturbed areas, is partially wooded and includes well-developed understory vegetation typical for the region. While the site is generally undeveloped and contains existing wetland there are areas that have been disturbed. An existing asphalt pad is located at the southeast corner as well as a few large power poles running through the site in an existing easement. Vegetation, around the power poles is predominately scattered bushes and low-level vegetation. In addition, a Pierce County Sewer Utilities Pump Station is located near the middle of the property on the east side immediately adjacent to Dupont-Steilacoom Road.

Drainage/Soils

According to the NRCS, the site is situated over three soil environments. However, most of the proposed development area is situated on the Spanaway gravelly sandy loam(41A), while a small portion may extend over a transition to the Everett-Spanaway-Spana Complex. Refer to the NRCS Soil Map within the report Appendix for further information.

Section 3 – Infiltration Rates

A design rate of 30 inches per hour is recommended per the *Geotechnical Soil Observation Report – Champion Centre*, prepared by LS&E and dated 8/24/23 (refer to Appendix E) for use in designing the infiltration trench systems.

Section 4 – Wells and Septic Systems

The project site contains an existing well which will be decommissioned. The site does not contain any existing septic systems to the best of our knowledge. There is however an existing Pierce County Utilities Sewer Pump Station located on the property within an easement.

Section 5 – Fuel Tanks

No fuel tanks are present to the best of our knowledge. However, it is assumed that the Pierce County Utilities Sewer Pump Station has a back-up generator with fuel tank.

Section 6 – Sub-basin Description

Predeveloped:

The project site is characterized by slopes with grades generally between 5 to 20 percent and generally descending south to north toward the wetland.

The parcel is currently occupied in the south with a concrete pad (to be removed), power lines (to remain) occupying a center portion of Parcel A and an existing Pierce County Utilities Pump Station located at the extreme northeast corner of Parcel B. The remaining ground cover is predominately scattered bushes, scattered trees, and low-level vegetation. A stand of trees are centrally located on the southeast side of Parcel A, these will be protected and remain.

Table 1 presents the reviewer with the historic land cover for the on-site and the existing conditions for the off-site areas for the predeveloped basin.

LAND COVER	BASIN AREA
Parcel A: On-Site Historic: Forest	-148,258 SF (3.404 AC)
Parcel B: On-site Historic: Forest	-35,315 SF (0.811 AC)
Ex. PC Util Pump Station(Parcel B):	
Gravel/Paving-Imp	-2,544 SF (0.06 AC)
Landscaping-Pasture	-3,142 SF (0.072 AC)
Parcel C: Wetland	
Pond	-600,090 SF (13.776 AC)
Buffer-Forest	-143,364 SF (3.291 AC)
TOTAL Onsite:	-927,027 SF (21.28 AC)
Offsite:	
Contributary to Parcel A: Forest	-8,624 SF (0.198 AC)
Contributary to Parcel B: Forest	-3,295 SF (0.076 AC)
Total Area:	-932,102 SF (21.398 AC)
Existing Offsite Roadway pass through project site to wetland:	
Barksdale Avenue: PGIS including SW	32,868 SF (0.755 AC)
Wilmington/Steilacoom/Dupont Rd.: PGIS including SW	188,712 SF (4.332 AC)
Total Area:	221,580 SF (5.087 AC)

Table 1: Predeveloped/Existing Areas

Developed:

In the developed condition, the natural drainage pattern is retained in areas outside of the project limits. For the off-site, pervious pathways/sidewalks will be installed to help manage stormwater runoff. Table 2 presents the reviewer with the developed land cover and areas.

LAND COVER	AREA
Conveyed to Parcel A Infiltration Trench:	
-Parking Main (WQ A **Lower**)-Imp	-48,932 SF (1.123 AC)
-Curb/SW (WQ A **Lower**)-Imp	-4,910 SF (0.113 AC)
-Landscape A (WQ A **Lower**)-Pasture	-14,751 SF (0.339 AC)
-Roof Church, Imp	-25,850 SF (0.593 AC)
-Roof Dumpster (WQ A **Lower**)-Imp	-200 SF (0.005 AC)
-Native Tree Save (WQ A **Lower**)-Forest	-11,724 SF (0.269 AC)
-Parking Upper (WQ A **Upper**)-Imp	-15,871 SF (0.364 AC)
-Curb/SW Upper (**WQ A Lower**)-Imp	-2,814 SF (0.065 AC)
-Landscaping Upper (WQ A **Upper**)-Pasture	-4,520 SF (0.104 AC)
Bypass Parcel A 129,572	
-Landscape-Pasture	-11,197 SF (0.257 AC)
-Gravel Access-Imp	-1,550 SF (0.036 AC)
-Landscape-Pasture Steep	-5,939 SF (0.136 AC)
Total Parcel A-Basin	-148,258 (3.404 AC)
-Offsite Run on Upper-Pasture (WQ A Upper and Infiltration Trench A)	-4,950 SF (0.114 AC)
-Offsite Run on Lower-Pasture (WQ A Lower and Infiltration Trench A)	-4,161 SF (0.096 AC)
Conveyed to Parcel B Infiltration Trench	
-Parking (WQ B)-Imp	-15,854 SF (0.364 AC)
-SW/Curb	-1,511 SF (0.035 AC)
-Landscape-Pasture	-1,853 SF (0.043 AC)
-Roof	-3,000 SF (0.069 AC)
Bypass Parcel B -Landscape-Pasture -Ex. PC Util Pump Station (Parcel B): -Gravel/Paving-Imp -Landscaping-Pasture	 -7,401 SF (0.170 AC) -2,544 SF (0.058 AC) -3,152 SF (0.072 AC)
Total Parcel B-Basin	-35,315 SF (0.811 AC)
-Offsite Run on-Pasture (WQ B and Infiltration Trench B)	-2,380 SF (0.054 AC)
-Offsite Run on-Imp (WQ B and Infiltration Trench B)	-458 SF (0.011 AC)
Parcel C – Wetland Basin	
-Pond	600,090 SF (13.776 AC)

-Buffer-Forest	-143,364 SF (3.291 AC)
Total Parcel C-Basin	743,454 SF (17.067 AC)
Total Onsite Basin Area:	927,027 SF (21.282 AC)
Total Onsite Basin plus run-on	939,434 SF (21.566 AC)

Table 2: Developed Areas

Table 3 presents the reviewer with the peak flows for the 5-, 10-, 25-, 50-, and 100-Year Storm recurrence events in the historic and developed conditions.

Storm Recurrence	Historic Peak Flow (CFS)	Developed Peak Flow (CFS)
2-Year	6.182	0.000
5-Year	7.644	0.000
10-Year	9.020	0.000
25-Year	11.137	0.000
50-Year	13.296	0.000
100-Year	15.665	0.000

Table 3: Pre- and Post-Developed Peak Flows

See Appendix C for Stormwater Calculations.

The existing storm roadway collection system for a portion of Barksdale Avenue and Wilmington/Steilacoom-Dupont is conveyed through existing parcel 0119362043. The outflow pipe will be extended to facilitate the proposed site development. Table 4 presents the reviewer with the existing land cover for the off-site public roadway areas contributary to the wetland.

Existing Offsite Roadway pass through project site to wetland:	
Barksdale Avenue: PGIS including SW	32,868 SF (0.755 AC)
Wilmington/Steilacoom-Dupont Rd.: PGIS including SW	188,712 SF (4.332 AC)
Total Area:	221,580 SF (5.087 AC)

Table 4: Existing Areas – Offsite Roadways

Table 5 presents the reviewer with the developed land cover for the off-site public roadway areas contributary to the wetland after construction is complete. A total reduction of 2,728 square feet contributary area flowing to the roadway system is due to the conversion of existing standard concrete sidewalks to pervious concrete.

Developed Offsite Roadway pass through project site to wetland: Barksdale Avenue: PGIS Wilmington/Steilacoom-Dupont Rd.: PGIS	 31,930 SF (0.733 AC) 186,922 SF (4.291 AC)
Total Area:	218,852 SF (5.024 AC)

Table 5: Developed Areas – Offsite Roadways

Calculations have been provided in the appendix showing flows. Proposed conveyance sizing has been designed upon the existing conditions. The project is not proposing any additional water quality for the public roadway as the project is reducing the amount of impervious contributory to the city storm system.

Table 6 presents the reviewer with the peak flows for the 5-, 10-, 25-, 50-, and 100-Year Storm recurrence events in the existing and developed conditions.

Storm Recurrence	Historic Peak Flow (CFS)	Developed Peak Flow (CFS)
2-Year	2.243	2.215
5-Year	2.810	2.775
10-Year	3.243	3.203
25-Year	4.063	4.012
50-Year	4.760	4.701
100-Year	5.754	5.683

Table 6: Pre- and Post-Developed Peak Flows

See Appendix C for Stormwater Calculations.

Section 7 – Floodplain Analysis

According to the Federal Emergency Management Program Flood Insurance Rate Map 53053C0526E a, effective March 7, 2017, a portion of the project site does lie within a floodplain (Wetland area); however, the proposed project will not develop the floodplain area. The remainder of the site lies within an "Area of Minimal Flood Hazard." A FirmETTE has been created for this project and is presented in the located Appendix.

Section 8 – Aesthetic Considerations for Facilities

All drainage facilities will be located underground and therefore out of general view. The proposed landscape buffers around the site will also enhance the aesthetics of the site.

Section 9 – Facility Sizing and Downstream Analysis

Facility Sizing

The project's stormwater facilities were designed and sized using MGS Flood version 4.58 with a 15-minute time step.

Design infiltration rates for the Bioretention system were discussed within Section 3 above is as follows:

- I = 30 in/hr

Therefore, two infiltration trenches have been sized to mitigate the 100-year, 24-hour return period. Parcel A (Infiltration Trench A) was determined to be 76'L x 20'W x 3' D utilizing 30 percent voids within the proposed drainage rock.

Parcel B (Infiltration Trench B) was determined to be 45'L x 8'W x 2' D utilizing 30 percent voids within the proposed drainage rock.

Downstream Analysis

In the existing condition, runoff from the site generally infiltrates or flows north into the wetland. In the developed condition, flows from a majority of the site will be infiltrated. A minor amount of stormwater runoff from landscaped edges will sheet-flow overland through amended soils with plantings toward the wetland and then follow the wetland northward, thus maintaining the natural discharge point.

As stated previously, the site receives stormwater from two existing drainage systems.

a) An existing 84-inch diameter storm drainage pipe releases to the wetland from the south. The pipe and headwall will remain in existing condition. The project site does not release stormwater runoff to this pipe.

b) An existing 15-inch diameter corrugated metal pipe flows directly onto the project site from approximately 4.33 acres of roadway. Approximately 850-feet of Steilacoom Dupont Road SW which runs across the frontage of the property as well as approximately 2,370-feet of Wilmington Dr. The project is proposing to extend this pipe through the site and release to the wetland buffer via a Flow Spreader. The project is proposing only to extend the pipe but will generally not release stormwater to this system; however Infiltration Trench A will connect to this system as an emergency overflow route. Additionally, the project is not adding any additional PGIS to the system thus the existing stormwater oil/water separator will remain in the current condition. No additional water quality treatment is proposed for this city owned system.

Aquifer Recharge

Per the Pierce County Interactive Web Application, the project lies within the Central Pierce County Aquifer Recharge Area. Calculations indicate that the pre- and post-developed recharge volumes are 11.446 ac-ft/year and 14.472 ac-ft/year, respectively. As such, the post-development volume is greater than the pre-development volume which will assist in maintaining and recharging the aquifer.

Water Quality Treatment

Per minimum requirement #6, water quality treatment is necessary for this project. The project proposes to address Water Quality through the installation of Oldcastle BioPod Biofilter Systems, however an equivalent, Washington State approved product would be acceptable. Oldcastle BioPod Biofilter Systems provide Enhanced Water Quality in accordance with Washington State DOE Standards.

BioPod BioFilter System Sizing

The site requires three (3) separate BioPod BioFilter Systems. structures to provide Quality Mitigation due to topography and to maintain separation for Parcels A and B. In accordance with the flows, as indicated by the stormwater calculations, the number of ZPC style cartridges necessary for each water quality facility are as follows:

- Parcel A – Lower – 0.14 cfs (offline, 15-min WQ flow), therefore a Model BPU-4121B BioPod BioFilter System is proposed.
- Parcel A – Upper – 0.05 cfs (offline, 15-min WQ flow), therefore a Model BPU-461B BioPod BioFilter System is proposed.
- Parcel B – 0.05 cfs (offline, 15-min WQ flow), therefore a Model BPU-461B BioPod BioFilter System is proposed.

Section 10 – Utilities

The lots will be serviced by the following utility providers:

Cable T.V.:	Comcast
Telephone:	Century Link
Power:	Puget Sound Energy
Gas:	Puget Sound Energy
Water:	City of DuPont
Sewer:	Pierce County Sewer
Refuse:	LeMay Inc.

Section 11 – Covenants, Dedications, Easements

As part of the development of this property, the project will deed over to the City of DuPont, Parcel C once complete. Please refer to the site plans and survey plans for further information.

Section 12 – Property Owner's Association Articles of Incorporation.

Not applicable to this project.

Section 13 – Other Permits or Conditions Placed on the Project

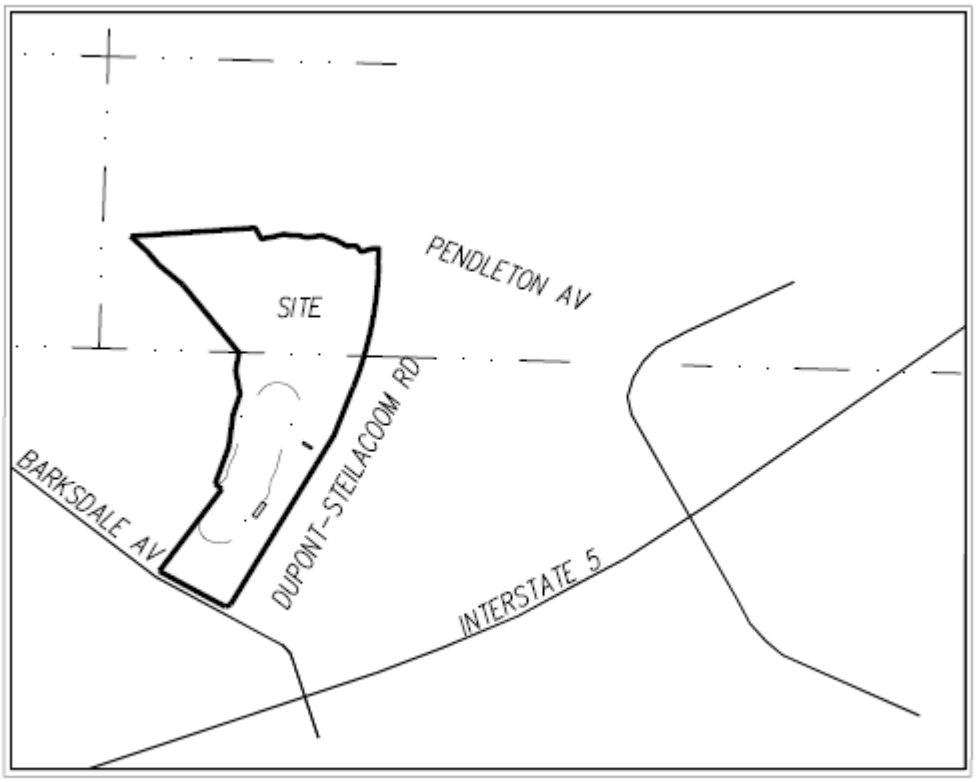
Other Permits or Conditions placed on this project may include but are not limited to:

Landscape Plan

Boundary Line Adjustment

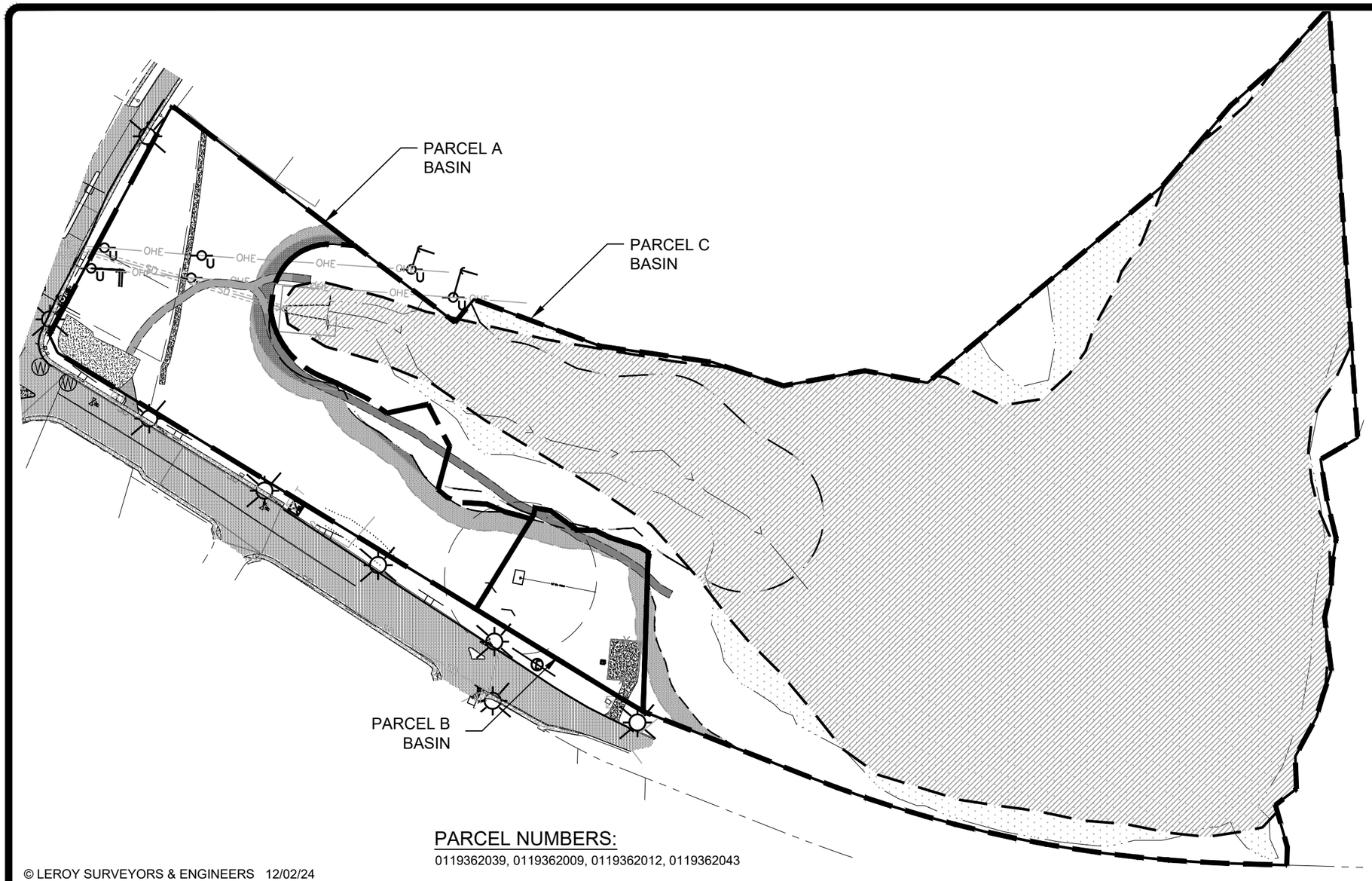
Appendix A

Vicinity Map



Appendix B

Basin Maps



LAND COVER	BASIN AREA
Parcel A: On-Site Historic: Forest	-148,258 SF (3.404 AC)
Parcel B: On-site Historic: Forest	-35,315 SF (0.811 AC)
Ex. PC Util Pump Station(Parcel B):	
Gravel/Paving-Imp	-2,544 SF (0.06 AC)
Landscaping-Pasture	-3,142 SF (0.072 AC)
Parcel C: Wetland	
Pond	-600,090 SF (13.776 AC)
Buffer-Forest	-143,364 SF (3.291 AC)
TOTAL Onsite:	-927,027 SF (21.28 AC)
Offsite:	
Contributary to Parcel A: Forest	-8,624 SF (0.198 AC)
Contributary to Parcel B: Forest	-3,295 SF (0.076 AC)
Total Area:	-932,102 SF (21.398 AC)
Existing Offsite Roadway pass through project site to wetland:	
Barksdale Avenue: PGIS including SW	32,868 SF (0.755 AC)
Wilmington/Steilacoom/Dupont Rd.: PGIS including SW	188,712 SF (4.332 AC)
Total Area:	221,580 SF (5.087 AC)

Table 1: Predeveloped/Existing Areas

PARCEL NUMBERS:
0119362039, 0119362009, 0119362012, 0119362043

GRAPHIC SCALE
0 75 150
1" = 150 FEET

PREDEVELOPED DRAINAGE BASIN MAP

LEROY SURVEYORS & ENGINEERS
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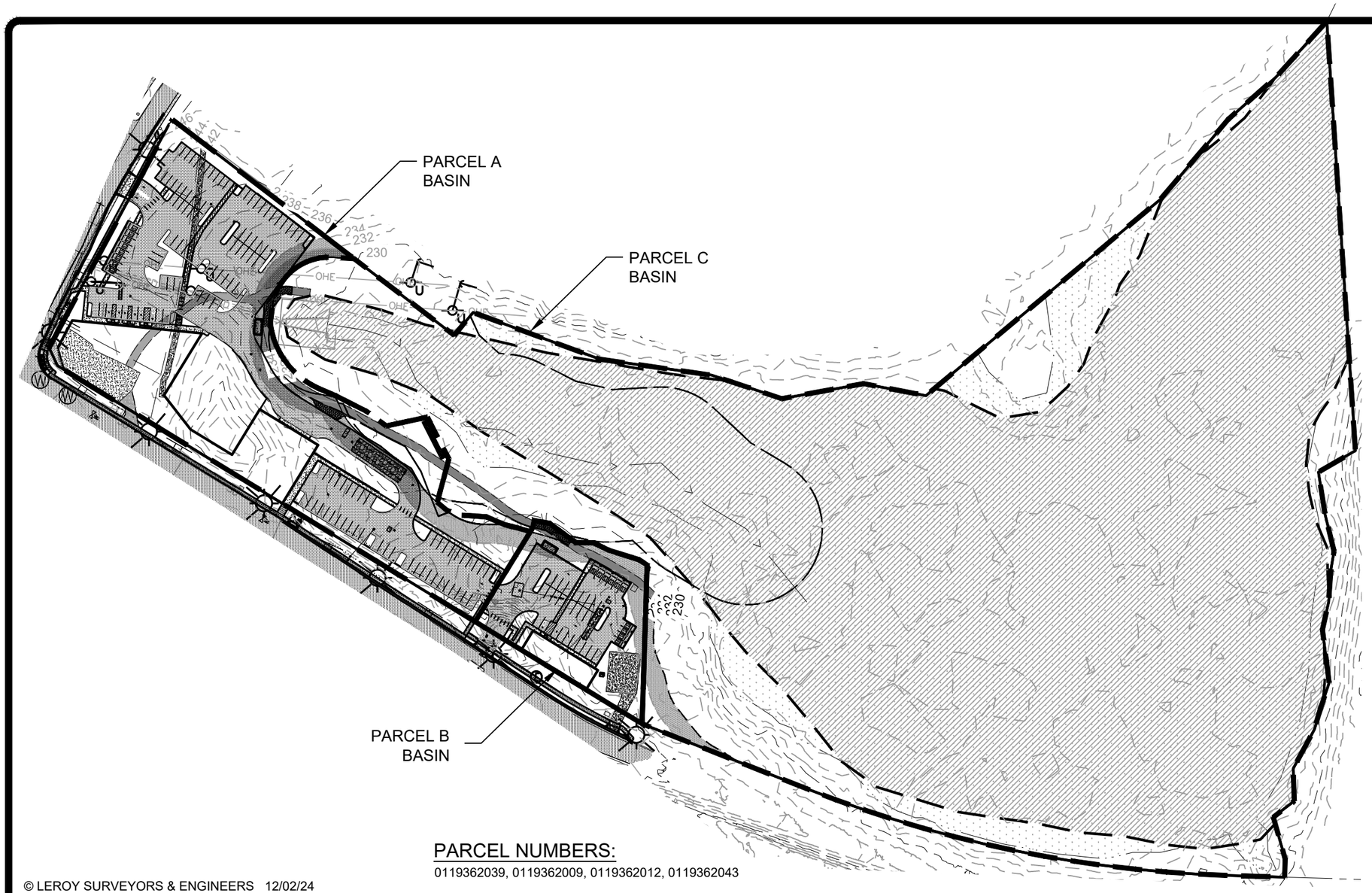
P.O. Box 740, Puyallup, Washington 98371
(253) 848-6608 Fax: (253) 840-4140
www.lseinc.com

CLIENT: MUSTARD SEED LEGACY DEV LLC		DESIGNER: STEVE T. NELSON, P.E.	
PHONE NUMBER:		CERT. NO.	
ADDRESS: 32706 MOUNTAIN HWY E		SUBDIVISION:	
EATONVILLE, WA 98328		LOT NO.	DRAWN: STN
PARCEL NO. SEE ABOVE		DATE: 12/2/24	JOB NO. 12895

SHEET

12/2/2024



LAND COVER	AREA
Conveyed to Parcel A Infiltration Trench:	
-Parking Main (WQ A **Lower**)-Imp	-48,932 SF (1.123 AC)
-Curb/SW (WQ A **Lower**)-Imp	-4,910 SF (0.113 AC)
-Landscape A (WQ A **Lower**)-Pasture	-14,751 SF (0.339 AC)
-Roof Church, Imp	-25,850 SF (0.593 AC)
-Roof Dumpster (WQ A **Lower**)-Imp	-200 SF (0.005 AC)
-Native Tree Save (WQ A **Lower**)-Forest	-11,724 SF (0.269 AC)
-Parking Upper (WQ A **Upper**)-Imp	-15,871 SF (0.364 AC)
-Curb/SW Upper (**WQ A Lower**)-Imp	-2,814 SF (0.065 AC)
-Landscaping Upper (WQ A **Upper**)-Pasture	-4,520 SF (0.104 AC)
Bypass Parcel A 129,572	
-Landscape-Pasture	-11,197 SF (0.257 AC)
-Gravel Access-Imp	-1,550 SF (0.036 AC)
-Landscape-Pasture Steep	-5,939 SF (0.136 AC)
Total Parcel A-Basin	-148,258 (3.404 AC)
-Offsite Run on Upper-Pasture (WQ A Upper and Infiltration Trench A)	-4,950 SF (0.114 AC)
-Offsite Run on Lower-Pasture (WQ A Lower and Infiltration Trench A)	-4,161 SF (0.096 AC)
Conveyed to Parcel B Infiltration Trench	
-Parking (WQ B)-Imp	-15,854 SF (0.364 AC)
-SW/Curb	-1,511 SF (0.035 AC)
-Landscape-Pasture	-1,853 SF (0.043 AC)
-Roof	-3,000 SF (0.069 AC)
Bypass Parcel B	
-Landscape-Pasture	-7,401 SF (0.170 AC)
-Ex. PC Util Pump Station (Parcel B):	
-Gravel/Paving-Imp	-2,544 SF (0.058 AC)
-Landscaping-Pasture	-3,152 SF (0.072 AC)
Total Parcel B-Basin	-35,315 SF (0.811 AC)
-Offsite Run on-Pasture (WQ B and Infiltration Trench B)	-2,380 SF (0.054 AC)
-Offsite Run on-Imp (WQ B and Infiltration Trench B)	-458 SF (0.011 AC)
Parcel C – Wetland Basin	
-Pond	600,090 SF (13.776 AC)
-Buffer-Forest	-143,364 SF (3.291 AC)
Total Parcel C-Basin	743,454 SF (17.067 AC)
Total Onsite Basin Area:	927,027 SF (21.282 AC)
Total Onsite Basin plus run-on	939,434 SF (21.566 AC)

Table 2: Developed Areas

PARCEL NUMBERS:
0119362039, 0119362009, 0119362012, 0119362043

GRAPHIC SCALE
0 75 150
1" = 150 FEET

DEVELOPED DRAINAGE BASIN MAP

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(253) 848-6608 Fax: (253) 840-4140
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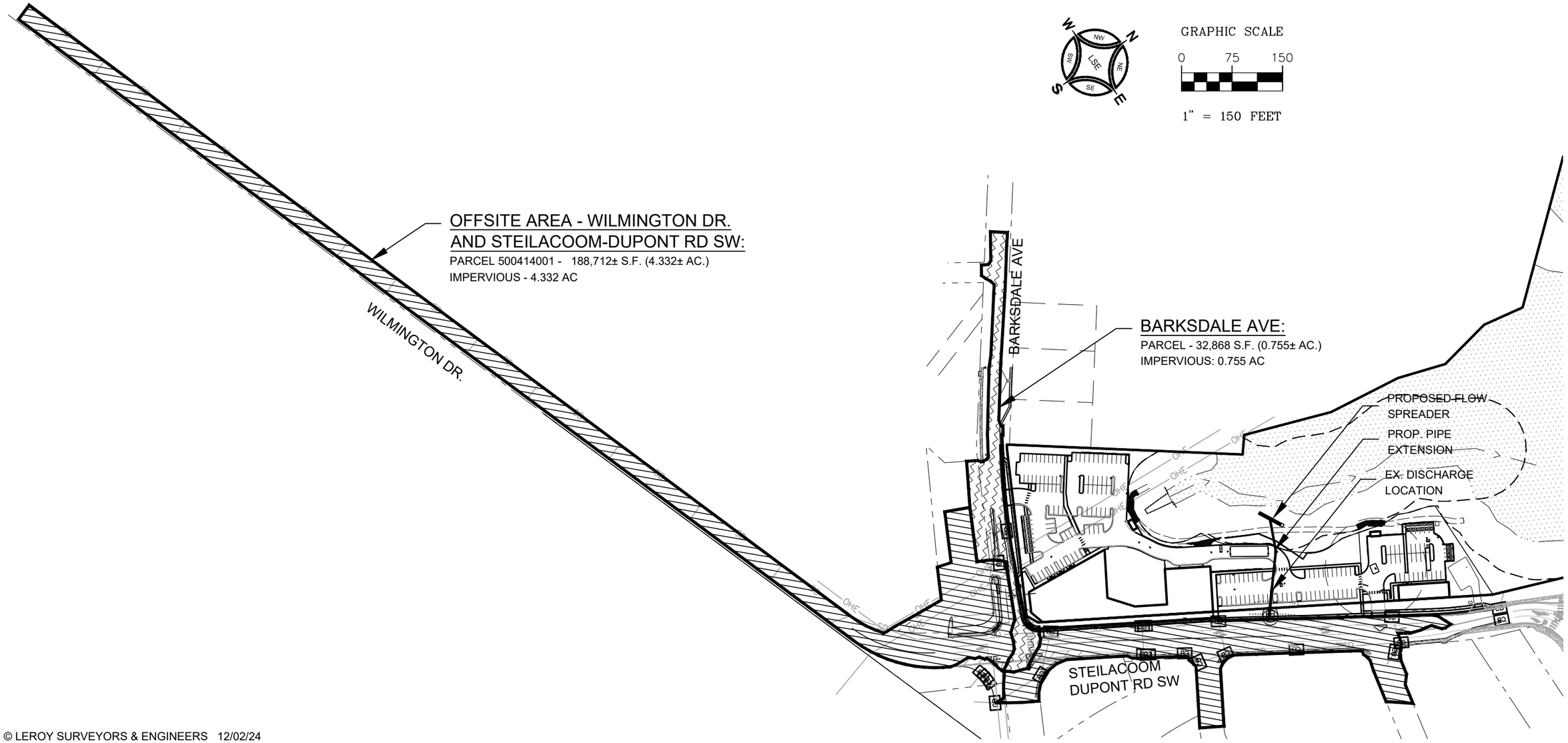
CLIENT: MUSTARD SEED LEGACY DEV LLC		DESIGNER: STEVE T. NELSON, P.E.	
PHONE NUMBER:		CERT. NO.	
ADDRESS: 32706 MOUNTAIN HWY E		SUBDIVISION:	
EATONVILLE, WA 98328		LOT NO.	DRAWN: STN
PARCEL NO. SEE ABOVE		DATE: 12/2/24	JOB NO. 12895

SHEET

12/2/2024

K:\Jobs\12895\AutoCAD\dwg\02_Engineering\dwg stn basin mod\12895-Basin Maps 20241202.dwg LAST EDITED: 12/02/24 5:24PM BY: snelson



OFFSITE DRAINAGE BASIN MAP

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EATONVILLE, WA 98328		LOT NO.	DRAWN: STN
PARCEL NO. SEE ABOVE		DATE: 12/2/24	JOB NO. 12895

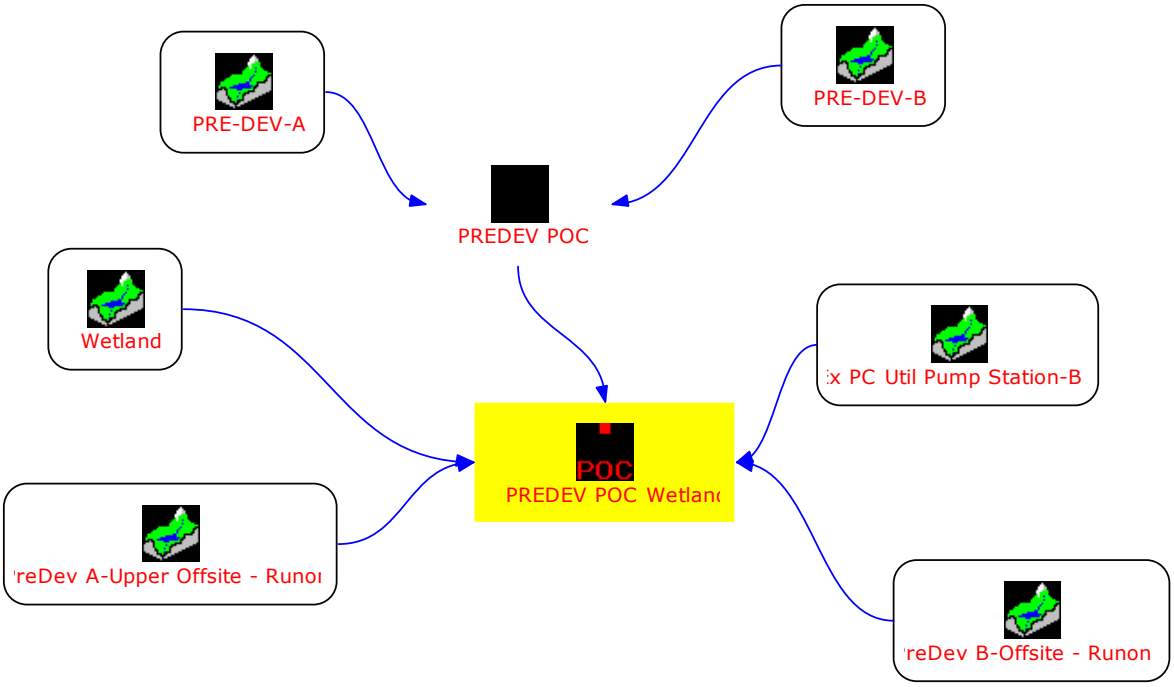
SHEET

12/2/2024

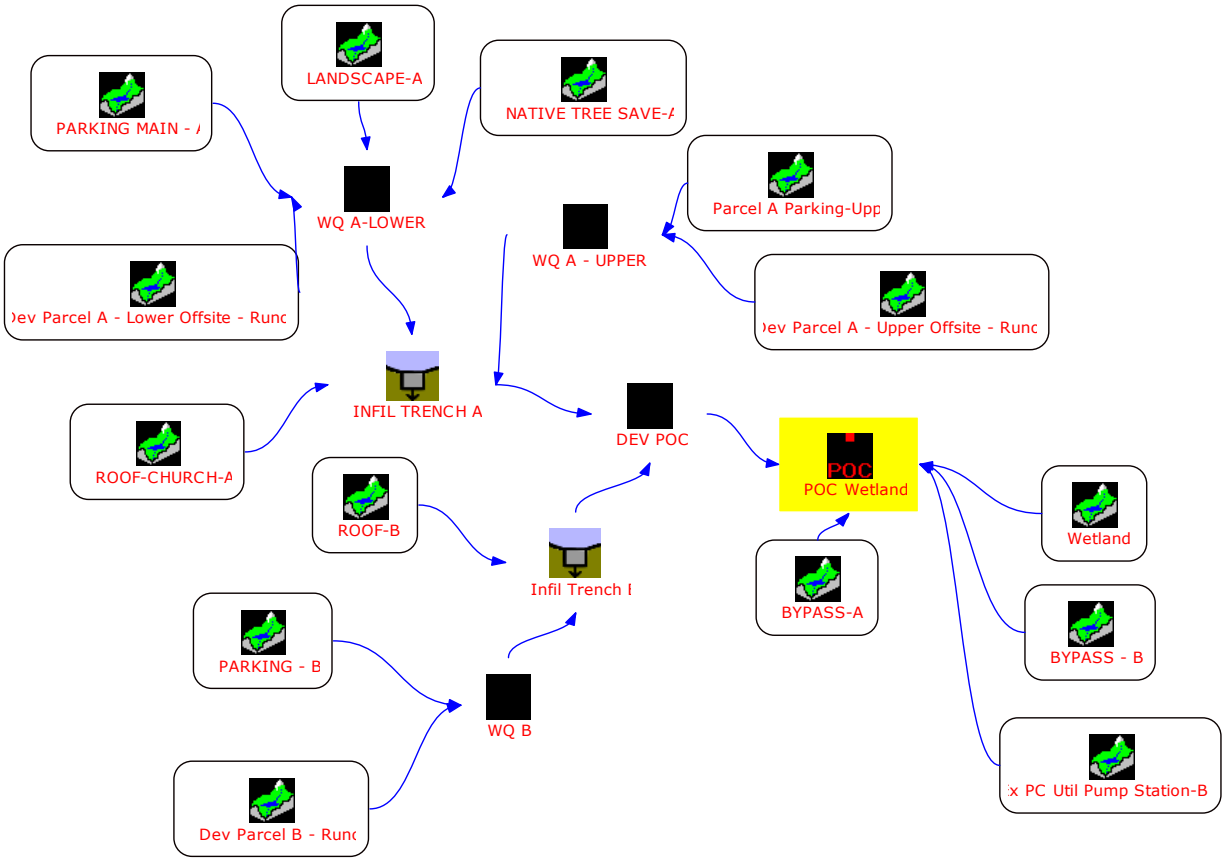
Appendix C

Stormwater Design Calculations

CHAMPIONS CENTRE
Stormwater Calculations
LSE Job #12895



Pre-Developed


LANDSCAPE-A
PARKING MAIN - A
NATIVE TREE SAVE-A
WQ A-LOWER
Parcel A Parking-Upp
WQ A - UPPER
Dev Parcel A - Lower Offsite - Runc
Dev Parcel A - Upper Offsite - Runc
INFIL TRENCH A
DEV POC
ROOF-CHURCH-A
POC
POC Wetland
ROOF-B
Wetland
Infil Trench I
BYPASS-A
PARKING - B
BYPASS - B
WQ B
x PC Util Pump Station-B
Dev Parcel B - Runc

Developed

MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.59
Program License Number: 201010005
Project Simulation Performed on: 12/02/2024 1:31 PM
Report Generation Date: 12/02/2024 1:48 PM

Input File Name: 12895MuSeed20241202.fld
Project Name: Mustard Seed (12895)
Analysis Title: Storm Calculations - Parcel A
Comments: Quantity and Quality Sizing with Wetland Criteria

PRECIPITATION INPUT

Computational Time Step (Minutes): 15

Extended Precipitation Time Series Selected

Full Period of Record Available used for Routing

Climatic Region Number: 45
Precipitation Station : 920042 Pierce Co. West 42 in 10/01/1939-10/01/2097
Evaporation Station : 921042 Pierce Co. West 42 in

Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : Ecology Default

********** Default HSPF Parameters Used (Not Modified by User) **********

********** **WATERSHED DEFINITION** **********

Predevelopment/Post Development Tributary Area Summary

	Predeveloped	Post Developed
Total Subbasin Area (acres)	21.557	21.557
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	21.557	21.557

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 6

---------- Subbasin : PRE-DEV-A ----------

	-------Area (Acres) --------
A/B, Forest, Mod	3.404
Subbasin Total	3.404

---------- Subbasin : Wetland ----------

	-------Area (Acres) --------
C, Forest, Flat	3.291
POND	13.776
Subbasin Total	17.067

---------- Subbasin : PreDev A-Upper Offsite - Runon ----------

	-------Area (Acres) --------
A/B, Forest, Steep	0.198
Subbasin Total	0.198

---------- Subbasin : PRE-DEV-B ----------

	-------Area (Acres) --------
A/B, Forest, Steep	0.680
Subbasin Total	0.680

---------- Subbasin : Ex PC Util Pump Station-B ----------

	-------Area (Acres) --------
A/B, Pasture, Mod	0.072
DRIVEWAYS/FLAT	0.060
Subbasin Total	0.132

---------- Subbasin : PreDev B-Offsite - Runon ----------

	-------Area (Acres) --------
A/B, Forest, Steep	0.076
Subbasin Total	0.076

----------SCENARIO: POSTDEVELOPED

Number of Subbasins: 14

---------- Subbasin : ROOF-CHURCH-A ----------

	-------Area (Acres) --------
ROOF TOPS/FLAT	0.593
Subbasin Total	0.593

---------- Subbasin : PARKING MAIN - A ----------

	-------Area (Acres) --------
ROOF TOPS/FLAT	0.005
SIDEWALKS/FLAT	0.113
PARKING/FLAT	1.123
Subbasin Total	1.241

---------- Subbasin : LANDSCAPE-A ----------

	-------Area (Acres) --------
A/B, Pasture, Flat	0.339
Subbasin Total	0.339

---------- Subbasin : NATIVE TREE SAVE-A ----------

	-------Area (Acres) --------
A/B, Forest, Steep	0.269
Subbasin Total	0.269

---------- Subbasin : BYPASS-A ----------

	-------Area (Acres) --------
A/B, Pasture, Flat	0.257
A/B, Pasture, Mod	0.136
DRIVEWAYS/FLAT	0.036
Subbasin Total	0.429

---------- Subbasin : Parcel A Parking-Upper ----------

	-------Area (Acres) --------
A/B, Pasture, Flat	0.104
SIDEWALKS/FLAT	0.065
PARKING/FLAT	0.364
Subbasin Total	0.533

---------- Subbasin : Dev Parcel A - Upper Offsite - Runon ----------

	-------Area (Acres) --------
A/B, Pasture, Steep	0.114
Subbasin Total	0.114

---------- Subbasin : Wetland ----------

	-------Area (Acres) --------
C, Forest, Flat	3.291
POND	13.776
Subbasin Total	17.067

---------- Subbasin : Ex PC Util Pump Station-B ----------

	-------Area (Acres) --------
A/B, Pasture, Steep	0.072
DRIVEWAYS/FLAT	0.058
Subbasin Total	0.130

---------- Subbasin : BYPASS - B ----------

	-------Area (Acres) --------
A/B, Pasture, Steep	0.170
Subbasin Total	0.170

---------- Subbasin : ROOF-B ----------

	-------Area (Acres) --------
ROOF TOPS/FLAT	0.069
Subbasin Total	0.069

---------- Subbasin : PARKING - B ----------

	-------Area (Acres) --------
A/B, Pasture, Flat	0.043
SIDEWALKS/FLAT	0.035
PARKING/FLAT	0.364
Subbasin Total	0.442

---------- Subbasin : Dev Parcel A - Lower Offsite - Runon ----------

	-------Area (Acres) --------
A/B, Pasture, Steep	0.096
Subbasin Total	0.096

---------- Subbasin : Dev Parcel B - Runon ----------

	-------Area (Acres) --------
A/B, Pasture, Steep	0.054
ROADS/FLAT	0.011
Subbasin Total	0.065

********** **LINK DATA** **********

----------SCENARIO: PREDEVELOPED
Number of Links: 2

Link Name: PREDEV POC Wetland
Link Type: Copy
Downstream Link: None

Link Name: PREDEV POC
Link Type: Copy
Downstream Link Name: PREDEV POC Wetland

********** **LINK DATA** **********

----------SCENARIO: POSTDEVELOPED
Number of Links: 7

Link Name: WQ A-LOWER
Link Type: Copy
Downstream Link Name: INFIL TRENCH A

Link Name: DEV POC
Link Type: Copy
Downstream Link Name: POC Wetland

Link Name: INFIL TRENCH A
Link Type: Infiltration Trench
Downstream Link Name: DEV POC

Trench Type : Trench on Embankment Sideslope
Trench Length (ft) : 76.00
Trench Width (ft) : 20.00
Trench Depth (ft) : 3.00
Trench Bottom Elev (ft) : 100.00
Trench Rockfill Porosity (%) : 30.00

Constant Infiltration Option Used
Infiltration Rate (in/hr): 30.00

Link Name: WQ A - UPPER
Link Type: Copy
Downstream Link Name: INFIL TRENCH A

Link Name: Infil Trench B
Link Type: Infiltration Trench
Downstream Link Name: DEV POC

Trench Type : Trench on Embankment Sideslope
Trench Length (ft) : 45.00
Trench Width (ft) : 8.00
Trench Depth (ft) : 2.00
Trench Bottom Elev (ft) : 100.00
Trench Rockfill Porosity (%) : 30.00

Constant Infiltration Option Used
Infiltration Rate (in/hr): 30.00

Link Name: WQ B
Link Type: Copy
Downstream Link Name: Infil Trench B

Link Name: POC Wetland
Link Type: Copy
Downstream Link: None

**********FLOOD FREQUENCY AND DURATION STATISTICS**********

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 6
Number of Links: 2

********** Subbasin: PRE-DEV-A **********

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	7.804E-03
5-Year	2.231E-02
10-Year	3.002E-02
25-Year	7.863E-02
50-Year	0.117
100-Year	0.147
200-Year	0.151
500-Year	0.156

********** Subbasin: Wetland **********

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	6.155
5-Year	7.610
10-Year	8.962
25-Year	11.089
50-Year	13.212
100-Year	15.597
200-Year	16.302
500-Year	17.199

********** Subbasin: PreDev A-Upper Offsite - Runon **********

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	5.507E-04
5-Year	1.571E-03
10-Year	2.124E-03
25-Year	5.603E-03
50-Year	8.276E-03
100-Year	9.749E-03
200-Year	1.039E-02
500-Year	1.121E-02

********** **Subbasin: PRE-DEV-B** **********

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	1.891E-03
5-Year	5.394E-03
10-Year	7.294E-03
25-Year	1.924E-02
50-Year	2.842E-02
100-Year	3.348E-02
200-Year	3.568E-02
500-Year	3.851E-02

********** **Subbasin: Ex PC Util Pump Station-B** **********

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	2.694E-02
5-Year	3.403E-02
10-Year	4.086E-02
25-Year	4.871E-02
50-Year	5.796E-02
100-Year	6.788E-02
200-Year	7.102E-02
500-Year	7.500E-02

********** **Subbasin: PreDev B-Offsite - Runon** **********

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	2.114E-04
5-Year	6.029E-04
10-Year	8.152E-04
25-Year	2.150E-03
50-Year	3.177E-03
100-Year	3.742E-03

200-Year	3.988E-03
500-Year	4.304E-03

********** Link: PREDEV POC Wetland ********** Link

Outflow 1 Frequency Stats

Flood Frequency Data(cfs)

(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	6.182
5-Year	7.644
10-Year	9.020
25-Year	11.137
50-Year	13.296
100-Year	15.665
200-Year	16.374
500-Year	17.275

********** Link: PREDEV POC ********** Link Inflow

Frequency Stats

Flood Frequency Data(cfs)

(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	9.695E-03
5-Year	2.771E-02
10-Year	3.729E-02
25-Year	9.797E-02
50-Year	0.146
100-Year	0.180
200-Year	0.187
500-Year	0.194

********** Link: PREDEV POC ********** Link Outflow

1 Frequency Stats

Flood Frequency Data(cfs)

(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	9.695E-03
5-Year	2.771E-02
10-Year	3.729E-02
25-Year	9.797E-02
50-Year	0.146
100-Year	0.180
200-Year	0.187
500-Year	0.194

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 14
Number of Links: 7

********** **Subbasin: ROOF-CHURCH-A** **********

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	0.261
5-Year	0.328
10-Year	0.378
25-Year	0.474
50-Year	0.555
100-Year	0.671
200-Year	0.701
500-Year	0.740

********** **Subbasin: PARKING MAIN - A** **********

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	0.547
5-Year	0.685
10-Year	0.791
25-Year	0.991
50-Year	1.161
100-Year	1.404
200-Year	1.468
500-Year	1.550

********** **Subbasin: LANDSCAPE-A** **********

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	1.674E-03
5-Year	3.174E-03
10-Year	6.769E-03
25-Year	1.493E-02
50-Year	1.998E-02
100-Year	2.857E-02
200-Year	3.024E-02
500-Year	3.238E-02

********** **Subbasin: NATIVE TREE SAVE-A** **********

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	7.481E-04
5-Year	2.134E-03
10-Year	2.886E-03
25-Year	7.612E-03
50-Year	1.124E-02
100-Year	1.325E-02
200-Year	1.411E-02
500-Year	1.523E-02

********** **Subbasin: BYPASS-A** **********

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	1.681E-02
5-Year	2.203E-02
10-Year	2.931E-02
25-Year	4.099E-02
50-Year	4.767E-02
100-Year	5.728E-02
200-Year	6.049E-02
500-Year	6.469E-02

********** **Subbasin: Parcel A Parking-Upper** **********

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	0.189
5-Year	0.237
10-Year	0.276
25-Year	0.343
50-Year	0.403
100-Year	0.485
200-Year	0.508
500-Year	0.536

********** **Subbasin: Dev Parcel A - Upper Offsite - Runon** **********

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	9.445E-04
5-Year	1.754E-03
10-Year	3.908E-03
25-Year	7.728E-03
50-Year	1.045E-02
100-Year	1.260E-02
200-Year	1.336E-02
500-Year	1.439E-02

********** **Subbasin: Wetland** **********

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	6.155
5-Year	7.610
10-Year	8.962
25-Year	11.089
50-Year	13.212
100-Year	15.597
200-Year	16.302
500-Year	17.199

********** **Subbasin: Ex PC Util Pump Station-B** **********

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	2.605E-02
5-Year	3.321E-02
10-Year	3.953E-02
25-Year	4.708E-02
50-Year	5.647E-02
100-Year	6.562E-02
200-Year	6.866E-02
500-Year	7.252E-02

********** **Subbasin: BYPASS - B** **********

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	1.408E-03
5-Year	2.615E-03
10-Year	5.828E-03
25-Year	1.152E-02
50-Year	1.558E-02
100-Year	1.879E-02
200-Year	1.993E-02
500-Year	2.145E-02

********** **Subbasin: ROOF-B** **********

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	3.042E-02
5-Year	3.811E-02
10-Year	4.399E-02
25-Year	5.510E-02
50-Year	6.457E-02
100-Year	7.805E-02
200-Year	8.162E-02
500-Year	8.616E-02

********** **Subbasin: PARKING - B** **********

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	0.176
5-Year	0.220
10-Year	0.255
25-Year	0.319
50-Year	0.374
100-Year	0.451
200-Year	0.472
500-Year	0.498

********** **Subbasin: Dev Parcel A - Lower Offsite - Runon** **********

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	7.954E-04
5-Year	1.477E-03
10-Year	3.291E-03
25-Year	6.508E-03
50-Year	8.801E-03
100-Year	1.061E-02
200-Year	1.125E-02
500-Year	1.211E-02

********** **Subbasin: Dev Parcel B - Runon** **********

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	5.051E-03
5-Year	6.581E-03
10-Year	8.707E-03
25-Year	1.153E-02
50-Year	1.268E-02
100-Year	1.332E-02
200-Year	1.370E-02
500-Year	1.420E-02

********** Link: WQ A-LOWER ********** Link Inflow Frequency Stats

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	0.547
5-Year	0.686
10-Year	0.804
25-Year	0.991
50-Year	1.172
100-Year	1.404
200-Year	1.468
500-Year	1.550

********** Link: WQ A-LOWER ********** Link Outflow 1 Frequency Stats

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	0.547
5-Year	0.686
10-Year	0.804
25-Year	0.991
50-Year	1.172
100-Year	1.404
200-Year	1.468
500-Year	1.550

********** Link: DEV POC ********** Link Inflow Frequency Stats

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	1.639E-07
5-Year	1.349E-06
10-Year	4.610E-06
25-Year	1.047E-05
50-Year	2.019E-05
100-Year	2.270E-05
200-Year	0.740
500-Year	1.737

********** Link: INFIL TRENCH A ********** Link Inflow Frequency Stats

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	0.998
5-Year	1.250
10-Year	1.456
25-Year	1.807
50-Year	2.134
100-Year	2.560
200-Year	2.677
500-Year	2.827

********** Link: INFIL TRENCH A ********** Link Outflow 1 Frequency Stats

Flood Frequency Data(cfs)

(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	1.192E-07
5-Year	1.304E-06
10-Year	3.576E-06
25-Year	7.375E-06
50-Year	1.346E-05
100-Year	1.476E-05
200-Year	0.659
500-Year	1.548

********** Link: INFIL TRENCH A ********** Link WSEL Stats

WSEL Frequency Data(ft)

(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	WSEL Peak (ft)
1.05-Year	100.009
1.11-Year	100.010
1.25-Year	100.011
2.00-Year	100.014
3.33-Year	100.074
5-Year	100.257
10-Year	100.728
25-Year	101.470
50-Year	102.686
100-Year	102.963

********** Link: WQ A - UPPER ********** Link Inflow Frequency Stats

Flood Frequency Data(cfs)

(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	0.189
5-Year	0.237
10-Year	0.280
25-Year	0.343
50-Year	0.407
100-Year	0.485
200-Year	0.508
500-Year	0.536

********** Link: WQ A - UPPER ********** Link Outflow 1 Frequency Stats

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	0.189
5-Year	0.237
10-Year	0.280
25-Year	0.343
50-Year	0.407
100-Year	0.485
200-Year	0.508
500-Year	0.536

********** Link: Infil Trench B ********** Link Inflow Frequency Stats

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	0.211
5-Year	0.265
10-Year	0.308
25-Year	0.383
50-Year	0.451
100-Year	0.542
200-Year	0.567
500-Year	0.598

********** Link: Infil Trench B ********** Link Outflow 1 Frequency Stats

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	5.960E-08
5-Year	1.173E-07
10-Year	1.360E-06
25-Year	3.465E-06
50-Year	6.011E-06
100-Year	8.663E-06
200-Year	8.030E-02
500-Year	0.189

********** Link: Infil Trench B ********** Link WSEL Stats

WSEL Frequency Data(ft)

(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	WSEL Peak (ft)
1.05-Year	100.006
1.11-Year	100.006
1.25-Year	100.007
2.00-Year	100.008
3.33-Year	100.010
5-Year	100.026
10-Year	100.271
25-Year	100.696
50-Year	101.203
100-Year	101.729

********** Link: WQ B ********** Link Inflow

Frequency Stats

Flood Frequency Data(cfs)

(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	0.181
5-Year	0.226
10-Year	0.264
25-Year	0.327
50-Year	0.386
100-Year	0.464
200-Year	0.485
500-Year	0.512

********** Link: WQ B ********** Link Outflow 1

Frequency Stats

Flood Frequency Data(cfs)

(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	0.181
5-Year	0.226
10-Year	0.264
25-Year	0.327
50-Year	0.386
100-Year	0.464
200-Year	0.485
500-Year	0.512

********** Link: POC Wetland ********** Link Inflow
Frequency Stats
Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	6.196
5-Year	7.662
10-Year	9.046
25-Year	11.164
50-Year	13.315
100-Year	15.703
200-Year	16.414
500-Year	17.317

********** Link: POC Wetland ********** Link Outflow 1
Frequency Stats
Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	6.196
5-Year	7.662
10-Year	9.046
25-Year	11.164
50-Year	13.315
100-Year	15.703
200-Year	16.414
500-Year	17.317

*************Groundwater Recharge Summary **************
Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Model Element	Total Predeveloped Recharge During Simulation Recharge Amount (ac-ft)
Subbasin: PRE-DEV-A	1074.501
Subbasin: Wetland	408.389
Subbasin: PreDev A-Upper Offsi	62.492
Subbasin: PRE-DEV-B	214.621
Subbasin: Ex PC Util Pump Stat	24.468
Subbasin: PreDev B-Offsite - R	23.987
Link: PREDEV POC Wetland	0.000
Link: PREDEV POC	0.000
Total:	1808.458

Total Post Developed Recharge During Simulation

Model Element		Recharge Amount (ac-ft)
Subbasin: ROOF-CHURCH-A		0.000
Subbasin: PARKING MAIN - A		0.000
Subbasin: LANDSCAPE-A		115.255
Subbasin: NATIVE TREE SAVE-A		84.901
Subbasin: BYPASS-A		133.594
Subbasin: Parcel A Parking-Upp		35.358
Subbasin: Dev Parcel A - Upper		38.729
Subbasin: Wetland		408.389
Subbasin: Ex PC Util Pump Stat		24.461
Subbasin: BYPASS - B		57.754
Subbasin: ROOF-B		0.000
Subbasin: PARKING - B		14.619
Subbasin: Dev Parcel A – Lower		32.614
Subbasin: Dev Parcel B - Runon		18.346
Link:	WQ A-LOWER	0.000
Link:	DEV POC	0.000
Link:	INFIL TRENCH A	1126.687
Link:	WQ A - UPPER	0.000
Link:	Infil Trench B	238.450
Link:	WQ B	0.000
Link:	POC Wetland	0.000
Total:		2329.158

Total Predevelopment Recharge is Less than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 11.446 ac-ft/year, Post Developed: 14.742 ac-ft/year

************Water Quality Facility Data **************

----------SCENARIO: PREDEVELOPED

Number of Links: 2

********** Link: PREDEV POC Wetland **********

2-Year Discharge Rate : 6.182 cfs

15-Minute Timestep, Water Quality Treatment Design Discharge
On-line Design Discharge Rate (91% Exceedance): 2.54 cfs
Off-line Design Discharge Rate (91% Exceedance): 1.51 cfs

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 7553.82
Inflow Volume Including PPT-Evap (ac-ft): 7553.82
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 7553.82
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

********** Link: PREDEV POC **********

2-Year Discharge Rate : 0.010 cfs

15-Minute Timestep, Water Quality Treatment Design Discharge
On-line Design Discharge Rate (91% Exceedance): 0.01 cfs
Off-line Design Discharge Rate (91% Exceedance): 0.01 cfs

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 2.18
Inflow Volume Including PPT-Evap (ac-ft): 2.18
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 2.18
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

----------SCENARIO: POSTDEVELOPED

Number of Links: 7

********** Link: WQ A-LOWER **********

2-Year Discharge Rate : 0.547 cfs

15-Minute Timestep, Water Quality Treatment Design Discharge
On-line Design Discharge Rate (91% Exceedance): 0.23 cfs
Off-line Design Discharge Rate (91% Exceedance): 0.14 cfs  WQ Flow Parcel A-Lower

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 618.06
Inflow Volume Including PPT-Evap (ac-ft): 618.06
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 618.06
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

********** Link: DEV POC **********

2-Year Discharge Rate : 0.000 cfs

15-Minute Timestep, Water Quality Treatment Design Discharge
On-line Design Discharge Rate (91% Exceedance): 0.33 cfs
Off-line Design Discharge Rate (91% Exceedance): 0.33 cfs

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 0.03
Inflow Volume Including PPT-Evap (ac-ft): 0.03

Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 0.03
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

********** Link: INFIL TRENCH A **********

2-Year Discharge Rate : 0.000 cfs

15-Minute Timestep, Water Quality Treatment Design Discharge
On-line Design Discharge Rate (91% Exceedance): 0.42 cfs
Off-line Design Discharge Rate (91% Exceedance): 0.25 cfs

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 1126.83
Inflow Volume Including PPT-Evap (ac-ft): 1126.83
Total Runoff Infiltrated (ac-ft): 1126.69, 99.99%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 0.03
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 99.99%

********** Link: WQ A - UPPER **********

2-Year Discharge Rate : 0.189 cfs

15-Minute Timestep, Water Quality Treatment Design Discharge
On-line Design Discharge Rate (91% Exceedance): 0.08 cfs
Off-line Design Discharge Rate (91% Exceedance): 0.05 cfs  WQ Flow Parcel A-Upper

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 213.68
Inflow Volume Including PPT-Evap (ac-ft): 213.68
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 213.68
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

********** Link: Infil Trench B **********

2-Year Discharge Rate : 0.000 cfs

15-Minute Timestep, Water Quality Treatment Design Discharge
On-line Design Discharge Rate (91% Exceedance): 0.09 cfs
Off-line Design Discharge Rate (91% Exceedance): 0.05 cfs

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 238.45

Inflow Volume Including PPT-Evap (ac-ft): 238.45
Total Runoff Infiltrated (ac-ft): 238.45, 100.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 0.00
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 100.00%

********** Link: WQ B **********

2-Year Discharge Rate : 0.181 cfs

15-Minute Timestep, Water Quality Treatment Design Discharge
On-line Design Discharge Rate (91% Exceedance): 0.08 cfs
Off-line Design Discharge Rate (91% Exceedance): 0.05 cfs ← WQ Flow Parcel B

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 204.11
Inflow Volume Including PPT-Evap (ac-ft): 204.11
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 204.11
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

********** Link: POC Wetland **********

2-Year Discharge Rate : 6.196 cfs

15-Minute Timestep, Water Quality Treatment Design Discharge
On-line Design Discharge Rate (91% Exceedance): 2.55 cfs
Off-line Design Discharge Rate (91% Exceedance): 1.51 cfs

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 7568.93
Inflow Volume Including PPT-Evap (ac-ft): 7568.93
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 7568.93
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

**********Compliance Point Results **********

Scenario Predeveloped Compliance Link: PREDEV POC Wetland
Scenario Postdeveloped Compliance Link: DEV POC

*** Point of Compliance Flow Frequency Data ***
Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff Postdevelopment Runoff

Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	6.182	2-Year	0.000
5-Year	7.644	5-Year	0.000
10-Year	9.020	10-Year	0.000
25-Year	11.137	25-Year	0.000
50-Year	13.296	50-Year	0.000
100-Year	15.665	100-Year	0.000
200-Year	16.374	200-Year	0.740
500-Year	17.275	500-Year	1.737

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

****** Flow Duration Performance ******

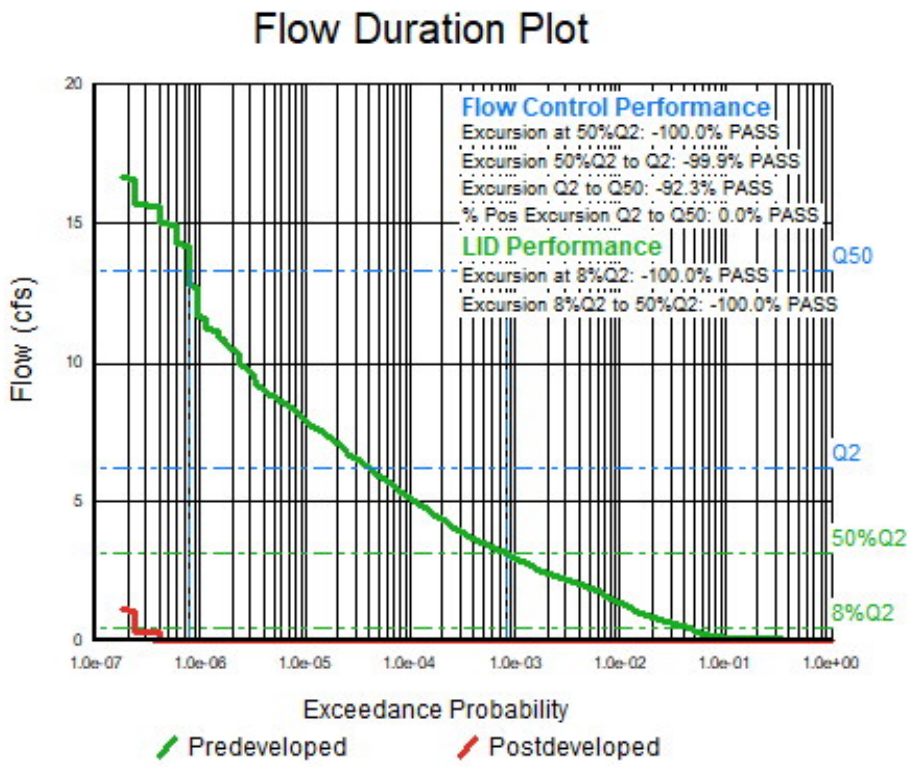
Excursion at Predeveloped 50%Q2 (Must be Less Than or Equal to 0%):	-100.0%	PASS
Maximum Excursion from 50%Q2 to Q2 (Must be Less Than or Equal to 0%):	-99.9%	PASS
Maximum Excursion from Q2 to Q50 (Must be less than 10%):	-92.3%	PASS
Percent Excursion from Q2 to Q50 (Must be less than 50%):	0.0%	PASS

MEETS ALL FLOW DURATION DESIGN CRITERIA: PASS

****** LID Duration Performance ******

Excursion at Predeveloped 8%Q2 (Must be Less Than 0%):	-100.0%	PASS
Maximum Excursion from 8%Q2 to 50%Q2 (Must be Less Than 0%):	-100.0%	PASS

MEETS ALL LID DURATION DESIGN CRITERIA: PASS



**********Wetland Hydrologic Loading Analysis Results **********

Predeveloped Wetland Location: PREDEV POC Wetland, Inflow
Postdeveloped Wetland Location: POC Wetland, Inflow

Days out of Compliance: 0
Months out of Compliance: 0

**********Mean Daily Wetland Inflow (cfs) **********
Must be within 20% for each Day

Month	Predeveloped	Postdeveloped	Percent Difference
Oct-01	4.094E-02	4.101E-02	0.17%
Oct-02	2.627E-02	2.632E-02	0.18%
Oct-03	3.774E-02	3.780E-02	0.18%
Oct-04	4.901E-02	4.910E-02	0.18%
Oct-05	3.371E-02	3.377E-02	0.18%
Oct-06	6.838E-02	6.849E-02	0.17%
Oct-07	5.463E-02	5.472E-02	0.17%
Oct-08	5.592E-02	5.602E-02	0.17%
Oct-09	6.993E-02	7.005E-02	0.17%
Oct-10	6.820E-02	6.832E-02	0.17%
Oct-11	4.978E-02	4.986E-02	0.17%
Oct-12	4.758E-02	4.766E-02	0.17%
Oct-13	4.777E-02	4.785E-02	0.17%
Oct-14	5.478E-02	5.487E-02	0.17%
Oct-15	4.360E-02	4.367E-02	0.17%
Oct-16	3.580E-02	3.586E-02	0.17%
Oct-17	7.077E-02	7.088E-02	0.17%
Oct-18	6.261E-02	6.272E-02	0.17%
Oct-19	7.062E-02	7.074E-02	0.17%
Oct-20	8.430E-02	8.445E-02	0.17%
Oct-21	9.226E-02	9.242E-02	0.17%
Oct-22	8.831E-02	8.846E-02	0.17%
Oct-23	8.880E-02	8.895E-02	0.17%
Oct-24	6.836E-02	6.848E-02	0.17%
Oct-25	8.113E-02	8.126E-02	0.17%
Oct-26	9.596E-02	9.612E-02	0.17%
Oct-27	1.140E-01	1.142E-01	0.16%
Oct-28	8.818E-02	8.833E-02	0.16%
Oct-29	9.349E-02	9.364E-02	0.16%
Oct-30	8.042E-02	8.055E-02	0.16%
Oct-31	1.180E-01	1.182E-01	0.16%
Nov-01	9.585E-02	9.600E-02	0.16%
Nov-02	8.935E-02	8.950E-02	0.16%
Nov-03	1.374E-01	1.376E-01	0.16%
Nov-04	1.245E-01	1.247E-01	0.16%
Nov-05	7.915E-02	7.928E-02	0.16%
Nov-06	8.915E-02	8.929E-02	0.16%
Nov-07	1.062E-01	1.064E-01	0.16%
Nov-08	9.043E-02	9.057E-02	0.15%
Nov-09	1.280E-01	1.282E-01	0.16%
Nov-10	1.315E-01	1.318E-01	0.16%
Nov-11	1.395E-01	1.397E-01	0.15%
Nov-12	1.032E-01	1.034E-01	0.15%

Nov-13	1.413E-01	1.415E-01	0.15%
Nov-14	1.217E-01	1.218E-01	0.15%
Nov-15	1.204E-01	1.206E-01	0.15%
Nov-16	1.362E-01	1.364E-01	0.15%
Nov-17	1.455E-01	1.457E-01	0.15%
Nov-18	1.282E-01	1.284E-01	0.15%
Nov-19	1.703E-01	1.706E-01	0.15%
Nov-20	1.296E-01	1.298E-01	0.14%
Nov-21	1.375E-01	1.377E-01	0.14%
Nov-22	1.202E-01	1.204E-01	0.15%
Nov-23	1.880E-01	1.883E-01	0.15%
Nov-24	1.908E-01	1.911E-01	0.15%
Nov-25	1.712E-01	1.715E-01	0.14%
Nov-26	1.429E-01	1.431E-01	0.14%
Nov-27	1.620E-01	1.623E-01	0.14%
Nov-28	1.078E-01	1.080E-01	0.14%
Nov-29	1.423E-01	1.425E-01	0.14%
Nov-30	1.653E-01	1.655E-01	0.14%
Dec-01	1.480E-01	1.483E-01	0.14%
Dec-02	1.620E-01	1.622E-01	0.14%
Dec-03	1.740E-01	1.743E-01	0.14%
Dec-04	1.589E-01	1.591E-01	0.14%
Dec-05	1.547E-01	1.549E-01	0.14%
Dec-06	1.509E-01	1.511E-01	0.14%
Dec-07	1.394E-01	1.396E-01	0.14%
Dec-08	1.272E-01	1.273E-01	0.14%
Dec-09	1.274E-01	1.276E-01	0.14%
Dec-10	1.534E-01	1.536E-01	0.14%
Dec-11	1.374E-01	1.376E-01	0.14%
Dec-12	1.308E-01	1.309E-01	0.13%
Dec-13	1.234E-01	1.236E-01	0.13%
Dec-14	1.295E-01	1.297E-01	0.14%
Dec-15	1.503E-01	1.505E-01	0.14%
Dec-16	1.224E-01	1.226E-01	0.13%
Dec-17	1.313E-01	1.315E-01	0.14%
Dec-18	1.215E-01	1.217E-01	0.14%
Dec-19	1.299E-01	1.301E-01	0.14%
Dec-20	1.626E-01	1.628E-01	0.14%
Dec-21	1.529E-01	1.531E-01	0.14%
Dec-22	1.165E-01	1.166E-01	0.14%
Dec-23	1.248E-01	1.250E-01	0.14%
Dec-24	1.172E-01	1.173E-01	0.13%
Dec-25	1.144E-01	1.146E-01	0.14%
Dec-26	1.502E-01	1.504E-01	0.14%
Dec-27	1.344E-01	1.346E-01	0.14%
Dec-28	1.012E-01	1.014E-01	0.13%
Dec-29	1.583E-01	1.585E-01	0.14%
Dec-30	1.348E-01	1.349E-01	0.14%
Dec-31	9.506E-02	9.516E-02	0.11%
Jan-01	1.189E-01	1.191E-01	0.13%
Jan-02	1.427E-01	1.429E-01	0.13%
Jan-03	1.189E-01	1.191E-01	0.13%
Jan-04	1.233E-01	1.234E-01	0.12%
Jan-05	1.155E-01	1.156E-01	0.13%
Jan-06	1.217E-01	1.219E-01	0.13%
Jan-07	1.201E-01	1.203E-01	0.13%

Jan-08	1.123E-01	1.124E-01	0.13%
Jan-09	1.343E-01	1.344E-01	0.13%
Jan-10	1.398E-01	1.400E-01	0.13%
Jan-11	1.073E-01	1.074E-01	0.13%
Jan-12	1.294E-01	1.296E-01	0.13%
Jan-13	1.351E-01	1.353E-01	0.13%
Jan-14	1.711E-01	1.713E-01	0.13%
Jan-15	1.545E-01	1.547E-01	0.12%
Jan-16	1.355E-01	1.356E-01	0.12%
Jan-17	1.300E-01	1.301E-01	0.13%
Jan-18	1.381E-01	1.383E-01	0.13%
Jan-19	1.381E-01	1.383E-01	0.13%
Jan-20	1.285E-01	1.287E-01	0.11%
Jan-21	9.853E-02	9.864E-02	0.11%
Jan-22	1.111E-01	1.112E-01	0.12%
Jan-23	1.533E-01	1.535E-01	0.14%
Jan-24	1.268E-01	1.269E-01	0.13%
Jan-25	1.071E-01	1.073E-01	0.12%
Jan-26	1.025E-01	1.026E-01	0.12%
Jan-27	1.264E-01	1.266E-01	0.12%
Jan-28	9.332E-02	9.344E-02	0.12%
Jan-29	1.038E-01	1.039E-01	0.11%
Jan-30	9.895E-02	9.907E-02	0.11%
Jan-31	1.311E-01	1.312E-01	0.12%
Feb-01	1.165E-01	1.167E-01	0.13%
Feb-02	1.098E-01	1.100E-01	0.13%
Feb-03	9.014E-02	9.022E-02	0.09%
Feb-04	9.287E-02	9.299E-02	0.12%
Feb-05	9.969E-02	9.981E-02	0.13%
Feb-06	1.269E-01	1.270E-01	0.10%
Feb-07	1.012E-01	1.013E-01	0.12%
Feb-08	1.124E-01	1.125E-01	0.10%
Feb-09	1.015E-01	1.017E-01	0.12%
Feb-10	9.507E-02	9.519E-02	0.13%
Feb-11	8.775E-02	8.786E-02	0.12%
Feb-12	1.315E-01	1.317E-01	0.14%
Feb-13	1.225E-01	1.226E-01	0.13%
Feb-14	9.816E-02	9.827E-02	0.12%
Feb-15	1.134E-01	1.136E-01	0.12%
Feb-16	1.329E-01	1.330E-01	0.11%
Feb-17	1.556E-01	1.557E-01	0.11%
Feb-18	1.421E-01	1.423E-01	0.11%
Feb-19	1.283E-01	1.285E-01	0.11%
Feb-20	9.100E-02	9.110E-02	0.10%
Feb-21	9.540E-02	9.551E-02	0.11%
Feb-22	8.003E-02	8.012E-02	0.11%
Feb-23	7.725E-02	7.734E-02	0.12%
Feb-24	1.142E-01	1.144E-01	0.13%
Feb-25	1.015E-01	1.017E-01	0.12%
Feb-26	8.380E-02	8.389E-02	0.11%
Feb-27	9.736E-02	9.746E-02	0.10%
Feb-28	9.858E-02	9.869E-02	0.12%
Mar-01	8.996E-02	9.005E-02	0.10%
Mar-02	8.247E-02	8.257E-02	0.12%
Mar-03	1.021E-01	1.022E-01	0.07%
Mar-04	8.988E-02	8.999E-02	0.12%

Mar-05	9.511E-02	9.522E-02	0.11%
Mar-06	5.635E-02	5.641E-02	0.12%
Mar-07	7.113E-02	7.121E-02	0.12%
Mar-08	8.884E-02	8.895E-02	0.13%
Mar-09	1.158E-01	1.159E-01	0.12%
Mar-10	8.443E-02	8.452E-02	0.12%
Mar-11	7.625E-02	7.633E-02	0.11%
Mar-12	1.011E-01	1.012E-01	0.11%
Mar-13	6.669E-02	6.677E-02	0.11%
Mar-14	7.731E-02	7.740E-02	0.12%
Mar-15	7.576E-02	7.585E-02	0.12%
Mar-16	6.493E-02	6.500E-02	0.12%
Mar-17	7.445E-02	7.454E-02	0.11%
Mar-18	7.002E-02	7.010E-02	0.11%
Mar-19	5.885E-02	5.891E-02	0.10%
Mar-20	6.134E-02	6.142E-02	0.13%
Mar-21	5.835E-02	5.841E-02	0.10%
Mar-22	9.334E-02	9.347E-02	0.13%
Mar-23	8.854E-02	8.866E-02	0.14%
Mar-24	6.844E-02	6.853E-02	0.13%
Mar-25	6.161E-02	6.168E-02	0.13%
Mar-26	7.145E-02	7.154E-02	0.13%
Mar-27	6.251E-02	6.259E-02	0.13%
Mar-28	6.773E-02	6.781E-02	0.12%
Mar-29	9.009E-02	9.020E-02	0.13%
Mar-30	7.851E-02	7.860E-02	0.12%
Mar-31	6.977E-02	6.985E-02	0.11%
Apr-01	4.819E-02	4.825E-02	0.12%
Apr-02	4.013E-02	4.018E-02	0.13%
Apr-03	4.137E-02	4.142E-02	0.12%
Apr-04	6.060E-02	6.066E-02	0.09%
Apr-05	6.856E-02	6.864E-02	0.13%
Apr-06	5.027E-02	5.034E-02	0.13%
Apr-07	4.103E-02	4.108E-02	0.14%
Apr-08	6.897E-02	6.907E-02	0.14%
Apr-09	7.293E-02	7.303E-02	0.14%
Apr-10	4.919E-02	4.925E-02	0.13%
Apr-11	5.863E-02	5.871E-02	0.14%
Apr-12	5.545E-02	5.553E-02	0.14%
Apr-13	3.883E-02	3.889E-02	0.14%
Apr-14	4.160E-02	4.166E-02	0.14%
Apr-15	3.131E-02	3.135E-02	0.14%
Apr-16	4.541E-02	4.547E-02	0.14%
Apr-17	4.331E-02	4.337E-02	0.14%
Apr-18	2.508E-02	2.512E-02	0.14%
Apr-19	6.460E-02	6.470E-02	0.15%
Apr-20	4.766E-02	4.773E-02	0.14%
Apr-21	2.776E-02	2.779E-02	0.13%
Apr-22	4.782E-02	4.789E-02	0.14%
Apr-23	6.472E-02	6.482E-02	0.14%
Apr-24	4.231E-02	4.237E-02	0.14%
Apr-25	2.633E-02	2.636E-02	0.14%
Apr-26	2.939E-02	2.943E-02	0.14%
Apr-27	4.534E-02	4.541E-02	0.14%
Apr-28	3.568E-02	3.573E-02	0.14%
Apr-29	3.398E-02	3.403E-02	0.15%

Apr-30	4.181E-02	4.187E-02	0.14%
May-01	4.633E-02	4.639E-02	0.14%
May-02	3.918E-02	3.924E-02	0.14%
May-03	4.169E-02	4.175E-02	0.14%
May-04	2.514E-02	2.518E-02	0.14%
May-05	4.502E-02	4.509E-02	0.15%
May-06	3.695E-02	3.701E-02	0.15%
May-07	2.724E-02	2.728E-02	0.14%
May-08	2.685E-02	2.689E-02	0.15%
May-09	1.515E-02	1.517E-02	0.15%
May-10	1.794E-02	1.797E-02	0.15%
May-11	2.870E-02	2.874E-02	0.15%
May-12	3.114E-02	3.119E-02	0.15%
May-13	3.001E-02	3.005E-02	0.15%
May-14	2.697E-02	2.701E-02	0.15%
May-15	3.038E-02	3.042E-02	0.16%
May-16	2.969E-02	2.973E-02	0.15%
May-17	3.964E-02	3.969E-02	0.15%
May-18	1.912E-02	1.915E-02	0.14%
May-19	2.884E-02	2.888E-02	0.16%
May-20	2.248E-02	2.252E-02	0.15%
May-21	1.835E-02	1.838E-02	0.14%
May-22	2.558E-02	2.562E-02	0.15%
May-23	2.618E-02	2.622E-02	0.15%
May-24	2.407E-02	2.410E-02	0.15%
May-25	2.543E-02	2.547E-02	0.15%
May-26	3.475E-02	3.480E-02	0.15%
May-27	2.747E-02	2.752E-02	0.15%
May-28	2.509E-02	2.513E-02	0.15%
May-29	2.863E-02	2.867E-02	0.15%
May-30	3.077E-02	3.082E-02	0.15%
May-31	4.432E-02	4.439E-02	0.16%
Jun-01	2.921E-02	2.926E-02	0.16%
Jun-02	1.847E-02	1.850E-02	0.15%
Jun-03	2.467E-02	2.471E-02	0.15%
Jun-04	3.222E-02	3.227E-02	0.15%
Jun-05	1.992E-02	1.995E-02	0.15%
Jun-06	3.812E-02	3.817E-02	0.15%
Jun-07	2.643E-02	2.647E-02	0.16%
Jun-08	2.127E-02	2.131E-02	0.15%
Jun-09	2.550E-02	2.554E-02	0.15%
Jun-10	3.115E-02	3.120E-02	0.16%
Jun-11	2.106E-02	2.109E-02	0.15%
Jun-12	1.857E-02	1.860E-02	0.16%
Jun-13	2.034E-02	2.037E-02	0.16%
Jun-14	2.599E-02	2.603E-02	0.16%
Jun-15	1.749E-02	1.752E-02	0.16%
Jun-16	2.451E-02	2.455E-02	0.16%
Jun-17	2.373E-02	2.377E-02	0.16%
Jun-18	1.458E-02	1.460E-02	0.16%
Jun-19	1.039E-02	1.040E-02	0.16%
Jun-20	2.145E-02	2.148E-02	0.16%
Jun-21	1.578E-02	1.580E-02	0.16%
Jun-22	1.456E-02	1.458E-02	0.16%
Jun-23	1.496E-02	1.499E-02	0.16%
Jun-24	3.442E-02	3.448E-02	0.16%

Jun-25	1.472E-02	1.474E-02	0.16%
Jun-26	1.457E-02	1.460E-02	0.17%
Jun-27	1.270E-02	1.272E-02	0.17%
Jun-28	2.266E-02	2.270E-02	0.16%
Jun-29	3.708E-02	3.724E-02	0.43%
Jun-30	1.006E-02	1.008E-02	0.17%
Jul-01	1.833E-02	1.836E-02	0.16%
Jul-02	9.192E-03	9.207E-03	0.17%
Jul-03	1.423E-02	1.426E-02	0.16%
Jul-04	1.108E-02	1.110E-02	0.17%
Jul-05	2.703E-02	2.707E-02	0.17%
Jul-06	5.098E-03	5.107E-03	0.17%
Jul-07	8.913E-03	8.927E-03	0.16%
Jul-08	2.563E-02	2.568E-02	0.17%
Jul-09	1.536E-02	1.539E-02	0.17%
Jul-10	1.482E-02	1.484E-02	0.17%
Jul-11	1.464E-02	1.466E-02	0.16%
Jul-12	1.812E-02	1.815E-02	0.16%
Jul-13	7.441E-03	7.453E-03	0.17%
Jul-14	6.868E-03	6.880E-03	0.17%
Jul-15	8.472E-03	8.487E-03	0.17%
Jul-16	1.591E-02	1.594E-02	0.17%
Jul-17	1.287E-02	1.290E-02	0.17%
Jul-18	1.116E-02	1.118E-02	0.18%
Jul-19	9.445E-03	9.461E-03	0.17%
Jul-20	5.711E-03	5.721E-03	0.18%
Jul-21	8.249E-03	8.263E-03	0.17%
Jul-22	3.336E-03	3.342E-03	0.18%
Jul-23	1.016E-03	1.018E-03	0.18%
Jul-24	2.138E-03	2.141E-03	0.17%
Jul-25	6.778E-03	6.790E-03	0.18%
Jul-26	1.518E-02	1.520E-02	0.18%
Jul-27	7.754E-03	7.767E-03	0.18%
Jul-28	4.631E-03	4.639E-03	0.18%
Jul-29	2.493E-03	2.497E-03	0.17%
Jul-30	1.771E-03	1.774E-03	0.18%
Jul-31	2.223E-03	2.227E-03	0.18%
Aug-01	2.318E-03	2.322E-03	0.18%
Aug-02	1.062E-02	1.064E-02	0.18%
Aug-03	7.384E-03	7.397E-03	0.18%
Aug-04	8.919E-03	8.935E-03	0.18%
Aug-05	3.094E-03	3.100E-03	0.18%
Aug-06	9.386E-03	9.402E-03	0.17%
Aug-07	1.453E-02	1.455E-02	0.18%
Aug-08	4.003E-03	4.010E-03	0.18%
Aug-09	4.318E-03	4.326E-03	0.18%
Aug-10	1.981E-03	1.985E-03	0.18%
Aug-11	4.507E-03	4.515E-03	0.18%
Aug-12	9.073E-03	9.090E-03	0.18%
Aug-13	6.742E-03	6.754E-03	0.18%
Aug-14	1.591E-02	1.594E-02	0.18%
Aug-15	1.637E-02	1.640E-02	0.18%
Aug-16	1.207E-02	1.209E-02	0.18%
Aug-17	1.170E-02	1.172E-02	0.18%
Aug-18	1.393E-02	1.395E-02	0.18%
Aug-19	1.275E-02	1.278E-02	0.18%

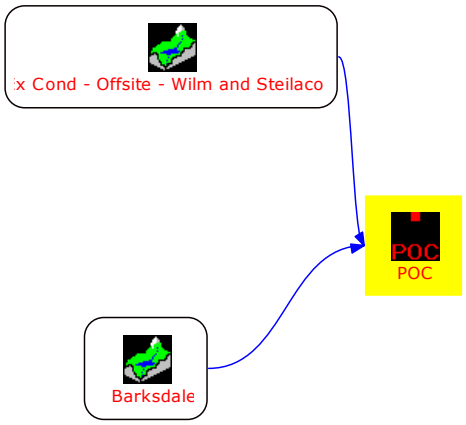
Aug-20	8.409E-03	8.424E-03	0.18%
Aug-21	1.314E-02	1.317E-02	0.18%
Aug-22	9.318E-03	9.334E-03	0.18%
Aug-23	3.287E-02	3.293E-02	0.18%
Aug-24	2.317E-02	2.321E-02	0.18%
Aug-25	2.287E-02	2.291E-02	0.18%
Aug-26	2.027E-02	2.031E-02	0.18%
Aug-27	2.504E-02	2.508E-02	0.18%
Aug-28	2.267E-02	2.271E-02	0.18%
Aug-29	2.767E-02	2.772E-02	0.18%
Aug-30	2.365E-02	2.369E-02	0.17%
Aug-31	1.553E-02	1.555E-02	0.18%
Sep-01	4.031E-02	4.038E-02	0.18%
Sep-02	2.906E-02	2.911E-02	0.18%
Sep-03	2.042E-02	2.046E-02	0.18%
Sep-04	2.118E-02	2.122E-02	0.18%
Sep-05	1.893E-02	1.897E-02	0.18%
Sep-06	2.002E-02	2.006E-02	0.18%
Sep-07	1.060E-02	1.062E-02	0.18%
Sep-08	1.761E-02	1.764E-02	0.18%
Sep-09	2.529E-02	2.534E-02	0.18%
Sep-10	2.554E-02	2.559E-02	0.18%
Sep-11	1.400E-02	1.402E-02	0.18%
Sep-12	6.711E-03	6.723E-03	0.18%
Sep-13	2.117E-02	2.121E-02	0.18%
Sep-14	3.184E-02	3.189E-02	0.18%
Sep-15	3.814E-02	3.820E-02	0.18%
Sep-16	3.432E-02	3.438E-02	0.18%
Sep-17	5.186E-02	5.195E-02	0.18%
Sep-18	2.916E-02	2.921E-02	0.18%
Sep-19	4.277E-02	4.285E-02	0.18%
Sep-20	3.508E-02	3.514E-02	0.18%
Sep-21	2.409E-02	2.413E-02	0.18%
Sep-22	3.868E-02	3.875E-02	0.17%
Sep-23	3.728E-02	3.734E-02	0.17%
Sep-24	2.791E-02	2.796E-02	0.18%
Sep-25	1.600E-02	1.603E-02	0.18%
Sep-26	3.821E-02	3.827E-02	0.18%
Sep-27	3.214E-02	3.219E-02	0.18%
Sep-28	3.766E-02	3.773E-02	0.18%
Sep-29	1.945E-02	1.948E-02	0.18%
Sep-30	3.550E-02	3.556E-02	0.18%

**********Mean Monthly Wetland Inflow (cfs) **********
Must be within 15% for each Month

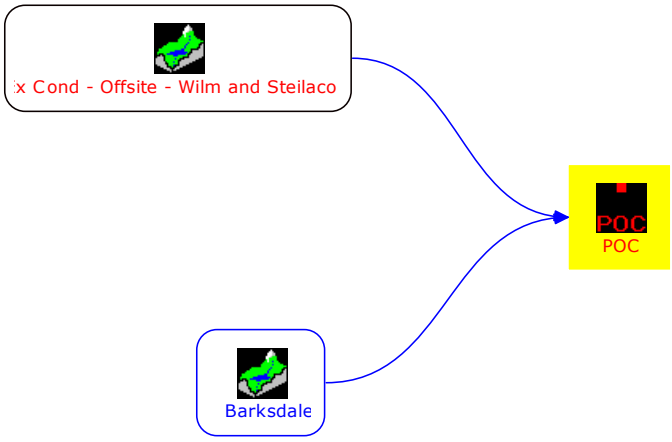
Month	Predeveloped	Postdeveloped	Percent Difference
Oct	6.711E-02	6.722E-02	0.17%
Nov	1.311E-01	1.313E-01	0.15%
Dec	1.365E-01	1.367E-01	0.14%
Jan	1.248E-01	1.249E-01	0.13%
Feb	1.070E-01	1.071E-01	0.12%
Mar	7.780E-02	7.790E-02	0.12%
Apr	4.625E-02	4.631E-02	0.13%
May	2.963E-02	2.968E-02	0.15%
Jun	2.188E-02	2.191E-02	0.17%

Jul	1.019E-02	1.021E-02	0.17%
Aug	1.336E-02	1.338E-02	0.18%
Sep	2.802E-02	2.807E-02	0.18%

CHAMPIONS CENTRE
Stormwater Calculations
Offsite Roadway Flow Calculations
LSE Job #12895



Existing Condition



Developed Conditions

MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.59
Program License Number: 201010005
Project Simulation Performed on: 12/02/2024 3:25 PM
Report Generation Date: 12/02/2024 3:25 PM

Input File Name: 12895Wilmoffsite.fld
Project Name: Mustard Seed (12895)
Analysis Title: Wilmington and Dupont Steilacoom Existing Flows
Comments: Quantity Flow Calculation

PRECIPITATION INPUT

Computational Time Step (Minutes): 15

Extended Precipitation Time Series Selected

Full Period of Record Available used for Routing

Climatic Region Number: 45
Precipitation Station : 920042 Pierce Co. West 42 in 10/01/1939-10/01/2097
Evaporation Station : 921042 Pierce Co. West 42 in

Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : Ecology Default

********** Default HSPF Parameters Used (Not Modified by User) **********

********** **WATERSHED DEFINITION** **********

Predevelopment/Post Development Tributary Area Summary

	Predeveloped	Post Developed
Total Subbasin Area (acres)	5.087	5.024
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	5.087	5.024

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 2

---------- Subbasin : Ex Cond - Offsite - Wilm and Steilacoom ----------

	-------Area (Acres) --------
ROADS/FLAT	4.332
Subbasin Total	4.332

---------- Subbasin : Barksdale ----------
-------Area (Acres) --------
ROADS/FLAT 0.755

Subbasin Total 0.755

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 2

---------- Subbasin : Ex Cond - Offsite - Wilm and Steilacoom ----------
-------Area (Acres) --------
ROADS/FLAT 4.291

Subbasin Total 4.291

---------- Subbasin : Barksdale ----------
-------Area (Acres) --------
ROADS/FLAT 0.733

Subbasin Total 0.733

********** **LINK DATA** **********

----------SCENARIO: PREDEVELOPED
Number of Links: 1

Link Name: POC
Link Type: Copy
Downstream Link: None

********** **LINK DATA** **********

----------SCENARIO: POSTDEVELOPED
Number of Links: 1

Link Name: POC
Link Type: Copy
Downstream Link: None

**********FLOOD FREQUENCY AND DURATION STATISTICS**********

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 2
Number of Links: 1

********** **Subbasin: Ex Cond - Offsite - Wilm and Steilacoom** **********

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	1.910
5-Year	2.393
10-Year	2.762
25-Year	3.460
50-Year	4.054
100-Year	4.900
200-Year	5.124
500-Year	5.409

********** **Subbasin: Barksdale** **********

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	0.333
5-Year	0.417
10-Year	0.481
25-Year	0.603
50-Year	0.707
100-Year	0.854
200-Year	0.893
500-Year	0.943

********** Link: POC ********** Link Outflow 1
Frequency Stats
Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	2.243
5-Year	2.810
10-Year	3.243
25-Year	4.063
50-Year	4.760
100-Year	5.754
200-Year	6.017
500-Year	6.352

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 2
Number of Links: 1

********** **Subbasin: Ex Cond - Offsite - Wilm and Steilacoom** **********

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	1.892
5-Year	2.370
10-Year	2.736
25-Year	3.427
50-Year	4.015
100-Year	4.854
200-Year	5.076
500-Year	5.358

********** **Subbasin: Barksdale** **********

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	0.323
5-Year	0.405
10-Year	0.467
25-Year	0.585
50-Year	0.686
100-Year	0.829
200-Year	0.867
500-Year	0.915

********** Link: POC ********** Link Outflow 1
Frequency Stats
Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	2.215
5-Year	2.775
10-Year	3.203
25-Year	4.012
50-Year	4.701
100-Year	5.683
200-Year	5.943
500-Year	6.274

************Groundwater Recharge Summary **************
Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Total Predeveloped Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: Ex Cond - Offsite -	0.000
Subbasin: Barksdale	0.000
Link: POC	0.000
Total:	0.000

Total Post Developed Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: Ex Cond - Offsite -	0.000
Subbasin: Barksdale	0.000
Link: POC	0.000
Total:	0.000

Total Predevelopment Recharge Equals Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 0.000 ac-ft/year, Post Developed: 0.000 ac-ft/year

************Water Quality Facility Data **************

----------SCENARIO: PREDEVELOPED

Number of Links: 1

********** Link: POC **********

2-Year Discharge Rate : 2.243 cfs

15-Minute Timestep, Water Quality Treatment Design Discharge
On-line Design Discharge Rate (91% Exceedance): 0.94 cfs
Off-line Design Discharge Rate (91% Exceedance): 0.56 cfs

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 2531.42
Inflow Volume Including PPT-Evap (ac-ft): 2531.42
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 2531.42
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

----------SCENARIO: POSTDEVELOPED

Number of Links: 1

********** Link: POC **********

2-Year Discharge Rate : 2.215 cfs

15-Minute Timestep, Water Quality Treatment Design Discharge
On-line Design Discharge Rate (91% Exceedance): 0.93 cfs
Off-line Design Discharge Rate (91% Exceedance): 0.56 cfs

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 2500.07
Inflow Volume Including PPT-Evap (ac-ft): 2500.07
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 2500.07
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

*************Compliance Point Results ***************

Scenario Predeveloped Compliance Link: POC
Scenario Postdeveloped Compliance Link: POC

***** Point of Compliance Flow Frequency Data *****
Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	2.243	2-Year	2.215
5-Year	2.810	5-Year	2.775
10-Year	3.243	10-Year	3.203
25-Year	4.063	25-Year	4.012
50-Year	4.760	50-Year	4.701
100-Year	5.754	100-Year	5.683
200-Year	6.017	200-Year	5.943
500-Year	6.352	500-Year	6.274

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Dec 2 2024

<Name>

Circular

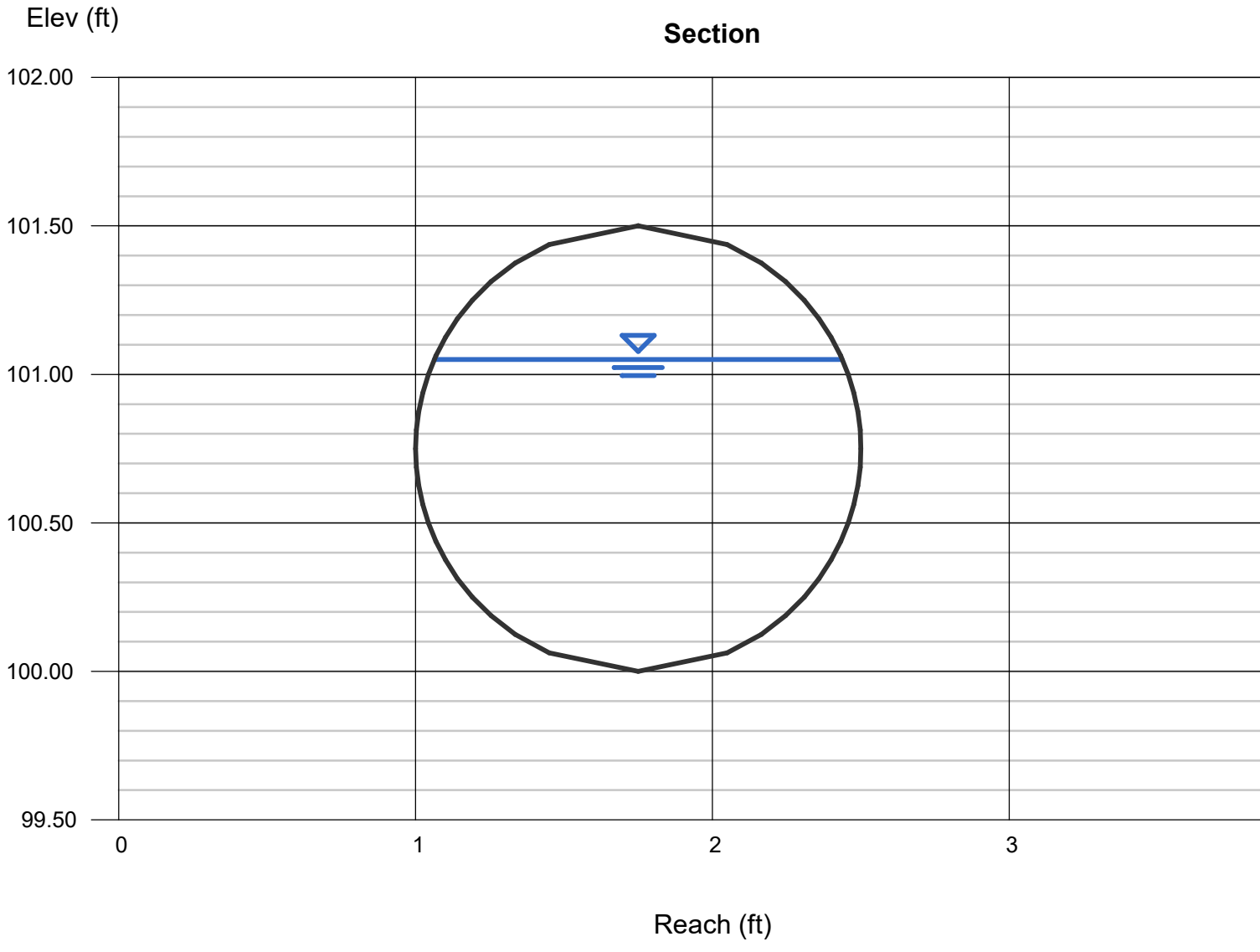
Diameter (ft)	= 1.50
Invert Elev (ft)	= 100.00
Slope (%)	= 0.50
N-Value	= 0.014

Calculations

Compute by:	Known Q
Known Q (cfs)	= 5.75

Highlighted

Depth (ft)	= 1.05
Q (cfs)	= 5.754
Area (sqft)	= 1.32
Velocity (ft/s)	= 4.35
Wetted Perim (ft)	= 2.98
Crit Depth, Yc (ft)	= 0.93
Top Width (ft)	= 1.37
EGL (ft)	= 1.34



WASHINGTON STATE DEPARTMENT OF ECOLOGY

July 2018

GENERAL USE LEVEL DESIGNATION FOR BASIC (TSS), DISSOLVED METALS (ENHANCED), AND PHOSPHORUS TREATMENT

For

Oldcastle Infrastructure, Inc.'s
The BioPod™ Biofilter
(Formerly the TreePod Biofilter)

Ecology's Decision:

Based on Oldcastle Infrastructure, Inc. application submissions for the The BioPod™ Biofilter (BioPod), Ecology hereby issues the following use level designation:

1. **General Use Level Designation (GULD) for Basic, Enhanced, and Phosphorus Treatment:**
   - **Sized at a hydraulic loading rate of 1.6 gallons per minute (gpm) per square foot (sq ft) of media surface area.**

2. **Ecology approves the BioPod at the hydraulic loading rate listed above, to achieve the maximum water quality design flow rate. The water quality design flow rates are calculated using the following procedures:**

   - **Western Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using the latest version of the Western Washington Hydrology Model or other Ecology-approved continuous runoff model.**
   - **Eastern Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using one of the three methods described in Chapter 2.2.5 of the Stormwater Management Manual for Eastern Washington (SWMMEW) or local manual.**
   - **Entire State: For treatment installed downstream of detention, the water quality design flow rate is the full 2-year release rate of the detention facility.**

3. **The GULD has no expiration date, but may be amended or revoked by Ecology.**

Ecology's Conditions of Use:

The BioPod shall comply with these conditions:

1) **Oldcastle Infrastructure, Inc. shall design, assemble, install, operate, and maintain the BioPod installations in accordance with Oldcastle Infrastructure, Inc.'s applicable manuals and the Ecology Decision.**

2) **BioPod media shall conform to the specifications submitted to and approved by Ecology**

3) **Maintenance: The required inspection/maintenance interval for stormwater treatment devices is often dependent on the efficiency of the device and the degree of pollutant loading from a particular drainage basin. Therefore, Ecology does not endorse or recommend a "one size fits all" maintenance cycle for a particular model/size of manufactured filter treatment device.**

   - **The BioPod is designed for a target maintenance interval of 1 year. Maintenance includes replacing the mulch, assessing plant health, removal of trash, and raking the top few inches of engineered media.**
   - **A BioPod system tested at the Lake Union Ship Canal Test Facility in Seattle, WA required maintenance after 1.5 months, or 6.3% of a water year. Monitoring personnel observed similar maintenance issues with other systems evaluated at the Test Facility. The runoff from the Test Facility may be unusual and maintenance requirements of systems installed at the Test Facility may not be indicative of maintenance requirements for all sites.**
   - **Test results provided to Ecology from a BioPod System evaluated in a lab following New Jersey Department of Environmental Protection Laboratory Protocol for Filtration MTDs have indicated the BioPod System is capable of longer maintenance intervals.**
   - **Owners/operators must inspect BioPod systems for a minimum of twelve months from the start of post-construction operation to determine site-specific inspection/maintenance schedules and requirements. Owners/operators must conduct inspections monthly during the wet season, and every other month during the dry season. (According to the SWMMWW, the wet season in western Washington is October 1 to April 30. According to the SWMMEW, the wet season in eastern Washington is October 1 to June 30.) After the first year of operation, owners/operators must conduct inspections based on the findings during the first year of inspections.**
   - **Conduct inspections by qualified personnel, follow manufacturer's guidelines, and use methods capable of determining either a decrease in treated effluent flow rate and/or a decrease in pollutant removal ability.**

4) **Install the BioPod in such a manner that you bypass flows exceeding the maximum operating rate and you will not resuspend captured sediment.**

5) Discharges from the BioPod shall not cause or contribute to water quality standards violations in receiving waters.

Applicant: Oldcastle Infrastructure, Inc.

Applicant's Address: 360 Sutton Place
Santa Rosa, CA 95407

Application Documents:

Technical Evaluation Report TreePod™ BioFilter System Performance Certification Project, Prepared for Oldcastle, Inc., Prepared by Herrera Environmental Consultants, Inc. February 2018

Technical Memorandum: Response to Board of External Reviewers' Comments on the Technical Evaluation Report for the TreePod™ Biofilter System Performance Certification Project, Oldcastle, Inc. and Herrera Environmental Consultants, Inc., February 2018

Technical Memorandum: Response to Board of External Reviewers' Comments on the Technical Evaluation Report for the TreePod™ Biofilter System Performance Certification Project, Oldcastle, Inc. and Herrera Environmental Consultants, Inc., January 2018

Application for Pilot Use Level Designation, TreePod™ Biofilter – Stormwater Treatment System, Oldcastle Stormwater Solutions, May 2016

Emerging Stormwater Treatment Technologies Application for Certification: The TreePod™ Biofilter, Oldcastle Stormwater Solutions, April 2016

Applicant's Use Level Request:

- General Use Level Designation as a Basic, Enhanced, and Phosphorus Treatment device in accordance with Ecology's *Stormwater Management Manual for Western Washington*

Applicant's Performance Claims:

Based on results from laboratory and field-testing, the applicant claims the BioPod™ Biofilter operating at a hydraulic loading rate of 153 inches per hour is able to remove:

- 80% of Total Suspended Solids (TSS) for influent concentrations greater than 100 mg/L and achieve a 20 mg/L effluent for influent concentrations less than 100 mg/L.
- 60% dissolved zinc for influent concentrations 0.02 to 0.3 mg/L.
- 30% dissolved copper for influent concentrations 0.005 to 0.02 mg/L.
- 50% or greater total phosphorus for influent concentrations 0.1 to 0.5 mg/L.

Ecology's Recommendations:

Ecology finds that:

- Oldcastle Infrastructure, Inc. has shown Ecology, through laboratory and field testing, that the BioPod™ Biofilter is capable of attaining Ecology's Basic, Total Phosphorus, and Enhanced treatment goals.

Findings of Fact:

Field Testing

1. Herrera Environmental Consultants, Inc. conducted monitoring of the BioPod™ Biofilter at the Lake Union Ship Canal Test Facility in Seattle Washington between November 2016 and April 2018. Herrera collected flow-weight composite samples during 14 separate storm events and peak flow grab samples during 3 separate storm events. The system was sized at an infiltration rate of 153 inches per hour or a hydraulic loading rate of 1.6 gpm/ft^2.
2. The D_{50} of the influent PSD ranged from 3 to 292 microns, with an average D_{50} of 28 microns.
3. Influent TSS concentrations ranged from 17 mg/L to 666 mg/L, with a mean concentration of 98 mg/L. For all samples (influent concentrations above and below 100 mg/L) the bootstrap estimate of the lower 95 percent confidence limit (LCL 95) of the mean TSS reduction was 84% and the bootstrap estimate of the upper 95 percent confidence limit (UCL95) of the mean TSS effluent concentration was 8.2 mg/L.
4. Dissolved copper influent concentrations from the 17 events ranged from 9.0 µg/L to 21.1 µg/L. The 21.1 µg/L data point was reduced to 20.0 µg/L, the upper limit to the TAPE allowed influent concentration range, prior to calculating the pollutant removal. A bootstrap estimate of the LCL95 of the mean dissolved copper reduction was 35%.
5. Dissolved zinc influent concentrations from the 17 events ranged from 26.1 µg/L to 43.3 µg/L. A bootstrap estimate of the LCL95 of the mean dissolved zinc reduction was 71%.
6. Total phosphorus influent concentrations from the 17 events ranged from 0.064 mg/L to 1.56 mg/L. All influent data greater than 0.5 mg/L were reduced to 0.5 mg/L, the upper limit to the TAPE allowed influent concentration range, prior to calculating the pollutant removal. A bootstrap estimate of the LCL95 of the mean total phosphorus reduction was 64%.
7. The system experienced rapid sediment loading and needed to be maintained after 1.5 months. Monitoring personnel observed similar sediment loading issues with other systems evaluated at the Test Facility. The runoff from the Test Facility may not be indicative of maintenance requirements for all sites.

Laboratory Testing

1. Good Harbour Laboratories (GHL) conducted laboratory testing at their site in Mississauga, Ontario in October 2017 following the New Jersey Department of Environmental Protection Laboratory Protocol for Filtration MTDs. The testing evaluated a 4-foot by 6-foot standard biofiltration chamber and inlet contour rack with bypass weir. The test sediment used during the testing was custom blended by GHL using various commercially available silica sands, which had an average d_{50} of 69 µm. Based on the lab test results:

a. GHL evaluated removal efficiency over 15 events at a Maximum Treatment Flow Rate (MTFR) of 37.6 gpm, which corresponds to a MTFR to effective filtration treatment area ratio of 1.80 gpm/ft^2. The system, operating at 100% of the MTFR with an average influent concentration of 201.3 mg/L, had an average removal efficiency of 99 percent.
b. GHL evaluated sediment mass loading capacity over an additional 16 events using an influent SSC concentration of 400 mg/L. The first 11 runs were evaluated at 100% of the MTFR. The BioPod began to bypass, so the remaining 5 runs were evaluated at 90% of the MTFR. The total mass of the sediment captured was 245.0 lbs and the cumulative mass removal efficiency was 96.3%.

2. Herrera Environmental Consultants Inc. conducted laboratory testing in September 2014 at the Seattle University Engineering Laboratory. The testing evaluated the flushing characteristics, hydraulic conductivity, and pollutant removal ability of twelve different media blends. Based on this testing, Oldcastle Infrastructure, Inc. selected one media blend, Mix 8, for inclusion in their TAPE evaluation of the BioPod™ Biofilter.
   a. Herrera evaluated Mix 8 in an 8-inch diameter by 36-inch tall polyvinyl chloride (PVC) column. The column contained 18-inches of Mix 8 on top of 6-inches of pea gravel. The BioPod will normally include a 3-inch mulch layer on top of the media layer; however, this was not included in the laboratory testing.
   b. Mix 8 has a hydraulic conductivity of 218 inches per hour; however, evaluation of the pollutant removal ability of the media was based on an infiltration rate of 115 inches per hour. The media was tested at 75%, 100%, and 125% of the infiltration rate. Based on the lab test results:
      - The system was evaluated using natural stormwater. The dissolved copper and dissolved zinc concentrations in the natural stormwater were lower than the TAPE influent standards; therefore, the stormwater was spiked with 66.4 mL of 100 mg/L Cu solution and 113.6 mL of 1,000 mg/L Zn solution.
      - The BioPod removed an average of 81% of TSS, with a mean influent concentration of 48.4 mg/L and a mean effluent concentration of 9.8 mg/L.
      - The BioPod removed an average of 94% of dissolved copper, with a mean influent concentration of 10.6 µg/L and a mean effluent concentration of 0.6 µg/L.
      - The BioPod removed an average of 97% of dissolved zinc, with a mean influent concentration of 117 µg/L and a mean effluent concentration of 4 µg/L.
      - The BioPod removed an average of 97% of total phosphorus, with a mean influent concentration of 2.52 mg/L and a mean effluent concentration of 0.066 mg/L. When total phosphorus influent concentrations were capped at the TAPE upper limit of 0.5 mg/L, calculations showed an average removal of 87%.

Other BioPod Related Issues to be Addressed By the Company:

1. Conduct hydraulic testing to obtain information about maintenance requirements on a site with runoff that is more typical of the Pacific Northwest.

Technology Description: Download at https://oldcastleprecast.com/stormwater/bioretention-biofiltration-applications/bioretention-biofiltration-solutions/

Contact Information:

Applicant: Chris Demarest
Oldcastle Infrastructure, Inc.
(925) 667-7100
Chris.demarest@oldcastle.com

Applicant website: https://oldcastleprecast.com/stormwater/

Ecology web link: https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

Ecology: Douglas C. Howie, P.E.
Department of Ecology
Water Quality Program
(360) 407-6444
douglas.howie@ecy.wa.gov

Revision History

Date	Revision
March 2018	GULD granted for Basic Treatment
March 2018	Provisional GULD granted for Enhanced and Phosphorus Treatment
June 2016	PULD Granted
April 2018	GULD for Basic and Provisional GULD for Enhanced and Phosphorus granted, changed name to BioPod from TreePod
July 2018	GULD for Enhanced and Phosphorus granted

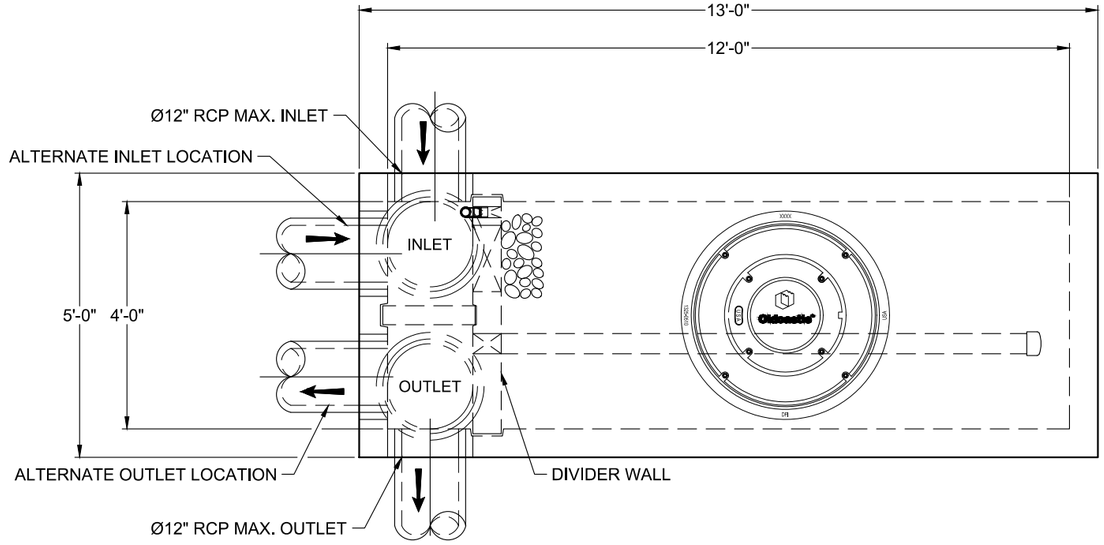
SITE SPECIFIC DATA	
Structure ID	BP#1
Treatment Flow Rate (cfs)	0.14
Peak Flow Rate (cfs)	1.374
Rim Elevation	233.12
Top of Vault Elevation	-

Pipe Data	Pipe Location	Pipe Size	Pipe Type	Invert Elevation
Inlet	-	-	-	-
Outlet	-	-	-	-

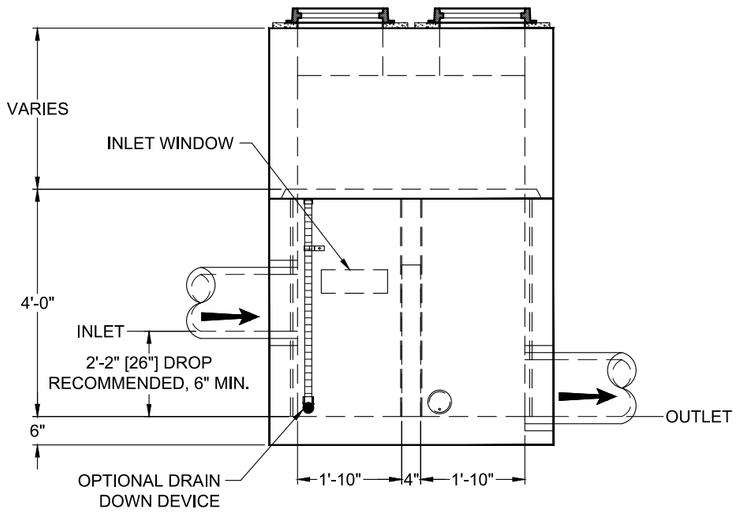
Notes:

PERFORMANCE SPECIFICATIONS	
Treatment Flow Capacities:*	
NJDEP 80% Removal, 75 micron	0.160 cfs
WA Ecology GULD - Basic, Enhanced & Phosphorus	0.142 cfs
Bypass Capacity	5.0 cfs

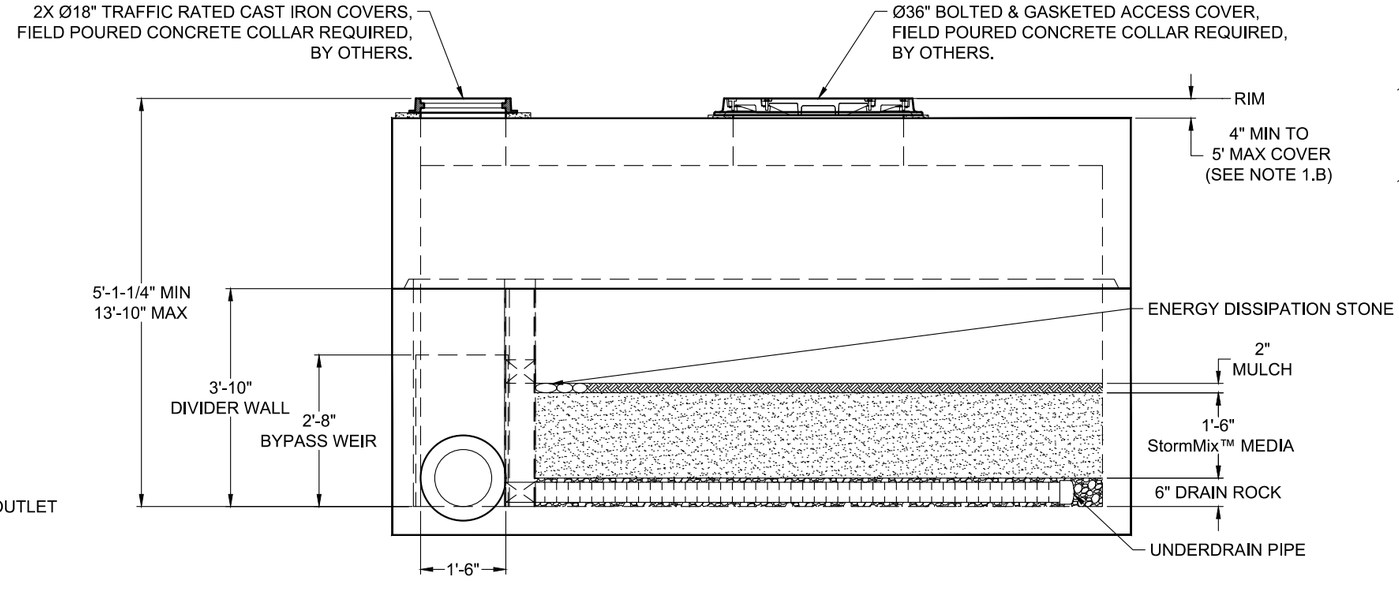
*Contact Oldcastle for alternative treatment flow capacities.



PLAN VIEW



LEFT END VIEW



ELEVATION VIEW

NOTES:

1. DESIGN LOADINGS:
   A. AASHTO HS-20-44 (WITH IMPACT)
   B. DESIGN SOIL COVER: 5'-0" MAXIMUM
   C. ASSUMED WATER TABLE: BELOW BASE OF PRECAST (ENGINEER-OF-RECORD TO CONFIRM SITE WATER TABLE ELEVATION)
   D. LATERAL EARTH PRESSURE: 45 PCF (DRAINED)
   E. LATERAL LIVE LOAD SURCHARGE: 80 PSF (APPLIED TO 8'-0" BELOW GRADE)
   F. NO LATERAL SURCHARGE FROM ADJACENT BUILDINGS, WALLS, PIERS, OR FOUNDATIONS.
2. CONCRETE 28-DAY MINIMUM COMPRESSIVE STRENGTH: 5,000 PSI MINIMUM.
3. REINFORCING: REBAR, ASTM A615/A706, GRADE 60
4. CEMENT: ASTM C150
5. REQUIRED ALLOWABLE SOIL BEARING CAPACITY: 2,500 PSF
6. REFERENCE STANDARD:
   A. ASTM C890
   B. ASTM C913
   C. ACI 318-14
7. THIS STRUCTURE IS DESIGNED TO THE PARAMETERS NOTED HEREIN. ENGINEER-OF-RECORD SHALL VERIFY FY THAT NOTED PARAMETERS MEET OR EXCEED PROJECT REQUIREMENTS. IF DESIGN PARAMETERS ARE INCORRECT, REVIEWING ENGINEER/AUTHORITY SHALL NOTIFY OLDCASTLE INFRASTRUCTURE UPON REVIEW.
8. INLET AND OUTLET HOLES WILL BE FACTORY CORED/CAST PER PLANS AND CUSTOMER REQUIREMENTS. INLET AND OUTLET LOCATIONS CAN BE MIRRORED.
9. CONTRACTOR RESPONSIBLE TO VERIFY ALL SIZES, LOCATIONS, AND ELEVATIONS OF OPENINGS.
10. CONTRACTOR RESPONSIBLE TO ENSURE ADEQUATE BEARING SURFACE IS PROVIDED (I.E. COMPACTED AND LEVEL PER PROJECT SPECIFICATIONS).
11. SECTION HEIGHTS, SLAB/WALL THICKNESSES, AND KEYWAYS ARE SUBJECT TO CHANGE AS REQUIRED FOR SITE REQUIREMENTS AND/OR DUE TO PRODUCT AVAILABILITY AND PRODUCTION FACILITY CONSTRAINTS.
12. MAXIMUM PICK WEIGHTS":
    A. TOP: XX,XXX LBS
    B. BASE: XX,XXX LBS*
    (* COMBINED WEIGHT OF BASE INCLUDES BYPASS WEIR, DIVIDER WALL, ROCK & MEDIA)
13. INTERNALS SHALL CONSIST OF UNDERDRAIN PIPE, ROCK, STORMMIX™ MEDIA, MULCH, DIVIDER WALL, BYPASS WEIR AND OPTIONAL DRAIN DOWN.

Bioretention/
Biofiltration

Oldcastle Infrastructure™
A CRH COMPANY

Ph: 800.579.8819 | www.oldcastleinfrastructure.com/stormwater

BioPod™ Biofilter System (STANDARD)
Underground Vault with Internal Bypass

CUSTOMER
-

PROJECT NAME
CHAMPIONS CENTRE

SHEET NAME	REVISION	SHEET
Specifier Drawing BPU-412IB	-	1 OF 1
	REV DATE -	

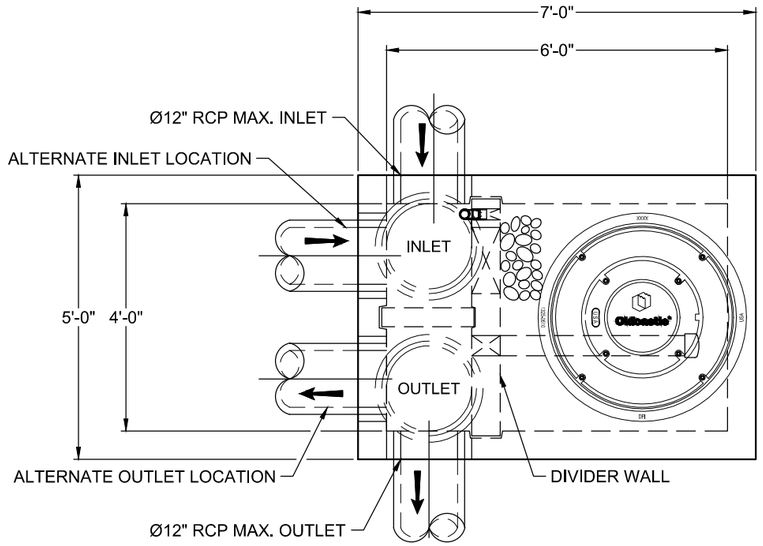
SITE SPECIFIC DATA	
Structure ID	BP#2
Treatment Flow Rate (cfs)	0.05
Peak Flow Rate (cfs)	0.485
Rim Elevation	243.00
Top of Vault Elevation	-

Pipe Data	Pipe Location	Pipe Size	Pipe Type	Invert Elevation
Inlet	-	-	-	-
Outlet	-	-	-	-

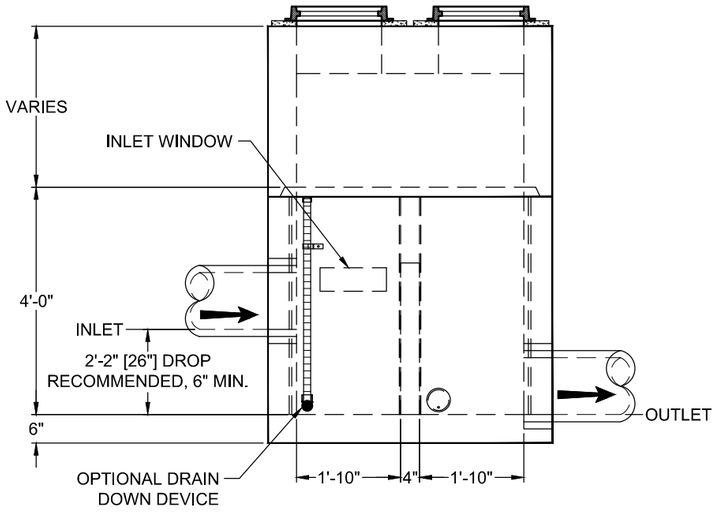
Notes:

PERFORMANCE SPECIFICATIONS	
Treatment Flow Capacities:*	
NJDEP 80% Removal, 75 micron	0.064 cfs
WA Ecology GULD - Basic, Enhanced & Phosphorus	0.057 cfs
Bypass Capactiy	5.0 cfs

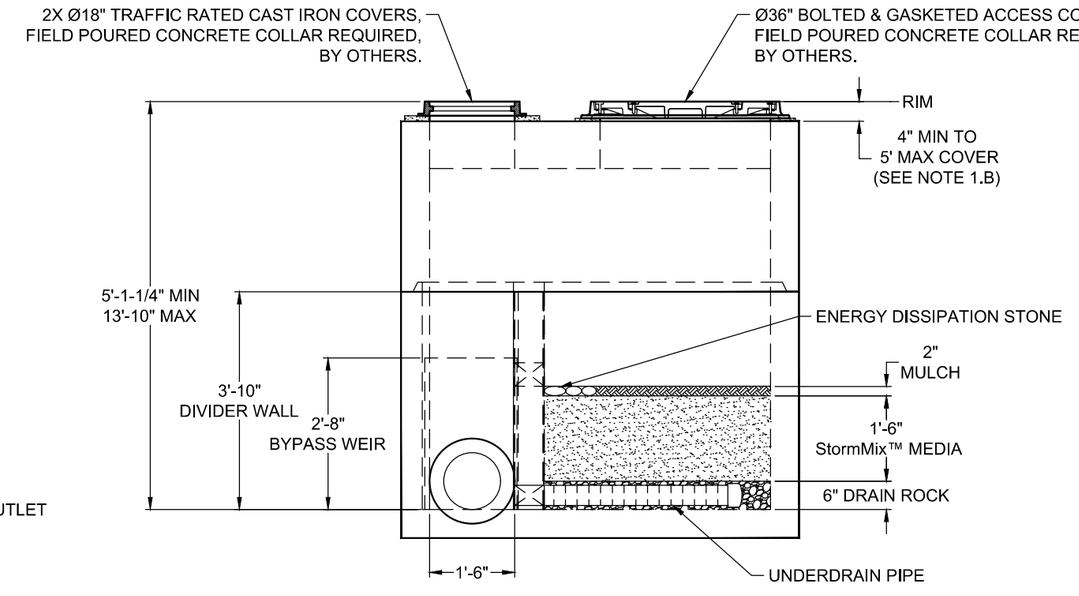
*Contact Oldcastle for alternative treatment flow capacities.



PLAN VIEW



LEFT END VIEW



ELEVATION VIEW

NOTES:

1. DESIGN LOADINGS:
   A. AASHTO HS-20-44 (WITH IMPACT)
   B. DESIGN SOIL COVER: 5'-0" MAXIMUM
   C. ASSUMED WATER TABLE: BELOW BASE OF PRECAST (ENGINEER-OF-RECORD TO CONFIRM SITE WATER TABLE ELEVATION)
   D. LATERAL EARTH PRESSURE: 45 PCF (DRAINED)
   E. LATERAL LIVE LOAD SURCHARGE: 80 PSF (APPLIED TO 8'-0" BELOW GRADE)
   F. NO LATERAL SURCHARGE FROM ADJACENT BUILDINGS, WALLS, PIERS, OR FOUNDATIONS.
2. CONCRETE 28-DAY MINIMUM COMPRESSIVE STRENGTH: 5,000 PSI MINIMUM.
3. REINFORCING: REBAR, ASTM A615/A706, GRADE 60
4. CEMENT: ASTM C150
5. REQUIRED ALLOWABLE SOIL BEARING CAPACITY: 2,500 PSF
6. REFERENCE STANDARD:
   A. ASTM C890
   B. ASTM C913
   C. ACI 318-14
7. THIS STRUCTURE IS DESIGNED TO THE PARAMETERS NOTED HEREIN. ENGINEER-OF-RECORD SHALL VERIFY FY THAT NOTED PARAMETERS MEET OR EXCEED PROJECT REQUIREMENTS. IF DESIGN PARAMETERS ARE INCORRECT, REVIEWING ENGINEER/AUTHORITY SHALL NOTIFY OLDCASTLE INFRASTRUCTURE UPON REVIEW.
8. INLET AND OUTLET HOLES WILL BE FACTORY CORED/CAST PER PLANS AND CUSTOMER REQUIREMENTS. INLET AND OUTLET LOCATIONS CAN BE MIRRORED.
9. CONTRACTOR RESPONSIBLE TO VERIFY ALL SIZES, LOCATIONS, AND ELEVATIONS OF OPENINGS.
10. CONTRACTOR RESPONSIBLE TO ENSURE ADEQUATE BEARING SURFACE IS PROVIDED (I.E. COMPACTED AND LEVEL PER PROJECT SPECIFICATIONS).
11. SECTION HEIGHTS, SLAB/WALL THICKNESSES, AND KEYWAYS ARE SUBJECT TO CHANGE AS REQUIRED FOR SITE REQUIREMENTS AND/OR DUE TO PRODUCT AVAILABILITY AND PRODUCTION FACILITY CONSTRAINTS.
12. MAXIMUM PICK WEIGHTS":
   A. TOP: XX,XXX LBS
   B. BASE: XX,XXX LBS*
   (* COMBINED WEIGHT OF BASE INCLUDES BYPASS WEIR, DIVIDER WALL, ROCK & MEDIA)
13. INTERNALS SHALL CONSIST OF UNDERDRAIN PIPE, ROCK, STORMMIX™ MEDIA, MULCH, DIVIDER WALL, BYPASS WEIR AND OPTIONAL DRAIN DOWN.

Bioretention/
Biofiltration

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A CRH COMPANY

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BioPod™ Biofilter System (STANDARD)

Underground Vault with Internal Bypass

CUSTOMER
-

PROJECT NAME
CHAMPIONS CENTRE

SHEET NAME	REVISION	SHEET
Specifier Drawing BPU-46IB	-	1 OF 1
	REV DATE -	

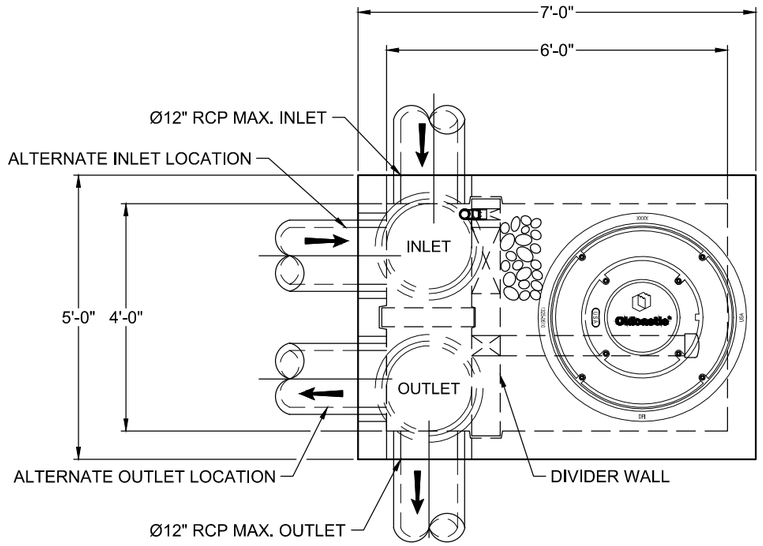
SITE SPECIFIC DATA	
Structure ID	BP#3
Treatment Flow Rate (cfs)	0.05
Peak Flow Rate (cfs)	0.499
Rim Elevation	239.20
Top of Vault Elevation	-

Pipe Data	Pipe Location	Pipe Size	Pipe Type	Invert Elevation
Inlet	-	-	-	-
Outlet	-	-	-	-

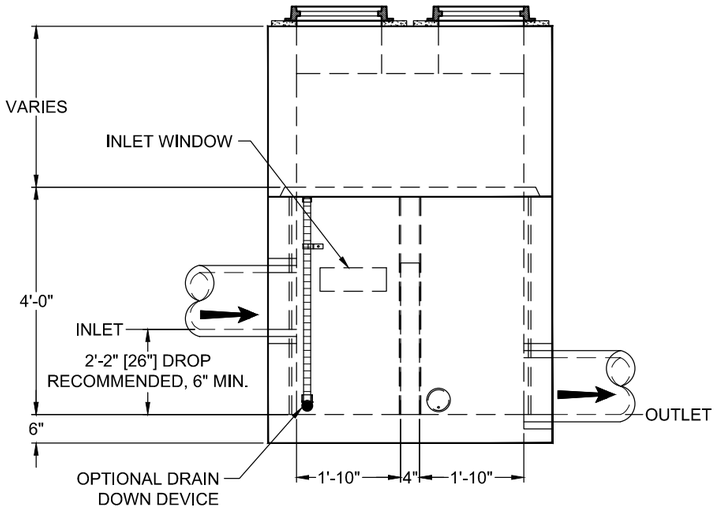
Notes:

PERFORMANCE SPECIFICATIONS	
Treatment Flow Capacities:*	
NJDEP 80% Removal, 75 micron	0.064 cfs
WA Ecology GULD - Basic, Enhanced & Phosphorus	0.057 cfs
Bypass Capactiy	5.0 cfs

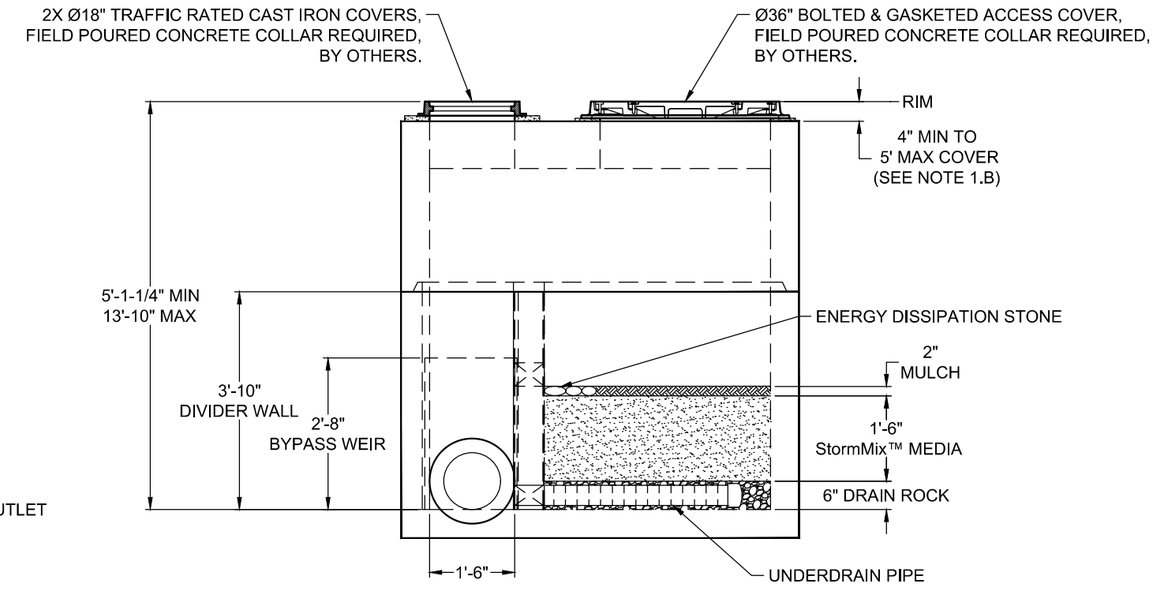
*Contact Oldcastle for alternative treatment flow capacities.



PLAN VIEW



LEFT END VIEW



ELEVATION VIEW

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   B. DESIGN SOIL COVER: 5'-0" MAXIMUM
   C. ASSUMED WATER TABLE: BELOW BASE OF PRECAST (ENGINEER-OF-RECORD TO CONFIRM SITE WATER TABLE ELEVATION)
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9. CONTRACTOR RESPONSIBLE TO VERIFY ALL SIZES, LOCATIONS, AND ELEVATIONS OF OPENINGS.
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CUSTOMER
-

PROJECT NAME
CHAMPIONS CENTRE

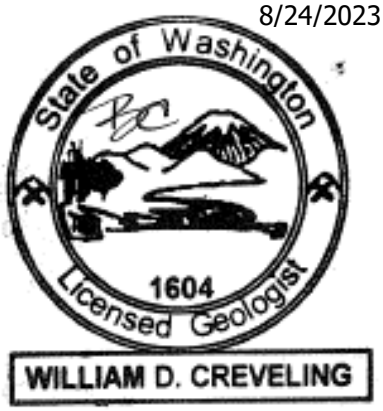
SHEET NAME	REVISION	SHEET
Specifier Drawing BPU-46IB	-	1 OF 1
	REV DATE -	

Appendix D

Soils Report

Project Name Champion Centre Geotechnical Soil Observation Report		**Job #** 12895	**Inspection Report** #1
Address / Parcel No. XXX Steilacoom Dupont RD SW / 0119362043		**Date** August 24, 2023	**Page** 1 of 11
City / County Dupont / Pierce	**Permit #**	**Arrival Time:** 1:00 pm (5/18/2023) 12:30 pm, (8/11/2023)	
Client Mustard Seed Legacy Development, LLC (c/o David Rich)	**Project Manager** Damon DeRosa, P.E.		
Contractor James Moynan Excavating	**Project Geologist** Bill Creveling, L.G.		
Weather n/a			
Type of Work Performed Perform soil observations via soil pit excavation to determine characteristics applicable for foundation support, drainage, and constructability of the proposed development. Review 'Critical Slope' characteristics per Chapter 25.105.030.345			
Equipment Used Tracked Mini-Excavator			

8/24/2023



Project Description

A Licensed Geologist visited the above site on two occasions to oversee the excavation of 12 test pits to characterize subsurface conditions for the feasibility of a new development plan for the property. The development plan includes a proposed eating and drinking establishment on the north portion of the site development plan, and a religious assembly building on the south portion of the plan. The development will require the typical grading for building pad and parking lot design, and on-site stormwater control. Through our site observations and published sources study, the purpose of this report is to summarize the site characteristics and make appropriate recommendations for project development. This report will also address the 'Critical Slope' review comments from the City of Dupont Review Letter dated June 2, 2023.

Information Sources

Soil identification and mapping for this report is supported by information from the Natural Resource Conservation Service (the NRCS), and in-situ test pits excavated for our confirmation of subsurface conditions. Geologic information for this assessment is supported by information from the Washington Department of Natural Resources (DNR) Geologic Map of the Tacoma 1:100,000 Scale Quadrangle, Washington. Our understanding of site geology is supported by the review of geologic mapping, published topographic and relief map layers from the Pierce County Geographical Information System (GIS), and site observations.

We reviewed Table 1806.2 "Presumptive Load Bearing Values" of the 2018 International Building Code; we contracted Construction Testing Laboratories for Particle Size Distribution Analysis; and evaluated published geologic and terrain mapping.

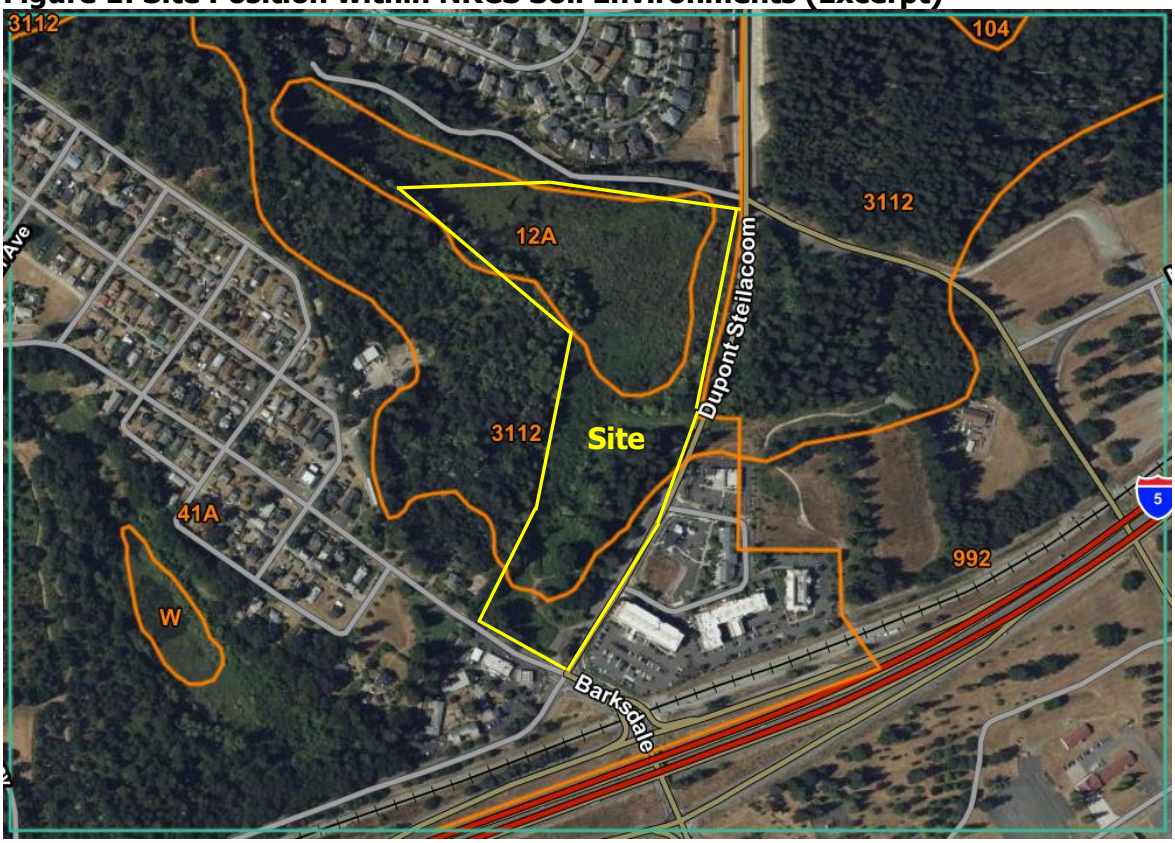
Site Description

This group of properties (the Site) comprise approximately 21 acres, albeit the proposed development will occur on the south and southeast portion of the site comprising approximately 4.75 acres. The site is undeveloped. It is partially wooded and includes well-developed understory vegetation typical for the region. It is bounded on the Southeast side and the Southwest side by Steilacoom Dupont Road Southwest and Barksdale Avenue respectively. Gentle to moderate slopes descend westward into the site from Steilacoom Dupont Road and dip slightly northward from Barksdale Avenue.

Soil

According to the NRCS, the site is situated over three soil environments. However, most of the proposed development area is situated on the Spanaway gravelly sandy loam, while a small portion may extend over a transition to the Everett-Spanaway-Spana Complex.
Figure 1 illustrates the site position in the soil mapping.

Figure 1: Site Position within NRCS Soil Environments (Excerpt)



Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
104	Semiahmoo muck, 0 to 1 percent slopes	0.5	0.2%
992	Urban land-Spanaway complex, 0 to 2 percent slopes	69.3	24.0%
3112	Everett-Spanaway-Spana complex, 0 to 30 percent slopes	37.6	13.0%
Subtotals for Soil Survey Area		**107.4**	**37.2%**
Totals for Area of Interest		**288.5**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
12A	Dupont muck	14.4	5.0%
41A	Spanaway gravelly sandy loam	113.9	39.5%
3112	Everett-Spanaway-Spana complex, 0 to 30 percent slopes	50.7	17.6%
W	Water	2.2	0.8%
Subtotals for Soil Survey Area		**181.1**	**62.8%**
Totals for Area of Interest		**288.5**	**100.0%**

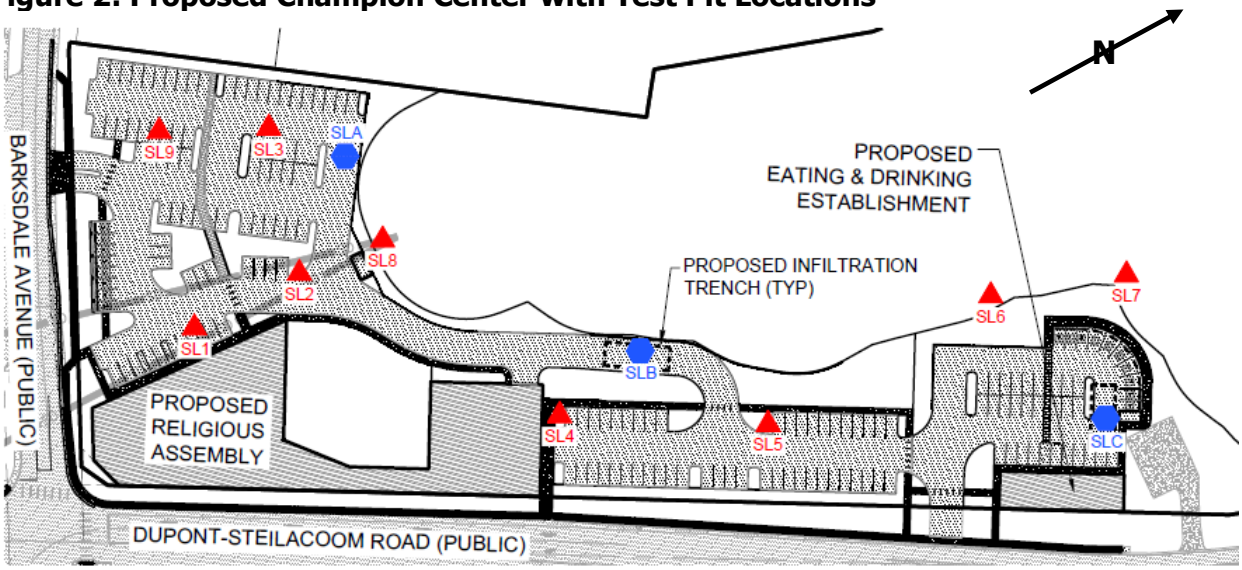
This near level to undulating Spanaway gravelly sandy loam is excessively drained. It formed in glacial outwash mixed in the upper part with volcanic ash on the very extensive plain from Lakewood to Roy. The elevation ranges from 100 to 500 feet. The annual precipitation in the region is 35 to 45 inches, and the mean annual air temperature is 51 degrees F. The frost-free season is about 170 days. Slopes range from 0 to 6 percent with the exception of anomalous Kame and Kettle features (See 'Geology' section for details).

Per the NRCS, a typical profile includes a surface layer of black gravelly sandy loam approximately 14 inches thick (but varies). The subsoil, to a depth of 18 inches, is dark grayish brown very gravelly sandy loam. The substratum, to a depth of more at least *60 inches to several tens of feet, is light brownish gray very gravelly sand. Permeability is extremely rapid. Surface runoff is slow to non-existent, and there is little erosion hazard.

Based on our test pits we can confirm the NRCS soil mapping on the site. We confirmed the site development area to be situated wholly or mostly on the Spanaway gravelly sandy loam. Figure 2 illustrates the site test pit locations on the site development plans.

*Note: the NRCS limits their analysis to the upper 60 inches of the subsurface environment even though actual depths may well exceed 60 inches (as they do in this case).

Figure 2: Proposed Champion Center with Test Pit Locations



In-Situ Soil Descriptions

SOIL LOGS:
BILL CREVELING, LS&E MAY 18, 2021

SL-1
0" - 80" ALTERNATING DARK BROWN/LIGHT BROWN VERY GRAVELLY FINE-COARSE SAND (FILL)

SL-2
0" - 60" BROWN/DARK BROWN VERY GRAVELLY FINE-MED SAND W/SILT, ORGANICS (FILL)
60" - 96" BROWN VERY GRAVELLY FINE-MED SAND

SL-3
0" - 48" DARK BROWN/BLACK VERY GRAVELLY LOAM (NATIVE)
48" - 96" BROWN EXTREMELY GRAVELLY FINE-COARSE SAND W/COBBLES (NATIVE)

SL-4
0"- 18" DARK BROWN/BLACK VERY GRAVELLY LOAM (NATIVE)
18" - 96" BROWN EXTREMELY GRAVELLY FINE-COARSE SAND W/COBBLES (NATIVE)

SL-5
0" - 18" BROWN VERY GRAVELLY LOAMY SAND
18" - 80" TAN/GRAY EXTREMELY GRAVELLY FINE-COARSE SAND, ROOTS TO 80"
80"+ WATER

SL-6
0" - 10" DARK BROWN SANDY LOAM, ORGANICS
10" - 48" BROWN GRAVELLY FINE-MED SAND, ROOTED
48" - 72" GRAY GRAVELLY MED-COARSE SAND, COBBLES

SL-7
0" - 18" DARK BROWN LOAMY SAND, ROOTED, ORGANICS
18" - 70" BROWN EXTREMELY GRAVELLY FINE-COARSE SAND, COBBLES & BOULDERS

SL-8
0" - 18" BROWN VERY GRAVELLY LOAMY FINE SAND, COMPACT (FILL)
18" - 48" DARK BROWN VERY GRAVELLY LOAM (NATIVE)
48" - 80" BROWN EXTREMELY GRAVELLY FINE-COARSE SAND W/OCCASIONAL BOULDERS

SOIL LOGS:
BILL CREVELING, LS&E AUGUST 11, 2023

SL-A
0" - 36" DARK BROWN / BLACK SILT W/ FN SAND GRAVEL, ORGANIC
36" - 120" TAN GRAVEL W/ SAND

SL-B
0" - 24" DARK BROWN / BLACK SILT W/ FN SAND GRAVEL, ORGANIC
24" - 120" TAN GRAVEL W/ SAND

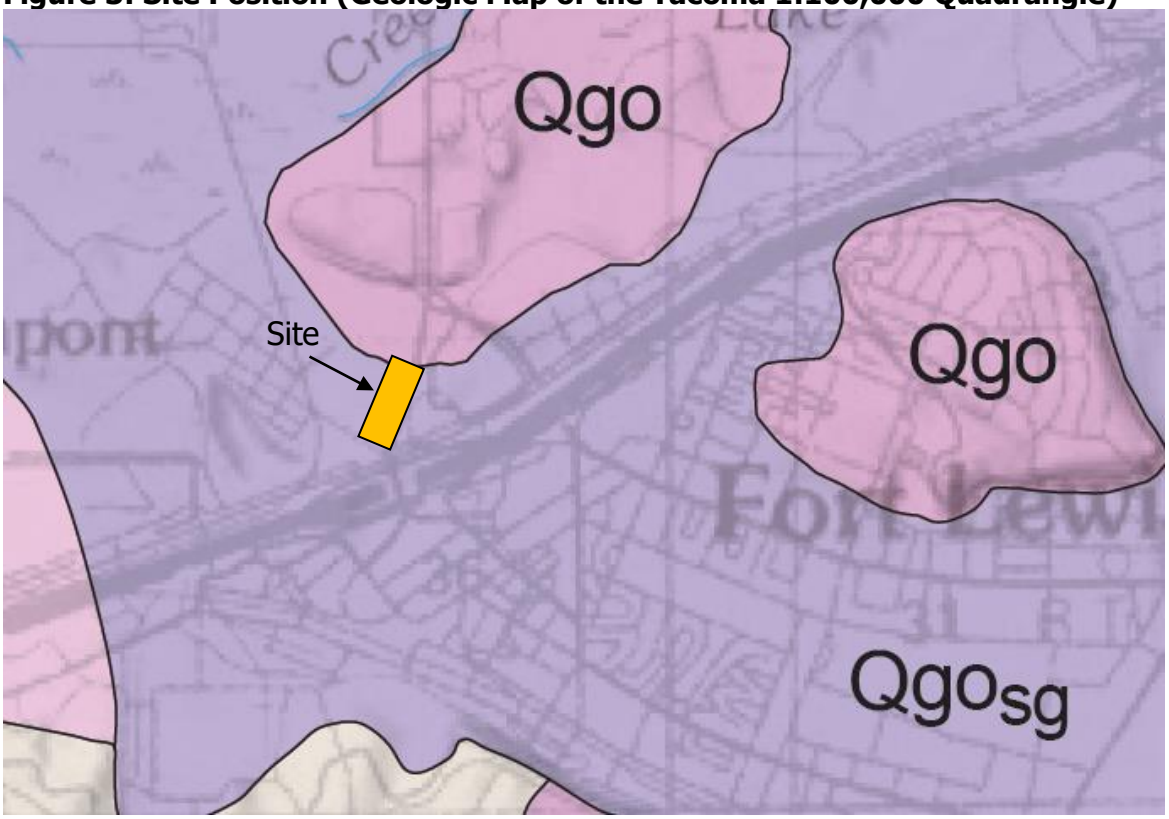
SL-C
0" - 54" BROWN FN-MED SAND WITH SILT, GRAVEL
54" - 120" TAN MED. SAND & GRAVEL

Geology

According to the Geologic Map of the Tacoma 1:100,000-scale Quadrangle, Washington, in Figure 3 below; this site is located on a coarse glacial outwash deposit emplaced during a period of glacial lake outburst flooding during the end of the Fraser glaciation period. An large regional body of water trapped between glacial ice in the lowlands, and the Cascade foothills to the east was released suddenly through ice failure. This catastrophic event produced a large scale erosion event which eroded and removed the previously emplaced glacial stratigraphy throughout the Spanaway and Lakewood area, and replaced the original material in the basin with an excessively coarse outwash referred to as the Steilacoom gravel (Qgo_{sg}).

Ice blocks were transported and deposited in the terrain during this outburst flooding. Kettle formations, found throughout the broad Steilacoom Gravel deposit, were created by these large ice blocks that were left behind by the retreating glacier. Sediment was deposited around the ice blocks, leaving kettle lakes when the ice melted. This event also deposited mounds of outwash against ice blocks present on the surface, that (following melting); left 'Kame' features (isolated mounds of gravel outwash). Spanaway Lake, Gravelly Lake, and nearby Old Fort Lake are well-known examples of kettles. The mounds and knob features in the area represent these outwash gravel kames. Figure 3 illustrates the site's position in the local geology.

Figure 3: Site Position (Geologic Map of the Tacoma 1:100,000 Quadrangle)



J. Eric Schuster, Ashley A. Cabibbo, Joseph Schilter, and Ian J. Hubert (October 2015)

Qgo_{sg} **Recessional outwash, Steilacoom Gravel**—Pebbles with boulders; local crossbedding; kettles and other ice-contact depressions.

Critical Slope Assessment

Per the City of Dupont's June 2, 2023, review letter, the following discussion and exhibit information will address Comment No. 3 on page 7, regarding the requirement to assess the slope (the small 'knob' feature) with slopes of approximately 22 percent. The applicable regulatory section is in the Dupont Municipal Code (DMC) Chapter 25.105.030.345.

The Code defines as steep slope when all three of the following criteria are met:

(a) Slopes Steeper than 15%

(b) Hillsides intersecting geologic contacts with a relatively permeable sediment overlying a relatively impermeable sediment or bedrock; and

(c) Springs or groundwater seepage

As discussed in the 'Geology' section above, the localized 'knobs' or 'mounds' are Kame features. The kames are composed of the coarse recessional flood outwash that was trapped at the time between glacial ice sheet remnants. These ice sheet blocks came to rest during the flooding on the surface where outwash became deposited against them. Upon melting, the outwash gained the appearance they have today as a mounded feature.

These deposits do not have inclined geologic contacts with permeable sediment overlying impermeable sediment, nor are any springs present per our observations (nor would they be possible in this geology). The 15% slope angle and its similar call out in other jurisdictions is only intended to warrant further analysis. In no case is such a shallow slope angle unstable. The typical angle of repose (the maximum angle an unconsolidated aggregate remains stable) for clean, well sorted, semi-rounded sand is 60 to 70 percent. The aggregate on this site has a steeper angle of repose given the poor sorting and minor sub-rounding form of the aggregate. The slope is globally stable in our opinion.

Findings/Recommendations

Foundation Bearing Capacity – The site is situated on loose gravel and sand, which is ideal for projects requiring moderate to significant bearing capacity, and limited space for drainage. However, due to the coarse nature of the aggregate, excavations may calve or settle laterally at approximately 2:1 (Vertical: Horizontal). Therefore, excavations should be laid back at 1 to 1 during construction. The 2018 International Building Code (IBC) Chapter 18 provides expected capacities for *Vertical Bearing Capacity, Lateral Bearing Pressure, and Lateral Coefficient of Friction* based on material classification. Please see Figure 3 below for an illustration of expected bearing capacity per the IBC.

Figure 3 – 2018 International Building Code (IBC) Excerpt

TABLE 1806.2
PRESUMPTIVE LOAD-BEARING VALUES

CLASS OF MATERIALS	VERTICAL FOUNDATION PRESSURE (psf)	LATERAL BEARING PRESSURE (psf/ft below natural grade)	LATERAL SLIDING RESISTANCE	
			Coefficient of friction[a]	Cohesion (psf)[b]
1. Crystalline bedrock	12,000	1,200	0.70	—
2. Sedimentary and foliated rock	4,000	400	0.35	—
3. Sandy gravel and gravel (GW and GP)	3,000	200	0.35	—
4. Sand, silty sand, clayey sand, silty gravel and clayey gravel (SW, SP, SM, SC, GM and GC)	2,000	150	0.25	—
5. Clay, sandy clay, silty clay, clayey silt, silt and sandy silt (CL, ML, MH and CH)	1,500	100	—	130

Foundation Drainage – As discussed in the 'Soil' and 'Geology' sections, the site is situated on an excessively permeable outwash deposit with depths of ten or more feet based on our test pit observations and the characteristics of the Steilacoom gravel. There are no perching strata or water bearing formations present. Therefore, conventional footing drain systems should be considered in the typical manner for the building facility, albeit they may never encounter ground water.

Runoff Control – The subsurface soil characteristics are ideal for subsurface infiltration. The coarse outwash depth was verified to be at least nine to ten feet in depth but may continue to greater depths when considering the terrain and landform. Soils are excessively coarse and rapidly draining, such that infiltration testing is difficult to impossible. Attempts to presoak or even hold a static ponding level are not possible in this formation based on our experience on multiple occasions. Whether attempting a falling head test using a 6-inch pipe on neighboring sites with similar soil; the infiltration was too rapid to even establish ponding in the pipe. Therefore, we opted for a more conservative design rate sizing method by collecting soil samples from the approximate basal zone of the proposed trenches and delivered to Construction Testing Laboratory for analysis (copies attached).

Results: In this case, the test confirms that these very gravelly to extremely gravelly outwash soils are ideal for infiltration. The table below summarizes the sieve results for each sample along with the necessary correction factors to determine an appropriate design infiltration rate.

Table 1 – Grain Size Analysis with Correction Factors for Infiltration Rate

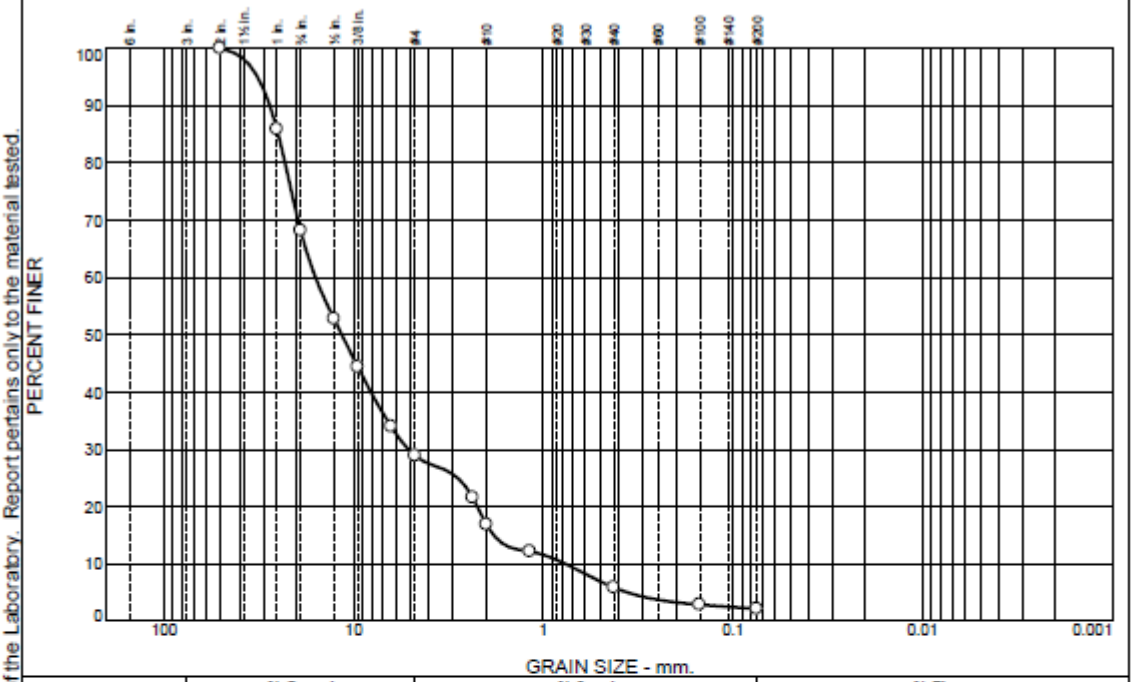
SOIL SAMPLE	D10	D60	D90	fines	1.90D10	0.015D60	0.013D90	2.08fines	log10 (Ksat)	Ksat (cm/s)	Ksat (in/hr)
SLA	0.00076	0.016	0.028	0.002	0.001444	0.00024	0.000364	0.00416	-1.57284	0.026739914	37.89909017
SLB	0.0098	0.015	0.029	0.001	0.01862	0.000225	0.000377	0.00208	-1.55361	0.027950398	39.61473765
SLC	0.0047	0.019	0.038	0.001	0.00893	0.000285	0.000494	0.00208	-1.56336	0.027330086	38.73555511

Infiltration Rate for Design - Given the substantial depth and excessive permeability of these coarse outwash soils, subsurface infiltration is ideal for stormwater control. The lowest-case recommended design rate for the three samples is 37.9 inches per hour per lab results and correction factors. We recommend using 30 inches per hour for design.

Liquefaction
The subsurface soil characteristics are such that liquefaction is not a risk. The soil is highly permeable, and free of groundwater to substantial depths. Therefore, saturated conditions are not likely to exist. Liquefaction is not expected.

See Attached Soil Test Results Below this Page

Particle Size Distribution Report ASTM C117, C136



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	32	39	12	11	4	2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2"	100		
1"	86		
3/4"	68		
1/2"	53		
3/8"	44		
1/4"	34		
#4	29		
#8	22		
#10	17		
#16	12		
#40	6		
#100	3		
#200	2.2		

* (no specification provided)

Material Description

Brown Gravel with Sand
Sampled from SL A at 9'

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 27.6653 D_{85}= 24.9885 D_{60}= 15.9151
D_{50}= 11.5485 D_{30}= 5.1518 D_{15}= 1.8281
D_{10}= 0.7642 C_u= 20.82 C_c= 2.18

Classification

USCS= GW AASHTO=

Remarks

Report: #01

Sampled by: Client

Source of Sample: Existing
Sample Number: 23-1184

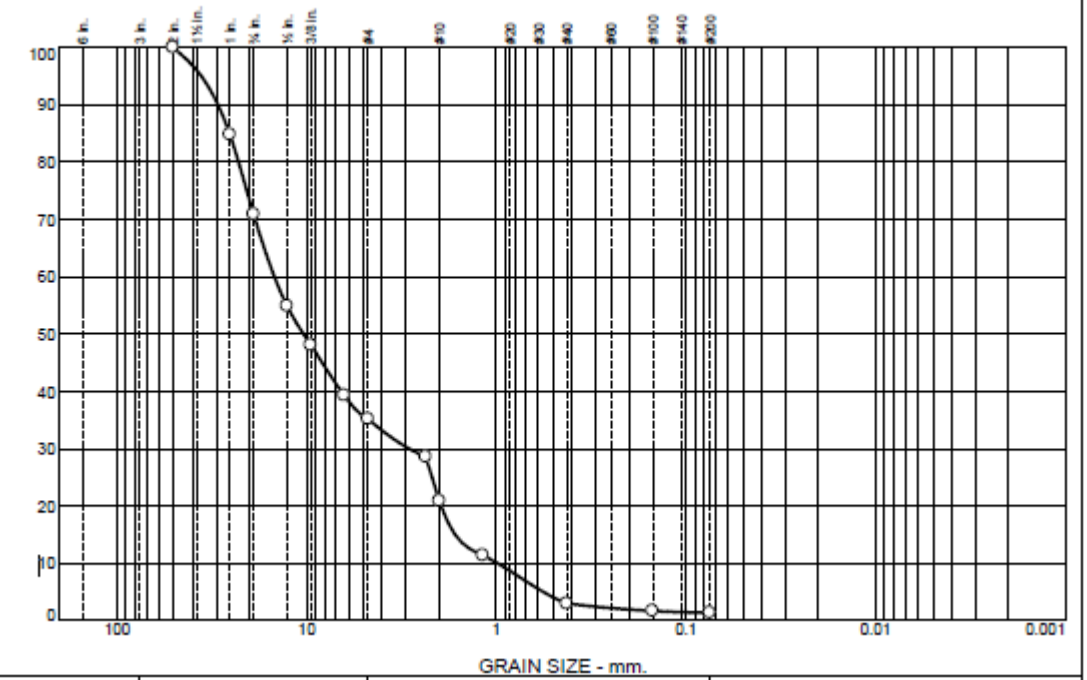
Date: 08-11-23

Construction Testing Laboratories
400 Valley Ave. NE, Suite #102
Puyallup WA, 98372 Tel. (253) 383-8778

Client: Mustard Seed Legacy Development, LLC
Project: Champion Centre
Project No: 10414 **Figure**

Tested By: R Rowden **Checked By:** C Pedersen

Particle Size Distribution Report ASTM C117, C136



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	29	36	14	18	2	1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2"	100		
1"	85		
3/4"	71		
1/2"	55		
3/8"	48		
1/4"	39		
#4	35		
#8	29		
#10	21		
#16	11		
#40	3		
#100	2		
#200	1.4		

* (no specification provided)

Material Description

Brown Gravel and Sand
Sampled from SL B at 10'

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 29.3348 D_{85}= 25.5221 D_{60}= 14.8099
D_{50}= 10.3997 D_{30}= 2.8775 D_{15}= 1.6507
D_{10}= 0.9841 C_u= 15.05 C_c= 0.57

Classification

USCS= GP AASHTO=

Remarks

Report: #02

Sampled by: Client

Source of Sample: Existing
Sample Number: 23-1185

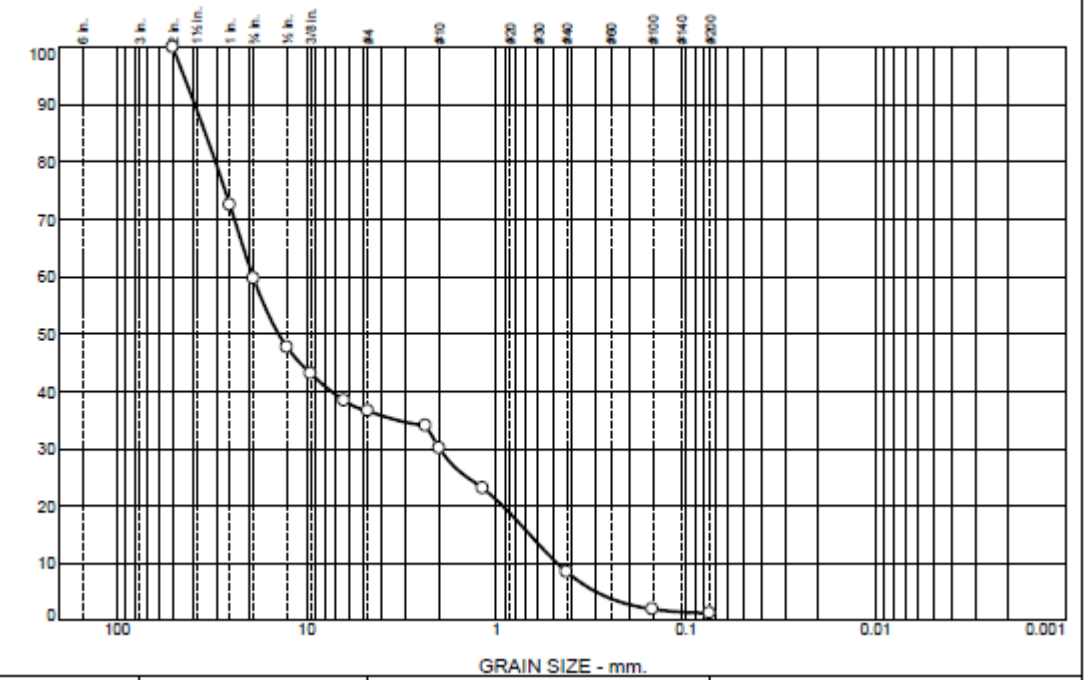
Date: 08-11-23

Construction Testing Laboratories
400 Valley Ave. NE, Suite #102
Puyallup WA, 98372 Tel. (253) 383-8778

Client: Mustard Seed Legacy Development, LLC
Project: Champion Centre
Project No: 10414 **Figure**

Tested By: R Rowden **Checked By:** C Pedersen

Particle Size Distribution Report ASTM C117, C136



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	40	23	7	22	7	1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2"	100		
1"	72		
3/4"	60		
1/2"	48		
3/8"	43		
1/4"	38		
#4	37		
#8	34		
#10	30		
#16	23		
#40	8		
#100	2		
#200	1.3		

* (no specification provided)

Material Description

Brown Gravel with Sand
Sampled from SG C at 10'

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 38.8807 D_{85}= 34.1865 D_{60}= 19.1923
D_{50}= 14.0747 D_{30}= 1.9911 D_{15}= 0.6658
D_{10}= 0.4770 C_u= 40.23 C_c= 0.43

Classification

USCS= GP AASHTO=

Remarks

Report: #03

Sampled by: Client

Source of Sample: Existing
Sample Number: 23-1186

Date: 08-11-23

Construction Testing Laboratories
400 Valley Ave. NE, Suite #102
Puyallup WA, 98372 Tel. (253) 383-8778

Client: Mustard Seed Legacy Development, LLC
Project: Champion Centre
Project No: 10414 **Figure**

Tested By: R Rowden **Checked By:** C Pedersen

Appendix E

Federal Emergency Management Agency Flood Insurance Panel

National Flood Hazard Layer FIRMette

FEMA

122°37'34"W 47°6'N

122°36'56"W 47°5'36"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 9/21/2023 at 3:22 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.