COFFMAN ENGINEERS

TECHNICAL INFORMATION REPORT

JAMESTOWN S'KLALLAM TRIBE OUTPATIENT CLINIC

SEQUIM, WASHINGTON

JANUARY 10, 2019

CEI PROJECT NO. 191652

TECHNICAL INFORMATION REPORT

JAMESTOWN S'KLALLAM TRIBE

OUTPATIENT CLINIC

SEQUIM, WA

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1.0 PROJECT OVERVIEW

This technical information report (TIR) contains information for the design of the stormwater system for the proposed Outpatient Clinic to be constructed in Sequim, WA. This TIR has been prepared in accordance with the 2014 Stormwater Management Manual for Western Washington (SMMWW). The project proposes to develop the northwest 3.3 (+/-) acres of the 18.19-acre subject parcel.

The project scope includes construction of a 16,720-square-foot medical clinic and associated parking lot as well as roadway extensions for South 9th Avenue and West Hammond Street. Installation of new utilities from South 9th Avenue to the project site, including water, sanitary sewer, power and communications is proposed.

Project Location: Parcel Numbers: 03301933000

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Total Parcel Area: 792,356+/- square feet (18.19 ac)
Total Project Area: 143,775 square feet+/- (3.3 ac+/-)

1.1. Existing Conditions

The project area is located between South 7th Avenue and South 9th Avenue, immediately north of US-Highway 101 in Sequim, Washington. This area is gently sloped from the southwest to the northeast and bisected by a public irrigation ditch crossing the site from the south to the north. The property is mainly vegetated with grasses except for a row of trees that runs through the middle of the property, which border the existing open irrigation ditch. Refer to Figure 1 for the vicinity map.

1.2. Developed Conditions

The proposed project is to develop the northwest 3.3 (+/-) acres of the 18.19 (+/-) acre property. A 16,720-square-foot medical clinic that will be made up of a medication assisted treatment program offering FDA approved dosing, primary care services, consulting services, dental healthcare services, and childcare services while clients are seen. Right-of-way improvements will include extensions of South 9th Avenue and West Hammond Street within the development limits of the site. Refer to Figure 1 for the overall site plan.

1.3. Site Geology

A geotechnical report for this project was completed by Krazan & Associates, Inc., dated October 24, 2019, Project No. 102-19020.

1.4. Existing Drainage Conditions

The project site generally slopes from southwest to northeast and any runoff that does not infiltrate is currently collected in an irrigation trench running south to north at about the center of the project site. The project area drains northeast to an existing irrigation ditch which is ultimately tributary to the Dungeness River.

1.5. Developed Drainage Conditions

The developed stormwater system will include an onsite conveyance system, filter strips, infiltration trenches and bioretention ponds. Onsite treatment and infiltration of 100% of the runoff is proposed.

The existing on-site irrigation ditch will be hard-piped, at the request of the irrigation district, in order to conserve the supply for uses downstream. The relocated conveyance

line will shift to the east of the existing location in a new irrigation district easement, to avoid damage to a Garry Oak tree that is currently near the existing open ditch.

The runoff from the West Hammond Street right-of-way improvements will be directed primarily to a biofiltration trench along the north side of West Hammond Street for treatment and infiltration. At the far east end of the proposed West Hammond Street, a small portion of the street will be dispersed across the onsite pasture areas to be cleansed and infiltrate. The east half of the right-of-way along the new South 9th Avenue will be collected in catch basins and routed to the biofiltration trench along the north side West Hammond Street. The west half of the South 9th Avenue right-of-way will be dispersed across the onsite pasture areas to be cleansed and infiltrate. Refer to Figure 2 for the proposed basin map.

1.6. Drainage Control During Construction

To minimize the potential erosive impacts to local soils during construction, the contractor shall install storm drain inlet protection in catch basins receiving runoff from the project area or near the work area. A temporary sedimentation pond will also be used during construction to collect and treat stormwater. Contractor shall cover embankments and disturbed surfaces with mulches, plastic sheeting or jute matting to control erosion during inclement weather. A stabilized construction access is to be installed as necessary to prevent tracking sediment onto roadways and use wattles to contain sediment onsite as needed. Details of these requirements are shown on the *Temporary Erosion & Sedimentation Control (TESC) Plan*, which is included in the separately bound civil plan set.

1.7. Maintenance

The Owners shall be responsible for the regular inspection and maintenance of the on-site drainage facilities and structures including the bioretention ponds, filter strips, infiltration facilities, catch basins, pipes and downspouts. Refer to Section 8 of this report for the Operations & Maintenance requirements.

2.0 MINIMUM STORMWATER REQUIREMENTS

The following are the minimum requirements in Section I-2.5.1 of the Department of Ecology's *2014 Stormwater Management Manual for Western Washington (SWMMWW).*

<u>REQUIREMENT #1: PREPARATION OF STORMWATER SITE PLANS</u>
Stormwater site plans have been prepared for this project. Refer to the separately bound civil plan set Jamestown S'Klallam Tribe Outpatient Clinic dated 12/30/2019.

<u>REQUIREMENT #2: CONST. STORMWATER POLLUTION PREVENTION (SWPPP)</u>
Refer to Section 2.1 of this report for compliance with the Construction SWPPP Elements.

<u>REQUIREMENT #3: SOURCE CONTROL POLLUTION</u>
There will be a medical storage room sized at approximately 23 square feet containting medical gas tanks of oxygen and nitrous oxide. These tanks will be stored indoors, be of small quanties and will discharge gas in the event of a small leak. No source control measures are required for stormwater.

REQUIREMENT #4: PRESERVE NATURAL DRAINAGE SYSTEM AND OUTFALLS
The project will infiltrate onsite as it does under natural conditions. Extreme flows will continue to drain to the existing irrigation ditch as it does under existing conditions.

REQUIREMENT #5: ON-SITE STORMWATER MANAGEMENT
Onsite stormwater management BMPs are recommended. The stormwater will be collected by bioretention ponds and infiltration trenches, and will infiltrate onsite or within the proposed right-of-way, separate from on-site runoff.

REQUIREMENT #6: RUNOFF TREATMENT
The stormwater will be treated by the bioretention ponds, biofiltration trenches and filter strips.

REQUIREMENT #7: FLOW CONTROL
The stormwater will be infiltrated onsite within the bioretention ponds and infiltration trenches. The onsite infiltration will be 100% which will provide the required flow control.

REQUIREMENT #8: WETLAND PROTECTION
There are no known wetlands near the proposed work area, so this requirement does not apply.

REQUIREMENT #9: OPERATION AND MAINTENANCE
There are operational and maintenance procedures for the proposed onsite bioretention ponds, filter strips, infiltration facilities and conveyance system included in the Department of Ecology's 2014 Stormwater Management Manual for Western Washington (SWMMWW).

2.1. STORMWATER POLLUTION PREVENTION PLAN (SWPPP) ELEMENTS

The construction-related Best Management Practices (BMP's) noted below are in reference to the Department of Ecology's *2014 Stormwater Management Manual for Western Washington (SWMMWW).*

Element 1: Mark Clearing Limits
The limits of clearing shall be established and marked at the beginning of construction with high visability construction fencing or other measures.

Element 2: Establish Construction Access
A stabilized construction access point will be established by the Contractor.

Element 3: Control Flow Rates
Flow control will be carried out through the use of bioretention ponds, filter strips, and onsite infiltration.

Element 4: Install Sediment Controls
On-site stormwater runoff shall be directed through filter fabric fences or catch basin inserts, prior to being discharged to the downstream drainage system. A temporary sedimentation pond will also be used as needed to control sediment transport from the site.

Element 5: Stabilize Soils
Disturbed soil that remains unchanged for more than two days within the period from October 1 to April 30 (or seven days from May 1 to September 30), shall be covered with nets and blankets, topsoil, hydroseed, sod or other approved methods (as necessary) to reduce erosive impacts. If required on a short term basis, mulch and plastic covering may be used temporarily until more permanent stabilization with plant growth can be established.

Element 6: Protect Slopes
There are no existing steep slopes within the work area.

Element 7: Protect Drain Inlets
All storm drain inlets shall, at a minimum, be inspected weekly and cleared of any flow-restricting debris or sediment. Catch basin inserts shall be installed in all existing and new catch basins, until the site soil at the prioject site is stabilized.

Element 8: Stabilize Channels and Outlets
The irrigation ditch will have a stabilized outlet adequate to prevent erosion of outlets, adjacent stream banks, slopes, and downstream reaches.

Element 9: Control Pollutants
Spill control structures shall be used in the catch basins to collect runoff from pollution generating surfaces.

Element 10: Control De-Watering
Stormwater collected within any excavations will be directed to the temporary sedimentation pond before discharging to the downstream system. Contractor to monitor the stormwater quality to ensure it meets the local jurisdictions requirements for discharging stormwater from the site.

Element 11: Maintain BMPs
All BMPs utilized for this project shall be maintained in accordance with their respective BMP specifications.

Element 12: Manage The Project
The on-site construction Supervisors shall be responsible for monitoring all erosion and sedimenation control measures, in addition to providing repairs or additional erosion-reducing measure, as field conditions require.

3.0 OFFSITE ANALYSIS

Per Section I.3.1.3 of the Preparation of Stormwater Site Plans section of the Department of Ecology's *2014 Stormwater Management Manual for Western Washington (SWMMWW)*, a downstream analysis is required for the proposed project.

3.1. Downstream

The downstream system consists of the existing irrigation trench crosssing the project site which continues to the north. The proposed stormwater system will infiltrate 100% of the onsite runoff and overland discharge to the downstream system will only be used in the case of an emergency overflow.

3.2. Upstream
There will be no significant impact to the upstream system.

4.0 FLOW CONTROL AND WATER QUALITY FACILITY ANALYSIS AND DESIGN

4.1. Flow Control
Flow control is required and will be achieved by infiltrating the onsite runoff. The onsite stormwater will be directed to one of six infiltration facilities consisting of bioretention ponds and infiltration trenches. Below is a summary table of the contributing basin areas for the project site. Refer to Figure 2 for the proposed basin map. The flow control and water quality facilities will be combined, refer to section 4.2 for more information.

TABLE 1A: ONSITE CONTRIBUTING AREAS

			IMPERVIOUS AREA					
BASIN	TOTAL AREA		ROOF AREA		PAVED AREA		PERVIOUS AREA	
AREAS	SQ FT	ACRES	SQ FT	ACRES	SQ FT	ACRES	SQ FT	ACRES
1	7,031	0.16	-	-	4,095	0.09	2,936	0.07
2A	16,454	0.38	-	-	9,656	0.22	6,798	0.16
2B	45,690	1.05	-	-	35,736	0.82	9,954	0.23
3	28,343	0.65	9,604	0.22	5,569	0.13	13,170	0.30
4	12,869	0.30	-	-	5,645	0.13	7,224	0.17
5	20,440	0.47	-	-	5,404	0.12	15,036	0.35
6	12,948	0.30	12,948	0.30	-	-	-	-
TOTAL	143,775	3.30						

The flow control for the stormwater within the right-of-way shall consist of a bioretention trench along the north side of West Hammond Street and limited area of dispersion (for sections of the road that are not proposed to be complete at this time. The flow control and water quality facilities will be combined, refer to section 4.2 for more information.

TABLE 1B: OFFSITE CONTRIBUTING AREAS

			IMPERVIOUS AREA					
BASIN	TOTAL AREA		ROOF AREA		PAVED AREA		PERVIOUS AREA	
AREAS	SQ FT	ACRES	SQ FT	ACRES	SQ FT	ACRES	SQ FT	ACRES
ROW	51,087	1.17	-	-	39,636	0.91	11,451	0.26
TOTAL	51,087	1.17						

4.2. Water Quality
The facilities for flow control and water quality will be combined when bioretention ponds are used, and separate when filter strips are used. The water quality for the stormwater within the right-of-way shall consist of a bioretention trench along the north side of West Hammond Street and overland flow for the limited areas. Below is a summary of the available facility dimensions and the required dimensions from the sizing calculation results for the onsite and ROW facilities. Refer to the calculations included in Appendix A for additional information.

TABLE 2A: FACILITY SUMMARY - AVAILABLE

BASIN AREAS	FACILITY TYPE	AVAILABLE BOTTOM AREA (sqft)	POND FREEBOARD DEPTH (ft)	POND STORAGE DEPTH (ft)	GRAVEL DEPTH (ft)	SIDE SLOPES	SLOPE	LENGTH (ft)	WIDTH (ft)
1	Filter Strip	n/a	n/a	n/a	n/a	n/a	2.5%	153	7
1	Trench	230	n/a	n/a	2.00	n/a	n/a	153	1.5
2A	Bio Pond	565	1.00	2.00	1.00	2H:1V	n/a	n/a	n/a
2B	Bio Pond	648	1.00	3.50	1.00	2H:1V	n/a	n/a	n/a
3	Bio Pond	784	0.50	1.00	1.00	2H:1V	n/a	n/a	n/a
4	Bio Pond	743	1.00	1.00	1.00	2H:1V	n/a	n/a	n/a
5	Bio Pond	438	1.00	1.50	1.00	2H:1V	n/a	n/a	n/a
6	Bio Pond	704	1.00	1.00	1.00	2H:1V	n/a	n/a	n/a
ROW	Bio Trench	1,068	1.00	1.00	1.00	3H:1V	2%	534	2

TABLE 2B: FACILITY SUMMARY REQUIRED

BASIN AREAS	FACILITY TYPE	REQUIRED BOTTOM AREA (sqft)	POND FREEBOARD DEPTH (ft)	POND STORAGE DEPTH (ft)	COMPOST DEPTH (ft)	SAND DEPTH (ft)	GRAVEL DEPTH (ft)	SIDE SLOPE	SLOPE	BOTTOM LENGTH (ft)	BOTTOM WIDTH (ft)
1	Filter Strip	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2.5%	150	13
1	Trench	225	n/a	n/a	0.50	0.50	2.00	n/a	n/a	150	1.5
2A	Bio Pond	560	0.50	1.50	0.50	1.50	1.00	2H:1V	n/a	20	28
2B	Bio Pond	640	1.00	3.00	0.50	1.50	1.00	2H:1V	n/a	10	64
3	Bio Pond	700	0.50	1.00	0.50	1.50	1.00	2H:1V	n/a	35	20
4	Bio Pond	700	1.00	1.00	0.50	1.50	1.00	2H:1V	n/a	35	20
5	Bio Pond	400	1.00	1.50	0.50	1.50	1.00	2H:1V	n/a	20	20
6	Bio Pond	700	1.00	1.00	0.50	1.50	1.00	2H:1V	n/a	35	20
ROW	Bio Trench	1,060	1.00	1.00	0.50	1.50	1.00	3H:1V	2%	530	2

5.0 CONVEYANCE CALCULATIONS

The stormwater conveyance system has been designed per the Department of Ecology's *Western Washington Hydraulic Model (WWHM).* The rational method has been used to calculate design peak flow rates. Refer to Appendix B for the pipe conveyance calculations. Below is a summary of the conveyance system calculation results.

TABLE 3: CONVEYANCE SUMMARY

STRUCTURE		CONTRIBUTING AREA		PIPE		PEAK FLOW		FLOW DEPTH	
				DIA.	SLOPE	25-YR	100-YR	25-YR	100-YR
INLET	OUTLET	(sq ft)	(acres)	(inches)	(ft/ft)	(cfs)	(cfs)	(in)	(in)
CB-1	2B POND	45,690	1.05	12	0.01	1.73	2.15	5.9	6.8
CB-7	3 POND	9,604	0.22	6	0.02	0.43	0.54	3.2	3.7
SD CO 1	6 POND	8,458	0.19	6	0.01	0.38	0.47	3.7	4.3
CB1A	DITCH	11,968	0.27	8	0.008	0.54	0.68	4	4.6

5.1. Backwater Conveyance

Backwater conveyance does not apply to this project.

6.0 SPECIAL REPORTS AND STUDIES

The geotechnical report is available upon request.

7.0 OTHER PERMITS

This project will require City of Sequim building and construction permits.

8.0 MAINTENANCE REQUIREMENTS

Maintenance of the onsite drainage facilities will conform to the requirements provided in the 2014 Department of Ecology's *2014 Stormwater Management Manual for Western Washington (SWMMWW).*

APPENDICIES

APPENDIX A – FACILITY CALCULATIONS

APPENDIX B – CONVEYANCE CALCULATIONS

APPENDIX A

FACILITY CALCULATIONS

APPENDIX A

FACILITY CALCULATIONS

BASIN AREA 1

FACILITY CALCULATIONS

AREA 1 - FILTER STRIP

Area =	4,095	sq ft	
=	0.09	acres	
y=	0.083	ft max	
n=	0.35		
t=	9	minutes	
s=	0.025		Range of 0.01 to 0.33
V=	0.5	ft/sec	Maximum velocity
Q=	0.018	cfs	(72% of 2 yr runoff for Q from WWHM)
K=	1.35		
T=	150	ft	
y=	0.007	ft	OK, does not exceed 1 inch (0.0833 ft)
V=	0.024	ft/sec	OK, does not exceed 0.5 ft/sec
L=	**13.0**	ft	

WWHM2012
PROJECT REPORT

Project Name: Area 1 Bioretention
Site Name:
Site Address:
City :
Report Date: 12/26/2019
Gage : Port Angelis
Data Start : 1948/10/01
Data End : 2009/09/30
Precip Scale: 0.80
Version Date: 2018/10/10
Version : 4.2.16

Low Flow Threshold for POC 1 : 50 Percent of the 2 Year

High Flow Threshold for POC 1: 50 year

PREDEVELOPED LAND USE

Name : Basin 1
Bypass: No

GroundWater: No

Pervious Land Use	acre
Pervious Total	0

Impervious Land Use	acre
PARKING FLAT	0.09
Impervious Total	0.09
Basin Total	0.09

Element Flows To:

Surface	Interflow	Groundwater

MITIGATED LAND USE

Name : Basin 1
Bypass: No

GroundWater: No

Pervious Land Use	acre
A B, Lawn, Steep	.07
Pervious Total	0.07

Impervious Land Use	acre
PARKING FLAT	0.09
Impervious Total	0.09
Basin Total	0.16

Element Flows To:

Surface	Interflow	Groundwater
Surface retention 1	Surface retention 1	

Name : Bioretention 1
Bottom Length: 150.00 ft.
Bottom Width: 1.50 ft.
Material thickness of first layer: 0.5
Material type for first layer: SMMWW 12 in/hr
Material thickness of second layer: 0.5
Material type for second layer: Sand
Material thickness of third layer: 2
Material type for third layer: GRAVEL
Infiltration On
Infiltration rate: 6
Infiltration safety factor: 1
Total Volume Infiltrated (ac-ft.): 6.468
Total Volume Through Riser (ac-ft.): 0
Total Volume Through Facility (ac-ft.): 6.468
Percent Infiltrated: 100
Total Precip Applied to Facility: 0.416
Total Evap From Facility: 0.285
Underdrain not used
Discharge Structure
Riser Height: 0 ft.
Riser Diameter: 0 in.

Element Flows To:

Outlet 1	Outlet 2

Bioretention 1 Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.0052	0.0000	0.0000	0.0000
0.0341	0.0052	0.0001	0.0000	0.0000
0.0681	0.0052	0.0002	0.0000	0.0000
0.1022	0.0052	0.0002	0.0000	0.0000

0.1363	0.0052	0.0003	0.0000	0.0001
0.1703	0.0052	0.0004	0.0000	0.0001
0.2044	0.0052	0.0005	0.0000	0.0004
0.2385	0.0052	0.0006	0.0000	0.0005
0.2725	0.0052	0.0006	0.0000	0.0010
0.3066	0.0052	0.0007	0.0000	0.0010
0.3407	0.0052	0.0008	0.0000	0.0013
0.3747	0.0052	0.0009	0.0000	0.0020
0.4088	0.0052	0.0010	0.0000	0.0024
0.4429	0.0052	0.0010	0.0000	0.0026
0.4769	0.0052	0.0011	0.0000	0.0034
0.5110	0.0052	0.0012	0.0000	0.0044
0.5451	0.0052	0.0013	0.0000	0.0045
0.5791	0.0052	0.0013	0.0000	0.0053
0.6132	0.0052	0.0014	0.0000	0.0069
0.6473	0.0052	0.0015	0.0000	0.0072
0.6813	0.0052	0.0015	0.0000	0.0078
0.7154	0.0052	0.0016	0.0000	0.0101
0.7495	0.0052	0.0017	0.0000	0.0108
0.7835	0.0052	0.0018	0.0000	0.0108
0.8176	0.0052	0.0018	0.0000	0.0140
0.8516	0.0052	0.0019	0.0000	0.0145
0.8857	0.0052	0.0020	0.0000	0.0154
0.9198	0.0052	0.0020	0.0000	0.0187
0.9538	0.0052	0.0021	0.0000	0.0188
0.9879	0.0052	0.0022	0.0000	0.0210
1.0220	0.0052	0.0023	0.0000	0.0238
1.0560	0.0052	0.0023	0.0000	0.0243
1.0901	0.0052	0.0024	0.0000	0.0276
1.1242	0.0052	0.0025	0.0000	0.0295
1.1582	0.0052	0.0025	0.0000	0.0307
1.1923	0.0052	0.0026	0.0000	0.0313
1.2264	0.0052	0.0027	0.0000	0.0313
1.2604	0.0052	0.0028	0.0000	0.0313
1.2945	0.0052	0.0028	0.0000	0.0313
1.3286	0.0052	0.0029	0.0000	0.0313
1.3626	0.0052	0.0030	0.0000	0.0313
1.3967	0.0052	0.0031	0.0000	0.0313
1.4308	0.0052	0.0031	0.0000	0.0313
1.4648	0.0052	0.0032	0.0000	0.0313
1.4989	0.0052	0.0033	0.0000	0.0313
1.5330	0.0052	0.0034	0.0000	0.0313
1.5670	0.0052	0.0034	0.0000	0.0313
1.6011	0.0052	0.0035	0.0000	0.0313
1.6352	0.0052	0.0036	0.0000	0.0313
1.6692	0.0052	0.0036	0.0000	0.0313
1.7033	0.0052	0.0037	0.0000	0.0313
1.7374	0.0052	0.0038	0.0000	0.0313
1.7714	0.0052	0.0039	0.0000	0.0313
1.8055	0.0052	0.0039	0.0000	0.0313
1.8396	0.0052	0.0040	0.0000	0.0313
1.8736	0.0052	0.0041	0.0000	0.0313
1.9077	0.0052	0.0042	0.0000	0.0313
1.9418	0.0052	0.0042	0.0000	0.0313
1.9758	0.0052	0.0043	0.0000	0.0313
2.0099	0.0052	0.0044	0.0000	0.0313
2.0440	0.0052	0.0044	0.0000	0.0313

2.0780	0.0052	0.0045	0.0000	0.0313
2.1121	0.0052	0.0046	0.0000	0.0313
2.1462	0.0052	0.0047	0.0000	0.0313
2.1802	0.0052	0.0047	0.0000	0.0313
2.2143	0.0052	0.0048	0.0000	0.0313
2.2484	0.0052	0.0049	0.0000	0.0313
2.2824	0.0052	0.0050	0.0000	0.0313
2.3165	0.0052	0.0050	0.0000	0.0313
2.3505	0.0052	0.0051	0.0000	0.0313
2.3846	0.0052	0.0052	0.0000	0.0313
2.4187	0.0052	0.0052	0.0000	0.0313
2.4527	0.0052	0.0053	0.0000	0.0313
2.4868	0.0052	0.0054	0.0000	0.0313
2.5209	0.0052	0.0055	0.0000	0.0313
2.5549	0.0052	0.0055	0.0000	0.0313
2.5890	0.0052	0.0056	0.0000	0.0313
2.6231	0.0052	0.0057	0.0000	0.0313
2.6571	0.0052	0.0058	0.0000	0.0313
2.6912	0.0052	0.0058	0.0000	0.0313
2.7253	0.0052	0.0059	0.0000	0.0313
2.7593	0.0052	0.0060	0.0000	0.0313
2.7934	0.0052	0.0061	0.0000	0.0313
2.8275	0.0052	0.0061	0.0000	0.0313
2.8615	0.0052	0.0062	0.0000	0.0313
2.8956	0.0052	0.0063	0.0000	0.0313
2.9297	0.0052	0.0063	0.0000	0.0313
2.9637	0.0052	0.0064	0.0000	0.0313
2.9978	0.0052	0.0065	0.0000	0.0313
3.0000	0.0052	0.0065	0.0000	0.0313

Surface retention 1 Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Wetted Surface
3.0000	0.0052	0.0065	0.0000	0.0625	0.0000
3.0341	0.0052	0.0067	0.0000	0.0625	0.0000
3.0681	0.0052	0.0068	0.0000	0.0710	0.0000
3.1000	0.0052	0.0070	0.0000	0.0750	0.0000

Name : Surface retention 1

Element Flows To:
Outlet 1 **Outlet 2**
Bioretention 1

ANALYSIS RESULTS

Stream Protection Duration

Predeveloped Landuse Totals for POC #1
Total Pervious Area:0
Total Impervious Area:0.09

Mitigated Landuse Totals for POC #1
Total Pervious Area:0.07
Total Impervious Area:0.09

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.025093
5 year	0.034044
10 year	0.040201
25 year	0.048246
50 year	0.054437
100 year	0.060799

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0
5 year	0
10 year	0
25 year	0
50 year	0
100 year	0

Stream Protection Duration
Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1949	0.033	0.000
1950	0.023	0.000
1951	0.047	0.000
1952	0.016	0.000
1953	0.038	0.000
1954	0.033	0.000
1955	0.026	0.000
1956	0.023	0.000
1957	0.022	0.000
1958	0.026	0.000
1959	0.033	0.000
1960	0.029	0.000
1961	0.023	0.000
1962	0.020	0.000
1963	0.025	0.000
1964	0.046	0.000
1965	0.017	0.000
1966	0.020	0.000
1967	0.025	0.000
1968	0.024	0.000
1969	0.022	0.000
1970	0.032	0.000
1971	0.054	0.000
1972	0.028	0.000
1973	0.024	0.000
1974	0.013	0.000
1975	0.034	0.000
1976	0.030	0.000

1977	0.020	0.000
1978	0.020	0.000
1979	0.041	0.000
1980	0.021	0.000
1981	0.038	0.000
1982	0.035	0.000
1983	0.028	0.000
1984	0.019	0.000
1985	0.045	0.000
1986	0.026	0.000
1987	0.057	0.000
1988	0.023	0.000
1989	0.024	0.000
1990	0.028	0.000
1991	0.028	0.000
1992	0.025	0.000
1993	0.015	0.000
1994	0.014	0.000
1995	0.013	0.000
1996	0.015	0.000
1997	0.020	0.000
1998	0.022	0.000
1999	0.028	0.000
2000	0.037	0.000
2001	0.014	0.000
2002	0.024	0.000
2003	0.018	0.000
2004	0.024	0.000
2005	0.031	0.000
2006	0.022	0.000
2007	0.051	0.000
2008	0.020	0.000
2009	0.017	0.000

Stream Protection Duration
Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0567	0.0000
2	0.0541	0.0000
3	0.0505	0.0000
4	0.0467	0.0000
5	0.0461	0.0000
6	0.0448	0.0000
7	0.0409	0.0000
8	0.0384	0.0000
9	0.0381	0.0000
10	0.0371	0.0000
11	0.0351	0.0000
12	0.0345	0.0000
13	0.0333	0.0000
14	0.0330	0.0000
15	0.0327	0.0000
16	0.0325	0.0000
17	0.0311	0.0000
18	0.0298	0.0000
19	0.0285	0.0000

20	0.0285	0.0000
21	0.0280	0.0000
22	0.0279	0.0000
23	0.0279	0.0000
24	0.0279	0.0000
25	0.0263	0.0000
26	0.0263	0.0000
27	0.0262	0.0000
28	0.0253	0.0000
29	0.0253	0.0000
30	0.0248	0.0000
31	0.0244	0.0000
32	0.0244	0.0000
33	0.0244	0.0000
34	0.0241	0.0000
35	0.0237	0.0000
36	0.0232	0.0000
37	0.0230	0.0000
38	0.0230	0.0000
39	0.0227	0.0000
40	0.0223	0.0000
41	0.0221	0.0000
42	0.0218	0.0000
43	0.0216	0.0000
44	0.0206	0.0000
45	0.0203	0.0000
46	0.0199	0.0000
47	0.0199	0.0000
48	0.0196	0.0000
49	0.0196	0.0000
50	0.0195	0.0000
51	0.0193	0.0000
52	0.0175	0.0000
53	0.0167	0.0000
54	0.0167	0.0000
55	0.0159	0.0000
56	0.0155	0.0000
57	0.0151	0.0000
58	0.0138	0.0000
59	0.0136	0.0000
60	0.0134	0.0000
61	0.0133	0.0000

Stream Protection Duration
POC #1
The Facility PASSED

The Facility PASSED.

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0125	1379	0	0	Pass
0.0130	1245	0	0	Pass
0.0134	1113	0	0	Pass
0.0138	994	0	0	Pass
0.0142	888	0	0	Pass
0.0147	778	0	0	Pass

0.0151	693	0	0	Pass
0.0155	626	0	0	Pass
0.0159	562	0	0	Pass
0.0164	504	0	0	Pass
0.0168	454	0	0	Pass
0.0172	415	0	0	Pass
0.0176	371	0	0	Pass
0.0180	336	0	0	Pass
0.0185	311	0	0	Pass
0.0189	276	0	0	Pass
0.0193	244	0	0	Pass
0.0197	220	0	0	Pass
0.0202	200	0	0	Pass
0.0206	180	0	0	Pass
0.0210	161	0	0	Pass
0.0214	145	0	0	Pass
0.0219	132	0	0	Pass
0.0223	124	0	0	Pass
0.0227	116	0	0	Pass
0.0231	106	0	0	Pass
0.0235	98	0	0	Pass
0.0240	93	0	0	Pass
0.0244	85	0	0	Pass
0.0248	80	0	0	Pass
0.0252	76	0	0	Pass
0.0257	71	0	0	Pass
0.0261	67	0	0	Pass
0.0265	61	0	0	Pass
0.0269	59	0	0	Pass
0.0274	57	0	0	Pass
0.0278	55	0	0	Pass
0.0282	46	0	0	Pass
0.0286	41	0	0	Pass
0.0290	40	0	0	Pass
0.0295	38	0	0	Pass
0.0299	35	0	0	Pass
0.0303	33	0	0	Pass
0.0307	31	0	0	Pass
0.0312	29	0	0	Pass
0.0316	28	0	0	Pass
0.0320	28	0	0	Pass
0.0324	27	0	0	Pass
0.0329	25	0	0	Pass
0.0333	24	0	0	Pass
0.0337	21	0	0	Pass
0.0341	20	0	0	Pass
0.0345	18	0	0	Pass
0.0350	18	0	0	Pass
0.0354	16	0	0	Pass
0.0358	16	0	0	Pass
0.0362	16	0	0	Pass
0.0367	16	0	0	Pass
0.0371	16	0	0	Pass
0.0375	14	0	0	Pass
0.0379	14	0	0	Pass
0.0384	13	0	0	Pass
0.0388	11	0	0	Pass

0.0392	10	0	0	Pass
0.0396	10	0	0	Pass
0.0401	10	0	0	Pass
0.0405	10	0	0	Pass
0.0409	9	0	0	Pass
0.0413	8	0	0	Pass
0.0417	7	0	0	Pass
0.0422	6	0	0	Pass
0.0426	6	0	0	Pass
0.0430	6	0	0	Pass
0.0434	6	0	0	Pass
0.0439	6	0	0	Pass
0.0443	6	0	0	Pass
0.0447	6	0	0	Pass
0.0451	5	0	0	Pass
0.0456	5	0	0	Pass
0.0460	5	0	0	Pass
0.0464	4	0	0	Pass
0.0468	3	0	0	Pass
0.0472	3	0	0	Pass
0.0477	3	0	0	Pass
0.0481	3	0	0	Pass
0.0485	3	0	0	Pass
0.0489	3	0	0	Pass
0.0494	3	0	0	Pass
0.0498	3	0	0	Pass
0.0502	3	0	0	Pass
0.0506	2	0	0	Pass
0.0511	2	0	0	Pass
0.0515	2	0	0	Pass
0.0519	2	0	0	Pass
0.0523	2	0	0	Pass
0.0527	2	0	0	Pass
0.0532	2	0	0	Pass
0.0536	2	0	0	Pass
0.0540	2	0	0	Pass
0.0544	1	0	0	Pass

Water Quality BMP Flow and Volume for POC #1
On-line facility volume: 0.0083 **acre-feet**
On-line facility target flow: 0.0115 **cfs.**
Adjusted for 15 min: 0.0115 **cfs.**
Off-line facility target flow: 0.0063 **cfs.**
Adjusted for 15 min: 0.0063 **cfs.**

LID Report

LID Technique	Used for Treatment?	Total Volume Needs (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft.)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality Percent	Comment	Water Quality Treated
retention 1 POC	N	5.89			N	100.00			
Total Volume Infiltrated		5.89	0.00	0.00		100.00			

0.00 0% No Treat. Credit
Compliance with LID Standard 8
Duration Analysis Result = Passed

Perlnd and Implnd Changes

No changes have been made.

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BASIN AREA 2A

FACILITY CALCULATIONS

WWHM2012
PROJECT REPORT

Project Name: Basin 2A Bioretention
Site Name:
Site Address:
City :
Report Date: 12/26/2019
Gage : Port Angelis
Data Start : 1948/10/01
Data End : 2009/09/30
Precip Scale: 0.80
Version Date: 2018/10/10
Version : 4.2.16

Low Flow Threshold for POC 1 : 50 Percent of the 2 Year

High Flow Threshold for POC 1: 50 year

PREDEVELOPED LAND USE

Name : Basin 1
Bypass: No

GroundWater: No

Pervious Land Use	acre
A B, Lawn, Mod	.16
Pervious Total	0.16

Impervious Land Use	acre
PARKING FLAT	0.22
Impervious Total	0.22
Basin Total	0.38

Element Flows To:

Surface	Interflow	Groundwater

MITIGATED LAND USE

Name : Basin 1
Bypass: No

GroundWater: No

Pervious Land Use	acre
A B, Lawn, Mod	.16
Pervious Total	0.16

Impervious Land Use	acre
PARKING FLAT	0.22
Impervious Total	0.22
Basin Total	0.38

Element Flows To:
Surface **Interflow** **Groundwater**
Surface etention 2A Surface etention 2A

Name : Bioretention 2A
Bottom Length: 20.00 ft.
Bottom Width: 28.00 ft.
Material thickness of first layer: 0.5
Material type for first layer: SMMWW 12 in/hr
Material thickness of second layer: 1.5
Material type for second layer: Sand
Material thickness of third layer: 1
Material type for third layer: GRAVEL
Infiltration On
Infiltration rate: 6
Infiltration safety factor: 1
Total Volume Infiltrated (ac-ft.): 15.535
Total Volume Through Riser (ac-ft.): 0
Total Volume Through Facility (ac-ft.): 15.535
Percent Infiltrated: 100
Total Precip Applied to Facility: 1.151
Total Evap From Facility: 1.349
Underdrain not used
Discharge Structure
Riser Height: 1.5 ft.
Riser Diameter: 12 in.

Element Flows To:
Outlet 1 **Outlet 2**

Bioretention 2A Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.0294	0.0000	0.0000	0.0000
0.0549	0.0292	0.0003	0.0000	0.0000
0.1099	0.0288	0.0007	0.0000	0.0000

0.1648	0.0284	0.0010	0.0000	0.0000
0.2198	0.0281	0.0013	0.0000	0.0000
0.2747	0.0277	0.0017	0.0000	0.0002
0.3297	0.0274	0.0020	0.0000	0.0005
0.3846	0.0270	0.0024	0.0000	0.0008
0.4396	0.0267	0.0028	0.0000	0.0010
0.4945	0.0263	0.0032	0.0000	0.0018
0.5495	0.0260	0.0035	0.0000	0.0028
0.6044	0.0257	0.0038	0.0000	0.0039
0.6593	0.0253	0.0042	0.0000	0.0041
0.7143	0.0250	0.0045	0.0000	0.0057
0.7692	0.0246	0.0049	0.0000	0.0076
0.8242	0.0243	0.0053	0.0000	0.0099
0.8791	0.0240	0.0056	0.0000	0.0102
0.9341	0.0237	0.0060	0.0000	0.0125
0.9890	0.0233	0.0064	0.0000	0.0156
1.0440	0.0230	0.0068	0.0000	0.0190
1.0989	0.0227	0.0072	0.0000	0.0206
1.1538	0.0224	0.0076	0.0000	0.0228
1.2088	0.0221	0.0080	0.0000	0.0271
1.2637	0.0217	0.0084	0.0000	0.0318
1.3187	0.0214	0.0088	0.0000	0.0356
1.3736	0.0211	0.0093	0.0000	0.0370
1.4286	0.0208	0.0097	0.0000	0.0379
1.4835	0.0205	0.0101	0.0000	0.0427
1.5385	0.0202	0.0106	0.0000	0.0488
1.5934	0.0199	0.0110	0.0000	0.0555
1.6484	0.0196	0.0115	0.0000	0.0557
1.7033	0.0193	0.0120	0.0000	0.0626
1.7582	0.0190	0.0124	0.0000	0.0703
1.8132	0.0187	0.0129	0.0000	0.0778
1.8681	0.0184	0.0134	0.0000	0.0778
1.9231	0.0181	0.0139	0.0000	0.0778
1.9780	0.0179	0.0144	0.0000	0.0778
2.0330	0.0176	0.0149	0.0000	0.0778
2.0879	0.0173	0.0155	0.0000	0.0778
2.1429	0.0170	0.0160	0.0000	0.0778
2.1978	0.0167	0.0166	0.0000	0.0778
2.2527	0.0165	0.0171	0.0000	0.0778
2.3077	0.0162	0.0177	0.0000	0.0778
2.3626	0.0159	0.0183	0.0000	0.0778
2.4176	0.0157	0.0188	0.0000	0.0778
2.4725	0.0154	0.0194	0.0000	0.0778
2.5275	0.0151	0.0200	0.0000	0.0778
2.5824	0.0149	0.0206	0.0000	0.0778
2.6374	0.0146	0.0212	0.0000	0.0778
2.6923	0.0143	0.0219	0.0000	0.0778
2.7473	0.0141	0.0225	0.0000	0.0778
2.8022	0.0138	0.0231	0.0000	0.0778
2.8571	0.0136	0.0238	0.0000	0.0778
2.9121	0.0133	0.0244	0.0000	0.0778
2.9670	0.0131	0.0251	0.0000	0.0778
3.0000	0.0129	0.0255	0.0000	0.0778

Surface etention 2A Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Wetted Surface
3.0000	0.0294	0.0255	0.0000	0.1556	0.0000

3.0549	0.0297	0.0271	0.0000	0.1556	0.0000
3.1099	0.0301	0.0287	0.0000	0.1691	0.0000
3.1648	0.0305	0.0304	0.0000	0.1735	0.0000
3.2198	0.0309	0.0321	0.0000	0.1779	0.0000
3.2747	0.0312	0.0338	0.0000	0.1823	0.0000
3.3297	0.0316	0.0355	0.0000	0.1867	0.0000
3.3846	0.0320	0.0373	0.0000	0.1911	0.0000
3.4396	0.0324	0.0390	0.0000	0.1956	0.0000
3.4945	0.0327	0.0408	0.0000	0.2000	0.0000
3.5495	0.0331	0.0426	0.0000	0.2044	0.0000
3.6044	0.0335	0.0445	0.0000	0.2088	0.0000
3.6593	0.0339	0.0463	0.0000	0.2132	0.0000
3.7143	0.0343	0.0482	0.0000	0.2176	0.0000
3.7692	0.0347	0.0501	0.0000	0.2220	0.0000
3.8242	0.0351	0.0520	0.0000	0.2264	0.0000
3.8791	0.0355	0.0540	0.0000	0.2308	0.0000
3.9341	0.0359	0.0559	0.0000	0.2352	0.0000
3.9890	0.0363	0.0579	0.0000	0.2396	0.0000
4.0440	0.0367	0.0599	0.0000	0.2440	0.0000
4.0989	0.0371	0.0619	0.0000	0.2484	0.0000
4.1538	0.0375	0.0640	0.0000	0.2528	0.0000
4.2088	0.0379	0.0660	0.0000	0.2572	0.0000
4.2637	0.0383	0.0681	0.0000	0.2616	0.0000
4.3187	0.0387	0.0703	0.0000	0.2660	0.0000
4.3736	0.0392	0.0724	0.0000	0.2704	0.0000
4.4286	0.0396	0.0746	0.0000	0.2748	0.0000
4.4835	0.0400	0.0767	0.0000	0.2792	0.0000
4.5385	0.0404	0.0790	0.0800	0.2836	0.0000
4.5934	0.0409	0.0812	0.3014	0.2880	0.0000
4.6484	0.0413	0.0834	0.5952	0.2925	0.0000
4.7033	0.0417	0.0857	0.9282	0.2969	0.0000
4.7582	0.0421	0.0880	1.2676	0.3013	0.0000
4.8132	0.0426	0.0904	1.5809	0.3057	0.0000
4.8681	0.0430	0.0927	1.8406	0.3101	0.0000
4.9231	0.0435	0.0951	2.0318	0.3145	0.0000
4.9780	0.0439	0.0975	2.1614	0.3189	0.0000
5.0000	0.0441	0.0985	2.2994	0.3206	0.0000

Name : Surface etention 2A

Element Flows To:
Outlet 1 **Outlet 2**
Bioretention 2A

ANALYSIS RESULTS

Stream Protection Duration

Predeveloped Landuse Totals for POC #1
Total Pervious Area:0.16

Total Impervious Area:0.22

Mitigated Landuse Totals for POC #1
Total Pervious Area:0.16
Total Impervious Area:0.22

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.061371
5 year	0.083252
10 year	0.0983
25 year	0.117965
50 year	0.133095
100 year	0.148641

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0
5 year	0
10 year	0
25 year	0
50 year	0
100 year	0

Stream Protection Duration
Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1949	0.081	0.000
1950	0.056	0.000
1951	0.114	0.000
1952	0.039	0.000
1953	0.093	0.000
1954	0.081	0.000
1955	0.064	0.000
1956	0.056	0.000
1957	0.054	0.000
1958	0.064	0.000
1959	0.080	0.000
1960	0.070	0.000
1961	0.057	0.000
1962	0.049	0.000
1963	0.062	0.000
1964	0.113	0.000
1965	0.041	0.000
1966	0.048	0.000
1967	0.061	0.000
1968	0.060	0.000
1969	0.053	0.000
1970	0.079	0.000
1971	0.132	0.000
1972	0.070	0.000
1973	0.058	0.000
1974	0.033	0.000
1975	0.084	0.000

1976	0.073	0.000
1977	0.048	0.000
1978	0.048	0.000
1979	0.100	0.000
1980	0.050	0.000
1981	0.094	0.000
1982	0.086	0.000
1983	0.068	0.000
1984	0.047	0.000
1985	0.109	0.000
1986	0.064	0.000
1987	0.139	0.000
1988	0.056	0.000
1989	0.060	0.000
1990	0.068	0.000
1991	0.068	0.000
1992	0.062	0.000
1993	0.038	0.000
1994	0.034	0.000
1995	0.033	0.000
1996	0.037	0.000
1997	0.049	0.000
1998	0.053	0.000
1999	0.068	0.000
2000	0.091	0.000
2001	0.033	0.000
2002	0.059	0.000
2003	0.043	0.000
2004	0.060	0.000
2005	0.076	0.000
2006	0.054	0.000
2007	0.124	0.000
2008	0.050	0.000
2009	0.041	0.000

Stream Protection Duration
Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.1387	0.0000
2	0.1323	0.0000
3	0.1235	0.0000
4	0.1143	0.0000
5	0.1127	0.0000
6	0.1095	0.0000
7	0.1001	0.0000
8	0.0939	0.0000
9	0.0931	0.0000
10	0.0907	0.0000
11	0.0857	0.0000
12	0.0843	0.0000
13	0.0814	0.0000
14	0.0806	0.0000
15	0.0799	0.0000
16	0.0794	0.0000
17	0.0760	0.0000
18	0.0727	0.0000

19	0.0698	0.0000
20	0.0697	0.0000
21	0.0683	0.0000
22	0.0683	0.0000
23	0.0683	0.0000
24	0.0681	0.0000
25	0.0644	0.0000
26	0.0643	0.0000
27	0.0641	0.0000
28	0.0620	0.0000
29	0.0619	0.0000
30	0.0606	0.0000
31	0.0598	0.0000
32	0.0597	0.0000
33	0.0596	0.0000
34	0.0590	0.0000
35	0.0580	0.0000
36	0.0568	0.0000
37	0.0564	0.0000
38	0.0563	0.0000
39	0.0556	0.0000
40	0.0544	0.0000
41	0.0542	0.0000
42	0.0534	0.0000
43	0.0529	0.0000
44	0.0504	0.0000
45	0.0497	0.0000
46	0.0488	0.0000
47	0.0486	0.0000
48	0.0479	0.0000
49	0.0478	0.0000
50	0.0477	0.0000
51	0.0471	0.0000
52	0.0428	0.0000
53	0.0409	0.0000
54	0.0409	0.0000
55	0.0388	0.0000
56	0.0379	0.0000
57	0.0369	0.0000
58	0.0338	0.0000
59	0.0332	0.0000
60	0.0329	0.0000
61	0.0326	0.0000

Stream Protection Duration
POC #1
The Facility PASSED

The Facility PASSED.

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0307	1380	0	0	Pass
0.0317	1243	0	0	Pass
0.0328	1114	0	0	Pass
0.0338	992	0	0	Pass
0.0348	890	0	0	Pass

0.0359	779	0	0	Pass
0.0369	695	0	0	Pass
0.0379	627	0	0	Pass
0.0390	562	0	0	Pass
0.0400	502	0	0	Pass
0.0410	453	0	0	Pass
0.0421	415	0	0	Pass
0.0431	371	0	0	Pass
0.0441	337	0	0	Pass
0.0452	312	0	0	Pass
0.0462	277	0	0	Pass
0.0472	244	0	0	Pass
0.0483	219	0	0	Pass
0.0493	200	0	0	Pass
0.0503	181	0	0	Pass
0.0514	161	0	0	Pass
0.0524	145	0	0	Pass
0.0534	133	0	0	Pass
0.0545	124	0	0	Pass
0.0555	116	0	0	Pass
0.0565	106	0	0	Pass
0.0576	98	0	0	Pass
0.0586	93	0	0	Pass
0.0596	86	0	0	Pass
0.0607	80	0	0	Pass
0.0617	76	0	0	Pass
0.0628	71	0	0	Pass
0.0638	67	0	0	Pass
0.0648	61	0	0	Pass
0.0659	59	0	0	Pass
0.0669	57	0	0	Pass
0.0679	55	0	0	Pass
0.0690	46	0	0	Pass
0.0700	41	0	0	Pass
0.0710	40	0	0	Pass
0.0721	38	0	0	Pass
0.0731	35	0	0	Pass
0.0741	33	0	0	Pass
0.0752	31	0	0	Pass
0.0762	29	0	0	Pass
0.0772	28	0	0	Pass
0.0783	28	0	0	Pass
0.0793	27	0	0	Pass
0.0803	25	0	0	Pass
0.0814	24	0	0	Pass
0.0824	21	0	0	Pass
0.0834	20	0	0	Pass
0.0845	18	0	0	Pass
0.0855	18	0	0	Pass
0.0865	16	0	0	Pass
0.0876	16	0	0	Pass
0.0886	16	0	0	Pass
0.0896	16	0	0	Pass
0.0907	16	0	0	Pass
0.0917	14	0	0	Pass
0.0928	14	0	0	Pass
0.0938	13	0	0	Pass

0.0948	11	0	0	Pass
0.0959	10	0	0	Pass
0.0969	10	0	0	Pass
0.0979	10	0	0	Pass
0.0990	10	0	0	Pass
0.1000	9	0	0	Pass
0.1010	8	0	0	Pass
0.1021	8	0	0	Pass
0.1031	6	0	0	Pass
0.1041	6	0	0	Pass
0.1052	6	0	0	Pass
0.1062	6	0	0	Pass
0.1072	6	0	0	Pass
0.1083	6	0	0	Pass
0.1093	6	0	0	Pass
0.1103	5	0	0	Pass
0.1114	5	0	0	Pass
0.1124	5	0	0	Pass
0.1134	4	0	0	Pass
0.1145	3	0	0	Pass
0.1155	3	0	0	Pass
0.1165	3	0	0	Pass
0.1176	3	0	0	Pass
0.1186	3	0	0	Pass
0.1196	3	0	0	Pass
0.1207	3	0	0	Pass
0.1217	3	0	0	Pass
0.1228	3	0	0	Pass
0.1238	2	0	0	Pass
0.1248	2	0	0	Pass
0.1259	2	0	0	Pass
0.1269	2	0	0	Pass
0.1279	2	0	0	Pass
0.1290	2	0	0	Pass
0.1300	2	0	0	Pass
0.1310	2	0	0	Pass
0.1321	2	0	0	Pass
0.1331	1	0	0	Pass

Water Quality BMP Flow and Volume for POC #1
On-line facility volume: 0 **acre-feet**
On-line facility target flow: 0 **cfs.**
Adjusted for 15 min: 0 **cfs.**
Off-line facility target flow: 0 **cfs.**
Adjusted for 15 min: 0 **cfs.**

LID Report

LID Technique	Used for Treatment?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft.)	Cumulative Infiltration Volume Credit	Percent Volume Infiltrated	Water Quality Percent Treated	Comment

```
etention  2A POC                N     14.14                                  N     100.00
Total Volume Infiltrated              14.14        0.00     0.00                    100.00
0.00         0%          No Treat. Credit
Compliance with LID Standard 8
Duration Analysis Result = Passed
```

Perlnd and Implnd Changes

No changes have been made.

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BASIN AREA 2B

FACILITY CALCULATIONS

WWHM2012
PROJECT REPORT

Project Name: Basin 2B Bioretention Pond
Site Name:
Site Address:
City :
Report Date: 12/26/2019
Gage : Port Angelis
Data Start : 1948/10/01
Data End : 2009/09/30
Precip Scale: 0.80
Version Date: 2018/10/10
Version : 4.2.16

Low Flow Threshold for POC 1 : 50 Percent of the 2 Year

High Flow Threshold for POC 1: 50 year

PREDEVELOPED LAND USE

Name : Basin 1
Bypass: No

GroundWater: No

Pervious Land Use	acre
A B, Lawn, Mod	.23
Pervious Total	0.23

Impervious Land Use	acre
PARKING FLAT	0.82
Impervious Total	0.82
Basin Total	1.05

Element Flows To:

Surface	Interflow	Groundwater

MITIGATED LAND USE

Name : Basin 1
Bypass: No

GroundWater: No

Pervious Land Use	acre
A B, Lawn, Mod	.23
Pervious Total	0.23

Impervious Land Use	acre
PARKING FLAT	0.82
Impervious Total	0.82
Basin Total	1.05

Element Flows To:

Surface	Interflow	Groundwater
Surface etention 2B	Surface etention 2B	

Name : Bioretention 2B
Bottom Length: 10.00 ft.
Bottom Width: 64.00 ft.
Material thickness of first layer: 0.5
Material type for first layer: SMMWW 12 in/hr
Material thickness of second layer: 1.5
Material type for second layer: Sand
Material thickness of third layer: 1
Material type for third layer: GRAVEL
Infiltration On
Infiltration rate: 6
Infiltration safety factor: 1
Total Volume Infiltrated (ac-ft.): 58.817
Total Volume Through Riser (ac-ft.): 0
Total Volume Through Facility (ac-ft.): 58.817
Percent Infiltrated: 100
Total Precip Applied to Facility: 1.922
Total Evap From Facility: 1.816
Underdrain not used
Discharge Structure
Riser Height: 3 ft.
Riser Diameter: 12 in.

Element Flows To:

Outlet 1	Outlet 2

Bioretention 2B Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.0384	0.0000	0.0000	0.0000
0.0769	0.0377	0.0005	0.0000	0.0000
0.1538	0.0370	0.0011	0.0000	0.0000

0.2308	0.0363	0.0016	0.0000	0.0001
0.3077	0.0356	0.0022	0.0000	0.0005
0.3846	0.0350	0.0028	0.0000	0.0013
0.4615	0.0343	0.0034	0.0000	0.0020
0.5385	0.0336	0.0040	0.0000	0.0027
0.6154	0.0330	0.0046	0.0000	0.0047
0.6923	0.0323	0.0052	0.0000	0.0074
0.7692	0.0317	0.0058	0.0000	0.0099
0.8462	0.0310	0.0064	0.0000	0.0108
0.9231	0.0304	0.0071	0.0000	0.0150
1.0000	0.0298	0.0077	0.0000	0.0201
1.0769	0.0291	0.0084	0.0000	0.0206
1.1538	0.0285	0.0091	0.0000	0.0261
1.2308	0.0279	0.0098	0.0000	0.0265
1.3077	0.0272	0.0105	0.0000	0.0331
1.3846	0.0266	0.0113	0.0000	0.0411
1.4615	0.0260	0.0121	0.0000	0.0501
1.5385	0.0254	0.0129	0.0000	0.0537
1.6154	0.0248	0.0137	0.0000	0.0603
1.6923	0.0242	0.0145	0.0000	0.0716
1.7692	0.0236	0.0154	0.0000	0.0841
1.8462	0.0230	0.0162	0.0000	0.0889
1.9231	0.0224	0.0171	0.0000	0.0889
2.0000	0.0219	0.0180	0.0000	0.0889
2.0769	0.0213	0.0190	0.0000	0.0889
2.1538	0.0207	0.0200	0.0000	0.0889
2.2308	0.0201	0.0210	0.0000	0.0889
2.3077	0.0196	0.0220	0.0000	0.0889
2.3846	0.0190	0.0230	0.0000	0.0889
2.4615	0.0185	0.0241	0.0000	0.0889
2.5385	0.0179	0.0252	0.0000	0.0889
2.6154	0.0174	0.0263	0.0000	0.0889
2.6923	0.0168	0.0274	0.0000	0.0889
2.7692	0.0163	0.0285	0.0000	0.0889
2.8462	0.0157	0.0297	0.0000	0.0889
2.9231	0.0152	0.0309	0.0000	0.0889
3.0000	0.0147	0.0321	0.0000	0.0889

Surface etention 2B Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Wetted Surface
3.0000	0.0384	0.0321	0.0000	0.0889	0.0000
3.0769	0.0391	0.0351	0.0000	0.0889	0.0000
3.1538	0.0398	0.0381	0.0000	0.0889	0.0000
3.2308	0.0405	0.0412	0.0000	0.0889	0.0000
3.3077	0.0412	0.0444	0.0000	0.0889	0.0000
3.3846	0.0419	0.0476	0.0000	0.0889	0.0000
3.4615	0.0426	0.0508	0.0000	0.0889	0.0000
3.5385	0.0433	0.0541	0.0000	0.0889	0.0000
3.6154	0.0441	0.0575	0.0000	0.0889	0.0000
3.6923	0.0448	0.0609	0.0000	0.0889	0.0000
3.7692	0.0455	0.0644	0.0000	0.0889	0.0000
3.8462	0.0463	0.0679	0.0000	0.0889	0.0000
3.9231	0.0470	0.0715	0.0000	0.0889	0.0000
4.0000	0.0478	0.0751	0.0000	0.0889	0.0000
4.0769	0.0485	0.0788	0.0000	0.0889	0.0000
4.1538	0.0493	0.0826	0.0000	0.0889	0.0000
4.2308	0.0500	0.0864	0.0000	0.0889	0.0000

4.3077	0.0508	0.0903	0.0000	0.0889	0.0000
4.3846	0.0515	0.0942	0.0000	0.0889	0.0000
4.4615	0.0523	0.0982	0.0000	0.0889	0.0000
4.5385	0.0531	0.1023	0.0000	0.0889	0.0000
4.6154	0.0539	0.1064	0.0000	0.0889	0.0000
4.6923	0.0547	0.1106	0.0000	0.0889	0.0000
4.7692	0.0555	0.1148	0.0000	0.0889	0.0000
4.8462	0.0562	0.1191	0.0000	0.0889	0.0000
4.9231	0.0570	0.1235	0.0000	0.0889	0.0000
5.0000	0.0579	0.1279	0.0000	0.0889	0.0000
5.0769	0.0587	0.1324	0.0000	0.0889	0.0000
5.1538	0.0595	0.1369	0.0000	0.0889	0.0000
5.2308	0.0603	0.1415	0.0000	0.0889	0.0000
5.3077	0.0611	0.1462	0.0000	0.0889	0.0000
5.3846	0.0619	0.1509	0.0000	0.0889	0.0000
5.4615	0.0628	0.1557	0.0000	0.0889	0.0000
5.5385	0.0636	0.1606	0.0000	0.0889	0.0000
5.6154	0.0644	0.1655	0.0000	0.0889	0.0000
5.6923	0.0653	0.1705	0.0000	0.0889	0.0000
5.7692	0.0661	0.1755	0.0000	0.0889	0.0000
5.8462	0.0670	0.1806	0.0000	0.0889	0.0000
5.9231	0.0678	0.1858	0.0000	0.0889	0.0000
6.0000	0.0687	0.1911	0.0000	0.0889	0.0000
6.0769	0.0696	0.1964	0.2257	0.0889	0.0000
6.1538	0.0704	0.2018	0.6273	0.0889	0.0000
6.2308	0.0713	0.2072	1.0991	0.0889	0.0000
6.3077	0.0722	0.2127	1.5516	0.0889	0.0000
6.3846	0.0731	0.2183	1.9054	0.0889	0.0000
6.4615	0.0739	0.2240	2.1274	0.0889	0.0000
6.5385	0.0748	0.2297	2.3112	0.0889	0.0000
6.6154	0.0757	0.2355	2.4708	0.0889	0.0000
6.6923	0.0766	0.2414	2.6207	0.0889	0.0000
6.7692	0.0775	0.2473	2.7624	0.0889	0.0000
6.8462	0.0784	0.2533	2.8972	0.0889	0.0000
6.9231	0.0793	0.2594	3.0261	0.0889	0.0000
7.0000	0.0803	0.2655	3.1496	0.0889	0.0000
7.0000	0.0803	0.2655	3.2685	0.0889	0.0000

Name : Surface etention 2B

Element Flows To:
Outlet 1 **Outlet 2**
Bioretention 2B

ANALYSIS RESULTS

Stream Protection Duration

Predeveloped Landuse Totals for POC #1
Total Pervious Area:0.23

Total Impervious Area:0.82

Mitigated Landuse Totals for POC #1
Total Pervious Area:0.23
Total Impervious Area:0.82

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.228672
5 year	0.310228
10 year	0.366319
25 year	0.439621
50 year	0.49602
100 year	0.553976

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0
5 year	0
10 year	0
25 year	0
50 year	0
100 year	0

Stream Protection Duration
Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1949	0.304	0.000
1950	0.207	0.000
1951	0.426	0.000
1952	0.145	0.000
1953	0.347	0.000
1954	0.300	0.000
1955	0.240	0.000
1956	0.210	0.000
1957	0.202	0.000
1958	0.240	0.000
1959	0.298	0.000
1960	0.260	0.000
1961	0.211	0.000
1962	0.182	0.000
1963	0.231	0.000
1964	0.420	0.000
1965	0.152	0.000
1966	0.178	0.000
1967	0.226	0.000
1968	0.222	0.000
1969	0.197	0.000
1970	0.296	0.000
1971	0.493	0.000
1972	0.260	0.000
1973	0.216	0.000
1974	0.121	0.000
1975	0.314	0.000

1976	0.271	0.000
1977	0.178	0.000
1978	0.179	0.000
1979	0.373	0.000
1980	0.188	0.000
1981	0.350	0.000
1982	0.319	0.000
1983	0.255	0.000
1984	0.176	0.000
1985	0.408	0.000
1986	0.239	0.000
1987	0.517	0.000
1988	0.210	0.000
1989	0.222	0.000
1990	0.255	0.000
1991	0.255	0.000
1992	0.231	0.000
1993	0.141	0.000
1994	0.126	0.000
1995	0.122	0.000
1996	0.137	0.000
1997	0.181	0.000
1998	0.199	0.000
1999	0.254	0.000
2000	0.338	0.000
2001	0.124	0.000
2002	0.220	0.000
2003	0.160	0.000
2004	0.223	0.000
2005	0.283	0.000
2006	0.203	0.000
2007	0.460	0.000
2008	0.185	0.000
2009	0.152	0.000

Stream Protection Duration
Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.5170	0.0000
2	0.4929	0.0000
3	0.4604	0.0000
4	0.4260	0.0000
5	0.4202	0.0000
6	0.4081	0.0000
7	0.3727	0.0000
8	0.3499	0.0000
9	0.3470	0.0000
10	0.3381	0.0000
11	0.3195	0.0000
12	0.3141	0.0000
13	0.3035	0.0000
14	0.3005	0.0000
15	0.2980	0.0000
16	0.2958	0.0000
17	0.2831	0.0000
18	0.2711	0.0000

19	0.2600	0.0000
20	0.2597	0.0000
21	0.2547	0.0000
22	0.2546	0.0000
23	0.2546	0.0000
24	0.2539	0.0000
25	0.2398	0.0000
26	0.2397	0.0000
27	0.2390	0.0000
28	0.2310	0.0000
29	0.2308	0.0000
30	0.2260	0.0000
31	0.2226	0.0000
32	0.2222	0.0000
33	0.2220	0.0000
34	0.2199	0.0000
35	0.2158	0.0000
36	0.2115	0.0000
37	0.2101	0.0000
38	0.2098	0.0000
39	0.2071	0.0000
40	0.2029	0.0000
41	0.2017	0.0000
42	0.1990	0.0000
43	0.1972	0.0000
44	0.1877	0.0000
45	0.1853	0.0000
46	0.1817	0.0000
47	0.1810	0.0000
48	0.1786	0.0000
49	0.1783	0.0000
50	0.1777	0.0000
51	0.1756	0.0000
52	0.1595	0.0000
53	0.1524	0.0000
54	0.1523	0.0000
55	0.1446	0.0000
56	0.1411	0.0000
57	0.1374	0.0000
58	0.1260	0.0000
59	0.1236	0.0000
60	0.1224	0.0000
61	0.1214	0.0000

Stream Protection Duration
POC #1
The Facility PASSED

The Facility PASSED.

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.1143	1390	0	0	Pass
0.1182	1249	0	0	Pass
0.1220	1113	0	0	Pass
0.1259	1012	0	0	Pass
0.1298	914	0	0	Pass

0.1336	789	0	0	Pass
0.1375	704	0	0	Pass
0.1413	631	0	0	Pass
0.1452	564	0	0	Pass
0.1490	504	0	0	Pass
0.1529	464	0	0	Pass
0.1567	421	0	0	Pass
0.1606	376	0	0	Pass
0.1645	342	0	0	Pass
0.1683	316	0	0	Pass
0.1722	278	0	0	Pass
0.1760	244	0	0	Pass
0.1799	226	0	0	Pass
0.1837	204	0	0	Pass
0.1876	183	0	0	Pass
0.1914	164	0	0	Pass
0.1953	148	0	0	Pass
0.1992	133	0	0	Pass
0.2030	124	0	0	Pass
0.2069	119	0	0	Pass
0.2107	107	0	0	Pass
0.2146	98	0	0	Pass
0.2184	93	0	0	Pass
0.2223	86	0	0	Pass
0.2261	80	0	0	Pass
0.2300	79	0	0	Pass
0.2339	71	0	0	Pass
0.2377	67	0	0	Pass
0.2416	62	0	0	Pass
0.2454	59	0	0	Pass
0.2493	57	0	0	Pass
0.2531	55	0	0	Pass
0.2570	48	0	0	Pass
0.2608	42	0	0	Pass
0.2647	40	0	0	Pass
0.2686	39	0	0	Pass
0.2724	35	0	0	Pass
0.2763	33	0	0	Pass
0.2801	31	0	0	Pass
0.2840	30	0	0	Pass
0.2878	28	0	0	Pass
0.2917	28	0	0	Pass
0.2955	28	0	0	Pass
0.2994	25	0	0	Pass
0.3033	24	0	0	Pass
0.3071	21	0	0	Pass
0.3110	20	0	0	Pass
0.3148	19	0	0	Pass
0.3187	18	0	0	Pass
0.3225	16	0	0	Pass
0.3264	16	0	0	Pass
0.3302	16	0	0	Pass
0.3341	16	0	0	Pass
0.3379	16	0	0	Pass
0.3418	14	0	0	Pass
0.3457	14	0	0	Pass
0.3495	13	0	0	Pass

0.3534	11	0	0	Pass
0.3572	10	0	0	Pass
0.3611	10	0	0	Pass
0.3649	10	0	0	Pass
0.3688	10	0	0	Pass
0.3726	9	0	0	Pass
0.3765	8	0	0	Pass
0.3804	8	0	0	Pass
0.3842	6	0	0	Pass
0.3881	6	0	0	Pass
0.3919	6	0	0	Pass
0.3958	6	0	0	Pass
0.3996	6	0	0	Pass
0.4035	6	0	0	Pass
0.4073	6	0	0	Pass
0.4112	5	0	0	Pass
0.4151	5	0	0	Pass
0.4189	5	0	0	Pass
0.4228	4	0	0	Pass
0.4266	3	0	0	Pass
0.4305	3	0	0	Pass
0.4343	3	0	0	Pass
0.4382	3	0	0	Pass
0.4420	3	0	0	Pass
0.4459	3	0	0	Pass
0.4498	3	0	0	Pass
0.4536	3	0	0	Pass
0.4575	3	0	0	Pass
0.4613	2	0	0	Pass
0.4652	2	0	0	Pass
0.4690	2	0	0	Pass
0.4729	2	0	0	Pass
0.4767	2	0	0	Pass
0.4806	2	0	0	Pass
0.4845	2	0	0	Pass
0.4883	2	0	0	Pass
0.4922	2	0	0	Pass
0.4960	1	0	0	Pass

Water Quality BMP Flow and Volume for POC #1
On-line facility volume: 0 **acre-feet**
On-line facility target flow: 0 **cfs.**
Adjusted for 15 min: 0 **cfs.**
Off-line facility target flow: 0 **cfs.**
Adjusted for 15 min: 0 **cfs.**

LID Report

LID Technique	Used for Treatment?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft.)	Cumulative Infiltration Volume Credit	Percent Volume Infiltrated	Water Quality Percent Treated	Water Quality Comment

Total Volume Infiltrated 0.00 0.00 0.00 0.00
0.00 0% No Treat. Credit
Compliance with LID Standard 8
Duration Analysis Result = Passed

Perlnd and Implnd Changes

No changes have been made.

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BASIN AREA 3

FACILITY CALCULATIONS

WWHM2012
PROJECT REPORT

Project Name: BASIN 3 BIORETENTION
Site Name:
Site Address:
City :
Report Date: 12/26/2019
Gage : Port Angelis
Data Start : 1948/10/01
Data End : 2009/09/30
Precip Scale: 0.80
Version Date: 2018/10/10
Version : 4.2.16

Low Flow Threshold for POC 1 : 50 Percent of the 2 Year

High Flow Threshold for POC 1: 50 year

PREDEVELOPED LAND USE

Name : Basin 3
Bypass: No

GroundWater: No

Pervious Land Use	acre
A B, Lawn, Mod	.3
Pervious Total	0.3

Impervious Land Use	acre
ROADS MOD	0.22
PARKING FLAT	0.13
Impervious Total	0.35
Basin Total	0.65

Element Flows To:

Surface	Interflow	Groundwater

MITIGATED LAND USE

Name : Basin 1
Bypass: No

GroundWater: No

Pervious Land Use	acre
A B, Lawn, Mod	.3
Pervious Total	0.3

Impervious Land Use	acre
ROADS MOD	0.22
PARKING FLAT	0.13
Impervious Total	0.35
Basin Total	0.65

Element Flows To:

Surface	Interflow	Groundwater
Surface retention 3	Surface retention 3	

Name : Bioretention 3
Bottom Length: 35.00 ft.
Bottom Width: 20.00 ft.
Material thickness of first layer: 0.5
Material type for first layer: SMMWW 12 in/hr
Material thickness of second layer: 1.5
Material type for second layer: Sand
Material thickness of third layer: 1
Material type for third layer: GRAVEL
Infiltration On
Infiltration rate: 6
Infiltration safety factor: 1
Total Volume Infiltrated (ac-ft.): 25.268
Total Volume Through Riser (ac-ft.): 0
Total Volume Through Facility (ac-ft.): 25.268
Percent Infiltrated: 100
Total Precip Applied to Facility: 1.491
Total Evap From Facility: 1.695
Underdrain not used
Discharge Structure
Riser Height: 1 ft.
Riser Diameter: 8 in.

Element Flows To:

Outlet 1	Outlet 2

Bioretention 3 Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.0345	0.0000	0.0000	0.0000

0.0495	0.0343	0.0004	0.0000	0.0000
0.0989	0.0339	0.0007	0.0000	0.0000
0.1484	0.0336	0.0011	0.0000	0.0000
0.1978	0.0332	0.0015	0.0000	0.0000
0.2473	0.0329	0.0019	0.0000	0.0002
0.2967	0.0325	0.0023	0.0000	0.0005
0.3462	0.0322	0.0027	0.0000	0.0008
0.3956	0.0318	0.0031	0.0000	0.0010
0.4451	0.0315	0.0035	0.0000	0.0017
0.4945	0.0311	0.0039	0.0000	0.0027
0.5440	0.0308	0.0043	0.0000	0.0038
0.5934	0.0305	0.0047	0.0000	0.0040
0.6429	0.0301	0.0051	0.0000	0.0055
0.6923	0.0298	0.0054	0.0000	0.0074
0.7418	0.0295	0.0058	0.0000	0.0095
0.7912	0.0291	0.0062	0.0000	0.0099
0.8407	0.0288	0.0066	0.0000	0.0121
0.8901	0.0285	0.0070	0.0000	0.0150
0.9396	0.0281	0.0075	0.0000	0.0183
0.9890	0.0278	0.0079	0.0000	0.0199
1.0385	0.0275	0.0083	0.0000	0.0220
1.0879	0.0272	0.0087	0.0000	0.0261
1.1374	0.0269	0.0092	0.0000	0.0306
1.1868	0.0265	0.0096	0.0000	0.0343
1.2363	0.0262	0.0101	0.0000	0.0356
1.2857	0.0259	0.0105	0.0000	0.0379
1.3352	0.0256	0.0110	0.0000	0.0410
1.3846	0.0253	0.0115	0.0000	0.0469
1.4341	0.0250	0.0119	0.0000	0.0533
1.4835	0.0247	0.0124	0.0000	0.0537
1.5330	0.0244	0.0129	0.0000	0.0602
1.5824	0.0241	0.0134	0.0000	0.0676
1.6319	0.0238	0.0139	0.0000	0.0755
1.6813	0.0235	0.0144	0.0000	0.0786
1.7308	0.0232	0.0149	0.0000	0.0840
1.7802	0.0229	0.0154	0.0000	0.0911
1.8297	0.0226	0.0159	0.0000	0.0930
1.8791	0.0223	0.0165	0.0000	0.0972
1.9286	0.0220	0.0170	0.0000	0.0972
1.9780	0.0217	0.0175	0.0000	0.0972
2.0275	0.0214	0.0181	0.0000	0.0972
2.0769	0.0211	0.0187	0.0000	0.0972
2.1264	0.0209	0.0193	0.0000	0.0972
2.1758	0.0206	0.0198	0.0000	0.0972
2.2253	0.0203	0.0204	0.0000	0.0972
2.2747	0.0200	0.0210	0.0000	0.0972
2.3242	0.0197	0.0217	0.0000	0.0972
2.3736	0.0195	0.0223	0.0000	0.0972
2.4231	0.0192	0.0229	0.0000	0.0972
2.4725	0.0189	0.0235	0.0000	0.0972
2.5220	0.0187	0.0242	0.0000	0.0972
2.5714	0.0184	0.0248	0.0000	0.0972
2.6209	0.0181	0.0254	0.0000	0.0972
2.6703	0.0179	0.0261	0.0000	0.0972
2.7198	0.0176	0.0268	0.0000	0.0972
2.7692	0.0173	0.0274	0.0000	0.0972
2.8187	0.0171	0.0281	0.0000	0.0972

2.8681	0.0168	0.0288	0.0000	0.0972
2.9176	0.0166	0.0295	0.0000	0.0972
2.9670	0.0163	0.0302	0.0000	0.0972
3.0000	0.0161	0.0307	0.0000	0.0972

Surface retention 3 Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Wetted Surface
3.0000	0.0345	0.0307	0.0000	0.1944	0.0000
3.0495	0.0349	0.0324	0.0000	0.1944	0.0000
3.0989	0.0352	0.0341	0.0000	0.2103	0.0000
3.1484	0.0356	0.0359	0.0000	0.2153	0.0000
3.1978	0.0360	0.0376	0.0000	0.2202	0.0000
3.2473	0.0363	0.0394	0.0000	0.2252	0.0000
3.2967	0.0367	0.0412	0.0000	0.2301	0.0000
3.3462	0.0371	0.0431	0.0000	0.2351	0.0000
3.3956	0.0375	0.0449	0.0000	0.2400	0.0000
3.4451	0.0378	0.0468	0.0000	0.2450	0.0000
3.4945	0.0382	0.0486	0.0000	0.2499	0.0000
3.5440	0.0386	0.0505	0.0000	0.2549	0.0000
3.5934	0.0390	0.0525	0.0000	0.2599	0.0000
3.6429	0.0393	0.0544	0.0000	0.2648	0.0000
3.6923	0.0397	0.0563	0.0000	0.2698	0.0000
3.7418	0.0401	0.0583	0.0000	0.2747	0.0000
3.7912	0.0405	0.0603	0.0000	0.2797	0.0000
3.8407	0.0409	0.0623	0.0000	0.2846	0.0000
3.8901	0.0413	0.0644	0.0000	0.2896	0.0000
3.9396	0.0417	0.0664	0.0000	0.2945	0.0000
3.9890	0.0421	0.0685	0.0000	0.2995	0.0000
4.0385	0.0425	0.0706	0.0533	0.3045	0.0000
4.0879	0.0429	0.0727	0.1820	0.3094	0.0000
4.1374	0.0433	0.0748	0.3430	0.3144	0.0000
4.1868	0.0437	0.0770	0.5072	0.3193	0.0000
4.2363	0.0441	0.0791	0.6466	0.3243	0.0000
4.2857	0.0445	0.0813	0.7429	0.3292	0.0000
4.3352	0.0449	0.0835	0.8104	0.3342	0.0000
4.3846	0.0453	0.0857	0.8681	0.3391	0.0000
4.4341	0.0457	0.0880	0.9223	0.3441	0.0000
4.4835	0.0461	0.0903	0.9734	0.3490	0.0000
4.5000	0.0462	0.0910	1.0219	0.3507	0.0000

Name : Surface retention 3

Element Flows To:

Outlet 1	**Outlet 2**
Bioretention 3	

ANALYSIS RESULTS

Stream Protection Duration

Predeveloped Landuse Totals for POC #1
Total Pervious Area:0.3
Total Impervious Area:0.35

Mitigated Landuse Totals for POC #1
Total Pervious Area:0.3
Total Impervious Area:0.35

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.107928
5 year	0.145884
10 year	0.171918
25 year	0.205868
50 year	0.231942
100 year	0.258699

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0
5 year	0
10 year	0
25 year	0
50 year	0
100 year	0

Stream Protection Duration
Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1949	0.142	0.000
1950	0.090	0.000
1951	0.191	0.000
1952	0.076	0.000
1953	0.174	0.000
1954	0.144	0.000
1955	0.105	0.000
1956	0.097	0.000
1957	0.095	0.000
1958	0.117	0.000
1959	0.136	0.000
1960	0.130	0.000
1961	0.101	0.000
1962	0.097	0.000
1963	0.104	0.000
1964	0.210	0.000
1965	0.068	0.000
1966	0.091	0.000
1967	0.104	0.000
1968	0.099	0.000
1969	0.099	0.000
1970	0.149	0.000
1971	0.224	0.000
1972	0.129	0.000
1973	0.094	0.000

1974	0.054	0.000
1975	0.140	0.000
1976	0.121	0.000
1977	0.085	0.000
1978	0.084	0.000
1979	0.164	0.000
1980	0.086	0.000
1981	0.160	0.000
1982	0.139	0.000
1983	0.118	0.000
1984	0.079	0.000
1985	0.180	0.000
1986	0.104	0.000
1987	0.255	0.000
1988	0.095	0.000
1989	0.105	0.000
1990	0.136	0.000
1991	0.121	0.000
1992	0.110	0.000
1993	0.068	0.000
1994	0.065	0.000
1995	0.054	0.000
1996	0.071	0.000
1997	0.093	0.000
1998	0.090	0.000
1999	0.124	0.000
2000	0.162	0.000
2001	0.054	0.000
2002	0.107	0.000
2003	0.083	0.000
2004	0.105	0.000
2005	0.135	0.000
2006	0.089	0.000
2007	0.209	0.000
2008	0.096	0.000
2009	0.072	0.000

Stream Protection Duration
Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.2550	0.0000
2	0.2243	0.0000
3	0.2096	0.0000
4	0.2087	0.0000
5	0.1908	0.0000
6	0.1801	0.0000
7	0.1742	0.0000
8	0.1638	0.0000
9	0.1625	0.0000
10	0.1600	0.0000
11	0.1491	0.0000
12	0.1439	0.0000
13	0.1420	0.0000
14	0.1402	0.0000
15	0.1386	0.0000
16	0.1360	0.0000

17	0.1356	0.0000
18	0.1353	0.0000
19	0.1302	0.0000
20	0.1287	0.0000
21	0.1236	0.0000
22	0.1212	0.0000
23	0.1210	0.0000
24	0.1183	0.0000
25	0.1174	0.0000
26	0.1102	0.0000
27	0.1072	0.0000
28	0.1051	0.0000
29	0.1050	0.0000
30	0.1047	0.0000
31	0.1043	0.0000
32	0.1041	0.0000
33	0.1041	0.0000
34	0.1010	0.0000
35	0.0988	0.0000
36	0.0986	0.0000
37	0.0973	0.0000
38	0.0969	0.0000
39	0.0963	0.0000
40	0.0955	0.0000
41	0.0952	0.0000
42	0.0940	0.0000
43	0.0930	0.0000
44	0.0913	0.0000
45	0.0901	0.0000
46	0.0895	0.0000
47	0.0888	0.0000
48	0.0862	0.0000
49	0.0851	0.0000
50	0.0840	0.0000
51	0.0831	0.0000
52	0.0791	0.0000
53	0.0760	0.0000
54	0.0722	0.0000
55	0.0705	0.0000
56	0.0682	0.0000
57	0.0677	0.0000
58	0.0652	0.0000
59	0.0544	0.0000
60	0.0543	0.0000
61	0.0538	0.0000

Stream Protection Duration
POC #1
The Facility PASSED

The Facility PASSED.

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0540	1167	0	0	Pass
0.0558	1038	0	0	Pass
0.0576	937	0	0	Pass

0.0594	829	0	0	Pass
0.0612	736	0	0	Pass
0.0630	662	0	0	Pass
0.0648	583	0	0	Pass
0.0665	534	0	0	Pass
0.0683	472	0	0	Pass
0.0701	430	0	0	Pass
0.0719	388	0	0	Pass
0.0737	355	0	0	Pass
0.0755	329	0	0	Pass
0.0773	293	0	0	Pass
0.0791	260	0	0	Pass
0.0809	236	0	0	Pass
0.0827	209	0	0	Pass
0.0845	194	0	0	Pass
0.0863	173	0	0	Pass
0.0881	164	0	0	Pass
0.0899	145	0	0	Pass
0.0917	131	0	0	Pass
0.0935	121	0	0	Pass
0.0953	111	0	0	Pass
0.0971	103	0	0	Pass
0.0989	94	0	0	Pass
0.1007	88	0	0	Pass
0.1025	81	0	0	Pass
0.1043	75	0	0	Pass
0.1061	69	0	0	Pass
0.1079	63	0	0	Pass
0.1097	61	0	0	Pass
0.1115	56	0	0	Pass
0.1133	55	0	0	Pass
0.1151	54	0	0	Pass
0.1169	52	0	0	Pass
0.1187	47	0	0	Pass
0.1205	45	0	0	Pass
0.1223	42	0	0	Pass
0.1241	39	0	0	Pass
0.1259	38	0	0	Pass
0.1277	37	0	0	Pass
0.1295	34	0	0	Pass
0.1313	31	0	0	Pass
0.1331	29	0	0	Pass
0.1349	29	0	0	Pass
0.1367	26	0	0	Pass
0.1385	26	0	0	Pass
0.1403	23	0	0	Pass
0.1421	22	0	0	Pass
0.1439	20	0	0	Pass
0.1456	19	0	0	Pass
0.1474	19	0	0	Pass
0.1492	17	0	0	Pass
0.1510	17	0	0	Pass
0.1528	17	0	0	Pass
0.1546	16	0	0	Pass
0.1564	16	0	0	Pass
0.1582	15	0	0	Pass
0.1600	15	0	0	Pass

0.1618	14	0	0	Pass
0.1636	13	0	0	Pass
0.1654	11	0	0	Pass
0.1672	11	0	0	Pass
0.1690	11	0	0	Pass
0.1708	11	0	0	Pass
0.1726	11	0	0	Pass
0.1744	10	0	0	Pass
0.1762	10	0	0	Pass
0.1780	9	0	0	Pass
0.1798	9	0	0	Pass
0.1816	8	0	0	Pass
0.1834	7	0	0	Pass
0.1852	7	0	0	Pass
0.1870	7	0	0	Pass
0.1888	6	0	0	Pass
0.1906	6	0	0	Pass
0.1924	4	0	0	Pass
0.1942	4	0	0	Pass
0.1960	4	0	0	Pass
0.1978	4	0	0	Pass
0.1996	4	0	0	Pass
0.2014	4	0	0	Pass
0.2032	4	0	0	Pass
0.2050	4	0	0	Pass
0.2068	4	0	0	Pass
0.2086	4	0	0	Pass
0.2104	2	0	0	Pass
0.2122	2	0	0	Pass
0.2140	2	0	0	Pass
0.2158	2	0	0	Pass
0.2176	2	0	0	Pass
0.2194	2	0	0	Pass
0.2212	2	0	0	Pass
0.2230	2	0	0	Pass
0.2248	1	0	0	Pass
0.2265	1	0	0	Pass
0.2283	1	0	0	Pass
0.2301	1	0	0	Pass
0.2319	1	0	0	Pass

Water Quality BMP Flow and Volume for POC #1
On-line facility volume: 0 **acre-feet**
On-line facility target flow: 0 **cfs.**
Adjusted for 15 min: 0 **cfs.**
Off-line facility target flow: 0 **cfs.**
Adjusted for 15 min: 0 **cfs.**

LID Report

LID Technique	Used for Treatment?	Total Volume Needs Treatment	Volume Through Facility	Infiltration Volume (ac-ft.)	Cumulative Volume Infiltration	Percent Volume Infiltrated	Water Quality Percent	Comment

Treated

		(ac-ft)	(ac-ft)		Credit	
retention 3 POC	N	22.99			N	100.00
Total Volume Infiltrated		22.99	0.00	0.00		100.00

0.00 0% No Treat. Credit
Compliance with LID Standard 8
Duration Analysis Result = Passed

Perlnd and Implnd Changes

No changes have been made.

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BASIN AREA 4

FACILITY CALCULATIONS

WWHM2012
PROJECT REPORT

Project Name: Area 4_bioretention
Site Name:
Site Address:
City :
Report Date: 12/26/2019
Gage : Port Angelis
Data Start : 1948/10/01
Data End : 2009/09/30
Precip Scale: 0.80
Version Date: 2018/10/10
Version : 4.2.16

Low Flow Threshold for POC 1 : 50 Percent of the 2 Year

High Flow Threshold for POC 1: 50 year

PREDEVELOPED LAND USE

Name : Basin 1
Bypass: No

GroundWater: No

Pervious Land Use	acre
A B, Lawn, Mod	.17
Pervious Total	0.17

Impervious Land Use	acre
PARKING FLAT	0.13
Impervious Total	0.13
Basin Total	0.3

Element Flows To:

Surface	Interflow	Groundwater

MITIGATED LAND USE

Name : Basin 1
Bypass: No

GroundWater: No

Pervious Land Use	acre
A B, Lawn, Mod	.17
Pervious Total	0.17

Impervious Land Use	acre
PARKING FLAT	0.13
Impervious Total	0.13
Basin Total	0.3

Element Flows To:

Surface	Interflow	Groundwater
Surface retention 4	Surface retention 4	

Name : Bioretention 4
Bottom Length: 35.00 ft.
Bottom Width: 20.00 ft.
Material thickness of first layer: 0.5
Material type for first layer: SMMWW 12 in/hr
Material thickness of second layer: 1.5
Material type for second layer: Sand
Material thickness of third layer: 1
Material type for third layer: GRAVEL
Infiltration On
Infiltration rate: 6
Infiltration safety factor: 1
Total Volume Infiltrated (ac-ft.): 9.173
Total Volume Through Riser (ac-ft.): 0
Total Volume Through Facility (ac-ft.): 9.173
Percent Infiltrated: 100
Total Precip Applied to Facility: 1.36
Total Evap From Facility: 1.478
Underdrain not used
Discharge Structure
Riser Height: 1 ft.
Riser Diameter: 8 in.

Element Flows To:

Outlet 1	Outlet 2

Bioretention 4 Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.0345	0.0000	0.0000	0.0000
0.0549	0.0343	0.0004	0.0000	0.0000
0.1099	0.0339	0.0008	0.0000	0.0000

0.1648	0.0335	0.0012	0.0000	0.0000
0.2198	0.0331	0.0017	0.0000	0.0001
0.2747	0.0327	0.0021	0.0000	0.0003
0.3297	0.0323	0.0026	0.0000	0.0007
0.3846	0.0319	0.0030	0.0000	0.0010
0.4396	0.0316	0.0035	0.0000	0.0013
0.4945	0.0312	0.0039	0.0000	0.0023
0.5495	0.0308	0.0043	0.0000	0.0035
0.6044	0.0304	0.0048	0.0000	0.0049
0.6593	0.0301	0.0052	0.0000	0.0051
0.7143	0.0297	0.0056	0.0000	0.0071
0.7692	0.0293	0.0061	0.0000	0.0095
0.8242	0.0289	0.0065	0.0000	0.0124
0.8791	0.0286	0.0070	0.0000	0.0128
0.9341	0.0282	0.0074	0.0000	0.0157
0.9890	0.0279	0.0079	0.0000	0.0195
1.0440	0.0275	0.0084	0.0000	0.0237
1.0989	0.0271	0.0088	0.0000	0.0257
1.1538	0.0268	0.0093	0.0000	0.0285
1.2088	0.0264	0.0098	0.0000	0.0339
1.2637	0.0261	0.0103	0.0000	0.0398
1.3187	0.0257	0.0108	0.0000	0.0445
1.3736	0.0254	0.0114	0.0000	0.0463
1.4286	0.0250	0.0119	0.0000	0.0474
1.4835	0.0247	0.0124	0.0000	0.0533
1.5385	0.0244	0.0129	0.0000	0.0610
1.5934	0.0240	0.0135	0.0000	0.0693
1.6484	0.0237	0.0141	0.0000	0.0697
1.7033	0.0234	0.0146	0.0000	0.0783
1.7582	0.0230	0.0152	0.0000	0.0879
1.8132	0.0227	0.0158	0.0000	0.0972
1.8681	0.0224	0.0163	0.0000	0.0972
1.9231	0.0221	0.0169	0.0000	0.0972
1.9780	0.0217	0.0175	0.0000	0.0972
2.0330	0.0214	0.0182	0.0000	0.0972
2.0879	0.0211	0.0188	0.0000	0.0972
2.1429	0.0208	0.0195	0.0000	0.0972
2.1978	0.0205	0.0201	0.0000	0.0972
2.2527	0.0202	0.0208	0.0000	0.0972
2.3077	0.0199	0.0214	0.0000	0.0972
2.3626	0.0196	0.0221	0.0000	0.0972
2.4176	0.0193	0.0228	0.0000	0.0972
2.4725	0.0190	0.0235	0.0000	0.0972
2.5275	0.0187	0.0242	0.0000	0.0972
2.5824	0.0184	0.0249	0.0000	0.0972
2.6374	0.0181	0.0257	0.0000	0.0972
2.6923	0.0178	0.0264	0.0000	0.0972
2.7473	0.0175	0.0271	0.0000	0.0972
2.8022	0.0172	0.0279	0.0000	0.0972
2.8571	0.0169	0.0286	0.0000	0.0972
2.9121	0.0166	0.0294	0.0000	0.0972
2.9670	0.0163	0.0302	0.0000	0.0972
3.0000	0.0161	0.0307	0.0000	0.0972

Surface retention 4 Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Wetted Surface
3.0000	0.0345	0.0307	0.0000	0.1944	0.0000

3.0549	0.0349	0.0326	0.0000	0.1944	0.0000
3.1099	0.0353	0.0345	0.0000	0.2114	0.0000
3.1648	0.0357	0.0365	0.0000	0.2169	0.0000
3.2198	0.0361	0.0384	0.0000	0.2224	0.0000
3.2747	0.0365	0.0404	0.0000	0.2279	0.0000
3.3297	0.0370	0.0424	0.0000	0.2334	0.0000
3.3846	0.0374	0.0445	0.0000	0.2389	0.0000
3.4396	0.0378	0.0466	0.0000	0.2444	0.0000
3.4945	0.0382	0.0486	0.0000	0.2499	0.0000
3.5495	0.0386	0.0507	0.0000	0.2555	0.0000
3.6044	0.0390	0.0529	0.0000	0.2610	0.0000
3.6593	0.0395	0.0550	0.0000	0.2665	0.0000
3.7143	0.0399	0.0572	0.0000	0.2720	0.0000
3.7692	0.0403	0.0594	0.0000	0.2775	0.0000
3.8242	0.0408	0.0617	0.0000	0.2830	0.0000
3.8791	0.0412	0.0639	0.0000	0.2885	0.0000
3.9341	0.0416	0.0662	0.0000	0.2940	0.0000
3.9890	0.0421	0.0685	0.0000	0.2995	0.0000
4.0440	0.0425	0.0708	0.0650	0.3050	0.0000
4.0989	0.0429	0.0731	0.2160	0.3105	0.0000
4.1538	0.0434	0.0755	0.3989	0.3160	0.0000
4.2088	0.0438	0.0779	0.5737	0.3215	0.0000
4.2637	0.0443	0.0803	0.7058	0.3270	0.0000
4.3187	0.0447	0.0828	0.7843	0.3325	0.0000
4.3736	0.0452	0.0853	0.8556	0.3380	0.0000
4.4286	0.0456	0.0877	0.9164	0.3435	0.0000
4.4835	0.0461	0.0903	0.9734	0.3490	0.0000
4.5385	0.0466	0.0928	1.0272	0.3546	0.0000
4.5934	0.0470	0.0954	1.0783	0.3601	0.0000
4.6484	0.0475	0.0980	1.1272	0.3656	0.0000
4.7033	0.0479	0.1006	1.1739	0.3711	0.0000
4.7582	0.0484	0.1032	1.2189	0.3766	0.0000
4.8132	0.0489	0.1059	1.2623	0.3821	0.0000
4.8681	0.0494	0.1086	1.3043	0.3876	0.0000
4.9231	0.0498	0.1113	1.3449	0.3931	0.0000
4.9780	0.0503	0.1141	1.3844	0.3986	0.0000
5.0000	0.0505	0.1152	1.4227	0.4008	0.0000

Name : Surface retention 4

Element Flows To:
Outlet 1 **Outlet 2**
Bioretention 4

ANALYSIS RESULTS

Stream Protection Duration

Predeveloped Landuse Totals for POC #1
Total Pervious Area:0.17

Total Impervious Area:0.13

Mitigated Landuse Totals for POC #1
Total Pervious Area:0.17
Total Impervious Area:0.13

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.03628
5 year	0.04921
10 year	0.058102
25 year	0.069721
50 year	0.07866
100 year	0.087844

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0
5 year	0
10 year	0
25 year	0
50 year	0
100 year	0

Stream Protection Duration
Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1949	0.048	0.000
1950	0.033	0.000
1951	0.068	0.000
1952	0.023	0.000
1953	0.055	0.000
1954	0.048	0.000
1955	0.038	0.000
1956	0.033	0.000
1957	0.032	0.000
1958	0.038	0.000
1959	0.047	0.000
1960	0.041	0.000
1961	0.034	0.000
1962	0.029	0.000
1963	0.037	0.000
1964	0.067	0.000
1965	0.024	0.000
1966	0.028	0.000
1967	0.036	0.000
1968	0.035	0.000
1969	0.031	0.000
1970	0.047	0.000
1971	0.078	0.000
1972	0.041	0.000
1973	0.034	0.000
1974	0.019	0.000
1975	0.050	0.000

1976	0.043	0.000
1977	0.028	0.000
1978	0.028	0.000
1979	0.059	0.000
1980	0.030	0.000
1981	0.055	0.000
1982	0.051	0.000
1983	0.040	0.000
1984	0.028	0.000
1985	0.065	0.000
1986	0.038	0.000
1987	0.082	0.000
1988	0.033	0.000
1989	0.035	0.000
1990	0.040	0.000
1991	0.040	0.000
1992	0.037	0.000
1993	0.022	0.000
1994	0.020	0.000
1995	0.019	0.000
1996	0.022	0.000
1997	0.029	0.000
1998	0.032	0.000
1999	0.040	0.000
2000	0.054	0.000
2001	0.020	0.000
2002	0.035	0.000
2003	0.025	0.000
2004	0.035	0.000
2005	0.045	0.000
2006	0.032	0.000
2007	0.073	0.000
2008	0.029	0.000
2009	0.024	0.000

Stream Protection Duration
Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0820	0.0000
2	0.0782	0.0000
3	0.0730	0.0000
4	0.0676	0.0000
5	0.0666	0.0000
6	0.0647	0.0000
7	0.0592	0.0000
8	0.0555	0.0000
9	0.0551	0.0000
10	0.0536	0.0000
11	0.0506	0.0000
12	0.0498	0.0000
13	0.0481	0.0000
14	0.0476	0.0000
15	0.0472	0.0000
16	0.0469	0.0000
17	0.0449	0.0000
18	0.0430	0.0000

19	0.0412	0.0000
20	0.0412	0.0000
21	0.0404	0.0000
22	0.0404	0.0000
23	0.0404	0.0000
24	0.0403	0.0000
25	0.0381	0.0000
26	0.0380	0.0000
27	0.0379	0.0000
28	0.0367	0.0000
29	0.0366	0.0000
30	0.0358	0.0000
31	0.0354	0.0000
32	0.0353	0.0000
33	0.0352	0.0000
34	0.0349	0.0000
35	0.0343	0.0000
36	0.0336	0.0000
37	0.0334	0.0000
38	0.0333	0.0000
39	0.0329	0.0000
40	0.0322	0.0000
41	0.0320	0.0000
42	0.0316	0.0000
43	0.0313	0.0000
44	0.0298	0.0000
45	0.0294	0.0000
46	0.0289	0.0000
47	0.0287	0.0000
48	0.0283	0.0000
49	0.0283	0.0000
50	0.0282	0.0000
51	0.0278	0.0000
52	0.0253	0.0000
53	0.0242	0.0000
54	0.0241	0.0000
55	0.0229	0.0000
56	0.0224	0.0000
57	0.0219	0.0000
58	0.0200	0.0000
59	0.0196	0.0000
60	0.0194	0.0000
61	0.0192	0.0000

Stream Protection Duration
POC #1
The Facility PASSED

The Facility PASSED.

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0181	1383	0	0	Pass
0.0188	1245	0	0	Pass
0.0194	1116	0	0	Pass
0.0200	994	0	0	Pass
0.0206	890	0	0	Pass

0.0212	779	0	0	Pass
0.0218	699	0	0	Pass
0.0224	628	0	0	Pass
0.0230	563	0	0	Pass
0.0236	505	0	0	Pass
0.0243	454	0	0	Pass
0.0249	415	0	0	Pass
0.0255	372	0	0	Pass
0.0261	339	0	0	Pass
0.0267	312	0	0	Pass
0.0273	277	0	0	Pass
0.0279	246	0	0	Pass
0.0285	219	0	0	Pass
0.0291	201	0	0	Pass
0.0298	181	0	0	Pass
0.0304	161	0	0	Pass
0.0310	146	0	0	Pass
0.0316	134	0	0	Pass
0.0322	124	0	0	Pass
0.0328	117	0	0	Pass
0.0334	106	0	0	Pass
0.0340	98	0	0	Pass
0.0346	93	0	0	Pass
0.0353	86	0	0	Pass
0.0359	81	0	0	Pass
0.0365	76	0	0	Pass
0.0371	71	0	0	Pass
0.0377	67	0	0	Pass
0.0383	61	0	0	Pass
0.0389	59	0	0	Pass
0.0395	57	0	0	Pass
0.0401	55	0	0	Pass
0.0408	46	0	0	Pass
0.0414	41	0	0	Pass
0.0420	40	0	0	Pass
0.0426	38	0	0	Pass
0.0432	35	0	0	Pass
0.0438	33	0	0	Pass
0.0444	31	0	0	Pass
0.0450	29	0	0	Pass
0.0456	28	0	0	Pass
0.0463	28	0	0	Pass
0.0469	27	0	0	Pass
0.0475	25	0	0	Pass
0.0481	24	0	0	Pass
0.0487	21	0	0	Pass
0.0493	20	0	0	Pass
0.0499	18	0	0	Pass
0.0505	18	0	0	Pass
0.0512	16	0	0	Pass
0.0518	16	0	0	Pass
0.0524	16	0	0	Pass
0.0530	16	0	0	Pass
0.0536	16	0	0	Pass
0.0542	14	0	0	Pass
0.0548	14	0	0	Pass
0.0554	13	0	0	Pass

0.0560	11	0	0	Pass
0.0567	10	0	0	Pass
0.0573	10	0	0	Pass
0.0579	10	0	0	Pass
0.0585	10	0	0	Pass
0.0591	9	0	0	Pass
0.0597	8	0	0	Pass
0.0603	7	0	0	Pass
0.0609	6	0	0	Pass
0.0615	6	0	0	Pass
0.0622	6	0	0	Pass
0.0628	6	0	0	Pass
0.0634	6	0	0	Pass
0.0640	6	0	0	Pass
0.0646	6	0	0	Pass
0.0652	5	0	0	Pass
0.0658	5	0	0	Pass
0.0664	5	0	0	Pass
0.0670	4	0	0	Pass
0.0677	3	0	0	Pass
0.0683	3	0	0	Pass
0.0689	3	0	0	Pass
0.0695	3	0	0	Pass
0.0701	3	0	0	Pass
0.0707	3	0	0	Pass
0.0713	3	0	0	Pass
0.0719	3	0	0	Pass
0.0725	3	0	0	Pass
0.0732	2	0	0	Pass
0.0738	2	0	0	Pass
0.0744	2	0	0	Pass
0.0750	2	0	0	Pass
0.0756	2	0	0	Pass
0.0762	2	0	0	Pass
0.0768	2	0	0	Pass
0.0774	2	0	0	Pass
0.0780	2	0	0	Pass
0.0787	1	0	0	Pass

Water Quality BMP Flow and Volume for POC #1
On-line facility volume: 0 **acre-feet**
On-line facility target flow: 0 **cfs.**
Adjusted for 15 min: 0 **cfs.**
Off-line facility target flow: 0 **cfs.**
Adjusted for 15 min: 0 **cfs.**

LID Report

LID Technique	Used for Treatment?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft.)	Cumulative Infiltration Volume Credit	Percent Volume Infiltrated	Water Quality Percent Treated	Comment

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retention  4 POC                N     8.35                                    N     100.00
Total Volume Infiltrated               8.35         0.00     0.00                    100.00
0.00         0%          No Treat. Credit
Compliance with LID Standard 8
Duration Analysis Result = Passed
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Perlnd and Implnd Changes

No changes have been made.

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BASIN AREA 5

FACILITY CALCULATIONS

WWHM2012
PROJECT REPORT

Project Name: Area 5 Bioretention
Site Name:
Site Address:
City :
Report Date: 12/26/2019
Gage : Port Angelis
Data Start : 1948/10/01
Data End : 2009/09/30
Precip Scale: 0.80
Version Date: 2018/10/10
Version : 4.2.16

Low Flow Threshold for POC 1 : 50 Percent of the 2 Year

High Flow Threshold for POC 1: 50 year

PREDEVELOPED LAND USE

Name : Basin 1
Bypass: No

GroundWater: No

Pervious Land Use	acre
A B, Lawn, Flat	.35
Pervious Total	0.35

Impervious Land Use	acre
PARKING FLAT	0.12
Impervious Total	0.12
Basin Total	0.47

Element Flows To:

Surface	Interflow	Groundwater

MITIGATED LAND USE

Name : Basin 1
Bypass: No

GroundWater: No

Pervious Land Use	acre
A B, Lawn, Flat	.35
Pervious Total	0.35

Impervious Land Use	acre
PARKING FLAT	0.12
Impervious Total	0.12
Basin Total	0.47

Element Flows To:

Surface	Interflow	Groundwater
Surface retention 5	Surface retention 5	

Name : Bioretention 5
Bottom Length: 20.00 ft.
Bottom Width: 20.00 ft.
Material thickness of first layer: 0.5
Material type for first layer: SMMWW 12 in/hr
Material thickness of second layer: 1.5
Material type for second layer: Sand
Material thickness of third layer: 1
Material type for third layer: GRAVEL
Infiltration On
Infiltration rate: 6
Infiltration safety factor: 1
Total Volume Infiltrated (ac-ft.): 8.492
Total Volume Through Riser (ac-ft.): 0
Total Volume Through Facility (ac-ft.): 8.492
Percent Infiltrated: 100
Total Precip Applied to Facility: 0.824
Total Evap From Facility: 0.925
Underdrain not used
Discharge Structure
Riser Height: 1.5 ft.
Riser Diameter: 8 in.

Element Flows To:

Outlet 1	Outlet 2

Bioretention 5 Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.0235	0.0000	0.0000	0.0000
0.0604	0.0233	0.0003	0.0000	0.0000
0.1209	0.0229	0.0005	0.0000	0.0000

0.1813	0.0226	0.0008	0.0000	0.0000
0.2418	0.0222	0.0011	0.0000	0.0002
0.3022	0.0219	0.0013	0.0000	0.0005
0.3626	0.0215	0.0016	0.0000	0.0007
0.4231	0.0212	0.0019	0.0000	0.0009
0.4835	0.0209	0.0022	0.0000	0.0016
0.5440	0.0205	0.0025	0.0000	0.0025
0.6044	0.0202	0.0028	0.0000	0.0035
0.6648	0.0199	0.0031	0.0000	0.0037
0.7253	0.0196	0.0033	0.0000	0.0052
0.7857	0.0192	0.0036	0.0000	0.0069
0.8462	0.0189	0.0039	0.0000	0.0079
0.9066	0.0186	0.0043	0.0000	0.0090
0.9670	0.0183	0.0046	0.0000	0.0092
1.0275	0.0180	0.0049	0.0000	0.0114
1.0879	0.0177	0.0052	0.0000	0.0141
1.1484	0.0174	0.0055	0.0000	0.0172
1.2088	0.0171	0.0059	0.0000	0.0186
1.2692	0.0167	0.0062	0.0000	0.0207
1.3297	0.0165	0.0066	0.0000	0.0245
1.3901	0.0162	0.0069	0.0000	0.0288
1.4505	0.0159	0.0073	0.0000	0.0321
1.5110	0.0156	0.0077	0.0000	0.0332
1.5714	0.0153	0.0081	0.0000	0.0335
1.6319	0.0150	0.0084	0.0000	0.0386
1.6923	0.0147	0.0088	0.0000	0.0442
1.7527	0.0144	0.0092	0.0000	0.0502
1.8132	0.0142	0.0096	0.0000	0.0504
1.8736	0.0139	0.0101	0.0000	0.0556
1.9341	0.0136	0.0105	0.0000	0.0556
1.9945	0.0133	0.0109	0.0000	0.0556
2.0549	0.0131	0.0114	0.0000	0.0556
2.1154	0.0128	0.0118	0.0000	0.0556
2.1758	0.0126	0.0123	0.0000	0.0556
2.2363	0.0123	0.0128	0.0000	0.0556
2.2967	0.0120	0.0133	0.0000	0.0556
2.3571	0.0118	0.0138	0.0000	0.0556
2.4176	0.0115	0.0143	0.0000	0.0556
2.4780	0.0113	0.0148	0.0000	0.0556
2.5385	0.0110	0.0153	0.0000	0.0556
2.5989	0.0108	0.0158	0.0000	0.0556
2.6593	0.0106	0.0164	0.0000	0.0556
2.7198	0.0103	0.0169	0.0000	0.0556
2.7802	0.0101	0.0175	0.0000	0.0556
2.8407	0.0099	0.0180	0.0000	0.0556
2.9011	0.0096	0.0186	0.0000	0.0556
2.9615	0.0094	0.0192	0.0000	0.0556
3.0000	0.0092	0.0195	0.0000	0.0556

Surface retention 5 Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Wetted Surface
3.0000	0.0235	0.0195	0.0000	0.1111	0.0000
3.0604	0.0239	0.0210	0.0000	0.1111	0.0000
3.1209	0.0242	0.0224	0.0000	0.1214	0.0000
3.1813	0.0246	0.0239	0.0000	0.1249	0.0000
3.2418	0.0250	0.0254	0.0000	0.1284	0.0000
3.3022	0.0253	0.0269	0.0000	0.1318	0.0000

3.3626	0.0257	0.0285	0.0000	0.1353	0.0000
3.4231	0.0261	0.0300	0.0000	0.1387	0.0000
3.4835	0.0264	0.0316	0.0000	0.1422	0.0000
3.5440	0.0268	0.0332	0.0000	0.1457	0.0000
3.6044	0.0272	0.0349	0.0000	0.1491	0.0000
3.6648	0.0276	0.0365	0.0000	0.1526	0.0000
3.7253	0.0280	0.0382	0.0000	0.1560	0.0000
3.7857	0.0284	0.0399	0.0000	0.1595	0.0000
3.8462	0.0287	0.0416	0.0000	0.1630	0.0000
3.9066	0.0291	0.0434	0.0000	0.1664	0.0000
3.9670	0.0295	0.0451	0.0000	0.1699	0.0000
4.0275	0.0299	0.0469	0.0000	0.1733	0.0000
4.0879	0.0303	0.0488	0.0000	0.1768	0.0000
4.1484	0.0307	0.0506	0.0000	0.1803	0.0000
4.2088	0.0311	0.0525	0.0000	0.1837	0.0000
4.2692	0.0316	0.0544	0.0000	0.1872	0.0000
4.3297	0.0320	0.0563	0.0000	0.1906	0.0000
4.3901	0.0324	0.0582	0.0000	0.1941	0.0000
4.4505	0.0328	0.0602	0.0000	0.1976	0.0000
4.5110	0.0332	0.0622	0.0081	0.2010	0.0000
4.5714	0.0337	0.0642	0.1341	0.2045	0.0000
4.6319	0.0341	0.0663	0.3244	0.2079	0.0000
4.6923	0.0345	0.0683	0.5244	0.2114	0.0000
4.7527	0.0349	0.0704	0.6839	0.2149	0.0000
4.8132	0.0354	0.0726	0.7783	0.2183	0.0000
4.8736	0.0358	0.0747	0.8556	0.2218	0.0000
4.9341	0.0362	0.0769	0.9223	0.2253	0.0000
4.9945	0.0367	0.0791	0.9844	0.2287	0.0000
5.0549	0.0371	0.0813	1.0428	0.2322	0.0000
5.1154	0.0376	0.0836	1.0981	0.2356	0.0000
5.1758	0.0380	0.0859	1.1508	0.2391	0.0000
5.2363	0.0385	0.0882	1.2011	0.2426	0.0000
5.2967	0.0389	0.0905	1.2495	0.2460	0.0000
5.3571	0.0394	0.0929	1.2960	0.2495	0.0000
5.4176	0.0399	0.0953	1.3409	0.2529	0.0000
5.4780	0.0403	0.0977	1.3844	0.2564	0.0000
5.5000	0.0405	0.0986	1.4265	0.2577	0.0000

Name : Surface retention 5

Element Flows To:
Outlet 1 **Outlet 2**
Bioretention 5

ANALYSIS RESULTS

Stream Protection Duration

Predeveloped Landuse Totals for POC #1
Total Pervious Area:0.35

Total Impervious Area:0.12

Mitigated Landuse Totals for POC #1
Total Pervious Area:0.35
Total Impervious Area:0.12

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.033527
5 year	0.045462
10 year	0.053667
25 year	0.064387
50 year	0.072634
100 year	0.081106

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0
5 year	0
10 year	0
25 year	0
50 year	0
100 year	0

Stream Protection Duration
Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1949	0.044	0.000
1950	0.030	0.000
1951	0.062	0.000
1952	0.021	0.000
1953	0.051	0.000
1954	0.044	0.000
1955	0.035	0.000
1956	0.031	0.000
1957	0.030	0.000
1958	0.035	0.000
1959	0.044	0.000
1960	0.038	0.000
1961	0.031	0.000
1962	0.027	0.000
1963	0.034	0.000
1964	0.062	0.000
1965	0.022	0.000
1966	0.026	0.000
1967	0.033	0.000
1968	0.033	0.000
1969	0.029	0.000
1970	0.043	0.000
1971	0.072	0.000
1972	0.038	0.000
1973	0.032	0.000
1974	0.018	0.000
1975	0.046	0.000

1976	0.040	0.000
1977	0.026	0.000
1978	0.026	0.000
1979	0.055	0.000
1980	0.028	0.000
1981	0.051	0.000
1982	0.047	0.000
1983	0.037	0.000
1984	0.026	0.000
1985	0.060	0.000
1986	0.035	0.000
1987	0.076	0.000
1988	0.031	0.000
1989	0.033	0.000
1990	0.037	0.000
1991	0.037	0.000
1992	0.034	0.000
1993	0.021	0.000
1994	0.018	0.000
1995	0.018	0.000
1996	0.020	0.000
1997	0.027	0.000
1998	0.029	0.000
1999	0.037	0.000
2000	0.049	0.000
2001	0.018	0.000
2002	0.032	0.000
2003	0.023	0.000
2004	0.033	0.000
2005	0.042	0.000
2006	0.030	0.000
2007	0.067	0.000
2008	0.027	0.000
2009	0.022	0.000

Stream Protection Duration
Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0757	0.0000
2	0.0722	0.0000
3	0.0674	0.0000
4	0.0625	0.0000
5	0.0615	0.0000
6	0.0597	0.0000
7	0.0547	0.0000
8	0.0512	0.0000
9	0.0509	0.0000
10	0.0495	0.0000
11	0.0468	0.0000
12	0.0460	0.0000
13	0.0444	0.0000
14	0.0440	0.0000
15	0.0436	0.0000
16	0.0433	0.0000
17	0.0415	0.0000
18	0.0397	0.0000

19	0.0381	0.0000
20	0.0381	0.0000
21	0.0373	0.0000
22	0.0373	0.0000
23	0.0373	0.0000
24	0.0372	0.0000
25	0.0352	0.0000
26	0.0351	0.0000
27	0.0350	0.0000
28	0.0339	0.0000
29	0.0339	0.0000
30	0.0331	0.0000
31	0.0328	0.0000
32	0.0326	0.0000
33	0.0326	0.0000
34	0.0322	0.0000
35	0.0318	0.0000
36	0.0311	0.0000
37	0.0309	0.0000
38	0.0308	0.0000
39	0.0304	0.0000
40	0.0297	0.0000
41	0.0297	0.0000
42	0.0292	0.0000
43	0.0289	0.0000
44	0.0276	0.0000
45	0.0271	0.0000
46	0.0268	0.0000
47	0.0265	0.0000
48	0.0261	0.0000
49	0.0261	0.0000
50	0.0261	0.0000
51	0.0257	0.0000
52	0.0234	0.0000
53	0.0223	0.0000
54	0.0223	0.0000
55	0.0212	0.0000
56	0.0207	0.0000
57	0.0203	0.0000
58	0.0185	0.0000
59	0.0181	0.0000
60	0.0179	0.0000
61	0.0178	0.0000

Stream Protection Duration
POC #1
The Facility PASSED

The Facility PASSED.

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0168	1386	0	0	Pass
0.0173	1252	0	0	Pass
0.0179	1117	0	0	Pass
0.0185	997	0	0	Pass
0.0190	896	0	0	Pass

0.0196	782	0	0	Pass
0.0201	702	0	0	Pass
0.0207	629	0	0	Pass
0.0213	569	0	0	Pass
0.0218	505	0	0	Pass
0.0224	458	0	0	Pass
0.0230	422	0	0	Pass
0.0235	372	0	0	Pass
0.0241	341	0	0	Pass
0.0247	314	0	0	Pass
0.0252	277	0	0	Pass
0.0258	248	0	0	Pass
0.0264	220	0	0	Pass
0.0269	201	0	0	Pass
0.0275	183	0	0	Pass
0.0281	163	0	0	Pass
0.0286	148	0	0	Pass
0.0292	135	0	0	Pass
0.0297	124	0	0	Pass
0.0303	117	0	0	Pass
0.0309	108	0	0	Pass
0.0314	98	0	0	Pass
0.0320	92	0	0	Pass
0.0326	87	0	0	Pass
0.0331	81	0	0	Pass
0.0337	77	0	0	Pass
0.0343	72	0	0	Pass
0.0348	67	0	0	Pass
0.0354	61	0	0	Pass
0.0360	59	0	0	Pass
0.0365	57	0	0	Pass
0.0371	55	0	0	Pass
0.0376	46	0	0	Pass
0.0382	40	0	0	Pass
0.0388	40	0	0	Pass
0.0393	38	0	0	Pass
0.0399	35	0	0	Pass
0.0405	33	0	0	Pass
0.0410	31	0	0	Pass
0.0416	29	0	0	Pass
0.0422	28	0	0	Pass
0.0427	28	0	0	Pass
0.0433	28	0	0	Pass
0.0439	25	0	0	Pass
0.0444	24	0	0	Pass
0.0450	21	0	0	Pass
0.0455	20	0	0	Pass
0.0461	18	0	0	Pass
0.0467	18	0	0	Pass
0.0472	16	0	0	Pass
0.0478	16	0	0	Pass
0.0484	16	0	0	Pass
0.0489	16	0	0	Pass
0.0495	15	0	0	Pass
0.0501	14	0	0	Pass
0.0506	14	0	0	Pass
0.0512	13	0	0	Pass

0.0518	11	0	0	Pass
0.0523	10	0	0	Pass
0.0529	10	0	0	Pass
0.0534	10	0	0	Pass
0.0540	10	0	0	Pass
0.0546	9	0	0	Pass
0.0551	8	0	0	Pass
0.0557	7	0	0	Pass
0.0563	6	0	0	Pass
0.0568	6	0	0	Pass
0.0574	6	0	0	Pass
0.0580	6	0	0	Pass
0.0585	6	0	0	Pass
0.0591	6	0	0	Pass
0.0597	6	0	0	Pass
0.0602	5	0	0	Pass
0.0608	5	0	0	Pass
0.0613	5	0	0	Pass
0.0619	4	0	0	Pass
0.0625	4	0	0	Pass
0.0630	3	0	0	Pass
0.0636	3	0	0	Pass
0.0642	3	0	0	Pass
0.0647	3	0	0	Pass
0.0653	3	0	0	Pass
0.0659	3	0	0	Pass
0.0664	3	0	0	Pass
0.0670	3	0	0	Pass
0.0676	2	0	0	Pass
0.0681	2	0	0	Pass
0.0687	2	0	0	Pass
0.0692	2	0	0	Pass
0.0698	2	0	0	Pass
0.0704	2	0	0	Pass
0.0709	2	0	0	Pass
0.0715	2	0	0	Pass
0.0721	2	0	0	Pass
0.0726	1	0	0	Pass

Water Quality BMP Flow and Volume for POC #1
On-line facility volume: 0 **acre-feet**
On-line facility target flow: 0 **cfs.**
Adjusted for 15 min: 0 **cfs.**
Off-line facility target flow: 0 **cfs.**
Adjusted for 15 min: 0 **cfs.**

LID Report

LID Technique	Used for Treatment?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft.)	Cumulative Infiltration Volume Credit	Percent Volume Infiltrated	Water Quality Percent Treated	Comment

```
retention  5 POC                N     0.00                                    N     0.00
Total Volume Infiltrated              0.00         0.00     0.00                    0.00
0.00         0%          No Treat. Credit
Compliance with LID Standard 8
Duration Analysis Result = Passed
```

Perlnd and Implnd Changes

No changes have been made.

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BASIN AREA 6

FACILITY CALCULATIONS

WWHM2012
PROJECT REPORT

Project Name: Area 6 Bioretention
Site Name:
Site Address:
City :
Report Date: 12/26/2019
Gage : Port Angelis
Data Start : 1948/10/01
Data End : 2009/09/30
Precip Scale: 0.80
Version Date: 2018/10/10
Version : 4.2.16

Low Flow Threshold for POC 1 : 50 Percent of the 2 Year

High Flow Threshold for POC 1: 50 year

PREDEVELOPED LAND USE

Name : Basin 1
Bypass: No

GroundWater: No

Pervious Land Use	acre
Pervious Total	0

Impervious Land Use	acre
ROADS MOD	0.3
Impervious Total	0.3
Basin Total	0.3

Element Flows To:

Surface	Interflow	Groundwater

MITIGATED LAND USE

Name : Basin 1
Bypass: No

GroundWater: No

Pervious Land Use	acre
Pervious Total	0

Impervious Land Use	acre
ROADS MOD	0.3
Impervious Total	0.3
Basin Total	0.3

Element Flows To:

Surface	Interflow	Groundwater
Surface retention 6	Surface retention 6	

Name : Bioretention 6
Bottom Length: 35.00 ft.
Bottom Width: 20.00 ft.
Material thickness of first layer: 0.5
Material type for first layer: SMMWW 12 in/hr
Material thickness of second layer: 1.5
Material type for second layer: Sand
Material thickness of third layer: 1
Material type for third layer: GRAVEL
Infiltration On
Infiltration rate: 6
Infiltration safety factor: 1
Total Volume Infiltrated (ac-ft.): 22.132
Total Volume Through Riser (ac-ft.): 0
Total Volume Through Facility (ac-ft.): 22.132
Percent Infiltrated: 100
Total Precip Applied to Facility: 1.259
Total Evap From Facility: 1.136
Underdrain not used
Discharge Structure
Riser Height: 1 ft.
Riser Diameter: 8 in.

Element Flows To:

Outlet 1	Outlet 2

Bioretention 6 Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.0161	0.0000	0.0000	0.0000
0.0549	0.0161	0.0004	0.0000	0.0000
0.1099	0.0161	0.0008	0.0000	0.0000
0.1648	0.0161	0.0012	0.0000	0.0000
0.2198	0.0161	0.0016	0.0000	0.0001

0.2747	0.0161	0.0020	0.0000	0.0003
0.3297	0.0161	0.0024	0.0000	0.0007
0.3846	0.0161	0.0028	0.0000	0.0010
0.4396	0.0161	0.0032	0.0000	0.0013
0.4945	0.0161	0.0036	0.0000	0.0023
0.5495	0.0161	0.0040	0.0000	0.0035
0.6044	0.0161	0.0043	0.0000	0.0049
0.6593	0.0161	0.0047	0.0000	0.0051
0.7143	0.0161	0.0050	0.0000	0.0071
0.7692	0.0161	0.0054	0.0000	0.0095
0.8242	0.0161	0.0058	0.0000	0.0124
0.8791	0.0161	0.0061	0.0000	0.0128
0.9341	0.0161	0.0065	0.0000	0.0157
0.9890	0.0161	0.0068	0.0000	0.0195
1.0440	0.0161	0.0072	0.0000	0.0237
1.0989	0.0161	0.0075	0.0000	0.0257
1.1538	0.0161	0.0079	0.0000	0.0285
1.2088	0.0161	0.0082	0.0000	0.0339
1.2637	0.0161	0.0086	0.0000	0.0398
1.3187	0.0161	0.0089	0.0000	0.0445
1.3736	0.0161	0.0093	0.0000	0.0463
1.4286	0.0161	0.0096	0.0000	0.0474
1.4835	0.0161	0.0100	0.0000	0.0533
1.5385	0.0161	0.0103	0.0000	0.0610
1.5934	0.0161	0.0107	0.0000	0.0693
1.6484	0.0161	0.0111	0.0000	0.0697
1.7033	0.0161	0.0114	0.0000	0.0783
1.7582	0.0161	0.0118	0.0000	0.0879
1.8132	0.0161	0.0121	0.0000	0.0972
1.8681	0.0161	0.0125	0.0000	0.0972
1.9231	0.0161	0.0128	0.0000	0.0972
1.9780	0.0161	0.0132	0.0000	0.0972
2.0330	0.0161	0.0135	0.0000	0.0972
2.0879	0.0161	0.0139	0.0000	0.0972
2.1429	0.0161	0.0143	0.0000	0.0972
2.1978	0.0161	0.0146	0.0000	0.0972
2.2527	0.0161	0.0150	0.0000	0.0972
2.3077	0.0161	0.0154	0.0000	0.0972
2.3626	0.0161	0.0157	0.0000	0.0972
2.4176	0.0161	0.0161	0.0000	0.0972
2.4725	0.0161	0.0165	0.0000	0.0972
2.5275	0.0161	0.0168	0.0000	0.0972
2.5824	0.0161	0.0172	0.0000	0.0972
2.6374	0.0161	0.0176	0.0000	0.0972
2.6923	0.0161	0.0179	0.0000	0.0972
2.7473	0.0161	0.0183	0.0000	0.0972
2.8022	0.0161	0.0187	0.0000	0.0972
2.8571	0.0161	0.0190	0.0000	0.0972
2.9121	0.0161	0.0194	0.0000	0.0972
2.9670	0.0161	0.0198	0.0000	0.0972
3.0000	0.0161	0.0200	0.0000	0.0972

Surface retention 6 Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Wetted Surface
3.0000	0.0161	0.0200	0.0000	0.1944	0.0000
3.0549	0.0161	0.0209	0.0000	0.1944	0.0000
3.1099	0.0161	0.0218	0.0000	0.2114	0.0000

3.1648	0.0161	0.0226	0.0000	0.2169	0.0000
3.2198	0.0161	0.0235	0.0000	0.2224	0.0000
3.2747	0.0161	0.0244	0.0000	0.2279	0.0000
3.3297	0.0161	0.0253	0.0000	0.2334	0.0000
3.3846	0.0161	0.0262	0.0000	0.2389	0.0000
3.4396	0.0161	0.0270	0.0000	0.2444	0.0000
3.4945	0.0161	0.0279	0.0000	0.2499	0.0000
3.5495	0.0161	0.0288	0.0000	0.2555	0.0000
3.6044	0.0161	0.0297	0.0000	0.2610	0.0000
3.6593	0.0161	0.0306	0.0000	0.2665	0.0000
3.7143	0.0161	0.0315	0.0000	0.2720	0.0000
3.7692	0.0161	0.0323	0.0000	0.2775	0.0000
3.8242	0.0161	0.0332	0.0000	0.2830	0.0000
3.8791	0.0161	0.0341	0.0000	0.2885	0.0000
3.9341	0.0161	0.0350	0.0000	0.2940	0.0000
3.9890	0.0161	0.0359	0.0000	0.2995	0.0000
4.0440	0.0161	0.0368	0.0650	0.3050	0.0000
4.0989	0.0161	0.0376	0.2160	0.3105	0.0000
4.1538	0.0161	0.0385	0.3989	0.3160	0.0000
4.2088	0.0161	0.0394	0.5737	0.3215	0.0000
4.2637	0.0161	0.0403	0.7058	0.3270	0.0000
4.3187	0.0161	0.0412	0.7843	0.3325	0.0000
4.3736	0.0161	0.0421	0.8556	0.3380	0.0000
4.4286	0.0161	0.0429	0.9164	0.3435	0.0000
4.4835	0.0161	0.0438	0.9734	0.3490	0.0000
4.5385	0.0161	0.0447	1.0272	0.3546	0.0000
4.5934	0.0161	0.0456	1.0783	0.3601	0.0000
4.6484	0.0161	0.0465	1.1272	0.3656	0.0000
4.7033	0.0161	0.0474	1.1739	0.3711	0.0000
4.7582	0.0161	0.0482	1.2189	0.3766	0.0000
4.8132	0.0161	0.0491	1.2623	0.3821	0.0000
4.8681	0.0161	0.0500	1.3043	0.3876	0.0000
4.9231	0.0161	0.0509	1.3449	0.3931	0.0000
4.9780	0.0161	0.0518	1.3844	0.3986	0.0000
5.0000	0.0161	0.0521	1.4227	0.4008	0.0000

Name : Surface retention 6

Element Flows To:
Outlet 1 **Outlet 2**
Bioretention 6

ANALYSIS RESULTS

Stream Protection Duration

Predeveloped Landuse Totals for POC #1
Total Pervious Area:0
Total Impervious Area:0.3

Mitigated Landuse Totals for POC #1
Total Pervious Area:0
Total Impervious Area:0.3

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.100088
5 year	0.134151
10 year	0.156858
25 year	0.185783
50 year	0.207529
100 year	0.229467

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0
5 year	0
10 year	0
25 year	0
50 year	0
100 year	0

Stream Protection Duration
Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1949	0.128	0.000
1950	0.078	0.000
1951	0.172	0.000
1952	0.072	0.000
1953	0.162	0.000
1954	0.131	0.000
1955	0.098	0.000
1956	0.101	0.000
1957	0.091	0.000
1958	0.113	0.000
1959	0.121	0.000
1960	0.121	0.000
1961	0.092	0.000
1962	0.102	0.000
1963	0.092	0.000
1964	0.195	0.000
1965	0.060	0.000
1966	0.092	0.000
1967	0.093	0.000
1968	0.088	0.000
1969	0.092	0.000
1970	0.139	0.000
1971	0.199	0.000
1972	0.121	0.000
1973	0.081	0.000
1974	0.050	0.000
1975	0.123	0.000
1976	0.107	0.000
1977	0.080	0.000

1978	0.077	0.000
1979	0.143	0.000
1980	0.082	0.000
1981	0.145	0.000
1982	0.120	0.000
1983	0.106	0.000
1984	0.070	0.000
1985	0.157	0.000
1986	0.094	0.000
1987	0.236	0.000
1988	0.085	0.000
1989	0.095	0.000
1990	0.130	0.000
1991	0.110	0.000
1992	0.105	0.000
1993	0.064	0.000
1994	0.064	0.000
1995	0.048	0.000
1996	0.067	0.000
1997	0.088	0.000
1998	0.085	0.000
1999	0.114	0.000
2000	0.148	0.000
2001	0.047	0.000
2002	0.099	0.000
2003	0.079	0.000
2004	0.104	0.000
2005	0.126	0.000
2006	0.082	0.000
2007	0.185	0.000
2008	0.091	0.000
2009	0.070	0.000

Stream Protection Duration
Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.2360	0.0000
2	0.1993	0.0000
3	0.1949	0.0000
4	0.1850	0.0000
5	0.1724	0.0000
6	0.1624	0.0000
7	0.1574	0.0000
8	0.1485	0.0000
9	0.1449	0.0000
10	0.1425	0.0000
11	0.1393	0.0000
12	0.1313	0.0000
13	0.1298	0.0000
14	0.1280	0.0000
15	0.1260	0.0000
16	0.1232	0.0000
17	0.1213	0.0000
18	0.1213	0.0000
19	0.1210	0.0000
20	0.1199	0.0000

21	0.1136	0.0000
22	0.1127	0.0000
23	0.1100	0.0000
24	0.1067	0.0000
25	0.1063	0.0000
26	0.1050	0.0000
27	0.1038	0.0000
28	0.1019	0.0000
29	0.1014	0.0000
30	0.0986	0.0000
31	0.0984	0.0000
32	0.0950	0.0000
33	0.0944	0.0000
34	0.0931	0.0000
35	0.0922	0.0000
36	0.0921	0.0000
37	0.0919	0.0000
38	0.0918	0.0000
39	0.0912	0.0000
40	0.0911	0.0000
41	0.0876	0.0000
42	0.0876	0.0000
43	0.0852	0.0000
44	0.0846	0.0000
45	0.0822	0.0000
46	0.0816	0.0000
47	0.0813	0.0000
48	0.0802	0.0000
49	0.0788	0.0000
50	0.0777	0.0000
51	0.0769	0.0000
52	0.0724	0.0000
53	0.0698	0.0000
54	0.0697	0.0000
55	0.0667	0.0000
56	0.0645	0.0000
57	0.0645	0.0000
58	0.0600	0.0000
59	0.0500	0.0000
60	0.0480	0.0000
61	0.0467	0.0000

Stream Protection Duration
POC #1
The Facility PASSED

The Facility PASSED.

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0500	993	0	0	Pass
0.0516	901	0	0	Pass
0.0532	812	0	0	Pass
0.0548	718	0	0	Pass
0.0564	659	0	0	Pass
0.0580	601	0	0	Pass
0.0596	544	0	0	Pass

0.0612	482	0	0	Pass
0.0628	426	0	0	Pass
0.0644	392	0	0	Pass
0.0660	358	0	0	Pass
0.0675	322	0	0	Pass
0.0691	301	0	0	Pass
0.0707	270	0	0	Pass
0.0723	244	0	0	Pass
0.0739	222	0	0	Pass
0.0755	202	0	0	Pass
0.0771	186	0	0	Pass
0.0787	167	0	0	Pass
0.0803	158	0	0	Pass
0.0819	139	0	0	Pass
0.0834	122	0	0	Pass
0.0850	112	0	0	Pass
0.0866	104	0	0	Pass
0.0882	98	0	0	Pass
0.0898	91	0	0	Pass
0.0914	83	0	0	Pass
0.0930	74	0	0	Pass
0.0946	71	0	0	Pass
0.0962	67	0	0	Pass
0.0978	65	0	0	Pass
0.0994	62	0	0	Pass
0.1009	59	0	0	Pass
0.1025	54	0	0	Pass
0.1041	51	0	0	Pass
0.1057	49	0	0	Pass
0.1073	46	0	0	Pass
0.1089	45	0	0	Pass
0.1105	42	0	0	Pass
0.1121	41	0	0	Pass
0.1137	39	0	0	Pass
0.1153	39	0	0	Pass
0.1169	38	0	0	Pass
0.1184	36	0	0	Pass
0.1200	34	0	0	Pass
0.1216	30	0	0	Pass
0.1232	27	0	0	Pass
0.1248	26	0	0	Pass
0.1264	24	0	0	Pass
0.1280	23	0	0	Pass
0.1296	22	0	0	Pass
0.1312	20	0	0	Pass
0.1328	18	0	0	Pass
0.1344	18	0	0	Pass
0.1359	18	0	0	Pass
0.1375	18	0	0	Pass
0.1391	18	0	0	Pass
0.1407	17	0	0	Pass
0.1423	17	0	0	Pass
0.1439	16	0	0	Pass
0.1455	15	0	0	Pass
0.1471	14	0	0	Pass
0.1487	13	0	0	Pass
0.1503	11	0	0	Pass

0.1519	11	0	0	Pass
0.1534	11	0	0	Pass
0.1550	11	0	0	Pass
0.1566	11	0	0	Pass
0.1582	10	0	0	Pass
0.1598	10	0	0	Pass
0.1614	10	0	0	Pass
0.1630	9	0	0	Pass
0.1646	9	0	0	Pass
0.1662	9	0	0	Pass
0.1678	9	0	0	Pass
0.1694	7	0	0	Pass
0.1709	7	0	0	Pass
0.1725	6	0	0	Pass
0.1741	6	0	0	Pass
0.1757	6	0	0	Pass
0.1773	6	0	0	Pass
0.1789	6	0	0	Pass
0.1805	4	0	0	Pass
0.1821	4	0	0	Pass
0.1837	4	0	0	Pass
0.1853	3	0	0	Pass
0.1868	3	0	0	Pass
0.1884	3	0	0	Pass
0.1900	3	0	0	Pass
0.1916	3	0	0	Pass
0.1932	3	0	0	Pass
0.1948	3	0	0	Pass
0.1964	2	0	0	Pass
0.1980	2	0	0	Pass
0.1996	1	0	0	Pass
0.2012	1	0	0	Pass
0.2028	1	0	0	Pass
0.2043	1	0	0	Pass
0.2059	1	0	0	Pass
0.2075	1	0	0	Pass

Water Quality BMP Flow and Volume for POC #1
On-line facility volume: 0 **acre-feet**
On-line facility target flow: 0 **cfs.**
Adjusted for 15 min: 0 **cfs.**
Off-line facility target flow: 0 **cfs.**
Adjusted for 15 min: 0 **cfs.**

LID Report

LID Technique	Used for Treatment?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft.)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality Volume Treated	Percent Water Quality	Comment
retention 6 POC	N	20.14			N	100.00			
Total Volume Infiltrated		20.14	0.00	0.00		100.00	0.00	0%	No Treat. Credit

Compliance with LID Standard 8
Duration Analysis Result = Passed

Perlnd and Implnd Changes

No changes have been made.

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BASIN AREA ROW

FACILITY CALCULATIONS

WWHM2012
PROJECT REPORT

Project Name: ROW Bioretention
Site Name:
Site Address:
City :
Report Date: 12/26/2019
Gage : Port Angelis
Data Start : 1948/10/01
Data End : 2009/09/30
Precip Scale: 0.80
Version Date: 2018/10/10
Version : 4.2.16

Low Flow Threshold for POC 1 : 50 Percent of the 2 Year

High Flow Threshold for POC 1: 50 year

PREDEVELOPED LAND USE

Name : Basin 1
Bypass: No

GroundWater: No

Pervious Land Use	acre
A B, Lawn, Mod	.26
Pervious Total	0.26

Impervious Land Use	acre
ROADS MOD	0.3
PARKING FLAT	0.91
Impervious Total	1.21
Basin Total	1.47

Element Flows To:

Surface	Interflow	Groundwater

MITIGATED LAND USE

Name : Basin 1
Bypass: No

GroundWater: No

Pervious Land Use	acre
A B, Lawn, Mod	.26
Pervious Total	0.26

Impervious Land Use	acre
ROADS MOD	0.3
PARKING FLAT	0.91
Impervious Total	1.21
Basin Total	1.47

Element Flows To:

Surface	Interflow	Groundwater
Surface tention ROW	Surface tention ROW	

Name : Bioretention ROW
Bottom Length: 530.00 ft.
Bottom Width: 2.00 ft.
Material thickness of first layer: 0.5
Material type for first layer: SMMWW 12 in/hr
Material thickness of second layer: 1.5
Material type for second layer: Sand
Material thickness of third layer: 1
Material type for third layer: GRAVEL
Infiltration On
Infiltration rate: 6
Infiltration safety factor: 1
Total Volume Infiltrated (ac-ft.): 88.931
Total Volume Through Riser (ac-ft.): 0
Total Volume Through Facility (ac-ft.): 88.931
Percent Infiltrated: 100
Total Precip Applied to Facility: 7.415
Total Evap From Facility: 5.705
Underdrain not used
Discharge Structure
Riser Height: 1 ft.
Riser Diameter: 8 in.

Element Flows To:

Outlet 1	Outlet 2

Bioretention ROW Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.2516	0.0000	0.0000	0.0000

0.0549	0.2490	0.0003	0.0000	0.0000
0.1099	0.2447	0.0007	0.0000	0.0000
0.1648	0.2404	0.0011	0.0000	0.0000
0.2198	0.2362	0.0016	0.0000	0.0001
0.2747	0.2319	0.0022	0.0000	0.0004
0.3297	0.2276	0.0027	0.0000	0.0010
0.3846	0.2233	0.0034	0.0000	0.0016
0.4396	0.2191	0.0041	0.0000	0.0020
0.4945	0.2148	0.0048	0.0000	0.0034
0.5495	0.2106	0.0055	0.0000	0.0053
0.6044	0.2063	0.0062	0.0000	0.0074
0.6593	0.2021	0.0070	0.0000	0.0078
0.7143	0.1978	0.0078	0.0000	0.0108
0.7692	0.1936	0.0087	0.0000	0.0144
0.8242	0.1894	0.0096	0.0000	0.0188
0.8791	0.1852	0.0106	0.0000	0.0194
0.9341	0.1809	0.0116	0.0000	0.0237
0.9890	0.1767	0.0126	0.0000	0.0295
1.0440	0.1725	0.0137	0.0000	0.0359
1.0989	0.1683	0.0149	0.0000	0.0390
1.1538	0.1641	0.0161	0.0000	0.0432
1.2088	0.1599	0.0173	0.0000	0.0513
1.2637	0.1557	0.0186	0.0000	0.0602
1.3187	0.1515	0.0199	0.0000	0.0673
1.3736	0.1474	0.0213	0.0000	0.0700
1.4286	0.1432	0.0227	0.0000	0.0718
1.4835	0.1390	0.0241	0.0000	0.0807
1.5385	0.1349	0.0256	0.0000	0.0924
1.5934	0.1307	0.0272	0.0000	0.1050
1.6484	0.1266	0.0288	0.0000	0.1055
1.7033	0.1224	0.0304	0.0000	0.1185
1.7582	0.1183	0.0321	0.0000	0.1331
1.8132	0.1141	0.0338	0.0000	0.1472
1.8681	0.1100	0.0356	0.0000	0.1472
1.9231	0.1059	0.0375	0.0000	0.1472
1.9780	0.1017	0.0393	0.0000	0.1472
2.0330	0.0976	0.0413	0.0000	0.1472
2.0879	0.0935	0.0434	0.0000	0.1472
2.1429	0.0894	0.0454	0.0000	0.1472
2.1978	0.0853	0.0476	0.0000	0.1472
2.2527	0.0812	0.0498	0.0000	0.1472
2.3077	0.0771	0.0520	0.0000	0.1472
2.3626	0.0730	0.0543	0.0000	0.1472
2.4176	0.0689	0.0566	0.0000	0.1472
2.4725	0.0648	0.0590	0.0000	0.1472
2.5275	0.0608	0.0614	0.0000	0.1472
2.5824	0.0567	0.0639	0.0000	0.1472
2.6374	0.0526	0.0664	0.0000	0.1472
2.6923	0.0486	0.0690	0.0000	0.1472
2.7473	0.0445	0.0716	0.0000	0.1472
2.8022	0.0405	0.0743	0.0000	0.1472
2.8571	0.0364	0.0770	0.0000	0.1472
2.9121	0.0324	0.0797	0.0000	0.1472
2.9670	0.0284	0.0826	0.0000	0.1472
3.0000	0.0243	0.0843	0.0000	0.1472

Surface tention ROW Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Wetted Surface
3.0000	0.2516	0.0843	0.0000	0.2944	0.0000
3.0549	0.2559	0.0982	0.0000	0.2944	0.0000
3.1099	0.2602	0.1124	0.0000	0.3201	0.0000
3.1648	0.2645	0.1268	0.0000	0.3285	0.0000
3.2198	0.2688	0.1415	0.0000	0.3368	0.0000
3.2747	0.2732	0.1563	0.0000	0.3451	0.0000
3.3297	0.2775	0.1715	0.0000	0.3535	0.0000
3.3846	0.2818	0.1868	0.0000	0.3618	0.0000
3.4396	0.2862	0.2024	0.0000	0.3702	0.0000
3.4945	0.2905	0.2183	0.0000	0.3785	0.0000
3.5495	0.2948	0.2344	0.0000	0.3868	0.0000
3.6044	0.2992	0.2507	0.0000	0.3952	0.0000
3.6593	0.3036	0.2672	0.0000	0.4035	0.0000
3.7143	0.3079	0.2840	0.0000	0.4118	0.0000
3.7692	0.3123	0.3011	0.0000	0.4202	0.0000
3.8242	0.3166	0.3184	0.0000	0.4285	0.0000
3.8791	0.3210	0.3359	0.0000	0.4369	0.0000
3.9341	0.3254	0.3536	0.0000	0.4452	0.0000
3.9890	0.3298	0.3716	0.0000	0.4535	0.0000
4.0440	0.3342	0.3899	0.0650	0.4619	0.0000
4.0989	0.3386	0.4084	0.2160	0.4702	0.0000
4.1538	0.3430	0.4271	0.3989	0.4785	0.0000
4.2088	0.3474	0.4461	0.5737	0.4869	0.0000
4.2637	0.3518	0.4653	0.7058	0.4952	0.0000
4.3187	0.3562	0.4847	0.7843	0.5035	0.0000
4.3736	0.3606	0.5044	0.8556	0.5119	0.0000
4.4286	0.3651	0.5243	0.9164	0.5202	0.0000
4.4835	0.3695	0.5445	0.9734	0.5286	0.0000
4.5385	0.3739	0.5649	1.0272	0.5369	0.0000
4.5934	0.3784	0.5856	1.0783	0.5452	0.0000
4.6484	0.3828	0.6065	1.1272	0.5536	0.0000
4.7033	0.3873	0.6277	1.1739	0.5619	0.0000
4.7582	0.3917	0.6491	1.2189	0.5702	0.0000
4.8132	0.3962	0.6707	1.2623	0.5786	0.0000
4.8681	0.4006	0.6926	1.3043	0.5869	0.0000
4.9231	0.4051	0.7148	1.3449	0.5953	0.0000
4.9780	0.4096	0.7371	1.3844	0.6036	0.0000
5.0000	0.4114	0.7462	1.4227	0.6069	0.0000

Name : Surface tention ROW

Element Flows To:
Outlet 1 **Outlet 2**
Bioretention ROW

ANALYSIS RESULTS

Stream Protection Duration

Predeveloped Landuse Totals for POC #1
Total Pervious Area:0.26
Total Impervious Area:1.21

Mitigated Landuse Totals for POC #1
Total Pervious Area:0.26
Total Impervious Area:1.21

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.348735
5 year	0.473557
10 year	0.559467
25 year	0.671797
50 year	0.758266
100 year	0.847153

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0
5 year	0
10 year	0
25 year	0
50 year	0
100 year	0

Stream Protection Duration
Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1949	0.465	0.000
1950	0.307	0.000
1951	0.641	0.000
1952	0.233	0.000
1953	0.547	0.000
1954	0.465	0.000
1955	0.356	0.000
1956	0.316	0.000
1957	0.310	0.000
1958	0.358	0.000
1959	0.452	0.000
1960	0.410	0.000
1961	0.326	0.000
1962	0.282	0.000
1963	0.348	0.000
1964	0.661	0.000
1965	0.229	0.000
1966	0.264	0.000
1967	0.344	0.000
1968	0.330	0.000
1969	0.311	0.000
1970	0.468	0.000
1971	0.746	0.000
1972	0.399	0.000
1973	0.321	0.000

1974	0.183	0.000
1975	0.472	0.000
1976	0.408	0.000
1977	0.264	0.000
1978	0.270	0.000
1979	0.556	0.000
1980	0.280	0.000
1981	0.521	0.000
1982	0.474	0.000
1983	0.389	0.000
1984	0.265	0.000
1985	0.610	0.000
1986	0.354	0.000
1987	0.810	0.000
1988	0.318	0.000
1989	0.342	0.000
1990	0.412	0.000
1991	0.392	0.000
1992	0.344	0.000
1993	0.217	0.000
1994	0.190	0.000
1995	0.184	0.000
1996	0.219	0.000
1997	0.289	0.000
1998	0.301	0.000
1999	0.395	0.000
2000	0.524	0.000
2001	0.184	0.000
2002	0.343	0.000
2003	0.256	0.000
2004	0.333	0.000
2005	0.426	0.000
2006	0.302	0.000
2007	0.696	0.000
2008	0.297	0.000
2009	0.226	0.000

Stream Protection Duration
Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.8097	0.0000
2	0.7462	0.0000
3	0.6959	0.0000
4	0.6612	0.0000
5	0.6407	0.0000
6	0.6102	0.0000
7	0.5562	0.0000
8	0.5475	0.0000
9	0.5237	0.0000
10	0.5213	0.0000
11	0.4744	0.0000
12	0.4717	0.0000
13	0.4676	0.0000
14	0.4649	0.0000
15	0.4647	0.0000
16	0.4517	0.0000

17	0.4263	0.0000
18	0.4123	0.0000
19	0.4098	0.0000
20	0.4075	0.0000
21	0.3988	0.0000
22	0.3953	0.0000
23	0.3925	0.0000
24	0.3890	0.0000
25	0.3579	0.0000
26	0.3556	0.0000
27	0.3535	0.0000
28	0.3483	0.0000
29	0.3443	0.0000
30	0.3439	0.0000
31	0.3426	0.0000
32	0.3416	0.0000
33	0.3329	0.0000
34	0.3295	0.0000
35	0.3265	0.0000
36	0.3208	0.0000
37	0.3177	0.0000
38	0.3158	0.0000
39	0.3107	0.0000
40	0.3098	0.0000
41	0.3070	0.0000
42	0.3024	0.0000
43	0.3006	0.0000
44	0.2969	0.0000
45	0.2885	0.0000
46	0.2823	0.0000
47	0.2798	0.0000
48	0.2705	0.0000
49	0.2647	0.0000
50	0.2643	0.0000
51	0.2639	0.0000
52	0.2558	0.0000
53	0.2329	0.0000
54	0.2291	0.0000
55	0.2264	0.0000
56	0.2187	0.0000
57	0.2168	0.0000
58	0.1899	0.0000
59	0.1838	0.0000
60	0.1835	0.0000
61	0.1827	0.0000

Stream Protection Duration
POC #1
The Facility PASSED

The Facility PASSED.

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.1744	1321	0	0	Pass
0.1803	1183	0	0	Pass
0.1862	1062	0	0	Pass

0.1921	939	0	0	Pass
0.1980	841	0	0	Pass
0.2039	744	0	0	Pass
0.2098	672	0	0	Pass
0.2157	594	0	0	Pass
0.2216	532	0	0	Pass
0.2274	470	0	0	Pass
0.2333	429	0	0	Pass
0.2392	390	0	0	Pass
0.2451	351	0	0	Pass
0.2510	321	0	0	Pass
0.2569	298	0	0	Pass
0.2628	268	0	0	Pass
0.2687	235	0	0	Pass
0.2746	215	0	0	Pass
0.2805	194	0	0	Pass
0.2864	168	0	0	Pass
0.2923	155	0	0	Pass
0.2982	138	0	0	Pass
0.3041	129	0	0	Pass
0.3100	118	0	0	Pass
0.3159	111	0	0	Pass
0.3218	106	0	0	Pass
0.3277	100	0	0	Pass
0.3336	88	0	0	Pass
0.3395	82	0	0	Pass
0.3454	74	0	0	Pass
0.3513	70	0	0	Pass
0.3572	65	0	0	Pass
0.3631	61	0	0	Pass
0.3690	60	0	0	Pass
0.3749	58	0	0	Pass
0.3808	53	0	0	Pass
0.3867	51	0	0	Pass
0.3926	49	0	0	Pass
0.3985	44	0	0	Pass
0.4044	41	0	0	Pass
0.4103	36	0	0	Pass
0.4162	33	0	0	Pass
0.4221	31	0	0	Pass
0.4280	30	0	0	Pass
0.4339	29	0	0	Pass
0.4398	28	0	0	Pass
0.4457	26	0	0	Pass
0.4516	26	0	0	Pass
0.4575	25	0	0	Pass
0.4634	24	0	0	Pass
0.4693	21	0	0	Pass
0.4752	19	0	0	Pass
0.4811	18	0	0	Pass
0.4870	18	0	0	Pass
0.4929	16	0	0	Pass
0.4988	16	0	0	Pass
0.5047	16	0	0	Pass
0.5106	16	0	0	Pass
0.5164	15	0	0	Pass
0.5223	14	0	0	Pass

0.5282	12	0	0	Pass
0.5341	12	0	0	Pass
0.5400	11	0	0	Pass
0.5459	11	0	0	Pass
0.5518	10	0	0	Pass
0.5577	9	0	0	Pass
0.5636	9	0	0	Pass
0.5695	9	0	0	Pass
0.5754	9	0	0	Pass
0.5813	8	0	0	Pass
0.5872	8	0	0	Pass
0.5931	8	0	0	Pass
0.5990	7	0	0	Pass
0.6049	6	0	0	Pass
0.6108	6	0	0	Pass
0.6167	5	0	0	Pass
0.6226	5	0	0	Pass
0.6285	5	0	0	Pass
0.6344	5	0	0	Pass
0.6403	5	0	0	Pass
0.6462	4	0	0	Pass
0.6521	4	0	0	Pass
0.6580	4	0	0	Pass
0.6639	3	0	0	Pass
0.6698	3	0	0	Pass
0.6757	3	0	0	Pass
0.6816	3	0	0	Pass
0.6875	3	0	0	Pass
0.6934	3	0	0	Pass
0.6993	2	0	0	Pass
0.7052	2	0	0	Pass
0.7111	2	0	0	Pass
0.7170	2	0	0	Pass
0.7229	2	0	0	Pass
0.7288	2	0	0	Pass
0.7347	2	0	0	Pass
0.7406	2	0	0	Pass
0.7465	2	0	0	Pass
0.7524	1	0	0	Pass
0.7583	1	0	0	Pass

Water Quality BMP Flow and Volume for POC #1
On-line facility volume: 0 **acre-feet**
On-line facility target flow: 0 **cfs.**
Adjusted for 15 min: 0 **cfs.**
Off-line facility target flow: 0 **cfs.**
Adjusted for 15 min: 0 **cfs.**

LID Report

LID Technique	Used for Treatment?	Total Volume Needs Treatment	Volume Through Facility	Infiltration Volume (ac-ft.)	Cumulative Volume Infiltration	Percent Volume Infiltrated	Water Quality Percent	Comment

Treated

			(ac-ft)	(ac-ft)		Credit	
tention ROW POC		N	80.93			N	100.00
Total Volume Infiltrated			80.93	0.00	0.00		100.00
0.00	0%	No Treat. Credit					

Compliance with LID Standard 8
Duration Analysis Result = Passed

Perlnd and Implnd Changes

No changes have been made.

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BASIN AREA 1

FACILITY CALCULATIONS

BASIN AREA 2A

FACILITY CALCULATIONS

BASIN AREA 2B

FACILITY CALCULATIONS

BASIN AREA 3

FACILITY CALCULATIONS

BASIN AREA 4

FACILITY CALCULATIONS

BASIN AREA 5

FACILITY CALCULATIONS

BASIN AREA 6

FACILITY CALCULATIONS

BASIN AREA ROW

FACILITY CALCULATIONS

APPENDIX B

CONVEYANCE CALCULATIONS

B.0 CONVEYANCE SYSTEM CALCULATIONS

Per the King County Surface Water Design Manual, the Rational Method will be used to calculate design peak flow rates.

B.1 RATIONAL METHOD PEAK FLOW CALCULATIONS

The Rational Method peak flow rate is calculated using the following equation:

$$Q = C * I * A$$

where:

Q = peak flow [cfs]
C = composite Rational Method runoff coefficient
A = contributing area [acre]
I = peak rainfall intensity [in/hr]

RUNOFF COEFFICIENT

The runoff coefficient is calculated by the following equation:

$$Cc = (C1*A1 + C2*A2..Cn*An)/At$$

where:

C_i = Curve number for a contributing area
ΣAi = Total Contributing Area
A_i = Area of a contributing area
C = Composite Rational Method coefficient for a watershed

INTENSITY

Rainfall intensity is calculated using the following equations:

$$I = P * i$$

where:

$$i = a * Tc^{(-b)}$$

I = peak rainfall intensity [in/hr]
P = 24-hour precipitation for a given return frequency [in]
i = unit peak intensity factor
a, b = empirical coefficients (KCSWDM)
T_c = Time of Concentration [min]

Return Fre	P (in) **
2 year	**1.70**
10 year	**2.40**
25 year	**2.70**
100 year	**3.30**

** Precipitation/Frequency values are from NOAA Isopluvials for Washington State.

TIME OF CONCENTRATION

A time of concentration of 6.3 minutes will be utilized in this design, which corresponds to the shortest storm duration with the largrest rainfall intensity. This yields the most conservative peak flow estimate via the Rational Method.

B.2 PIPE SIZING - CB-1 TO AREA 2B POND

Inlet Structure: CB-1
Outlet Structure: 2B POND

Contributing Areas & Rational C-Values:

Total Area = 45,690 [sq. ft.]
= 1.05 [acre]

Surface Type	Area (sq. ft.)	Runoff Coef. (C) **
House/Roof Area	0	0.90
Road / Walk	35,736	0.90
Landscape	9,954	0.25
Total Area =	45,690	

Composite C-value for on-site project area = 0.76

TIME OF CONCENTRATION

A time of concentration of 6.3 minutes will be utilized in this design, which corresponds to the shortest storm duration with the largest rainfall intensity. This yields the most conservative peak flow estimate via the Rational Method.

Time of Concentration, Tc = 6.30 [min]

INTENSITY:

Return Freq	a	b	i	P [in]	I [in/hr]
2 year	1.58	0.58	0.543	1.70	0.92
10 year	2.44	0.64	0.751	2.40	1.80
25 year	2.66	0.65	0.804	2.70	2.17
100 year	2.61	0.63	0.819	3.30	2.70

DESIGN FLOW:

Return Freq	C	I [in/hr]	A [acre]	Q [cfs]
2 year	0.76	0.92	1.05	0.735
10 year	0.76	1.80	1.05	1.434
25 year	0.76	2.17	1.05	1.727
100 year	0.76	2.70	1.05	2.149

PIPE SIZING:

All pipes will be sized for the 25-year, 24-hour event using the Manning's formula for open channel flow and checked for the 100-year, 24-hour storm.

Manning's formula for open channel flow =

25 YEAR CALCULATION

Given Round Pipe:

Manning's Coef, n =	0.013	PVC PIPE
Diameter, D =	12.0	inches
Slope =	0.0100	ft/ft
Depth of Flow, h =	5.9	inches

Results (assumes constant n):

Full Pipe Area, A =	0.8	sq ft
Flow Area, a =	0.4	sq ft
Wetted Perimeter, P =	1.6	feet
Hydraulic Radius, R =	0.2	feet
Q full =	3.56	cfs
V full =	4.54	fps

Design for 25-year storm:

@ depth = 5.9 inches, V =	4.50	fps	
@ depth = 5.9 inches, Q =	1.73	cfs	, OK

100 YEAR CALCULATION

Given Round Pipe:

Manning's Coef, n =	0.013	DI PIPE
Diameter, D =	12.0	inches
Slope =	0.0100	ft/ft
Depth of Flow, h =	6.8	inches

Results (assumes constant n):

Full Pipe Area, A =	0.8	sq ft
Flow Area, a =	0.5	sq ft
Wetted Perimeter, P =	1.7	feet
Hydraulic Radius, R =	0.3	feet
Q full =	3.56	cfs
V full =	4.54	fps

Check for a 100-year storm:

@ depth = 6.8 inches, V =	4.77	fps	
@ depth = 6.8 inches, Q =	2.19	cfs	, OK

All pipes upstream from this structure will have smaller contributing areas and will therefore have adequate capacity.

B.3 PIPE SIZING - CB-7 TO AREA 3 POND

Inlet Structure: CB-7
Outlet Structure: 3 POND

Contributing Areas & Rational C-Values:

Total Area = 9,604 [sq. ft.]
= 0.22 [acre]

Surface Type	Area (sq. ft.)	Runoff Coef. (C) **
House/Roof Area	9,604	0.90
Road / Walk	0	0.90
Landscape	0	0.25
Total Area =	9,604	

Composite C-value for on-site project area = 0.90

TIME OF CONCENTRATION

A time of concentration of 6.3 minutes will be utilized in this design, which corresponds to the shortest storm duration with the largest rainfall intensity. This yields the most conservative peak flow estimate via the Rational Method.

Time of Concentration, Tc = 6.30 [min]

INTENSITY:

Return Freq	a	b	i	P [in]	I [in/hr]
2 year	1.58	0.58	0.543	1.70	0.92
10 year	2.44	0.64	0.751	2.40	1.80
25 year	2.66	0.65	0.804	2.70	2.17
100 year	2.61	0.63	0.819	3.30	2.70

DESIGN FLOW:

Return Freq	C	I [in/hr]	A [acre]	Q [cfs]
2 year	0.90	0.92	0.22	0.183
10 year	0.90	1.80	0.22	0.358
25 year	0.90	2.17	0.22	0.431
100 year	0.90	2.70	0.22	0.536

PIPE SIZING:

All pipes will be sized for the 25-year, 24-hour event using the Manning's formula for open channel flow and checked for the 100-year, 24-hour storm.

Manning's formula for open channel flow =

25 YEAR CALCULATION

Given Round Pipe:

Manning's Coef, n =	0.013	PVC PIPE
Diameter, D =	6.0	inches
Slope =	0.0200	ft/ft
Depth of Flow, h =	3.2	inches

Results (assumes constant n):

Full Pipe Area, A =	0.2	sq ft
Flow Area, a =	0.1	sq ft
Wetted Perimeter, P =	0.8	feet
Hydraulic Radius, R =	0.1	feet
Q full =	0.79	cfs
V full =	4.04	fps

Design for 25-year storm:

@ depth = 3.2 inches, V =	4.15	fps	
@ depth = 3.2 inches, Q =	0.44	cfs	, OK

100 YEAR CALCULATION

Given Round Pipe:

Manning's Coef, n =	0.013	DI PIPE
Diameter, D =	6.0	inches
Slope =	0.0200	ft/ft
Depth of Flow, h =	3.7	inches

Results (assumes constant n):

Full Pipe Area, A =	0.2	sq ft
Flow Area, a =	0.1	sq ft
Wetted Perimeter, P =	0.9	feet
Hydraulic Radius, R =	0.1	feet
Q full =	0.79	cfs
V full =	4.04	fps

Check for a 100-year storm:

@ depth = 3.7 inches, V =	4.38	fps	
@ depth = 3.7 inches, Q =	0.56	cfs	, OK

All pipes upstream from this structure will have smaller contributing areas and will therefore have adequate capacity.

B.4 PIPE SIZING - SD CO 1 TO AREA 6 POND

Inlet Structure: SD CO 1
Outlet Structure: 6 POND

Contributing Areas & Rational C-Values:

Total Area = 8,458 [sq. ft.]
= 0.19 [acre]

Surface Type	Area (sq. ft.)	Runoff Coef. (C) **
House/Roof Area	8,458	0.90
Road / Walk	0	0.90
Landscape	0	0.25
Total Area =	8,458	

Composite C-value for on-site project area = 0.90

TIME OF CONCENTRATION

A time of concentration of 6.3 minutes will be utilized in this design, which corresponds to the shortest storm duration with the largest rainfall intensity. This yields the most conservative peak flow estimate via the Rational Method.

Time of Concentration, Tc = 6.30 [min]

INTENSITY:

Return Freq	a	b	i	P [in]	I [in/hr]
2 year	1.58	0.58	0.543	1.70	0.92
10 year	2.44	0.64	0.751	2.40	1.80
25 year	2.66	0.65	0.804	2.70	2.17
100 year	2.61	0.63	0.819	3.30	2.70

DESIGN FLOW:

Return Freq	C	I [in/hr]	A [acre]	Q [cfs]
2 year	0.90	0.92	0.19	0.161
10 year	0.90	1.80	0.19	0.315
25 year	0.90	2.17	0.19	0.379
100 year	0.90	2.70	0.19	0.472

PIPE SIZING:

All pipes will be sized for the 25-year, 24-hour event using the Manning's formula for open channel flow and checked for the 100-year, 24-hour storm.

Manning's formula for open channel flow =

25 YEAR CALCULATION

Given Round Pipe:

Manning's Coef, n =	0.013	PVC PIPE
Diameter, D =	6.0	inches
Slope =	0.0100	ft/ft
Depth of Flow, h =	3.7	inches

Results (assumes constant n):

Full Pipe Area, A =	0.2	sq ft
Flow Area, a =	0.1	sq ft
Wetted Perimeter, P =	0.9	feet
Hydraulic Radius, R =	0.1	feet
Q full =	0.56	cfs
V full =	2.86	fps

Design for 25-year storm:

@ depth = 3.7 inches, V =	3.09	fps	
@ depth = 3.7 inches, Q =	0.39	cfs	, OK

100 YEAR CALCULATION

Given Round Pipe:

Manning's Coef, n =	0.013	DI PIPE
Diameter, D =	6.0	inches
Slope =	0.0100	ft/ft
Depth of Flow, h =	4.3	inches

Results (assumes constant n):

Full Pipe Area, A =	0.2	sq ft
Flow Area, a =	0.2	sq ft
Wetted Perimeter, P =	1.0	feet
Hydraulic Radius, R =	0.1	feet
Q full =	0.56	cfs
V full =	2.86	fps

Check for a 100-year storm:

@ depth = 4.3 inches, V =	3.21	fps	
@ depth = 4.3 inches, Q =	0.48	cfs	, OK

B.5 PIPE SIZING - CB-1A TO DITCH

Inlet Structure: CB1A
Outlet Structure: DITCH

Contributing Areas & Rational C-Values:

Total Area = 11,968 [sq. ft.]
= 0.27 [acre]

Surface Type	Area (sq. ft.)	Runoff Coef. (C) **
House/Roof Area	0	0.90
Road / Walk	11,968	0.90
Landscape	0	0.25
Total Area =	11,968	

Composite C-value for on-site project area = 0.90

TIME OF CONCENTRATION

A time of concentration of 6.3 minutes will be utilized in this design, which corresponds to the shortest storm duration with the largest rainfall intensity. This yields the most conservative peak flow estimate via the Rational Method.

Time of Concentration, Tc = 6.30 [min]

INTENSITY:

Return Freq	a	b	i	P [in]	I [in/hr]
2 year	1.58	0.58	0.543	1.70	0.92
10 year	2.44	0.64	0.751	2.40	1.80
25 year	2.66	0.65	0.804	2.70	2.17
100 year	2.61	0.63	0.819	3.30	2.70

DESIGN FLOW:

Return Freq	C	I [in/hr]	A [acre]	Q [cfs]
2 year	0.90	0.92	0.27	0.228
10 year	0.90	1.80	0.27	0.446
25 year	0.90	2.17	0.27	0.537
100 year	0.90	2.70	0.27	0.668

PIPE SIZING:

All pipes will be sized for the 25-year, 24-hour event using the Manning's formula for open channel flow and checked for the 100-year, 24-hour storm.

Manning's formula for open channel flow =

25 YEAR CALCULATION

Given Round Pipe:

Manning's Coef, n =	0.013	PVC PIPE
Diameter, D =	8.0	inches
Slope =	0.0081	ft/ft
Depth of Flow, h =	4.0	inches

Results (assumes constant n):

Full Pipe Area, A =	0.3	sq ft
Flow Area, a =	0.2	sq ft
Wetted Perimeter, P =	1.0	feet
Hydraulic Radius, R =	0.2	feet
Q full =	1.09	cfs
V full =	3.12	fps

Design for 25-year storm:

@ depth = 4 inches, V =	3.12	fps	
@ depth = 4 inches, Q =	0.54	cfs	, OK

100 YEAR CALCULATION

Given Round Pipe:

Manning's Coef, n =	0.013	DI PIPE
Diameter, D =	8.0	inches
Slope =	0.0081	ft/ft
Depth of Flow, h =	4.6	inches

Results (assumes constant n):

Full Pipe Area, A =	0.3	sq ft
Flow Area, a =	0.2	sq ft
Wetted Perimeter, P =	1.1	feet
Hydraulic Radius, R =	0.2	feet
Q full =	1.09	cfs
V full =	3.12	fps

Check for a 100-year storm:

@ depth = 4.6 inches, V =	3.29	fps	
@ depth = 4.6 inches, Q =	0.68	cfs	, OK

FIGURES

FIGURE 1 – VICINITY MAP AND SITE PLAN

FIGURE 2 – PROPOSED BASIN MAP

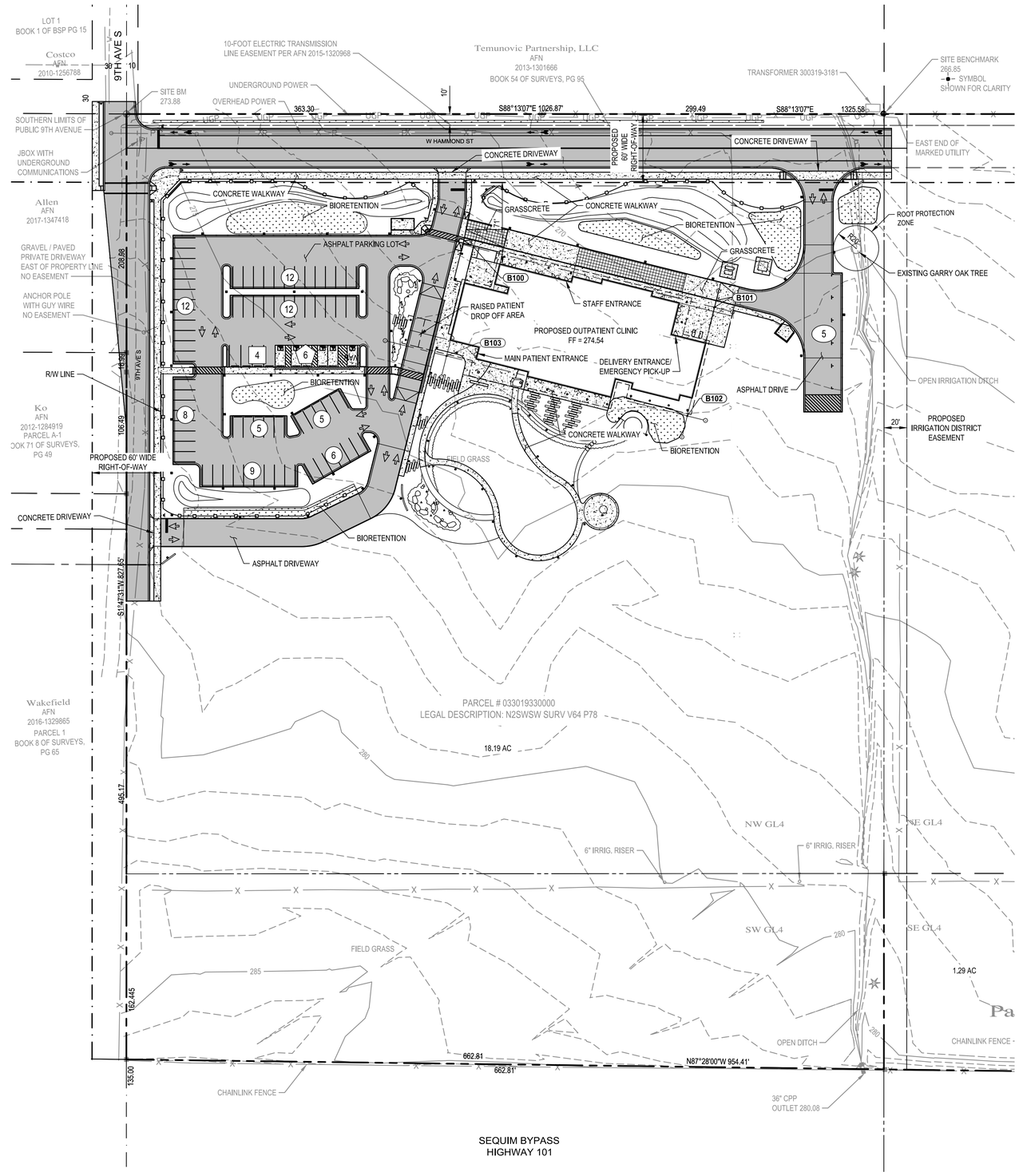
FIGURE 3 – TESC PLAN

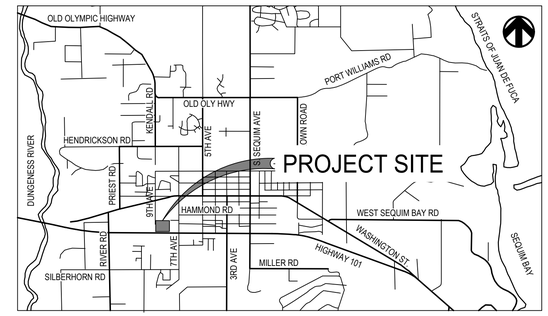
JAMESTOWN S'KLALLAM TRIBE

OUTPATIENT CLINIC

526 S. 9TH AVENUE

SEQUIM, WASHINGTON, CLALLAM COUNTY, USA





LOCATION MAP

NTS

GENERAL NOTES

1. SEE ENLARGED SITE PLAN SHEETS C4.0 AND C4.1 FOR HORIZONTAL CONTROL.
2. SEE UTILITY PLAN SHEETS C5.1 AND C5.2 FOR ALL ABOVE AND BELOW GRADE UTILITIES.

SHEET LIST

SHEET NO	SHEET TITLE
C1.0	OVERALL SITE PLAN
C1.1	NOTES
C1.2	NOTES AND ABBREVIATIONS
C1.3	SURVEY
C2.0	TESC PLAN
C2.1	TESC DETAILS
C3.0	OVERALL GRADING AND STORMWATER DRAINAGE PLAN
C3.1	ENLARGED GRADING AND STORMWATER DRAINAGE PLAN - WEST
C3.2	ENLARGED GRADING AND STORMWATER DRAINAGE PLAN - EAST
C3.3	SITE CROSS SECTIONS
C4.0	ENLARGED SITE PLAN - WEST
C4.1	ENLARGED SITE PLAN -EAST
C4.2	SITE DETAILS
C4.3	SITE DETAILS
C5.0	OVERALL UTILITY PLAN
C5.1	ENLARGED UTILITY PLAN - WEST
C5.2	ENLARGED UTILITY PLAN - EAST
C5.3	UTILITY PROFILES
C5.4	UTILITY DETAILS
C5.5	UTILITY DETAILS
C6.0	TYPICAL ROADWAY SECTIONS
C6.1	HAMMOND STREET ROADWAY PLANS AND PROFILE
C6.2	HAMMOND STREET ROADWAY PLANS AND PROFILE
C6.3	9TH AVE PLAN AND PROFILE
C7.0	CIRCULATION PLAN

PARKING DATA

PARKING REQUIRED:

TOTAL STALLS: 1 STALL/200 NET SF = 16,720 SF/200 SF = 83.6 = 84 STALLS

ADA STALLS: 1 ADA STALL/25 STALLS = 84 STALLS/25 STALLS = 3.36 = 4 STALLS

PARKING PROVIDED:

SYMBOL	DESCRIPTION	COUNT
#	OVERSIZED STALLS (10'x19') =	4
#	STANDARD STALLS (9'x19') =	69
#	ADA STALLS (INCLUDING 1 VAN STALL) =	6
#	PARALLEL PARKING STALLS (9'x20')=	5
	TOTAL STALLS =	84

BUILDING GRID COORDINATE TABLE

POINT ID	NORTHING	EASTING
B100	400712.28	1080820.65
B101	400653.26	1081029.47
B102	400558.95	1081002.81
B103	400617.97	1080793.99

LEGEND

PROPERTY LINE

SECTION LINE

EASEMENT LINE

50 25 0 50 100

SCALE: 1 INCH = 50 FEET

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ALLISON L. HEIN, STATE OF WASHINGTON, 45468, REGISTERED PROFESSIONAL ENGINEER

12/30/2019

JAMESTOWN S'KLALLAM TRIBE
OUTPATIENT CLINIC
SEQUIM, WASHINGTON

BUILDING PERMIT APPLICATION

REV	DATE	DESCRIPTION

PROJ. NO. 191652

DRAWN KB

CHECKED **ALH**

DATE DEC 30, 2019

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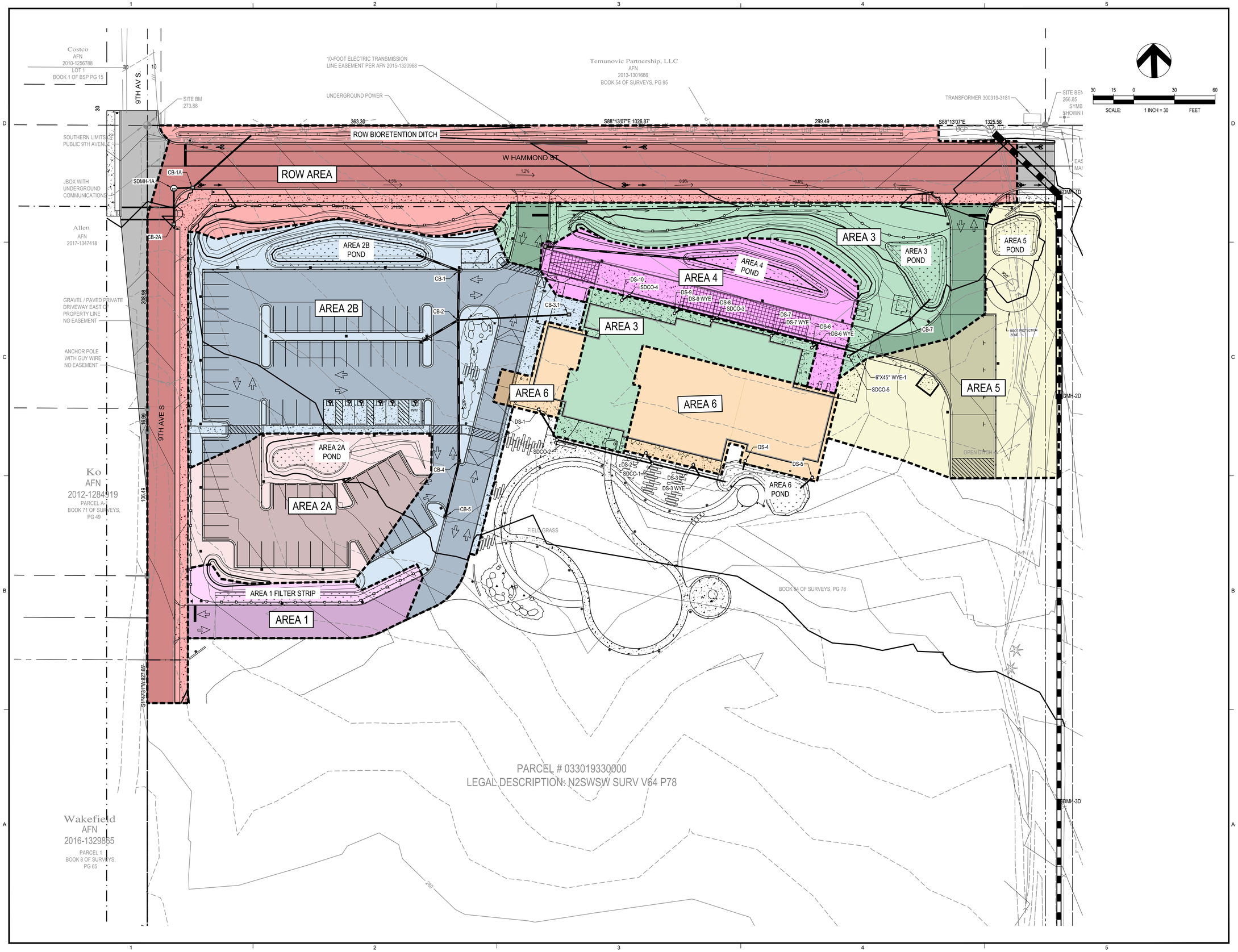
SHEET TITLE:

FIGURE 1: VICINITY MAP AND SITE PLAN

SHEET NO:

SHEET OF



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DATE	DEC 30, 2019

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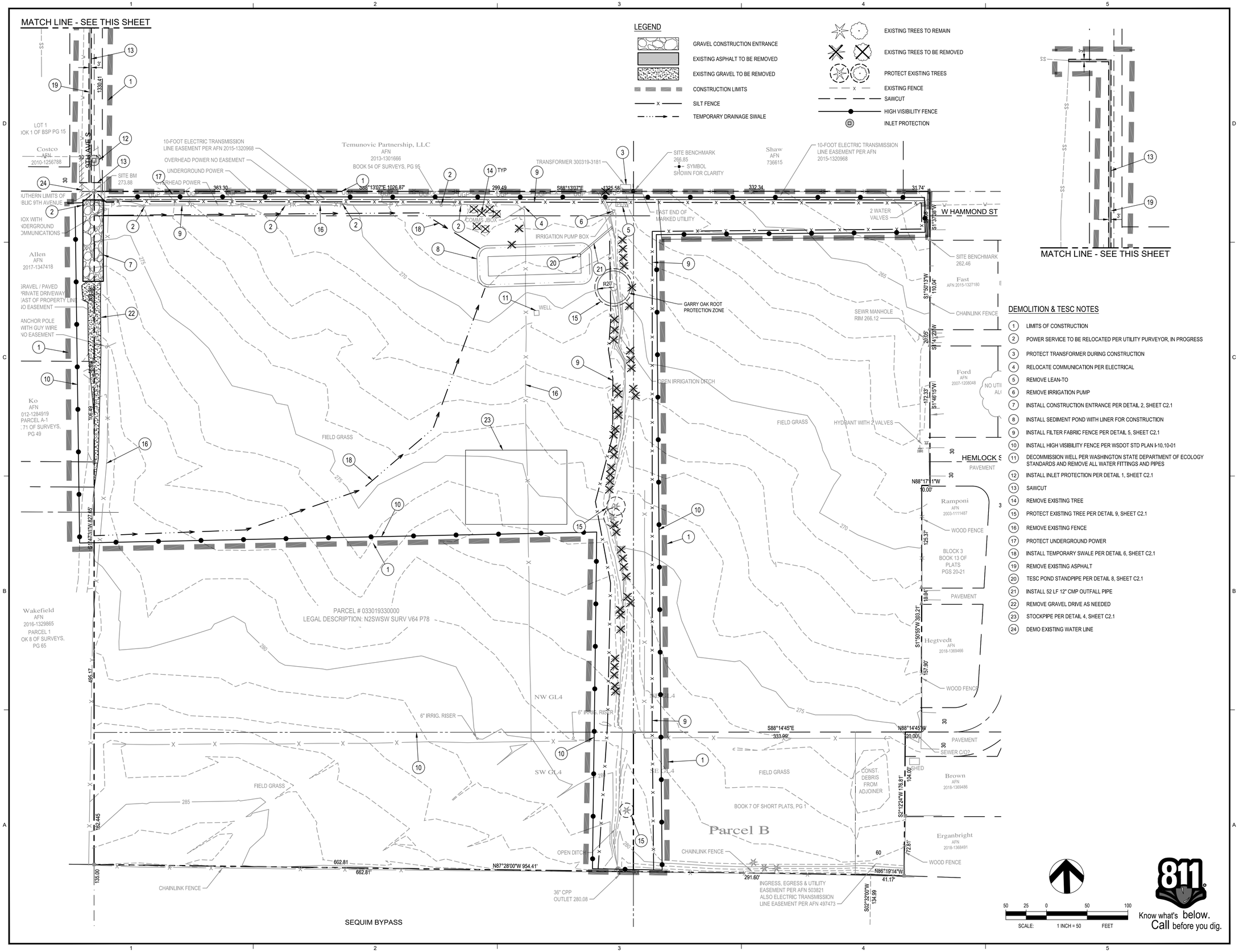
SHEET TITLE:

FIGURE 2: DEVELOPED DRAINAGE BASINS

SHEET NO:

SHEET OF



DEMOLITION & TESC NOTES

1. LIMITS OF CONSTRUCTION
2. POWER SERVICE TO BE RELOCATED PER UTILITY PURVEYOR, IN PROGRESS
3. PROTECT TRANSFORMER DURING CONSTRUCTION
4. RELOCATE COMMUNICATION PER ELECTRICAL
5. REMOVE LEAN-TO
6. REMOVE IRRIGATION PUMP
7. INSTALL CONSTRUCTION ENTRANCE PER DETAIL 2, SHEET C2.1
8. INSTALL SEDIMENT POND WITH LINER FOR CONSTRUCTION
9. INSTALL FILTER FABRIC FENCE PER DETAIL 5, SHEET C2.1
10. INSTALL HIGH VISIBILITY FENCE PER WSDOT STD PLAN I-10.10-01
11. DECOMMISSION WELL PER WASHINGTON STATE DEPARTMENT OF ECOLOGY STANDARDS AND REMOVE ALL WATER FITTINGS AND PIPES
12. INSTALL INLET PROTECTION PER DETAIL 1, SHEET C2.1
13. SAWCUT
14. REMOVE EXISTING TREE
15. PROTECT EXISTING TREE PER DETAIL 9, SHEET C2.1
16. REMOVE EXISTING FENCE
17. PROTECT UNDERGROUND POWER
18. INSTALL TEMPORARY SWALE PER DETAIL 6, SHEET C2.1
19. REMOVE EXISTING ASPHALT
20. TESC POND STANDPIPE PER DETAIL 8, SHEET C2.1
21. INSTALL 52 LF 12" CMP OUTFALL PIPE
22. REMOVE GRAVEL DRIVE AS NEEDED
23. STOCKPIPE PER DETAIL 4, SHEET C2.1
24. DEMO EXISTING WATER LINE

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SHEET TITLE:

FIGURE 3: TEMPORARY EROSION AND SEDIMENT CONTROL

SHEET NO:

SHEET OF