



Tapert Arlington Jensen

Drainage Report

Prepared for
Corstone Contractors, LLC
Contact: Mark Villwock
10515 20th St SE, #202
Lake Stevens, WA 98258
(360) 631-1820

Prepared by



Riley Mckee

Approved by
Tom Abbott, PE

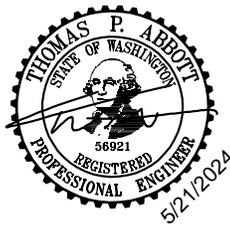


Table of Contents

Section	Title	
1	Project Overview	1-1
2	Temporary Erosion and Sediment Control Design	2-1
3	Downstream Analysis	3-1
4	Infiltration Facilities	4-1
5	Conveyance Analysis and Design	5-1
6	Operations and Maintenance Manual	6-1
7	Special Reports and Studies	7-1

Appendices

#	Title
1	Project Overview
2	Temporary Erosion and Sediment Control Design
3	Downstream Analysis
4	Infiltration Facilities Design
5	Conveyance Analysis and Design
6	Operations and Maintenance Manual
7	Special Reports and Studies

Figures

#	Title
1	Vicinity Map
2	Existing Conditions Map
3	Downstream Analysis Map
4	Predeveloped Hydrology Map
5	Developed Hydrology Map

SECTION 1: PROJECT OVERVIEW

The proposed Tapert Arlington Jensen project is an approximately 0.31-acre site. The proposed project is a single-family residential development on one parcel located on parcel #00893800000500 in Arlington, Washington. The project proposes to construct 4 single-family lots with associated out buildings. Emergency and standard access drives along with associated private and public utilities are proposed to serve project development. Frontage is already existing along Jensen Farm Lane and so no improvements are necessary. See the Vicinity Map in Appendix 1 for visual representation of the subject property.

Existing Site

The parcel #00893800000500 is currently undeveloped and covered in grass, site topography is relatively flat with no obvious signs of sloping (per the Geotechnical Report from Terra Associates, Inc. completed on April 19th, 2024). The project parcels are currently zoned RHC (Residential High Capacity). According to the USDA Soil Survey, site soils are consistent of Everett very gravelly sandy loam (0 to 8 percent slopes) and Norma loam. According to the geotechnical report by Terra Associates, Inc., dated April 19th, 2024, the outwash sand and gravel observed has a relatively low fines content and will support infiltration of project stormwater.

Proposed Development

The proposed single-family development project will construct four single-family lots with associated out buildings. Emergency and standard access drives along with associated private and public utilities are proposed to serve project development. Frontage improvements along Jensen Farm Lane are proposed.

Proposed Drainage System

This project is designed to comply with the 2019 Department of Ecology Stormwater Manual for Western Washington (2019 DOE SWMWW). Stormwater will be collected via two infiltration galleries on the west and southeast portions of the site and will be infiltrated 100% into the existing soils. Runoff from Jensen Farm Lane will be collected into a new catch basin along the frontage of the property and routed into the infiltration gallery on the southeast portion of the site.

Erosion/Sedimentation Control

Erosion control measures that will be utilized during construction will be provided in the SWPPP and TESC plan sheets in a forthcoming submittal.

Minimum Requirements

Per the 2019 DOE SWMWW, Minimum Requirements 1-5 apply to the proposed development.

Minimum Requirement #1: Preparation of Stormwater Site Plans

This report along with the preliminary plans satisfies the minimum requirement.

Minimum Requirement #2: Construction Stormwater Pollution Prevention

See Section 2 of this Report for the SWPPP BMP Elements, and the SWPP (submitted as a separate document) for a complete discussion of erosion control BMP's and their use specific to the site.

Minimum Requirement #3: Source of Pollution

Permanent source control BMPs are not applicable for the subject site since the associated activities for the new residences do not fall within the types of facilities listed within Volume IV of the DOE Manual (Residential developments are not required to implement source control BMP's). BMPs for erosion and sedimentation control will be specified in the Construction Plans and the CSWPP.

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

Flow from the site will infiltrate at 100% via two infiltration galleries (Galleries A and B) at the western and southeastern portions of the property, and runoff from Jansen Farm Lane will be routed to the southeaster infiltration gallery via a new catch basin that will be installed along the front of the project site.

Minimum Requirement #5: On-Site Stormwater Management

According to the geotechnical report by Terra Associates, Inc., dated April 19, 2024, due to the outwash sand and gravel observed having a relatively low fines content it will support infiltration of project stormwater. Two infiltration galleries have been designed to manage the stormwater runoff from the developed site. Both infiltration galleries infiltrate 100% of runoff directed to them.

Minimum Requirement #6: Runoff Treatment

Proposed new pollution generating impervious surfaces (PGIS) are approximately 3,400 SF, including Drive A area and driveways associated with the 4 proposed lots. This is less than the 5,000 SF threshold and thus no water quality treatment is required. Pre-treatment of stormwater prior to infiltration is required for PGIS runoff. Only Infiltration Gallery B infiltrates runoff from PGIS surfaces. CB-1 proposed for collection Drive A and driveway runoff includes a downturned elbow is shown in the construction plans in order to provide pre-treatment of stormwater.

Minimum Requirement #7: Flow Control

The project will exceed the 10,000 SF new plus replaced impervious threshold and is required to provide flow control. An open detention pond with vertical cast-in-place concrete walls will be installed in the western portion of the project site. Two infiltration galleries have been designed to manage the stormwater runoff from the developed site and provide flow control. Both infiltration galleries infiltrate 100% of runoff directed to them. Please see Section 4.0 for flow control modeling of infiltration galleries A and B and parameters for detention sizing.

Minimum Requirement #8: Wetlands Protection

There are no critical wetland areas, streams, or associated buffers on/within close proximity to the project site.

Minimum Requirement #9: Operation and Maintenance

See Operations and Maintenance in Section 6 of this report.

SECTION 2: TEMPORARY EROSION AND SEDIMENT CONTROL DESIGN

SWPPP Design Elements

A Construction Stormwater Pollution Prevention Plan (SWPPP) will be provided prior to construction. The SWPPP report is modeled under 2019 DOE Manual. Construction SWPPP Elements #1 through #13 are addressed below.

Element #1 – Mark Clearing Limits

All clearing limits will be delineated with high visibility plastic fence and/or silt fence. See sheets ER-01 of the construction plans for locations and details.

Element #2 – Establish Construction Access

Stabilized construction accesses will be installed as shown on the preliminary plans. See sheets ER-01 and ER-02 of the construction plans for locations and details.

Element #3 – Control Flow Rates

Rates on the project site are such that control is not anticipated.

Element #4 – Install Sediment Controls

Silt fence and storm drain inlet protection will be utilized to contain sediments within the project's clearing limits. See sheets ER-01 and ER-02 of the preliminary plans for locations and details.

Element #5 – Stabilize Soils

Exposed soils will be stabilized as specified in the Grading and Erosion Control Notes with temporary and permanent seeding, mulching, and plastic covering. See sheet ER-02 of the construction plans for notes.

Element #6 – Protect Slopes

Slopes are minor on the subject site. Slopes shall be protected as specified under Element #5.

Element #7 – Protect Drain Inlets

Storm drain inlet protection will be utilized to contain sediments within the project's clearing limits. See sheets ER-01 and ER-02 of the construction plans for locations and details.

Element #8 – Stabilize Channels and Outlets

Temporary channels shall be stabilized with check dams and an interceptor dike and swale as needed. See sheets ER-01 and ER-02 of the construction plans for locations and details.

Element #9 – Control Pollutants

Pollutants shall be controlled as specified in Volume IV of the 2019 DOE Manual—Source Control BMPs to address potential sources of pollution which may exacerbate possible soil/groundwater contamination identified onsite.

Element #10 – Control De-Watering

There will be no de-watering as a part of this project. See sheet ER-02 of the construction plans for notes.

Element #11 – Maintain BMPs

Maintenance of the BMPs is specified within the Construction Sequence and Grading and Erosion Control Notes. See sheets ER-01 and ER-02 of the preliminary plans for the Construction Sequence and notes.

Element #12: Manage the Project

The Grading and Erosion Control Notes specify seasonal work limitations. Maintenance of the BMPs is specified within the Construction Sequence and Grading and Erosion Control Notes. See sheets ER-01 and ER-02 of the construction plans for the Construction Sequence and notes.

Element #13: Protect on-site stormwater management BMPs

Low Impact Development (LID) BMP's will not be used in this project. The BMP's listed in elements #1 through #12 shall be used to protect LID BMP's if it becomes necessary.

SECTION 3: DOWNSTREAM ANALYSIS

Task 1. Study Area Definition and Maps

Snohomish County Bare Earth LiDAR, survey, and 2022 aerial photography were the best topographical references available for the area containing the site. The limits of the downstream analysis extend roughly 0.25 miles beyond the subject property's natural discharge location.

Task 2. Resource Review

All of the resources below have been reviewed for existing and potential issues near the project site:

Adopted Basin Plans

No Adopted Basin Plans were located that include the project site.

Drainage Basin

This site is tributary to Portage Creek. All site drainage will be collected via the two infiltration galleries on site and infiltrated at 100% into the soil. Proposed drainage runoff from the developed site will remain in the same threshold discharge basin.

Floodplain / Floodway (FEMA) maps

Per FEMA Floodplain map #53061C0415F the subject property is not within a floodplain.

Critical Areas Map

There are no critical areas on the project site.

Drainage Complaints

No relevant issues were identified near the proposed site.

Road Drainage Problems

No issues were identified near the proposed site.

Soil Survey

According to the USDA Soil Survey, site soils are classified as Everett very gravelly sandy loam (0 to 8 percent slopes) which is classified as Hydrologic Soil Group A, and Norma loam which is classified as Hydrologic Soil Group B/D.

Wetland Inventory Maps

There are no wetlands within the project site or tributary to the project site.

Migrating River Studies

Migrating River Studies are not considered applicable to the proposed development.

Section 303d List of Polluted Waters

Washington State Department of Ecology's Water Quality Assessment for Washington contains no listings for portage creek which is tributary to the project site.

Water Quality Problems

There are no known water quality issues within the quarter mile boundary of the project.

Stormwater Compliance Plans

Not applicable to the proposed project.

Task 3. Field Inspection/Downstream Analysis

On May 15th, 2024, a Downstream Analysis was performed at the site. The weather consisted of 69°F and sunny skies. The following observations were verified during the visit.

The subject property areas consist primarily of flat pasture with a single-family residence to the east and Jensen Park to the northwest.

The site soil is suitable for infiltration therefore much of the drainage infiltrates at 100% into the site soil (Image 1-3). Any runoff from the frontage areas of the site flows to the west (Image 4) through existing storm drainage catch basins until meeting with Portage Creek and continuing on the for the remainder of the quarter mile boundary. See Figure 3.0, "Downstream Analysis Map" in Appendix 3 for a visual representation of current discharge.

Task 4. Drainage System Description and Problem Descriptions

Based on the information available and all the resources available including visual inspection of the downstream flow path to the ¼-mile boundary, there is no evidence of existing or anticipated downstream drainage problems. All flows are adequately carried through natural channels to the quarter mile buffer of analysis.

Task 5. Mitigation of Existing or Potential Drainage Problems

No evidence of existing or potential problems with downstream drainage conveyance infrastructure was found. Mitigation is not required.

SECTION 4: INFILTRATION DESIGN

4.1 Predeveloped Site Hydrology

The pre-developed and developed conditions were modeled in WWHM for the purpose of peak flow determination for direct infiltration. Based on the site location, the WWHM used the Everett Gage with a Precipitation Scale factor of 1.200. For visual representation of the listed basins, see Figure 4.0, "Predeveloped Hydrology Map".

Onsite Basin – Infiltration Gallery A:

The predeveloped condition applied to the Onsite Basin – Infiltration Gallery A results in a forested land cover condition. The values as modeled in WWHM are as follows:

Table 1: Predeveloped Conditions: Onsite Basin – Infiltration Gallery A

Onsite Basin – Infiltration Gallery A	
<u>Ground Cover</u>	<u>Area (acre)</u>
Forest, flat	0.20
Total	0.20

Onsite Basin – Infiltration Gallery B:

The predeveloped condition applied to the Onsite Basin – Infiltration Gallery B results in a forested land cover condition. The values as modeled in WWHM are as follows:

Table 2: Predeveloped Conditions: Onsite Basin – Infiltration Gallery B

Onsite Basin – Infiltration Gallery B	
<u>Ground Cover</u>	<u>Area (acre)</u>
Forest, flat	0.10
Total	0.10

4.2 Developed Site Hydrology

In the developed condition, the proposed single-family development project will construct four single-family townhome lots. An emergency and standard access drive along with associated private and public utilities are proposed to serve project development. Frontage improvements along Jensen Farm Lane are proposed.

Onsite Basin – Infiltration Gallery A:

The developed Onsite Basin – Infiltration Gallery A is 0.20 acres and includes the majority of the developed site within its boundaries. In the developed condition, the Onsite Basin – Infiltration Gallery A has been modeled using WWHM with the following areas and ground cover designations:

Table 3: Developed Conditions: Onsite Basin – Infiltration Gallery A

Onsite Basin – Infiltration Gallery A	
Ground Cover	Area (acre)
Roof, flat	0.10
Pasture, flat	0.10
Total	0.20

Onsite Basin – Infiltration Gallery B:

The developed Onsite Basin – Infiltration Gallery B is 0.10 acres and is comprised of the driveways, sidewalks, and front portions of the lawn for the site. The Onsite Basin – Gallery B was modeled using WWHM with the following areas and ground cover designations:

Table 4: Developed Conditions: Onsite Basin – Infiltration Gallery B

Onsite Basin – Infiltration Gallery B	
Ground Cover	Area (acre)
Forest, flat	0.02
Driveways, flat	0.08
Sidewalks, flat	0.01
Total	0.11

4.3 Infiltration Facilities

The project proposes a two infiltration galleries infiltrate flow from developed surface runoff produced from the project and associated frontage improvements. A summary of the modeled and provided infiltration facility dimensions can be found below. Each facility shown below (with dimensions shown as length x width x depth) fully infiltrates all tributary runoff 100%. See Appendix C for WWHM output, volume calculations, and additional facility design details.

Upstream sediment removal of the infiltration galleries is provided by a downturned elbow in CB-1 to prevent sediment and/or debris from entering and clogging Infiltration Gallery B.

Table 5: Infiltration Facilities Summary

Infiltration Facilities	
Infiltration Facility	Dimensions (L x W x D)
Gallery A	29' x 18'6" x 2.5' = 1348.5 cf
Gallery B	18' x 22' x 2' = 792 cf

SECTION 5: CONVEYANCE DESIGN

There is no conveyance design for this project due to the site runoff being able to fully infiltrate.

SECTION 6: OPERATIONS AND MAINTENANCE MANUAL

The proposed storm drainage system consists of two infiltration galleries, a yard drain, buried pipes, and a catch basin with downturned tee. These facilities will require periodic maintenance and inspection. Inspection and maintenance procedures are contained on the following pages.

SECTION 7: SPECIAL REPORTS AND STUDIES

The following studies were conducted in preparation of this Report:

- Geotechnical Report, Terra Associates, Inc., April 19, 2024
- Boundary & Topographic Survey, Pacific Coast Surveys, Inc., April 15, 2024

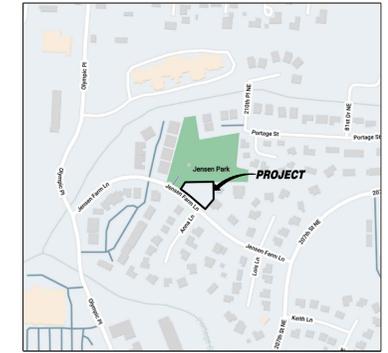
Appendix 1: Project Overview

1. Vicinity Map
2. Existing Conditions Map
3. Proposed Development Map

TAPERT ARLINGTON JENSEN

CONSTRUCTION PLANS

CITY OF ARLINGTON, SNOHOMISH COUNTY, WASHINGTON



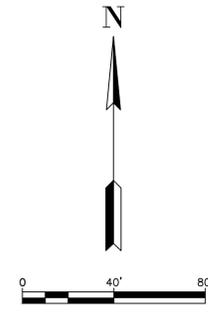
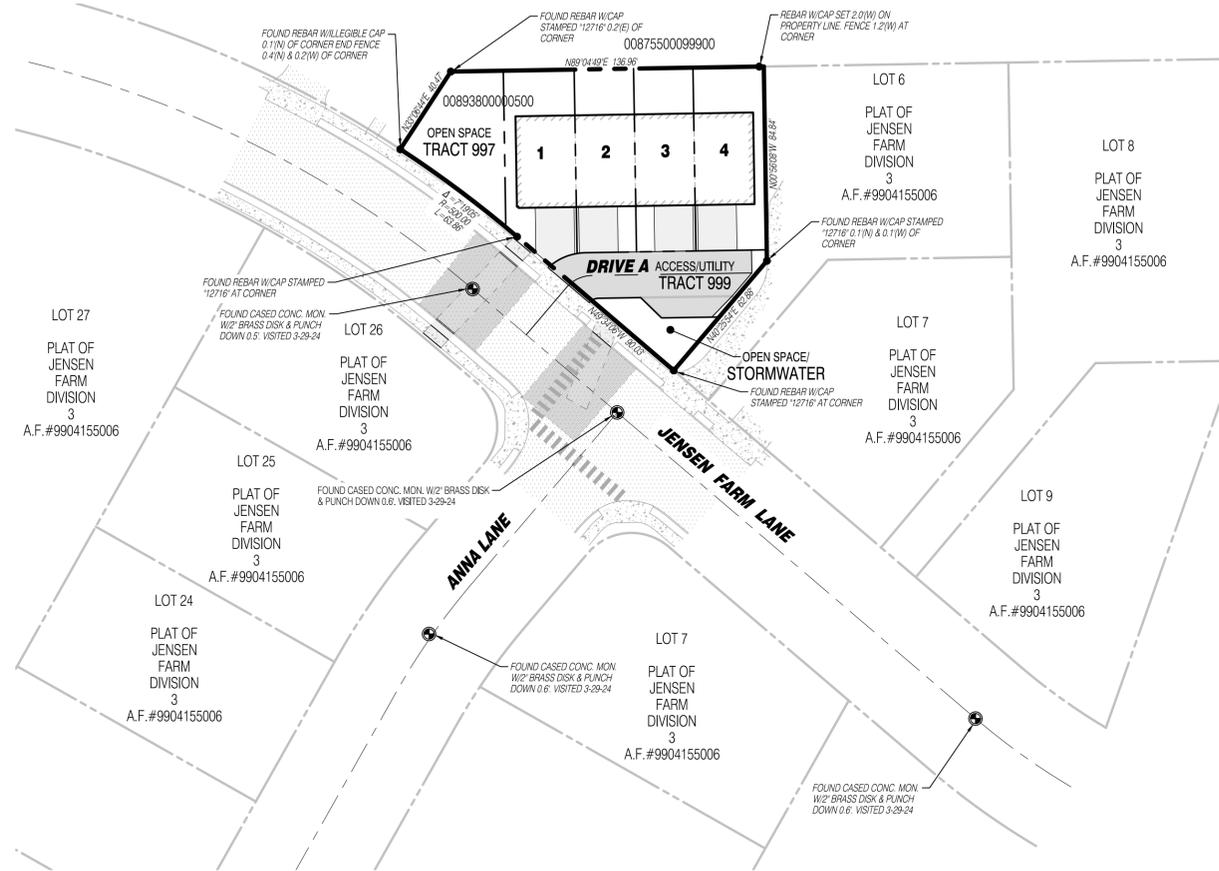
VICINITY MAP
SCALE: NTS

LEGEND AND ABBREVIATIONS

EXISTING SYMBOLS	DESCRIPTION	ABBREVIATIONS
⊙	MONUMENT IN CASE	GPM GAS PAINT MARK
○	FOUND REBAR W/ CAP	CB CATCH BASIN
●	EXISTING CORNER MONUMENT AS NOTED	IE INVERT ELEVATION
⊙	STORM MANHOLE	SD STORM DRAIN
⊙	SEWER CLEANOUT	SS SANITARY SEWER
⊙	SEWER MANHOLE	SSMH SANITARY SEWER MANHOLE
⊙	CATCH BASIN	C CEDAR
⊙	IRRIGATION CONTROL VALVE	PVC POLYVINYL CHLORIDE PIPE
⊙	FIRE HYDRANT	CPP CONCRETE PRESSURE PIPE
⊙	POWER TRANSFORMER	PP POWER POLE
⊙	WATER METER	TBR TO BE REMOVED
⊙	WATER VALVE	EX EXISTING
⊙	SIGN POST	RW RIGHT-OF-WAY
⊙	LIGHT POLE	
⊙	TELCO RISER	
⊙	CONIFEROUS TREE	

PROPOSED STORM SYMBOLS	DESCRIPTION	PROPOSED WATER SYMBOLS	DESCRIPTION
⊙	SD CAP	⊙	WATER CAP
⊙	TYPE 1 CATCH BASIN, GRATED LID	⊙	CONCRETE BLOCKING
⊙	TYPE 1 CATCH BASIN, SOLID LID	⊙	11.25° BEND
⊙	TYPE 2 CATCH BASIN, GRATED LID	⊙	22.5° BEND
⊙	TYPE 2 CATCH BASIN, SOLID LID	⊙	45° BEND
⊙	BEEHIVE MANHOLE COVER	⊙	90° BEND
⊙	SQUARE YARD DRAIN	⊙	VALVE
⊙	ROUND YARD DRAIN	⊙	HYDRANT ASSEMBLY
⊙	STORM CLEAN OUT	⊙	BLOW-OFF VALVE
⊙	STORM PIPE	⊙	REDUCER
⊙		⊙	AIR-VAC ASSEMBLY
⊙		⊙	WATER METER
⊙		⊙	WATER PIPE

PROPOSED SEWER SYMBOLS	DESCRIPTION
⊙	SEWER CAP
⊙	SEWER CLEANOUT
⊙	SEWER MANHOLE
⊙	SEWER PIPE



SURVEY INFORMATION

LEGAL DESCRIPTION

00893800000500;
THE SOUTHERLY 165.5 FEET OF TRACT 285, SUNNYSIDE FIVE ACRE TRACTS, ACCORDING TO THE PLAT THEREOF, RECORDED IN VOLUME 7 OF PLATS, PAGE 19 RECORDS OF THE SNOHOMISH COUNTY, WASHINGTON.

EXCEPT THE NORTH 135.5 FEET AND WEST 140 FEET THEREOF;
SITUATE IN THE COUNTY OF SNOHOMISH, STATE OF WASHINGTON.

LOT 6 PLAT OF JENSEN FARM DIVISION 3;
THE NORTH 135.5 FEET OF THE WEST 140 FEET OF THE SOUTH 135.5 FEET OF TRACT 285, SUNNYSIDE FIVE ACRE TRACTS, ACCORDING TO THE PLAT THEREOF, RECORDED IN VOLUME 7 OF PLATS, PAGE 19 RECORDS OF SNOHOMISH COUNTY, WASHINGTON.

SITUATE IN THE COUNTY OF SNOHOMISH, STATE OF WASHINGTON.

HORIZONTAL DATUM

NAD 83/2011 WASHINGTON STATE COORDINATES-NORTH ZONE

BENCHMARK

FOUND INVERTED NAIL IN 4" CONC. MON.
ELEVATION = 464.46 FEET.

BASIS OF BEARING

THE MONUMENTED CENTERLINE OF 172ND STREET NORTHEAST, AS THE BEARING OF NORTH 89°4'58" WEST, ALSO BEING THE SOUTH LINE OF SECTION 24, PER THE ARLINGTON ROUNDABOUT PLAZA BINDING SITE PLAN, RECORDED UNDER AUDITOR'S FILE NUMBER 201808315011.

EQUIPMENT & PROCEDURES

METHOD OF SURVEY:
SURVEY PERFORMED BY FIELD TRAVERSE
INSTRUMENTATION:
LEICA TS16 ROBOTIC ELECTRONIC TOTAL STATION
PRECISION:
MEETS OR EXCEEDS STATE STANDARDS WAC 332-130-090

REFERENCES

- (R1) ARLINGTON ROUNDABOUT PLAZA BINDING SITE PLAN, AFN 201808315011
- (R2) VERIZON BINDING SITE PLAN NO. 002-02 AF NO. 200705085171

SURVEY NOTES

THIS SURVEY HAS BEEN PREPARED FOR THE EXCLUSIVE USE OF PARTIES WHOSE NAMES APPEAR HEREON ONLY, AND DOES NOT EXTEND TO ANY UNNAMED THIRD PARTIES WITHOUT EXPRESS RECERTIFICATION BY THE LAND SURVEYOR OF RECORD.

BOUNDARY LINES SHOWN AND CORNERS SET REPRESENT DEED LOCATIONS; OWNERSHIP LINES MAY VARY. NO GUARANTEE OF OWNERSHIP IS EXPRESSED OR IMPLIED. THIS SURVEY WAS PERFORMED WITHOUT THE BENEFIT OF A TITLE REPORT AND DOES NOT PURPORT TO SHOW ALL EASEMENTS, RESTRICTIONS, RESERVATIONS, AND OCCUPATION WHICH MAY ENCUMBER TITLE OR USE OF SUBJECT PROPERTY.

EARTHWORK QUANTITIES

STRIPPING:	200 CY
CUT:	400 CY
FILL:	400 CY
NET:	0 CY (CUT/FILL)
DISTURBED AREA:	14,894 SF (0.34 AC)

THE ABOVE QUANTITIES ARE FOR PERMITTING PURPOSES. CONTRACTOR TO VERIFY.

CONTACT LIST

DEVELOPER: CORSTONE CONTRACTORS, LLC c/o LAND PRO GROUP 10515 20TH ST SE, SUITE #202 LAKE STEVENS, WASHINGTON 98258 CONTACT: MARK VILLWOOCK PHONE: (425) 231-2718 EMAIL: mvillwoock@landprogrp.com	CIVIL ENGINEER: SOLID GROUND ENGINEERING 8105 166TH AVE NE REDMOND, WA 98052 CONTACT: TOM ABBOTT, PE PHONE: (425) 281-8324 EMAIL: tabbott@solidgroundpnw.com
GEOTECHNICAL ENGINEER: COBALLT GEOSCIENCES, LLC P.O. BOX 1792 NORTH BEND, WASHINGTON 98045 CONTACT: PHIL HABERMAN, PE PHONE: (208) 331-1097 EMAIL: phil@coballtgeo.com	LANDSCAPE ARCHITECT: ORIGIN DESIGN GROUP 1031 185TH AVENUE NE SNOHOMISH, WASHINGTON 98290 CONTACT: KRISTAL LOWE PHONE: (425) 346-8105 EMAIL: origindg@gmail.com

SURVEYOR:
PACIFIC COAST SURVEYS, INC.
P.O. BOX 13619
MILL CREEK, WASHINGTON 98082
CONTACT: DARREN RIDDLER, PLS
PHONE: (425) 512-709
FAX: (425) 357-3577
EMAIL: darren@pcsurveys.net

TABLE OF CONTENTS

1	COVER SHEET	9	INFILTRATION GALLERY SECTIONS AND DETAILS
2	EXISTING CONDITIONS MAP	10-11	NOTES AND DETAILS
3	TESC PLAN	12	SANITARY SEWER PLAN
4	TESC NOTES AND DETAILS	13	SANITARY SEWER PROFILES
5	HORIZONTAL CONTROL PLAN	14	SANITARY SEWER DETAILS
6	ROAD AND GRADING PLAN	15	WATER PLAN
7	STORM DRAINAGE PLAN	16	MAILBOX PLAN
8	ROAD AND STORM DRAINAGE PROFILES AND SECTIONS		

PROJECT INFORMATION

TAX PARCELS:	00893800000500
SITE ADDRESS:	XXXX JENSEN FARM LANE ARLINGTON, WA 98223
SITE AREA:	13,674 SF (0.31 AC)
EXISTING ZONING:	RHC (RESIDENTIAL HIGH CAPACITY)
PROPOSED LOTS:	4 LOTS
BUILDING SETBACKS:	10' FRONT 5' SIDE 15' REAR
WATER:	CITY OF ARLINGTON
SEWER:	CITY OF ARLINGTON
POWER:	SNOHOMISH PUD
GAS:	PUGET SOUND ENERGY
TELEPHONE:	COMCAST
CABLE:	COMCAST
SCHOOL DISTRICT:	ARLINGTON SCHOOL DISTRICT NO. 16
FIRE DISTRICT:	NORTH COUNTY REGIONAL FIRE AUTHORITY

SURVEY DISCLAIMER

THE TOPOGRAPHIC SURVEY WAS PERFORMED BY PACIFIC COAST SURVEYS. SOLID GROUND ENGINEERING ASSUMES NO LIABILITY AS TO THE ACCURACY AND COMPLETENESS OF THIS DATA. ANY DISCREPANCIES FOUND BETWEEN WHAT IS SHOWN ON THE PLANS AND WHAT IS NOTED IN THE FIELD SHOULD BE BROUGHT IMMEDIATELY TO THE ATTENTION OF THE ENGINEER.

UTILITY NOTE

THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING UTILITIES PRIOR TO ANY CONSTRUCTION. AGENCIES INVOLVED SHALL BE NOTIFIED WITHIN A REASONABLE TIME PRIOR TO THE START OF CONSTRUCTION.



PROJECT FILE No. PWD 3608

CITY OF ARLINGTON
CONSTRUCTION DRAWING REVIEW APPROVAL

THIS PLAN SHEET HAS BEEN REVIEWED AND APPROVED PER THE CONDITIONS ON THE TITLE SHEET.

BY: _____
DEVELOPMENT SERVICES MANAGER

DATE: _____ THIS APPROVAL VALID FOR 18 MONTHS



ENGINEER'S STAMP

REVISIONS	DESCRIPTION	DATE

Solid Ground Engineering
8105 166th Ave NE
Redmond, WA 98052

COVER SHEET

CORSTONE CONTRACTORS, LLC

TAPERT ARLINGTON JENSEN

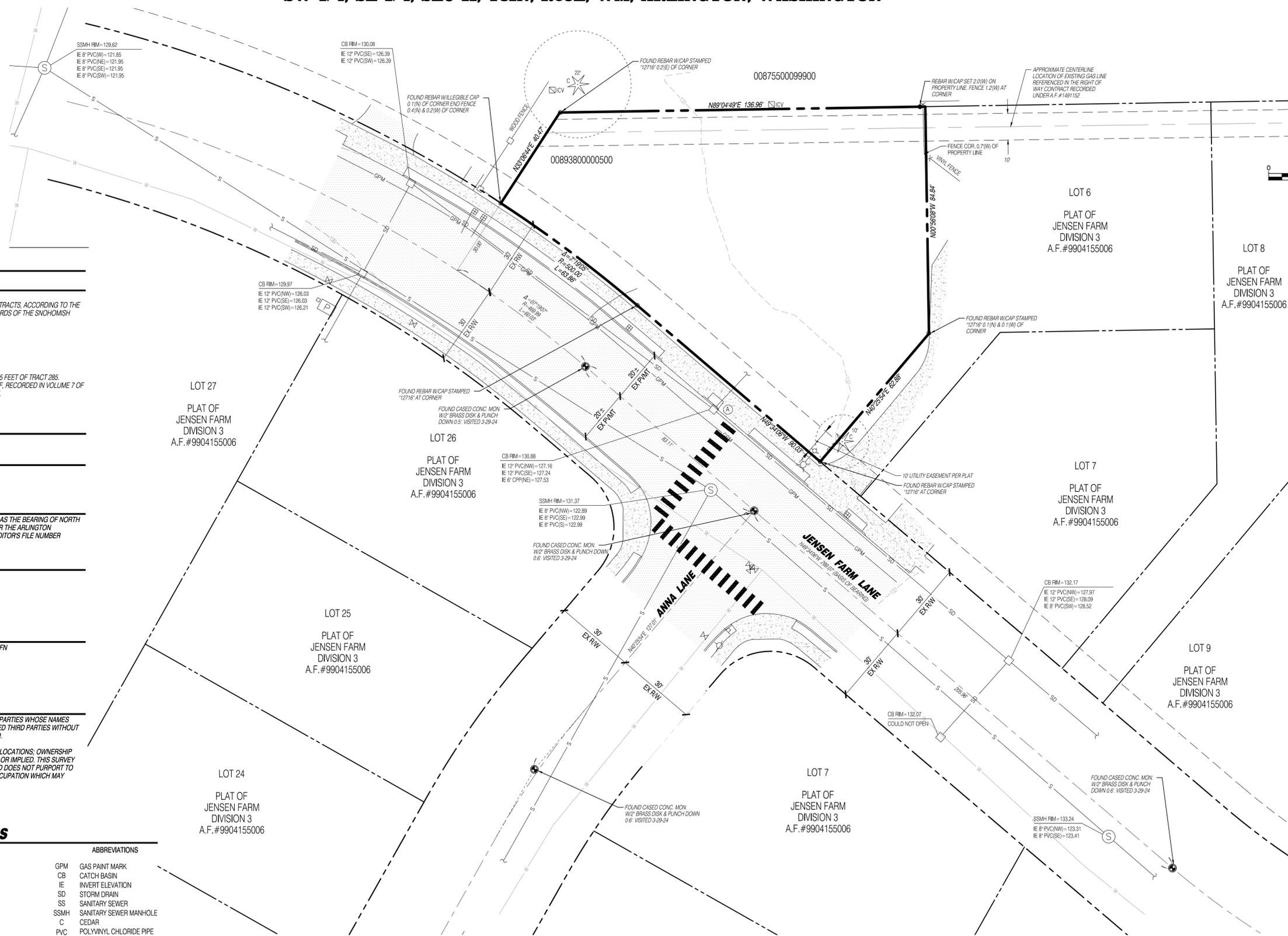
ARLINGTON, WA

DRAWN BY:	KMA
CHECKED BY:	TPA
DATE:	5-3-24
JURISDICTION:	CITY OF ARLINGTON
JOB NUMBER:	24-0041C

CS-01
1 OF 16

C:\Users\pcc\OneDrive\Solid Ground Engineering\24041 Tapert Arlington Jensen\Project Files\Drawings\24041-01-Cover.dwg 5/21/2024 2:28:35 PM

SW 1/4, SE 1/4, SEC 11, T31N, R05E, WM, ARLINGTON, WASHINGTON



SURVEY INFORMATION

LEGAL DESCRIPTION

0089380000500
THE SOUTHERLY 185.5 FEET OF TRACT 285, SUNNYSIDE FIVE ACRE TRACTS, ACCORDING TO THE PLAT THEREOF, RECORDED IN VOLUME 7 OF PLATS, PAGE 19 RECORDS OF THE SNOHOMISH COUNTY, WASHINGTON.

EXCEPT THE NORTH 135.5 FEET AND WEST 140 FEET THEREOF;

SITUATE IN THE COUNTY OF SNOHOMISH, STATE OF WASHINGTON.

LOT 6 PLAT OF JENSEN FARM DIVISION 3:
THE NORTH 135.5 FEET OF THE WEST 140 FEET OF THE SOUTH 135.5 FEET OF TRACT 285, SUNNYSIDE FIVE ACRE TRACTS, ACCORDING TO THE PLAT THEREOF, RECORDED IN VOLUME 7 OF PLATS, PAGE 19 RECORDS OF SNOHOMISH COUNTY, WASHINGTON.

SITUATE IN THE COUNTY OF SNOHOMISH, STATE OF WASHINGTON.

HORIZONTAL DATUM

NAD 83/2011 WASHINGTON STATE COORDINATES-NORTH ZONE

BENCHMARK

FOUND INVERTED NAIL IN 4" CONC. MON.

ELEVATION = 464.46 FEET.

BASIS OF BEARING

THE MONUMENTED CENTERLINE OF 172ND STREET NORTHEAST, AS THE BEARING OF NORTH 88°14'56" WEST, ALSO BEING THE SOUTH LINE OF SECTION 24, PER THE ARLINGTON ROUNDABOUT PLAZA BINDING SITE PLAN, RECORDED UNDER AUDITOR'S FILE NUMBER 201808315011.

EQUIPMENT & PROCEDURES

METHOD OF SURVEY:
SURVEY PERFORMED BY FIELD TRAVERSE
INSTRUMENTATION:
LEICA TS16 ROBOTIC ELECTRONIC TOTAL STATION
PRECISION:
MEETS OR EXCEEDS STATE STANDARDS WAC 332-130-090

REFERENCES

(R1) ARLINGTON ROUNDABOUT PLAZA BINDING SITE PLAN, AFN 201808315011

(R2) VERIZON BINDING SITE PLAN NO. 002-05
AFN NO. 200705085171

SURVEY NOTES

THIS SURVEY HAS BEEN PREPARED FOR THE EXCLUSIVE USE OF PARTIES WHOSE NAMES APPEAR HEREON ONLY, AND DOES NOT EXTEND TO ANY UNNAMED THIRD PARTIES WITHOUT EXPRESS RECERTIFICATION BY THE LAND SURVEYOR OF RECORD.

BOUNDARY LINES SHOWN AND CORNERS SET REPRESENT DEED LOCATIONS; OWNERSHIP LINES MAY VARY. NO GUARANTEE OF OWNERSHIP IS EXPRESSED OR IMPLIED. THIS SURVEY WAS PERFORMED WITHOUT THE BENEFIT OF A TITLE REPORT AND DOES NOT PURPORT TO SHOW ALL EASEMENTS, RESTRICTIONS, RESERVATIONS, AND OCCUPATION WHICH MAY ENCUMBER TITLE OR USE OF SUBJECT PROPERTY.

LEGEND AND ABBREVIATIONS

EXISTING SYMBOLS	DESCRIPTION	ABBREVIATIONS
⊕	MONUMENT IN CASE	GPM GAS PAINT MARK
●	FOUND REBAR W/ CAP	CB CATCH BASIN
○	EXISTING CORNER MONUMENT AS NOTED	IE INVERT ELEVATION
⊙	STORM MANHOLE	SD STORM DRAIN
⊙	SEWER CLEANOUT	SS SANITARY SEWER
⊙	SEWER MANHOLE	SSMH SANITARY SEWER MANHOLE
⊙	CATCH BASIN	C CEDAR
⊙	IRRIGATION CONTROL VALVE	PVC POLYVINYL CHLORIDE PIPE
⊙	FIRE HYDRANT	OPP CONCRETE PRESSURE PIPE
⊙	POWER TRANSFORMER	PP POWER POLE
⊙	WATER METER	TBR TO BE REMOVED
⊙	WATER VALVE	EX EXISTING
⊙	SIGN POST	RW RIGHT-OF-WAY
⊙	LIGHT POLE	
⊙	TELCO RISER	
⊙	CONIFEROUS TREE	

SURVEY DISCLAIMER

THE TOPOGRAPHIC SURVEY WAS PERFORMED BY PACIFIC COAST SURVEYS. SOLID GROUND ENGINEERING ASSUMES NO LIABILITY AS TO THE ACCURACY AND COMPLETENESS OF THIS DATA. ANY DISCREPANCIES FOUND BETWEEN WHAT IS SHOWN ON THE PLANS AND WHAT IS NOTED IN THE FIELD SHOULD BE BROUGHT IMMEDIATELY TO THE ATTENTION OF THE ENGINEER.

UTILITY NOTE

THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING UTILITIES PRIOR TO ANY CONSTRUCTION. AGENCIES INVOLVED SHALL BE NOTIFIED WITHIN A REASONABLE TIME PRIOR TO THE START OF CONSTRUCTION.



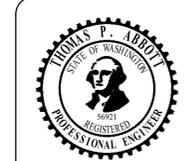
PROJECT FILE No. PWD 3608

CITY OF ARLINGTON
CONSTRUCTION DRAWING REVIEW APPROVAL

THIS PLAN SHEET HAS BEEN REVIEWED AND APPROVED PER THE CONDITIONS ON THE TITLE SHEET.

BY: _____
DEVELOPMENT SERVICES MANAGER

DATE: _____ THIS APPROVAL VALID FOR 18 MONTHS



ENGINEER'S STAMP

REVISIONS	DESCRIPTION	DATE	#

Solid Ground Engineering
8705 166th Ave NE
Redmond, WA 98052

EXISTING CONDITIONS MAP

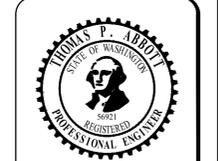
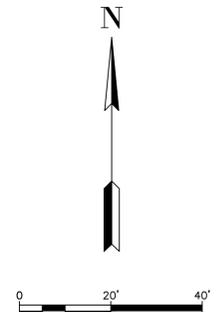
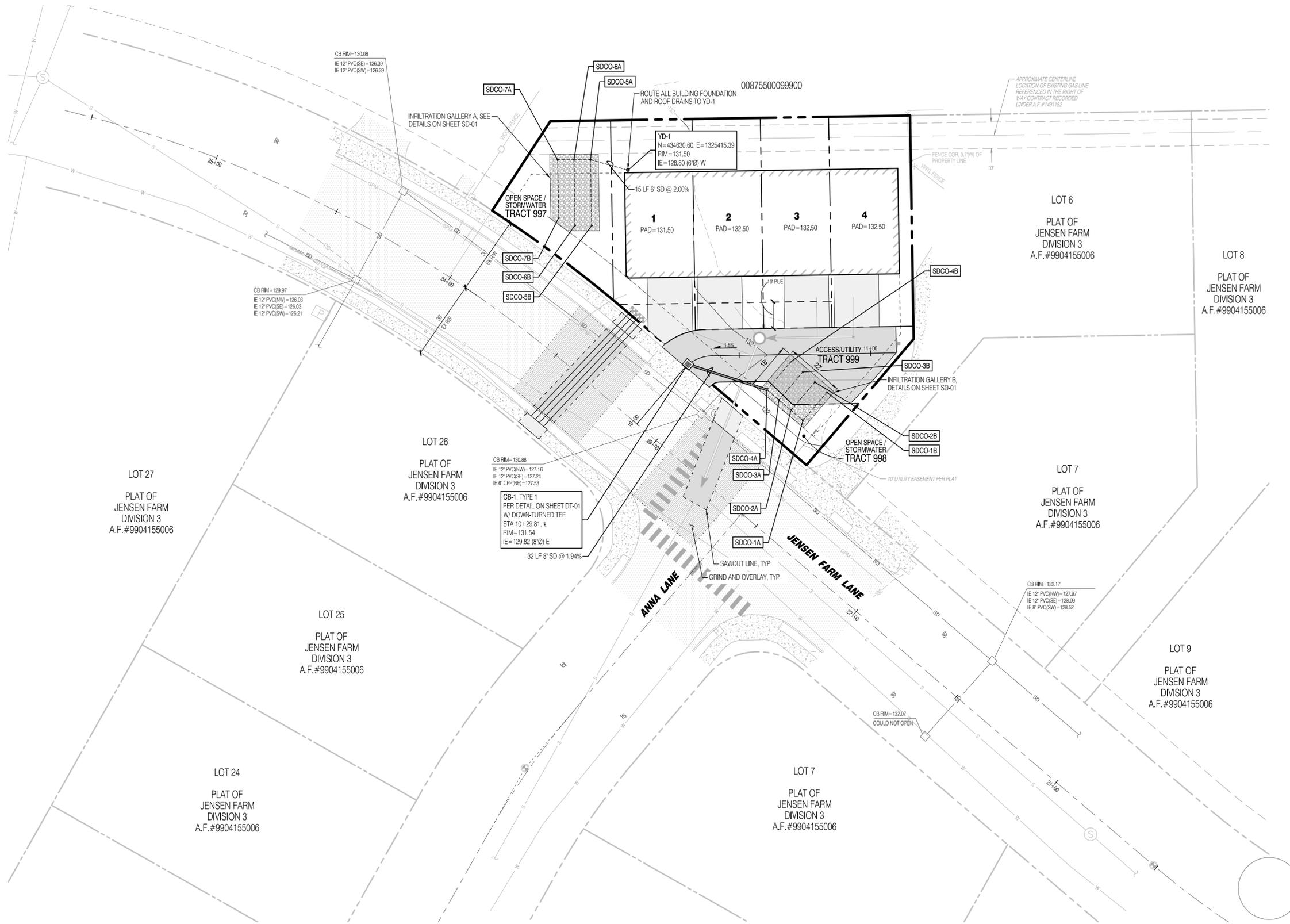
CORSTONE CONTRACTORS, LLC
TAPERT ARLINGTON JENSEN
ARLINGTON, WA

DRAWN BY:	KMA
CHECKED BY:	TPA
DATE:	5-3-24
JURISDICTION:	CITY OF ARLINGTON
JOB NUMBER:	24-0041C

EC-01
2 OF 16

C:\Users\paco\Documents\Ground Engineering\24-0041 Tapert Arlington Jensen\Project Files\Drawings\24-0041 EC-01 CEC.dwg 5/21/2024 2:52:42 PM

SW 1/4, SE 1/4, SEC 11, T31N, R05E, WM, ARLINGTON, WASHINGTON



ENGINEER'S STAMP

REVISIONS	DESCRIPTION	DATE	#

STORM DRAINAGE PLAN

CORSTONE CONTRACTORS, LLC
TAPERT ARLINGTON
JENSEN
ARLINGTON, WA

DRAWN BY:	KMA
CHECKED BY:	TPA
DATE:	5-3-24
JURISDICTION:	CITY OF ARLINGTON
JOB NUMBER:	24-0041C

DR-01
7 OF 16

PROJECT FILE No. PWD 3608

CITY OF ARLINGTON
 CONSTRUCTION DRAWING REVIEW APPROVAL

THIS PLAN SHEET HAS BEEN REVIEWED AND APPROVED PER THE CONDITIONS ON THE TITLE SHEET.

BY: _____
 DEVELOPMENT SERVICES MANAGER

DATE: _____ THIS APPROVAL VALID FOR 18 MONTHS

SURVEY DISCLAIMER
 THE TOPOGRAPHIC SURVEY WAS PERFORMED BY PACIFIC COAST SURVEYS. SOLID GROUND ENGINEERING ASSUMES NO LIABILITY AS TO THE ACCURACY AND COMPLETENESS OF THIS DATA. ANY DISCREPANCIES FOUND BETWEEN WHAT IS SHOWN ON THE PLANS AND WHAT IS NOTED IN THE FIELD SHOULD BE BROUGHT IMMEDIATELY TO THE ATTENTION OF THE ENGINEER.

UTILITY NOTE
 THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING UTILITIES PRIOR TO ANY CONSTRUCTION. AGENCIES INVOLVED SHALL BE NOTIFIED WITHIN A REASONABLE TIME PRIOR TO THE START OF CONSTRUCTION.



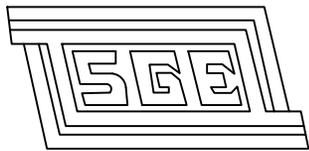
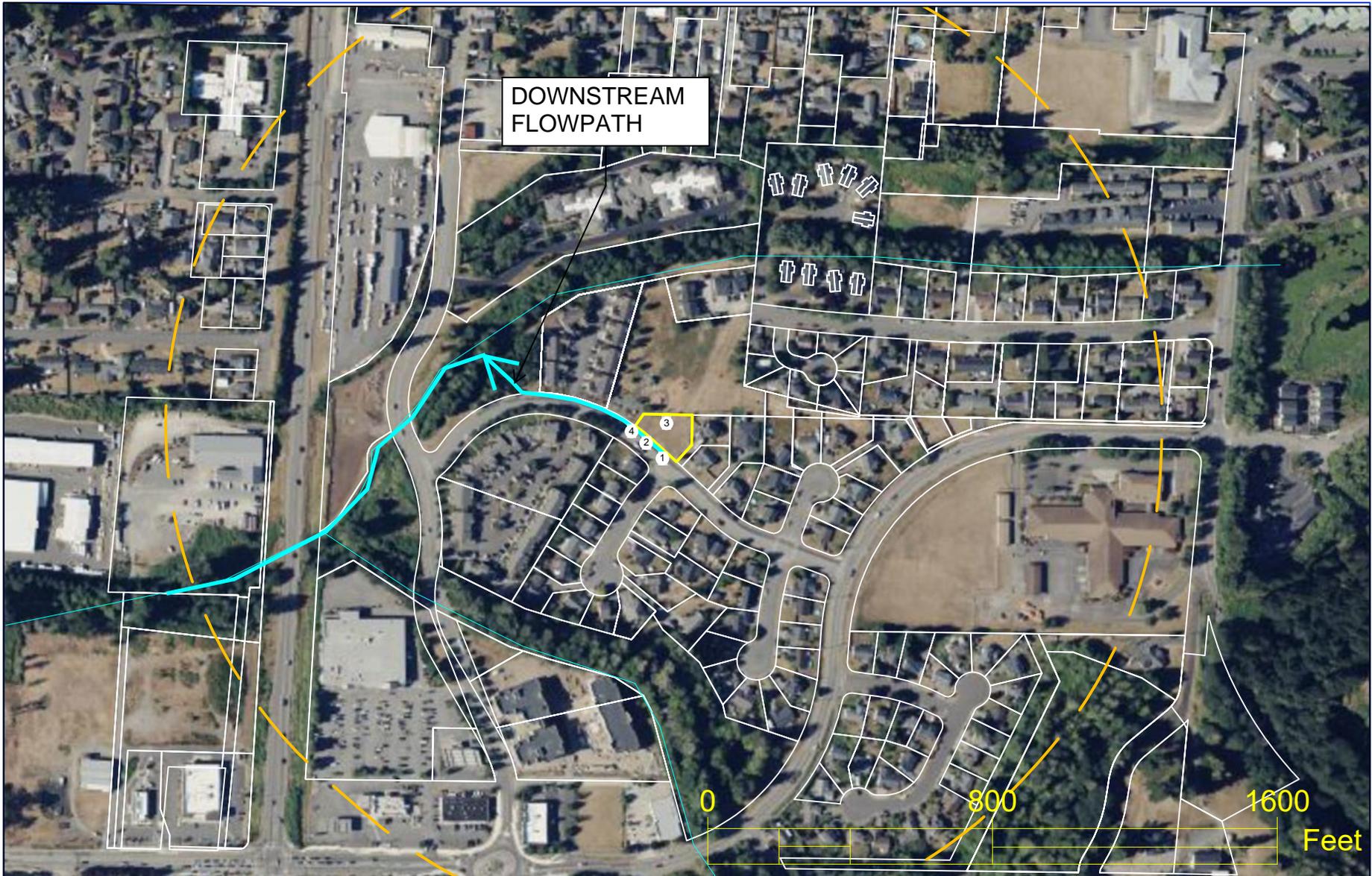
C:\Users\jacob\OneDrive\Documents\Projects\24041 Tapert Arlington Jensen Farm\Drawings\DWG\24041C0404.dwg 5/21/2024 3:53:11 PM

Appendix 2: Temporary Erosion and Sediment Control Design

1. TESC Plans

Appendix 3: Downstream Analysis

1. Downstream Analysis Map
2. Downstream Analysis Site Visit Pictures
3. USDA Soils Map & Description



Solid Ground Engineering

8105 166th Ave NE
Redmond, WA 98052

CORSTONE CONTRACTORS, LLC
TAPERT ARLINGTON JENSEN

DOWNSTREAM ANALYSIS MAP

JOB NUMBER:	24-0041	DATE:	5-20-24
JURISDICTION:	Arlington	DRAWN BY:	CJD

Downstream Analysis Photographs



Image 1 & 2: Front of property

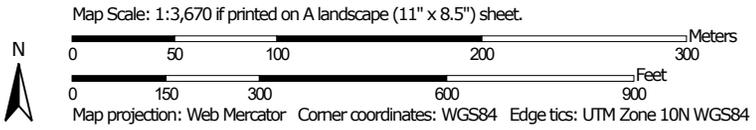
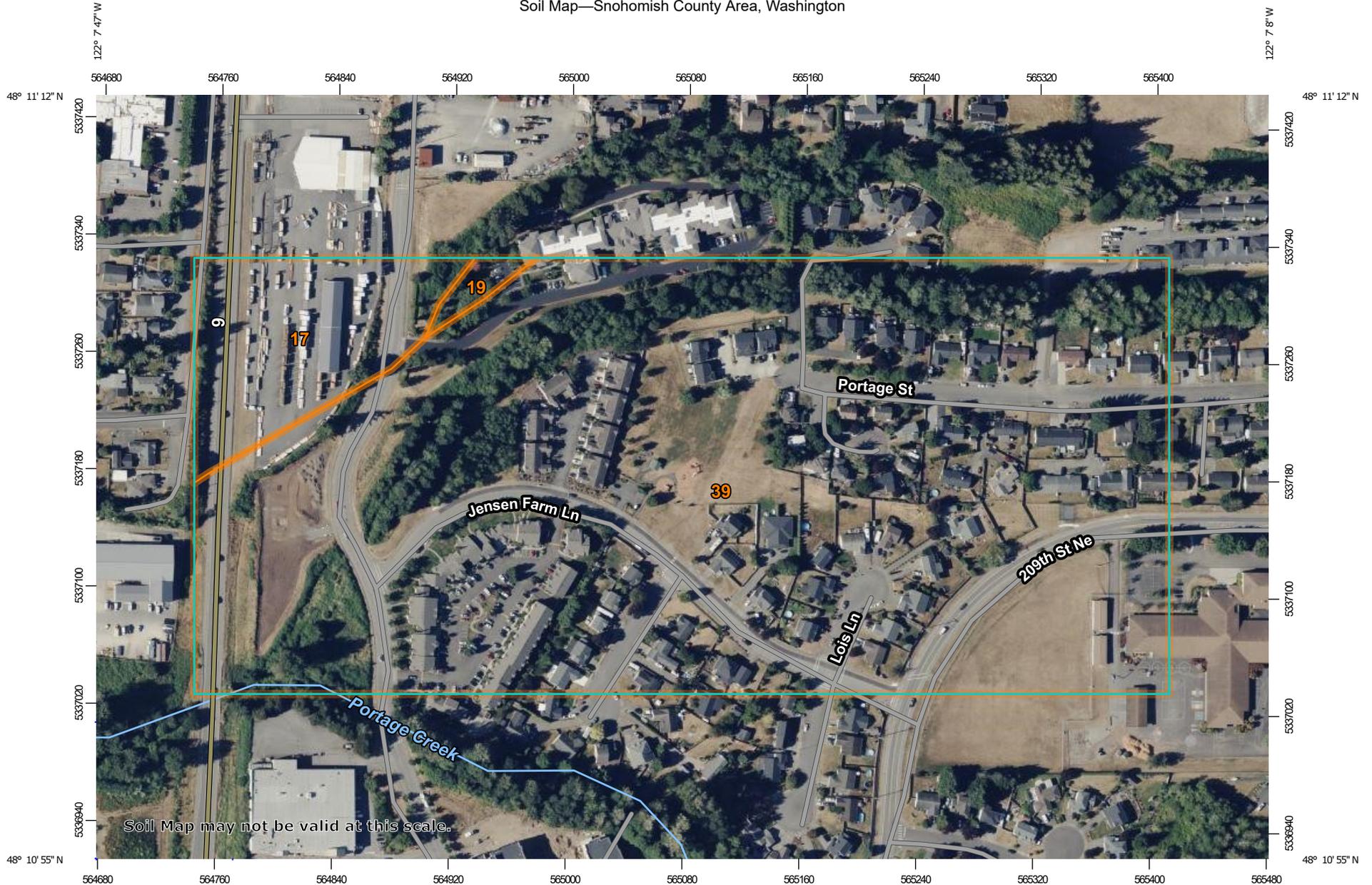


Image 3: View from back of site looking towards the southeast.



Image 4: Flow travels to the west through existing catch basins.

Soil Map—Snohomish County Area, Washington



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

Water Features



Streams and Canals

Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

Background



Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Snohomish County Area, Washington

Survey Area Data: Version 25, Aug 29, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 14, 2022—Sep 1, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
17	Everett very gravelly sandy loam, 0 to 8 percent slopes	4.4	8.9%
19	Everett very gravelly sandy loam, 15 to 30 percent slopes	0.3	0.7%
39	Norma loam	44.5	90.4%
Totals for Area of Interest		49.3	100.0%

Snohomish County Area, Washington

39—Norma loam

Map Unit Setting

National map unit symbol: 2hyx

Elevation: 0 to 1,000 feet

Mean annual precipitation: 35 to 60 inches

Mean annual air temperature: 48 to 52 degrees F

Frost-free period: 150 to 200 days

Farmland classification: Prime farmland if drained

Map Unit Composition

Norma, undrained, and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Norma, Undrained

Setting

Landform: Drainageways, depressions

Parent material: Alluvium

Typical profile

H1 - 0 to 10 inches: ashy loam

H2 - 10 to 28 inches: sandy loam

H3 - 28 to 60 inches: sandy loam

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Poorly drained

Capacity of the most limiting layer to transmit water

(Ksat): Moderately high to high (0.57 to 1.98 in/hr)

Depth to water table: About 0 inches

Frequency of flooding: None

Frequency of ponding: Frequent

Available water supply, 0 to 60 inches: Moderate (about 9.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 5w

Hydrologic Soil Group: B/D

Ecological site: F002XA007WA - Puget Lowlands Wet Forest

Forage suitability group: Wet Soils (G002XN102WA)

Other vegetative classification: Wet Soils (G002XN102WA)

Hydric soil rating: Yes

Minor Components

Norma, drained

Percent of map unit: 5 percent

Landform: Depressions

Other vegetative classification: Seasonally Wet Soils
(G002XN202WA)

Hydric soil rating: Yes

Terric medisaprists, undrained

Percent of map unit: 5 percent

Landform: Depressions

Other vegetative classification: Wet Soils (G002XN102WA)

Hydric soil rating: Yes

Bellingham, undrained

Percent of map unit: 5 percent

Landform: Depressions

Other vegetative classification: Wet Soils (G002XN102WA)

Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Snohomish County Area, Washington

Survey Area Data: Version 25, Aug 29, 2023

Snohomish County Area, Washington

17—Everett very gravelly sandy loam, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2t629

Elevation: 30 to 900 feet

Mean annual precipitation: 35 to 91 inches

Mean annual air temperature: 48 to 52 degrees F

Frost-free period: 180 to 240 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Everett and similar soils: 80 percent

Minor components: 20 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Everett

Setting

Landform: Kames, moraines, eskers

Landform position (two-dimensional): Summit, shoulder

Landform position (three-dimensional): Interfluve, crest

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Sandy and gravelly glacial outwash

Typical profile

O_i - 0 to 1 inches: slightly decomposed plant material

A - 1 to 3 inches: very gravelly sandy loam

B_w - 3 to 24 inches: very gravelly sandy loam

C₁ - 24 to 35 inches: very gravelly loamy sand

C₂ - 35 to 60 inches: extremely cobbly coarse sand

Properties and qualities

Slope: 0 to 8 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat excessively drained

Capacity of the most limiting layer to transmit water (K_{sat}): High
(1.98 to 5.95 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Low (about 3.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4s

Hydrologic Soil Group: A

Ecological site: F002XA004WA - Puget Lowlands Forest

Forage suitability group: Droughty Soils (G002XN402WA),
Droughty Soils (G002XF403WA), Droughty Soils
(G002XS401WA)

Other vegetative classification: Droughty Soils (G002XN402WA),
Droughty Soils (G002XF403WA), Droughty Soils
(G002XS401WA)

Hydric soil rating: No

Minor Components

Alderwood

Percent of map unit: 10 percent

Landform: Hills, ridges

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Crest, tal

Down-slope shape: Convex, linear

Across-slope shape: Convex

Hydric soil rating: No

Indianola

Percent of map unit: 10 percent

Landform: Terraces, kames, eskers

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Hydric soil rating: No

Data Source Information

Soil Survey Area: Snohomish County Area, Washington

Survey Area Data: Version 25, Aug 29, 2023

Snohomish County Area, Washington

19—Everett very gravelly sandy loam, 15 to 30 percent slopes

Map Unit Setting

National map unit symbol: 2t62c

Elevation: 30 to 900 feet

Mean annual precipitation: 35 to 91 inches

Mean annual air temperature: 48 to 52 degrees F

Frost-free period: 180 to 240 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Everett and similar soils: 80 percent

Minor components: 20 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Everett

Setting

Landform: Kames, moraines, eskers

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Sandy and gravelly glacial outwash

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material

A - 1 to 3 inches: very gravelly sandy loam

Bw - 3 to 24 inches: very gravelly sandy loam

C1 - 24 to 35 inches: very gravelly loamy sand

C2 - 35 to 60 inches: extremely cobbly coarse sand

Properties and qualities

Slope: 15 to 30 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat excessively drained

Capacity of the most limiting layer to transmit water (Ksat): High
(1.98 to 5.95 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Low (about 3.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4e

Hydrologic Soil Group: A

Ecological site: F002XA004WA - Puget Lowlands Forest

Forage suitability group: Droughty Soils (G002XN402WA),
Droughty Soils (G002XS401WA)
Other vegetative classification: Droughty Soils (G002XN402WA),
Droughty Soils (G002XS401WA)
Hydric soil rating: No

Minor Components

Indianola

Percent of map unit: 10 percent
Landform: Terraces, kames, eskers
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Alderwood

Percent of map unit: 10 percent
Landform: Hills, ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Nose slope, side slope, tal
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Data Source Information

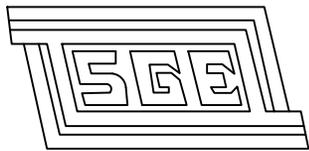
Soil Survey Area: Snohomish County Area, Washington
Survey Area Data: Version 25, Aug 29, 2023

Appendix 4: Infiltration Facilities Analysis

1. Predeveloped Hydrology Map
2. Developed Hydrology Map
3. WWHM2012 Output – Infiltration Gallery A
4. WWHM2012 Output – Infiltration Gallery B



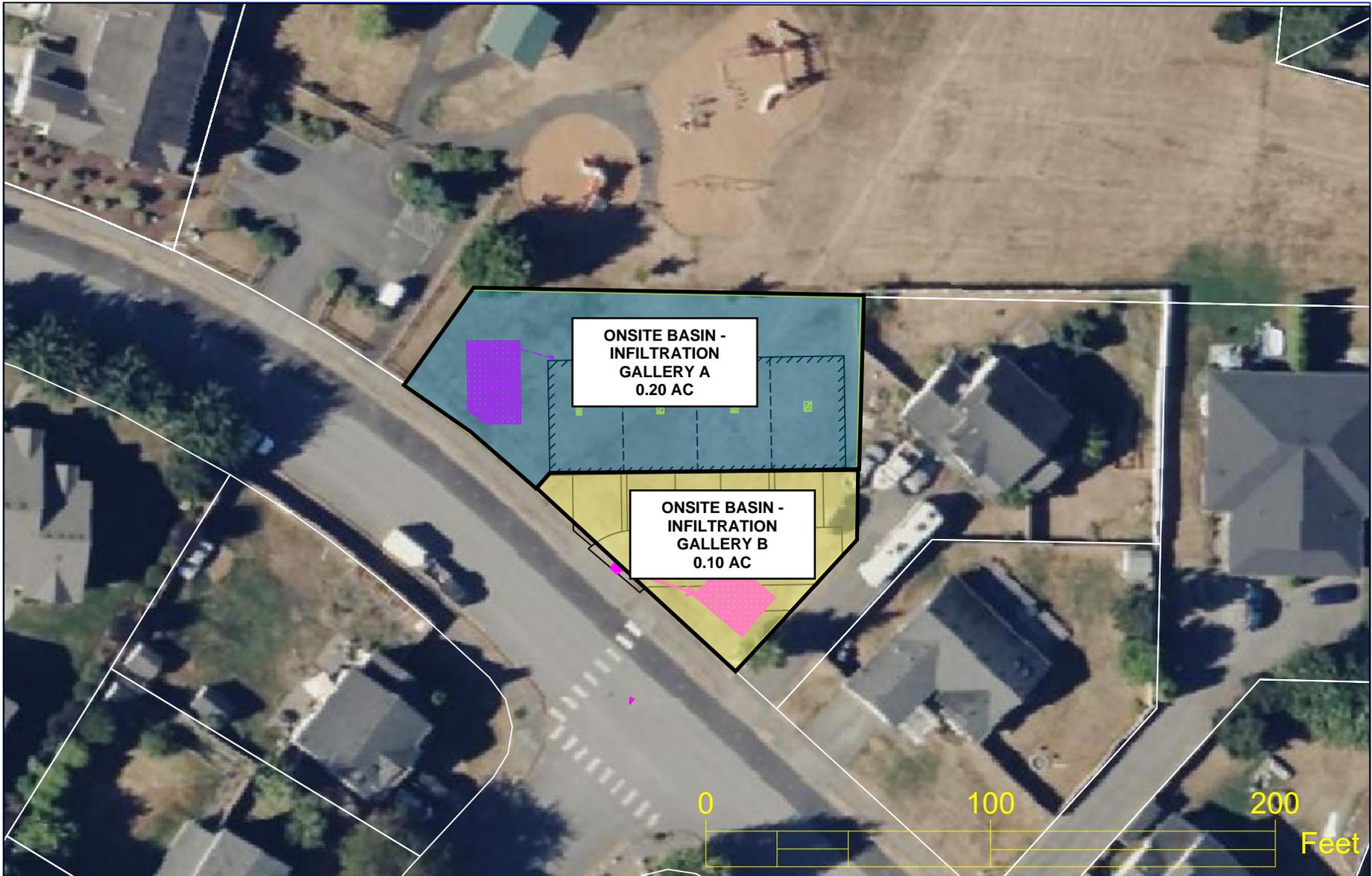
CORSTONE CONTRACTORS, LLC
 TAPERT ARLINGTON JENSEN
 PREDEVELOPED HYDROLOGY MAP



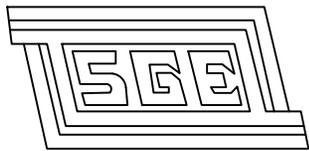
Solid Ground Engineering

8105 166th Ave NE
 Redmond, WA 98052

JOB NUMBER:	24-0041	DATE:	5-20-24
JURISDICTION:	Arlington	DRAWN BY:	CJD



CORSTONE CONTRACTORS, LLC
 TAPERT ARLINGTON JENSEN
 DEVELOPED HYDROLOGY MAP



Solid Ground Engineering

8105 166th Ave NE
 Redmond, WA 98052

JOB NUMBER:	24-0041	DATE:	5-20-24
JURISDICTION:	Arlington	DRAWN BY:	CJD

WWHM2012
PROJECT REPORT

General Model Information

WWHM2012 Project Name: Tract 997

Site Name: Tapert Arlington Jensen

Site Address:

City: Arlington

Report Date: 5/20/2024

Gage: Everett

Data Start: 1948/10/01

Data End: 2009/09/30

Timestep: 15 Minute

Precip Scale: 0.000 (adjusted)

Version Date: 2023/01/27

Version: 4.2.19

POC Thresholds

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

High Flow Threshold for POC1: 50 Year

DRAFT

Landuse Basin Data
Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use C, Forest, Flat	acre 0.2
Pervious Total	0.2
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.2

DRAFT

Mitigated Land Use

Tract 997 Gallery

Bypass: No

GroundWater: No

Pervious Land Use acre
C, Pasture, Flat 0.1

Pervious Total 0.1

Impervious Land Use acre
ROOF TOPS FLAT 0.1

Impervious Total 0.1

Basin Total 0.2

DRAFT

Routing Elements
Predeveloped Routing

DRAFT

Mitigated Routing

Tract 997 Trench

Bottom Length: 29.00 ft.
 Bottom Width: 18.60 ft.
 Trench bottom slope 1: 0 To 1
 Trench Left side slope 0: 0 To 1
 Trench right side slope 2: 0 To 1
 Material thickness of first layer: 2.5
 Pour Space of material for first layer: 0.35
 Material thickness of second layer: 0
 Pour Space of material for second layer: 0
 Material thickness of third layer: 0
 Pour Space of material for third layer: 0
 Infiltration On
 Infiltration rate: 2
 Infiltration safety factor: 1
 Total Volume Infiltrated (ac-ft.): 26.754
 Total Volume Through Riser (ac-ft.): 0
 Total Volume Through Facility (ac-ft.): 26.754
 Percent Infiltrated: 100
 Total Precip Applied to Facility: 0
 Total Evap From Facility: 0
 Discharge Structure
 Riser Height: 0 ft.
 Riser Diameter: 0 in.
 Element Flows To:
 Outlet 1 Outlet 2

Gravel Trench Bed Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.012	0.000	0.000	0.000
0.0278	0.012	0.000	0.000	0.025
0.0556	0.012	0.000	0.000	0.025
0.0833	0.012	0.000	0.000	0.025
0.1111	0.012	0.000	0.000	0.025
0.1389	0.012	0.000	0.000	0.025
0.1667	0.012	0.000	0.000	0.025
0.1944	0.012	0.000	0.000	0.025
0.2222	0.012	0.001	0.000	0.025
0.2500	0.012	0.001	0.000	0.025
0.2778	0.012	0.001	0.000	0.025
0.3056	0.012	0.001	0.000	0.025
0.3333	0.012	0.001	0.000	0.025
0.3611	0.012	0.001	0.000	0.025
0.3889	0.012	0.001	0.000	0.025
0.4167	0.012	0.001	0.000	0.025
0.4444	0.012	0.001	0.000	0.025
0.4722	0.012	0.002	0.000	0.025
0.5000	0.012	0.002	0.000	0.025
0.5278	0.012	0.002	0.000	0.025
0.5556	0.012	0.002	0.000	0.025
0.5833	0.012	0.002	0.000	0.025
0.6111	0.012	0.002	0.000	0.025
0.6389	0.012	0.002	0.000	0.025

0.6667	0.012	0.002	0.000	0.025
0.6944	0.012	0.003	0.000	0.025
0.7222	0.012	0.003	0.000	0.025
0.7500	0.012	0.003	0.000	0.025
0.7778	0.012	0.003	0.000	0.025
0.8056	0.012	0.003	0.000	0.025
0.8333	0.012	0.003	0.000	0.025
0.8611	0.012	0.003	0.000	0.025
0.8889	0.012	0.003	0.000	0.025
0.9167	0.012	0.004	0.000	0.025
0.9444	0.012	0.004	0.000	0.025
0.9722	0.012	0.004	0.000	0.025
1.0000	0.012	0.004	0.000	0.025
1.0278	0.012	0.004	0.000	0.025
1.0556	0.012	0.004	0.000	0.025
1.0833	0.012	0.004	0.000	0.025
1.1111	0.012	0.004	0.000	0.025
1.1389	0.012	0.004	0.000	0.025
1.1667	0.012	0.005	0.000	0.025
1.1944	0.012	0.005	0.000	0.025
1.2222	0.012	0.005	0.000	0.025
1.2500	0.012	0.005	0.000	0.025
1.2778	0.012	0.005	0.000	0.025
1.3056	0.012	0.005	0.000	0.025
1.3333	0.012	0.005	0.000	0.025
1.3611	0.012	0.005	0.000	0.025
1.3889	0.012	0.006	0.000	0.025
1.4167	0.012	0.006	0.000	0.025
1.4444	0.012	0.006	0.000	0.025
1.4722	0.012	0.006	0.000	0.025
1.5000	0.012	0.006	0.000	0.025
1.5278	0.012	0.006	0.000	0.025
1.5556	0.012	0.006	0.000	0.025
1.5833	0.012	0.006	0.000	0.025
1.6111	0.012	0.007	0.000	0.025
1.6389	0.012	0.007	0.000	0.025
1.6667	0.012	0.007	0.000	0.025
1.6944	0.012	0.007	0.000	0.025
1.7222	0.012	0.007	0.000	0.025
1.7500	0.012	0.007	0.000	0.025
1.7778	0.012	0.007	0.000	0.025
1.8056	0.012	0.007	0.000	0.025
1.8333	0.012	0.007	0.000	0.025
1.8611	0.012	0.008	0.000	0.025
1.8889	0.012	0.008	0.000	0.025
1.9167	0.012	0.008	0.000	0.025
1.9444	0.012	0.008	0.000	0.025
1.9722	0.012	0.008	0.000	0.025
2.0000	0.012	0.008	0.000	0.025
2.0278	0.012	0.008	0.000	0.025
2.0556	0.012	0.008	0.000	0.025
2.0833	0.012	0.009	0.000	0.025
2.1111	0.012	0.009	0.000	0.025
2.1389	0.012	0.009	0.000	0.025
2.1667	0.012	0.009	0.000	0.025
2.1944	0.012	0.009	0.000	0.025
2.2222	0.012	0.009	0.000	0.025
2.2500	0.012	0.009	0.000	0.025

DRAFT

2.2778	0.012	0.009	0.000	0.025
2.3056	0.012	0.010	0.000	0.025
2.3333	0.012	0.010	0.000	0.025
2.3611	0.012	0.010	0.000	0.025
2.3889	0.012	0.010	0.000	0.025
2.4167	0.012	0.010	0.000	0.025
2.4444	0.012	0.010	0.000	0.025
2.4722	0.012	0.010	0.000	0.025
2.5000	0.012	0.010	0.000	0.025

DRAFT

Analysis Results
POC 1

DRAFT

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

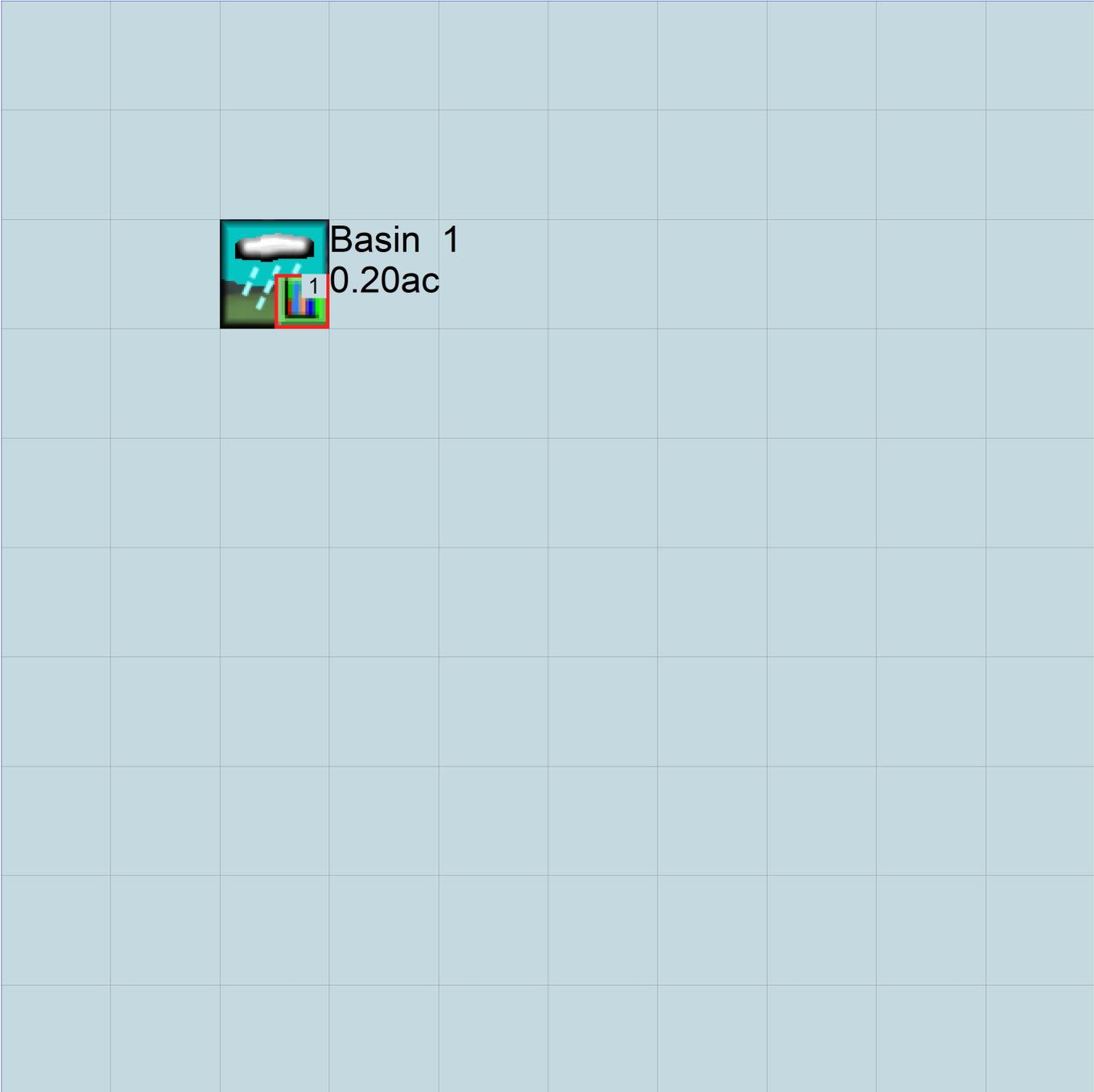
No PERLND changes have been made.

IMPLND Changes

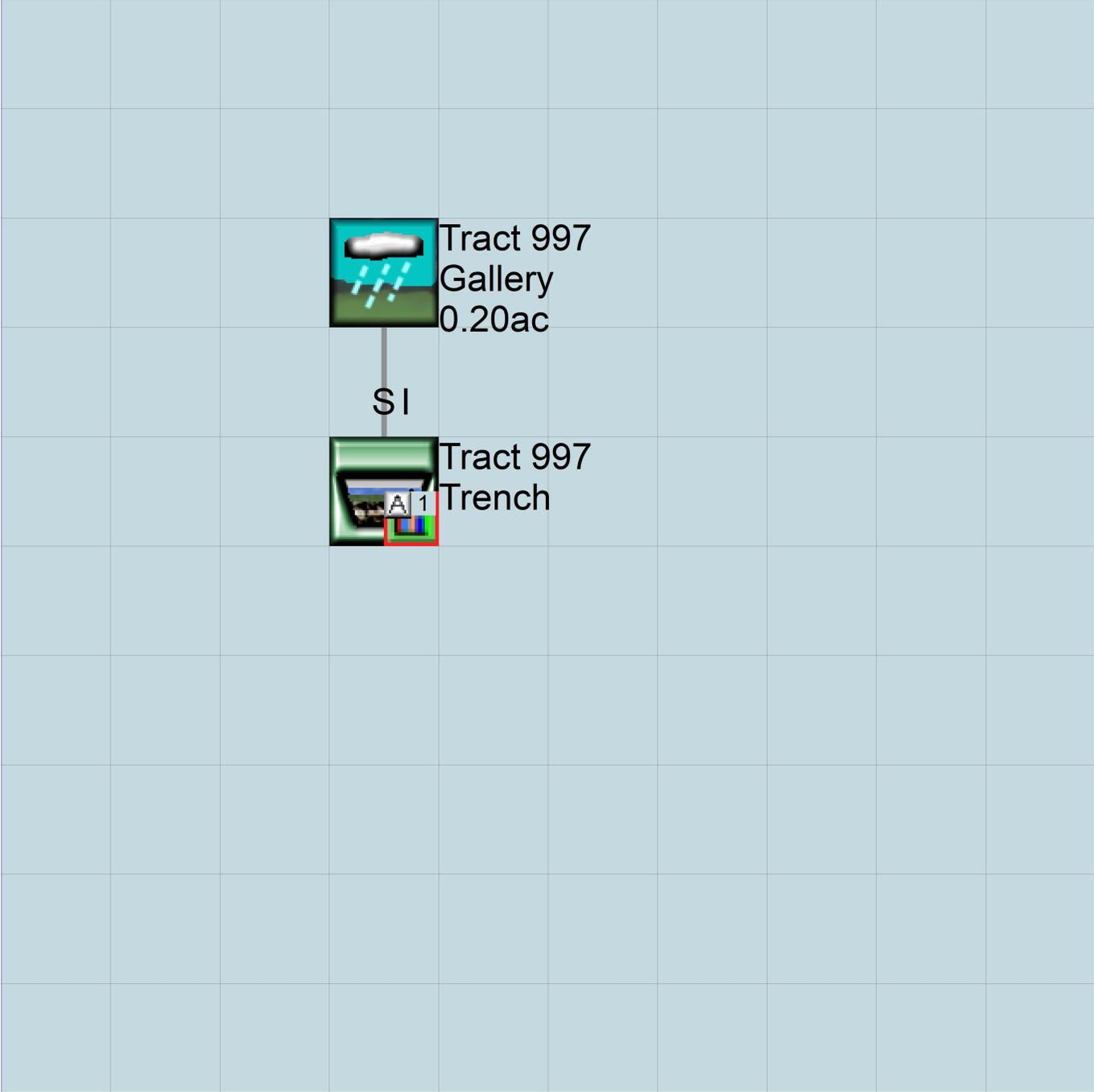
No IMPLND changes have been made.

DRAFT

Appendix
Predeveloped Schematic



Mitigated Schematic



Mitigated UCI File

RUN

GLOBAL

WVHM4 model simulation
START 1948 10 01 END 2009 09 30
RUN INTERP OUTPUT LEVEL 3 0
RESUME 0 RUN 1 UNIT SYSTEM 1
END GLOBAL

FILES

<File>	<Un#>	<-----File Name----->	***
<-ID->			***
WDM	26	Tract 997.wdm	
MESSU	25	MitTract 997.MES	
	27	MitTract 997.L61	
	28	MitTract 997.L62	
	30	POCTract 9971.dat	

END FILES

OPN SEQUENCE

INGRP INDELT 00:15
PERLND 13
IMPLND 4
RCHRES 1
COPY 1
COPY 501
DISPLY 1
END INGRP

END OPN SEQUENCE

DISPLY

DISPLY-INFO1
- #<-----Title----->***TRAN PIVL DIG1 FIL1 PYR DIG2 FIL2 YRND
1 Tract 997 Trench MAX 1 2 30 9
END DISPLY-INFO1

END DISPLY

COPY

TIMESERIES
- # NPT NMN ***
1 1 1
501 1 1
END TIMESERIES

END COPY

GENER

OPCODE
OPCD ***
END OPCODE
PARAM
K ***
END PARAM

END GENER

PERLND

GEN-INFO
<PLS ><-----Name----->NBLKS Unit-systems Printer ***
- # User t-series Engl Metr ***
in out ***
13 C, Pasture, Flat 1 1 1 1 27 0
END GEN-INFO
*** Section PWATER***

ACTIVITY

<PLS > ***** Active Sections *****
- # ATMP SNOW PWAT SED PST PWG PQAL MSTL PEST NITR PHOS TRAC ***
13 0 0 1 0 0 0 0 0 0 0 0 0
END ACTIVITY

PRINT-INFO

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

DRAFT

13 0 0 4 0 0 0 0 0 0 0 0 0 0 1 9
END PRINT-INFO

PWAT-PARM1
<PLS > PWATER variable monthly parameter value flags ***
- # CSNO RTOP UZFG VCS VUZ VNN VIFW VIRC VLE INFC HWT ***
13 0 0 0 0 0 0 0 0 0 0 0
END PWAT-PARM1

PWAT-PARM2
<PLS > PWATER input info: Part 2 ***
- # ***FOREST LZSN INFILT LSUR SLSUR KVARY AGWRC
13 0 4.5 0.06 400 0.05 0.5 0.996
END PWAT-PARM2

PWAT-PARM3
<PLS > PWATER input info: Part 3 ***
- # ***PETMAX PETMIN INFEXP INFILD DEEPFR BASETP AGWETP
13 0 0 2 2 0 0 0
END PWAT-PARM3

PWAT-PARM4
<PLS > PWATER input info: Part 4 ***
- # CEPSC UZSN NSUR INTFW IRC LZETP ***
13 0.15 0.4 0.3 6 0.5 0.4
END PWAT-PARM4

PWAT-STATE1
<PLS > *** Initial conditions at start of simulation
ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
- # *** CEPS SURS UZS IFWS LZS AGWS GWVS
13 0 0 0 0 2.5 1 0
END PWAT-STATE1

END PERLND

IMPLND

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

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

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

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

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

IWAT-PARM3
<PLS > IWATER input info: Part 3 ***


```

1          1          0.01          0.0          0.0          0.5          0.0
END HYDR-PARM2
HYDR-INIT
  RCHRES Initial conditions for each HYDR section ***
  # - # *** VOL Initial value of COLIND Initial value of OUTDGT
    *** ac-ft for each possible exit for each possible exit
<-----><-----> <-----><-----><-----> *** <-----><-----><-----><----->
1          0          4.0 5.0 0.0 0.0 0.0          0.0 0.0 0.0 0.0 0.0
END HYDR-INIT
END RCHRES

```

```

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES

```

```

FTABLE 1
92 5

```

Depth (ft)	Area (acres)	Volume (acre-ft)	Outflow1 (cfs)	Outflow2 (cfs)	Velocity (ft/sec)	Travel Time*** (Minutes)***
0.000000	0.012383	0.000000	0.000000	0.000000		
0.027778	0.012383	0.000120	0.000000	0.024972		
0.055556	0.012383	0.000241	0.000000	0.024972		
0.083333	0.012383	0.000361	0.000000	0.024972		
0.111111	0.012383	0.000482	0.000000	0.024972		
0.138889	0.012383	0.000602	0.000000	0.024972		
0.166667	0.012383	0.000722	0.000000	0.024972		
0.194444	0.012383	0.000843	0.000000	0.024972		
0.222222	0.012383	0.000963	0.000000	0.024972		
0.250000	0.012383	0.001084	0.000000	0.024972		
0.277778	0.012383	0.001204	0.000000	0.024972		
0.305556	0.012383	0.001324	0.000000	0.024972		
0.333333	0.012383	0.001445	0.000000	0.024972		
0.361111	0.012383	0.001565	0.000000	0.024972		
0.388889	0.012383	0.001685	0.000000	0.024972		
0.416667	0.012383	0.001806	0.000000	0.024972		
0.444444	0.012383	0.001926	0.000000	0.024972		
0.472222	0.012383	0.002047	0.000000	0.024972		
0.500000	0.012383	0.002167	0.000000	0.024972		
0.527778	0.012383	0.002287	0.000000	0.024972		
0.555556	0.012383	0.002408	0.000000	0.024972		
0.583333	0.012383	0.002528	0.000000	0.024972		
0.611111	0.012383	0.002649	0.000000	0.024972		
0.638889	0.012383	0.002769	0.000000	0.024972		
0.666667	0.012383	0.002889	0.000000	0.024972		
0.694444	0.012383	0.003010	0.000000	0.024972		
0.722222	0.012383	0.003130	0.000000	0.024972		
0.750000	0.012383	0.003251	0.000000	0.024972		
0.777778	0.012383	0.003371	0.000000	0.024972		
0.805556	0.012383	0.003491	0.000000	0.024972		
0.833333	0.012383	0.003612	0.000000	0.024972		
0.861111	0.012383	0.003732	0.000000	0.024972		
0.888889	0.012383	0.003852	0.000000	0.024972		
0.916667	0.012383	0.003973	0.000000	0.024972		
0.944444	0.012383	0.004093	0.000000	0.024972		
0.972222	0.012383	0.004214	0.000000	0.024972		
1.000000	0.012383	0.004334	0.000000	0.024972		
1.027778	0.012383	0.004454	0.000000	0.024972		
1.055556	0.012383	0.004575	0.000000	0.024972		
1.083333	0.012383	0.004695	0.000000	0.024972		
1.111111	0.012383	0.004816	0.000000	0.024972		
1.138889	0.012383	0.004936	0.000000	0.024972		
1.166667	0.012383	0.005056	0.000000	0.024972		
1.194444	0.012383	0.005177	0.000000	0.024972		
1.222222	0.012383	0.005297	0.000000	0.024972		
1.250000	0.012383	0.005418	0.000000	0.024972		
1.277778	0.012383	0.005538	0.000000	0.024972		
1.305556	0.012383	0.005658	0.000000	0.024972		
1.333333	0.012383	0.005779	0.000000	0.024972		
1.361111	0.012383	0.005899	0.000000	0.024972		
1.388889	0.012383	0.006019	0.000000	0.024972		
1.416667	0.012383	0.006140	0.000000	0.024972		

1.444444	0.012383	0.006260	0.000000	0.024972
1.472222	0.012383	0.006381	0.000000	0.024972
1.500000	0.012383	0.006501	0.000000	0.024972
1.527778	0.012383	0.006621	0.000000	0.024972
1.555556	0.012383	0.006742	0.000000	0.024972
1.583333	0.012383	0.006862	0.000000	0.024972
1.611111	0.012383	0.006983	0.000000	0.024972
1.638889	0.012383	0.007103	0.000000	0.024972
1.666667	0.012383	0.007223	0.000000	0.024972
1.694444	0.012383	0.007344	0.000000	0.024972
1.722222	0.012383	0.007464	0.000000	0.024972
1.750000	0.012383	0.007585	0.000000	0.024972
1.777778	0.012383	0.007705	0.000000	0.024972
1.805556	0.012383	0.007825	0.000000	0.024972
1.833333	0.012383	0.007946	0.000000	0.024972
1.861111	0.012383	0.008066	0.000000	0.024972
1.888889	0.012383	0.008186	0.000000	0.024972
1.916667	0.012383	0.008307	0.000000	0.024972
1.944444	0.012383	0.008427	0.000000	0.024972
1.972222	0.012383	0.008548	0.000000	0.024972
2.000000	0.012383	0.008668	0.000000	0.024972
2.027778	0.012383	0.008788	0.000000	0.024972
2.055556	0.012383	0.008909	0.000000	0.024972
2.083333	0.012383	0.009029	0.000000	0.024972
2.111111	0.012383	0.009150	0.000000	0.024972
2.138889	0.012383	0.009270	0.000000	0.024972
2.166667	0.012383	0.009390	0.000000	0.024972
2.194444	0.012383	0.009511	0.000000	0.024972
2.222222	0.012383	0.009631	0.000000	0.024972
2.250000	0.012383	0.009752	0.000000	0.024972
2.277778	0.012383	0.009872	0.000000	0.024972
2.305556	0.012383	0.009992	0.000000	0.024972
2.333333	0.012383	0.010113	0.000000	0.024972
2.361111	0.012383	0.010233	0.000000	0.024972
2.388889	0.012383	0.010353	0.000000	0.024972
2.416667	0.012383	0.010474	0.000000	0.024972
2.444444	0.012383	0.010594	0.000000	0.024972
2.472222	0.012383	0.010715	0.000000	0.024972
2.500000	0.012383	0.010835	0.000000	0.024972
2.527778	0.012383	0.011179	0.000000	0.024972

END FTABLE 1
 END FTABLES

EXT SOURCES

<-Volume->	<Member>	SsysSgap<--Mult-->	Tran	<-Target	vols>	<-Grp>	<-Member->	***
<Name>	#	<Name>	#	tem strg<-factor->	strg	<Name>	#	#
WDM	2	PREC	ENGL	1.2		PERLND	1 999	EXTNL PREC
WDM	2	PREC	ENGL	1.2		IMPLND	1 999	EXTNL PREC
WDM	1	EVAP	ENGL	0.76		PERLND	1 999	EXTNL PETINP
WDM	1	EVAP	ENGL	0.76		IMPLND	1 999	EXTNL PETINP

END EXT SOURCES

EXT TARGETS

<-Volume->	<-Grp>	<-Member->	<--Mult-->	Tran	<-Volume->	<Member>	Tsys	Tgap	Amd	***	
<Name>	#	<Name>	#	#<-factor->	strg	<Name>	#	<Name>	tem strg	strg***	
RCHRES	1	HYDR	RO	1	1	WDM	1000	FLOW	ENGL	REPL	
RCHRES	1	HYDR	O	1	1	WDM	1001	FLOW	ENGL	REPL	
RCHRES	1	HYDR	O	2	1	WDM	1002	FLOW	ENGL	REPL	
RCHRES	1	HYDR	STAGE	1	1	WDM	1003	STAG	ENGL	REPL	
COPY	1	OUTPUT	MEAN	1	1	48.4	WDM	701	FLOW	ENGL	REPL
COPY	501	OUTPUT	MEAN	1	1	48.4	WDM	801	FLOW	ENGL	REPL

END EXT TARGETS

MASS-LINK

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

```

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

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

MASS-LINK          12
PERLND    PWATER  SURO      0.083333    COPY        INPUT   MEAN
END MASS-LINK          12

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

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

MASS-LINK          17
RCHRES    OFLOW   OVOL      1          COPY        INPUT   MEAN
END MASS-LINK          17

```

END MASS-LINK

END RUN

DRAFT

DRAFT

DRAFT

Disclaimer

Legal Notice

This program and accompanying documentation are provided 'as-is' without warranty of any kind. The entire risk regarding the performance and results of this program is assumed by End User. Clear Creek Solutions Inc. and the governmental licensee or sublicensees disclaim all warranties, either expressed or implied, including but not limited to implied warranties of program and accompanying documentation. In no event shall Clear Creek Solutions Inc. be liable for any damages whatsoever (including without limitation to damages for loss of business profits, loss of business information, business interruption, and the like) arising out of the use of, or inability to use this program even if Clear Creek Solutions Inc. or their authorized representatives have been advised of the possibility of such damages. Software Copyright © by : Clear Creek Solutions, Inc. 2005-2024; All Rights Reserved.

Clear Creek Solutions, Inc.
6200 Capitol Blvd. Ste F
Olympia, WA. 98501
Toll Free 1(866)943-0304
Local (360)943-0304

www.clearcreeksolutions.com

DRAFT

WWHM2012
PROJECT REPORT

General Model Information

WWHM2012 Project Name: Tarct 998

Site Name: Jensen-Tapert

Site Address:

City: Arlington

Report Date: 5/20/2024

Gage: Everett

Data Start: 1948/10/01

Data End: 2009/09/30

Timestep: 15 Minute

Precip Scale: 0.000 (adjusted)

Version Date: 2023/01/27

Version: 4.2.19

POC Thresholds

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

High Flow Threshold for POC1: 50 Year

DRAFT

Landuse Basin Data
Predeveloped Land Use

Tract 998

Bypass:	No
GroundWater:	No
Pervious Land Use C, Forest, Flat	acre 0.1
Pervious Total	0.1
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.1

DRAFT

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Flat	0.02
Pervious Total	0.02
Impervious Land Use	acre
DRIVEWAYS FLAT	0.08
SIDEWALKS FLAT	0.01
Impervious Total	0.09
Basin Total	0.11

DRAFT

Routing Elements
Predeveloped Routing

DRAFT

Mitigated Routing

Gravel Trench Bed 1

Bottom Length:	22.00 ft.
Bottom Width:	18.00 ft.
Trench bottom slope 1:	0 To 1
Trench Left side slope 0:	0 To 1
Trench right side slope 2:	0 To 1
Material thickness of first layer:	2.5
Pour Space of material for first layer:	0.35
Material thickness of second layer:	0
Pour Space of material for second layer:	0
Material thickness of third layer:	0
Pour Space of material for third layer:	0
Infiltration On	
Infiltration rate:	2
Infiltration safety factor:	1
Total Volume Infiltrated (ac-ft.):	18.455
Total Volume Through Riser (ac-ft.):	0
Total Volume Through Facility (ac-ft.):	18.455
Percent Infiltrated:	100
Total Precip Applied to Facility:	0
Total Evap From Facility:	0
Discharge Structure	
Riser Height:	0 ft.
Riser Diameter:	0 in.
Element Flows To:	
Outlet 1	Outlet 2

Gravel Trench Bed Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.009	0.000	0.000	0.000
0.0278	0.009	0.000	0.000	0.018
0.0556	0.009	0.000	0.000	0.018
0.0833	0.009	0.000	0.000	0.018
0.1111	0.009	0.000	0.000	0.018
0.1389	0.009	0.000	0.000	0.018
0.1667	0.009	0.000	0.000	0.018
0.1944	0.009	0.000	0.000	0.018
0.2222	0.009	0.000	0.000	0.018
0.2500	0.009	0.000	0.000	0.018
0.2778	0.009	0.000	0.000	0.018
0.3056	0.009	0.001	0.000	0.018
0.3333	0.009	0.001	0.000	0.018
0.3611	0.009	0.001	0.000	0.018
0.3889	0.009	0.001	0.000	0.018
0.4167	0.009	0.001	0.000	0.018
0.4444	0.009	0.001	0.000	0.018
0.4722	0.009	0.001	0.000	0.018
0.5000	0.009	0.001	0.000	0.018
0.5278	0.009	0.001	0.000	0.018
0.5556	0.009	0.001	0.000	0.018
0.5833	0.009	0.001	0.000	0.018
0.6111	0.009	0.001	0.000	0.018
0.6389	0.009	0.002	0.000	0.018

0.6667	0.009	0.002	0.000	0.018
0.6944	0.009	0.002	0.000	0.018
0.7222	0.009	0.002	0.000	0.018
0.7500	0.009	0.002	0.000	0.018
0.7778	0.009	0.002	0.000	0.018
0.8056	0.009	0.002	0.000	0.018
0.8333	0.009	0.002	0.000	0.018
0.8611	0.009	0.002	0.000	0.018
0.8889	0.009	0.002	0.000	0.018
0.9167	0.009	0.002	0.000	0.018
0.9444	0.009	0.003	0.000	0.018
0.9722	0.009	0.003	0.000	0.018
1.0000	0.009	0.003	0.000	0.018
1.0278	0.009	0.003	0.000	0.018
1.0556	0.009	0.003	0.000	0.018
1.0833	0.009	0.003	0.000	0.018
1.1111	0.009	0.003	0.000	0.018
1.1389	0.009	0.003	0.000	0.018
1.1667	0.009	0.003	0.000	0.018
1.1944	0.009	0.003	0.000	0.018
1.2222	0.009	0.003	0.000	0.018
1.2500	0.009	0.004	0.000	0.018
1.2778	0.009	0.004	0.000	0.018
1.3056	0.009	0.004	0.000	0.018
1.3333	0.009	0.004	0.000	0.018
1.3611	0.009	0.004	0.000	0.018
1.3889	0.009	0.004	0.000	0.018
1.4167	0.009	0.004	0.000	0.018
1.4444	0.009	0.004	0.000	0.018
1.4722	0.009	0.004	0.000	0.018
1.5000	0.009	0.004	0.000	0.018
1.5278	0.009	0.004	0.000	0.018
1.5556	0.009	0.004	0.000	0.018
1.5833	0.009	0.005	0.000	0.018
1.6111	0.009	0.005	0.000	0.018
1.6389	0.009	0.005	0.000	0.018
1.6667	0.009	0.005	0.000	0.018
1.6944	0.009	0.005	0.000	0.018
1.7222	0.009	0.005	0.000	0.018
1.7500	0.009	0.005	0.000	0.018
1.7778	0.009	0.005	0.000	0.018
1.8056	0.009	0.005	0.000	0.018
1.8333	0.009	0.005	0.000	0.018
1.8611	0.009	0.005	0.000	0.018
1.8889	0.009	0.006	0.000	0.018
1.9167	0.009	0.006	0.000	0.018
1.9444	0.009	0.006	0.000	0.018
1.9722	0.009	0.006	0.000	0.018
2.0000	0.009	0.006	0.000	0.018
2.0278	0.009	0.006	0.000	0.018
2.0556	0.009	0.006	0.000	0.018
2.0833	0.009	0.006	0.000	0.018
2.1111	0.009	0.006	0.000	0.018
2.1389	0.009	0.006	0.000	0.018
2.1667	0.009	0.006	0.000	0.018
2.1944	0.009	0.007	0.000	0.018
2.2222	0.009	0.007	0.000	0.018
2.2500	0.009	0.007	0.000	0.018

DRAFT

2.2778	0.009	0.007	0.000	0.018
2.3056	0.009	0.007	0.000	0.018
2.3333	0.009	0.007	0.000	0.018
2.3611	0.009	0.007	0.000	0.018
2.3889	0.009	0.007	0.000	0.018
2.4167	0.009	0.007	0.000	0.018
2.4444	0.009	0.007	0.000	0.018
2.4722	0.009	0.007	0.000	0.018
2.5000	0.009	0.008	0.000	0.018

DRAFT

Analysis Results

POC 1

POC #1 was not reported because POC must exist in both scenarios and both scenarios must have been run.

DRAFT

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

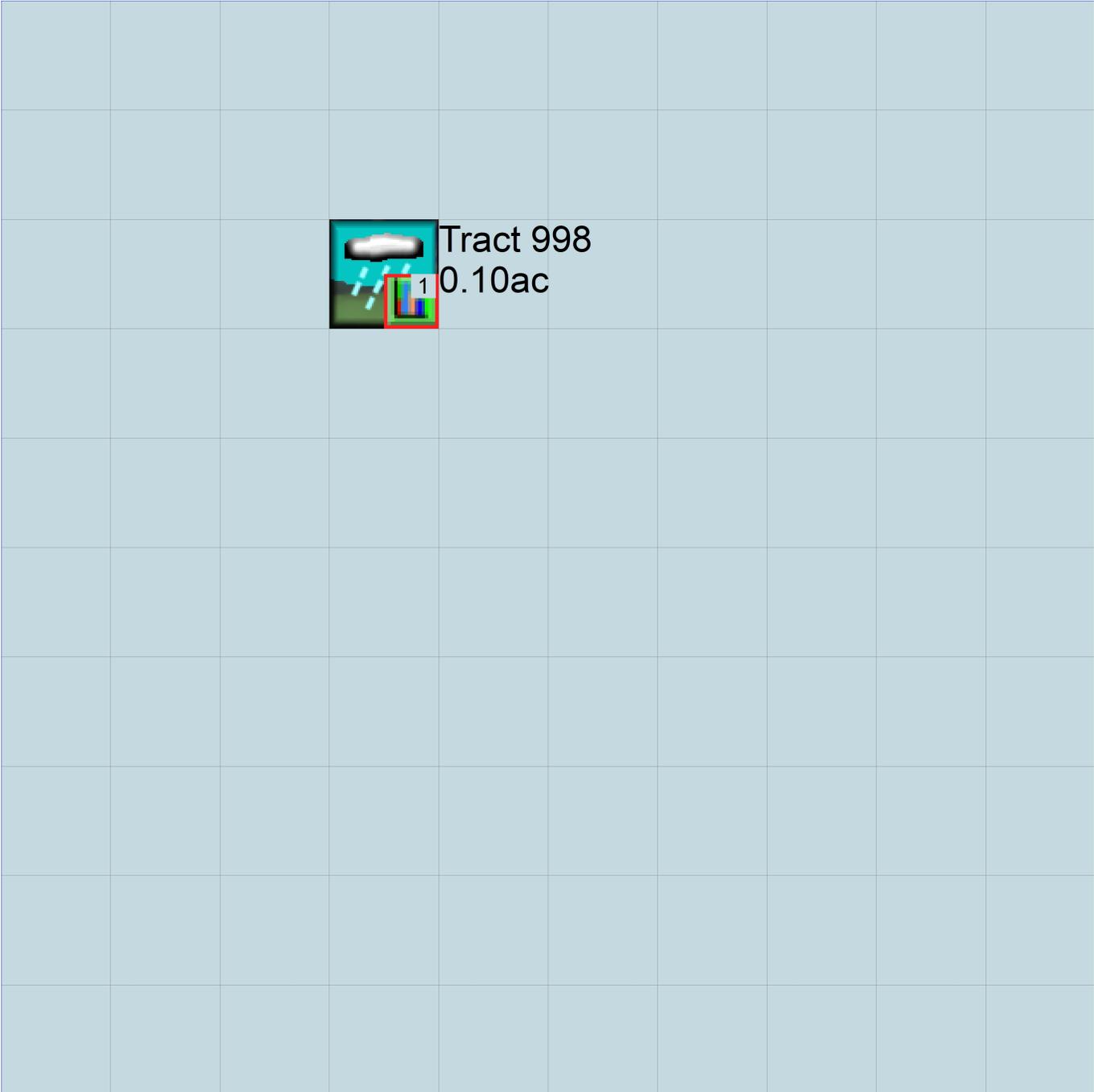
No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

DRAFT

Appendix
Predeveloped Schematic



Mitigated Schematic



DRAFT

Mitigated UCI File

RUN

GLOBAL

```
WVHM4 model simulation
START      1948 10 01      END      2009 09 30
RUN INTERP OUTPUT LEVEL   3      0
RESUME     0 RUN      1
UNIT SYSTEM      1
END GLOBAL
```

FILES

```
<File> <Un#> <-----File Name----->***
<-ID->                                     ***
WDM      26      Tarct 998.wdm
MESSU    25      MitTarct 998.MES
          27      MitTarct 998.L61
          28      MitTarct 998.L62
          30      POCTarct 9981.dat
```

END FILES

OPN SEQUENCE

```
INGRP          INDELT 00:15
  PERLND        10
  IMPLND         5
  IMPLND         8
  RCHRES         1
  COPY           1
  COPY          501
  DISPLY         1
```

END INGRP

END OPN SEQUENCE

DISPLY

DISPLY-INFO1

```
# - #<-----Title----->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
  1      Gravel Trench Bed 1      MAX      1      2      30      9
```

END DISPLY-INFO1

END DISPLY

COPY

TIMESERIES

```
# - # NPT NMN ***
  1      1      1
  501    1      1
```

END TIMESERIES

END COPY

GENER

OPCODE

```
#      # OPCD ***
```

END OPCODE

PARM

```
#      #      K ***
```

END PARM

END GENER

PERLND

GEN-INFO

```
<PLS ><-----Name----->NBLKS  Unit-systems  Printer ***
# - #      User  t-series  Engl Metr ***
          in  out      ***
```

```
  10      C, Forest, Flat      1      1      1      1      27      0
```

END GEN-INFO

*** Section PWATER***

ACTIVITY

```
<PLS > ***** Active Sections *****
# - # ATMP SNOW PWAT  SED  PST  PWG  PQAL MSTL  PEST  NITR  PHOS  TRAC  ***
  10      0      0      1      0      0      0      0      0      0      0      0      0
```

END ACTIVITY

PRINT-INFO

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

```
# - # ATMP SNOW PWAT SED PST PWG PQAL MSTL PEST NITR PHOS TRAC *****
10 0 0 4 0 0 0 0 0 0 0 0 0 0 0 1 9
END PRINT-INFO
```

PWAT-PARM1

```
<PLS > PWATER variable monthly parameter value flags ***
# - # CSNO RTOP UZFG VCS VUZ VNN VIFW VIRC VLE INFC HWT ***
10 0 0 0 0 0 0 0 0 0 0 0
END PWAT-PARM1
```

PWAT-PARM2

```
<PLS > PWATER input info: Part 2 ***
# - # ***FOREST LZSN INFILT LSUR SLSUR KVARY AGWRC
10 0 4.5 0.08 400 0.05 0.5 0.996
END PWAT-PARM2
```

PWAT-PARM3

```
<PLS > PWATER input info: Part 3 ***
# - # ***PETMAX PETMIN INFEXP INFILD DEEPFR BASETP AGWETP
10 0 0 2 2 0 0 0
END PWAT-PARM3
```

PWAT-PARM4

```
<PLS > PWATER input info: Part 4 ***
# - # CEPSC UZSN NSUR INTFW IRC LZETP ***
10 0.2 0.5 0.35 6 0.5 0.7
END PWAT-PARM4
```

PWAT-STATE1

```
<PLS > *** Initial conditions at start of simulation
ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
# - # *** CEPS SURS UZS IFWS LZS AGWS GWVS
10 0 0 0 0 2.5 1 0
END PWAT-STATE1
```

END PERLND

IMPLND

GEN-INFO

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

ACTIVITY

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

PRINT-INFO

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

IWAT-PARM1

```
<PLS > IWATER variable monthly parameter value flags ***
# - # CSNO RTOP VRS VNN RTLI ***
5 0 0 0 0 0
8 0 0 0 0 0
END IWAT-PARM1
```

IWAT-PARM2

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

```

5          400      0.01      0.1      0.1
8          400      0.01      0.1      0.1
END IWAT-PARM2

```

```

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

```

```

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

```

END IMPLND

```

SCHEMATIC
<-Source->      <--Area-->      <-Target->      MBLK      ***
<Name> #      <-factor->      <Name> #      Tbl#      ***
Basin 1***
PERLND 10      0.02      RCHRES 1      2
PERLND 10      0.02      RCHRES 1      3
IMPLND 5        0.08      RCHRES 1      5
IMPLND 8        0.01      RCHRES 1      5

```

```

*****Routing*****
PERLND 10      0.02      COPY 1      12
IMPLND 5        0.08      COPY 1      15
IMPLND 8        0.01      COPY 1      15
PERLND 10      0.02      COPY 1      13
RCHRES 1        1        COPY 501     17
END SCHEMATIC

```

```

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

```

```

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

```

```

RCHRES
GEN-INFO
RCHRES      Name      Nexits      Unit Systems      Printer      ***
# - #<-----><----> User T-series      Engl Metr LKFG      ***
in out      ***
1      Gravel Trench Be-005      2      1      1      1      28      0      1
END GEN-INFO
*** Section RCHRES***

```

```

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

```

```

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

```

HYDR-PARM1

```

RCHRES  Flags for each HYDR Section                                     ***
# - #   VC A1 A2 A3  ODFVFG for each *** ODGTFG for each  FUNCT  for each
      FG FG FG FG  possible exit *** possible exit  possible exit
      * * * *   * * * *   * * * *   * * * *
1       0 1  0  0   4 5  0  0  0   0  0  0  0  0   2  2  2  2  2
END HYDR-PARM1

```

```

HYDR-PARM2
# - #   FTABNO      LEN      DELTH      STCOR      KS      DB50      ***
<-----><-----><-----><-----><-----><-----><----->      ***
1       1       0.01      0.0      0.0      0.5      0.0
END HYDR-PARM2

```

```

HYDR-INIT
RCHRES  Initial conditions for each HYDR section                       ***
# - #   *** VOL      Initial value of COLIND      Initial value of OUTDGT
      *** ac-ft    for each possible exit      for each possible exit
<-----><-----> <-----><-----><-----><-----> *** <-----><-----><-----><-----><----->
1       0       4.0  5.0  0.0  0.0  0.0      0.0  0.0  0.0  0.0  0.0
END HYDR-INIT
END RCHRES

```

```

SPEC-ACTIONS
END SPEC-ACTIONS

```

FTABLES

```

FTABLE 1
92 5

```

Depth (ft)	Area (acres)	Volume (acre-ft)	Outflow1 (cfs)	Outflow2 (cfs)	Velocity (ft/sec)	Travel Time*** (Minutes)***
0.000000	0.009091	0.000000	0.000000	0.000000		
0.027778	0.009091	0.000088	0.000000	0.018333		
0.055556	0.009091	0.000177	0.000000	0.018333		
0.083333	0.009091	0.000265	0.000000	0.018333		
0.111111	0.009091	0.000354	0.000000	0.018333		
0.138889	0.009091	0.000442	0.000000	0.018333		
0.166667	0.009091	0.000530	0.000000	0.018333		
0.194444	0.009091	0.000619	0.000000	0.018333		
0.222222	0.009091	0.000707	0.000000	0.018333		
0.250000	0.009091	0.000795	0.000000	0.018333		
0.277778	0.009091	0.000884	0.000000	0.018333		
0.305556	0.009091	0.000972	0.000000	0.018333		
0.333333	0.009091	0.001061	0.000000	0.018333		
0.361111	0.009091	0.001149	0.000000	0.018333		
0.388889	0.009091	0.001237	0.000000	0.018333		
0.416667	0.009091	0.001326	0.000000	0.018333		
0.444444	0.009091	0.001414	0.000000	0.018333		
0.472222	0.009091	0.001503	0.000000	0.018333		
0.500000	0.009091	0.001591	0.000000	0.018333		
0.527778	0.009091	0.001679	0.000000	0.018333		
0.555556	0.009091	0.001768	0.000000	0.018333		
0.583333	0.009091	0.001856	0.000000	0.018333		
0.611111	0.009091	0.001944	0.000000	0.018333		
0.638889	0.009091	0.002033	0.000000	0.018333		
0.666667	0.009091	0.002121	0.000000	0.018333		
0.694444	0.009091	0.002210	0.000000	0.018333		
0.722222	0.009091	0.002298	0.000000	0.018333		
0.750000	0.009091	0.002386	0.000000	0.018333		
0.777778	0.009091	0.002475	0.000000	0.018333		
0.805556	0.009091	0.002563	0.000000	0.018333		
0.833333	0.009091	0.002652	0.000000	0.018333		
0.861111	0.009091	0.002740	0.000000	0.018333		
0.888889	0.009091	0.002828	0.000000	0.018333		
0.916667	0.009091	0.002917	0.000000	0.018333		
0.944444	0.009091	0.003005	0.000000	0.018333		
0.972222	0.009091	0.003093	0.000000	0.018333		
1.000000	0.009091	0.003182	0.000000	0.018333		
1.027778	0.009091	0.003270	0.000000	0.018333		
1.055556	0.009091	0.003359	0.000000	0.018333		
1.083333	0.009091	0.003447	0.000000	0.018333		
1.111111	0.009091	0.003535	0.000000	0.018333		
1.138889	0.009091	0.003624	0.000000	0.018333		

1.166667	0.009091	0.003712	0.000000	0.018333
1.194444	0.009091	0.003801	0.000000	0.018333
1.222222	0.009091	0.003889	0.000000	0.018333
1.250000	0.009091	0.003977	0.000000	0.018333
1.277778	0.009091	0.004066	0.000000	0.018333
1.305556	0.009091	0.004154	0.000000	0.018333
1.333333	0.009091	0.004242	0.000000	0.018333
1.361111	0.009091	0.004331	0.000000	0.018333
1.388889	0.009091	0.004419	0.000000	0.018333
1.416667	0.009091	0.004508	0.000000	0.018333
1.444444	0.009091	0.004596	0.000000	0.018333
1.472222	0.009091	0.004684	0.000000	0.018333
1.500000	0.009091	0.004773	0.000000	0.018333
1.527778	0.009091	0.004861	0.000000	0.018333
1.555556	0.009091	0.004949	0.000000	0.018333
1.583333	0.009091	0.005038	0.000000	0.018333
1.611111	0.009091	0.005126	0.000000	0.018333
1.638889	0.009091	0.005215	0.000000	0.018333
1.666667	0.009091	0.005303	0.000000	0.018333
1.694444	0.009091	0.005391	0.000000	0.018333
1.722222	0.009091	0.005480	0.000000	0.018333
1.750000	0.009091	0.005568	0.000000	0.018333
1.777778	0.009091	0.005657	0.000000	0.018333
1.805556	0.009091	0.005745	0.000000	0.018333
1.833333	0.009091	0.005833	0.000000	0.018333
1.861111	0.009091	0.005922	0.000000	0.018333
1.888889	0.009091	0.006010	0.000000	0.018333
1.916667	0.009091	0.006098	0.000000	0.018333
1.944444	0.009091	0.006187	0.000000	0.018333
1.972222	0.009091	0.006275	0.000000	0.018333
2.000000	0.009091	0.006364	0.000000	0.018333
2.027778	0.009091	0.006452	0.000000	0.018333
2.055556	0.009091	0.006540	0.000000	0.018333
2.083333	0.009091	0.006629	0.000000	0.018333
2.111111	0.009091	0.006717	0.000000	0.018333
2.138889	0.009091	0.006806	0.000000	0.018333
2.166667	0.009091	0.006894	0.000000	0.018333
2.194444	0.009091	0.006982	0.000000	0.018333
2.222222	0.009091	0.007071	0.000000	0.018333
2.250000	0.009091	0.007159	0.000000	0.018333
2.277778	0.009091	0.007247	0.000000	0.018333
2.305556	0.009091	0.007336	0.000000	0.018333
2.333333	0.009091	0.007424	0.000000	0.018333
2.361111	0.009091	0.007513	0.000000	0.018333
2.388889	0.009091	0.007601	0.000000	0.018333
2.416667	0.009091	0.007689	0.000000	0.018333
2.444444	0.009091	0.007778	0.000000	0.018333
2.472222	0.009091	0.007866	0.000000	0.018333
2.500000	0.009091	0.007955	0.000000	0.018333
2.527778	0.009091	0.008207	0.000000	0.018333

END FTABLE 1
 END FTABLES

EXT SOURCES

<-Volume->	<Member>	SsysSgap	<--Mult-->	Tran	<-Target vols>	<-Grp>	<-Member->	***	
<Name>	#	<Name>	#	tem strg	<-factor-->	strg	<Name>	# #	***
WDM	2	PREC		ENGL	1.2		PERLND	1 999	EXTNL PREC
WDM	2	PREC		ENGL	1.2		IMPLND	1 999	EXTNL PREC
WDM	1	EVAP		ENGL	0.76		PERLND	1 999	EXTNL PETINP
WDM	1	EVAP		ENGL	0.76		IMPLND	1 999	EXTNL PETINP

END EXT SOURCES

EXT TARGETS

<-Volume->	<-Grp>	<-Member->	<--Mult-->	Tran	<-Volume->	<Member>	Tsys	Tgap	Amd	***
<Name>	#	<Name>	#	#<-factor-->	strg	<Name>	#	<Name>	tem strg	strg***
RCHRES	1	HYDR		RO	1 1	1	WDM	1000	FLOW	ENGL REPL
RCHRES	1	HYDR		O	1 1	1	WDM	1001	FLOW	ENGL REPL
RCHRES	1	HYDR		O	2 1	1	WDM	1002	FLOW	ENGL REPL
RCHRES	1	HYDR		STAGE	1 1	1	WDM	1003	STAG	ENGL REPL

COPY 1 OUTPUT MEAN 1 1 48.4 WDM 701 FLOW ENGL REPL
 COPY 501 OUTPUT MEAN 1 1 48.4 WDM 801 FLOW ENGL REPL
 END EXT TARGETS

MASS-LINK

<Volume> <-Grp> <-Member-><--Mult--> <Target> <-Grp> <-Member->***
 <Name> <Name> # #<-factor-> <Name> <Name> # #***

MASS-LINK 2
 PERLND PWATER SURO 0.083333 RCHRES INFLOW IVOL
 END MASS-LINK 2

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

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

MASS-LINK 12
 PERLND PWATER SURO 0.083333 COPY INPUT MEAN
 END MASS-LINK 12

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

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

MASS-LINK 17
 RCHRES OFLOW OVOL 1 COPY INPUT MEAN
 END MASS-LINK 17

END MASS-LINK

END RUN



DRAFT

DRAFT

Disclaimer

Legal Notice

This program and accompanying documentation are provided 'as-is' without warranty of any kind. The entire risk regarding the performance and results of this program is assumed by End User. Clear Creek Solutions Inc. and the governmental licensee or sublicensees disclaim all warranties, either expressed or implied, including but not limited to implied warranties of program and accompanying documentation. In no event shall Clear Creek Solutions Inc. be liable for any damages whatsoever (including without limitation to damages for loss of business profits, loss of business information, business interruption, and the like) arising out of the use of, or inability to use this program even if Clear Creek Solutions Inc. or their authorized representatives have been advised of the possibility of such damages. Software Copyright © by : Clear Creek Solutions, Inc. 2005-2024; All Rights Reserved.

Clear Creek Solutions, Inc.
6200 Capitol Blvd. Ste F
Olympia, WA. 98501
Toll Free 1(866)943-0304
Local (360)943-0304

www.clearcreeksolutions.com

DRAFT

Appendix 5: Conveyance Analysis

Nothing is necessary for this appendix at this time

Appendix 6: Operations and Maintenance Manual

1. Operations and Maintenance Manual

Table V-A.1: Maintenance Standards - Detention Ponds (continued)

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
	Liner (if Applicable)	Liner is visible and has more than three 1/4-inch holes in it.	Liner repaired or replaced. Liner is fully covered.
Ponds Berms (Dikes)	Settlements	Any part of berm which has settled 4 inches lower than the design elevation If settlement is apparent, measure berm to determine amount of settlement Settling can be an indication of more severe problems with the berm or outlet works. A licensed engineer in the state of Washington should be consulted to determine the source of the settlement.	Dike is built back to the design elevation.
	Piping	Discernable water flow through pond berm. Ongoing erosion with potential for erosion to continue. (Recommend a Geotechnical engineer be called in to inspect and evaluate condition and recommend repair of condition.)	Piping eliminated. Erosion potential resolved.
Emergency Overflow/Spillway and Berms over 4 feet in height	Tree Growth	Tree growth on emergency spillways creates blockage problems and may cause failure of the berm due to uncontrolled overtopping. Tree growth on berms over 4 feet in height may lead to piping through the berm which could lead to failure of the berm.	Trees should be removed. If root system is small (base less than 4 inches) the root system may be left in place. Otherwise the roots should be removed and the berm restored. A licensed engineer in the state of Washington should be consulted for proper berm/spillway restoration.
	Piping	Discernable water flow through pond berm. Ongoing erosion with potential for erosion to continue. (Recommend a Geotechnical engineer be called in to inspect and evaluate condition and recommend repair of condition.)	Piping eliminated. Erosion potential resolved.
Emergency Overflow/Spillway	Emergency Overflow/Spillway	Only one layer of rock exists above native soil in area five square feet or larger, or any exposure of native soil at the top of out flow path of spillway. (Rip-rap on inside slopes need not be replaced.)	Rocks and pad depth are restored to design standards.
	Erosion	See "Side Slopes of Pond"	

Table V-A.2: Maintenance Standards - Infiltration

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
General	Trash & Debris	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
	Poisonous/Noxious Vegetation	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
	Contaminants and Pollution	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
	Rodent Holes	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
Storage Area	Sediment	Water ponding in infiltration pond after rainfall ceases and appropriate time allowed for infiltration. Treatment basins should infiltrate Water Quality Design Storm Volume within 48 hours, and empty within 24 hours after cessation of most rain events.	Sediment is removed and/or facility is cleaned so that infiltration system works according to design.

Table V-A.2: Maintenance Standards - Infiltration (continued)

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
		(A percolation test pit or test of facility indicates facility is only working at 90% of its designed capabilities. Test every 2 to 5 years. If two inches or more sediment is present, remove).	
Filter Bags (if applicable)	Filled with Sediment and Debris	Sediment and debris fill bag more than 1/2 full.	Filter bag is replaced or system is redesigned.
Rock Filters	Sediment and Debris	By visual inspection, little or no water flows through filter during heavy rain storms.	Gravel in rock filter is replaced.
Side Slopes of Pond	Erosion	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
Emergency Overflow Spillway and Berms over 4 feet in height.	Tree Growth	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
	Piping	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
Emergency Overflow Spillway	Rock Missing	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
	Erosion	See Table V-A.1: Maintenance Standards - Detention Ponds	See Table V-A.1: Maintenance Standards - Detention Ponds
Pre-settling Ponds and Vaults	Facility or sump filled with Sediment and/or debris	6" or designed sediment trap depth of sediment.	Sediment is removed.

Table V-A.3: Maintenance Standards - Closed Detention Systems (Tanks/Vaults)

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
Storage Area	Plugged Air Vents	One-half of the cross section of a vent is blocked at any point or the vent is damaged.	Vents open and functioning.
	Debris and Sediment	Accumulated sediment depth exceeds 10% of the diameter of the storage area for 1/2 length of storage vault or any point depth exceeds 15% of diameter. (Example: 72-inch storage tank would require cleaning when sediment reaches depth of 7 inches for more than 1/2 length of tank.)	All sediment and debris removed from storage area.
	Joints Between Tank/Pipe Section	Any openings or voids allowing material to be transported into facility. (Will require engineering analysis to determine structural stability).	All joint between tank/pipe sections are sealed.
	Tank Pipe Bent Out of Shape	Any part of tank/pipe is bent out of shape more than 10% of its design shape. (Review required by engineer to determine structural stability).	Tank/pipe repaired or replaced to design.
	Vault Structure Includes Cracks in Wall, Bottom, Damage to Frame and/or Top Slab	Cracks wider than 1/2-inch and any evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determines that the vault is not structurally sound. Cracks wider than 1/2-inch at the joint of any inlet/outlet pipe or any evidence of soil particles entering the vault through the walls.	Vault replaced or repaired to design specifications and is structurally sound. No cracks more than 1/4-inch wide at the joint of the inlet/outlet pipe.

Table V-A.5: Maintenance Standards - Catch Basins

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is performed
General	Trash & Debris	Trash or debris which is located immediately in front of the catch basin opening or is blocking inletting capacity of the basin by more than 10%. Trash or debris (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of six inches clearance from the debris surface to the invert of the lowest pipe. Trash or debris in any inlet or outlet pipe blocking more than 1/3 of its height. Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).	No Trash or debris located immediately in front of catch basin or on grate opening. No trash or debris in the catch basin. Inlet and outlet pipes free of trash or debris. No dead animals or vegetation present within the catch basin.
	Sediment	Sediment (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of 6 inches clearance from the sediment surface to the invert of the lowest pipe.	No sediment in the catch basin
	Structure Damage to Frame and/or Top Slab	Top slab has holes larger than 2 square inches or cracks wider than 1/4 inch. (Intent is to make sure no material is running into basin). Frame not sitting flush on top slab, i.e., separation of more than 3/4 inch of the frame from the top slab. Frame not securely attached	Top slab is free of holes and cracks. Frame is sitting flush on the riser rings or top slab and firmly attached.
	Fractures or Cracks in Basin Walls/ Bottom	Maintenance person judges that structure is unsound. Grout fillet has separated or cracked wider than 1/2 inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks.	Basin replaced or repaired to design standards. Pipe is regouted and secure at basin wall.
	Settlement/ Mis-alignment	If failure of basin has created a safety, function, or design problem.	Basin replaced or repaired to design standards.
	Vegetation	Vegetation growing across and blocking more than 10% of the basin opening. Vegetation growing in inlet/outlet pipe joints that is more than six inches tall and less than six inches apart.	No vegetation blocking opening to basin. No vegetation or root growth present.
	Contamination and Pollution	See Table V-A.1: Maintenance Standards - Detention Ponds	No pollution present.
Catch Basin Cover	Cover Not in Place	Cover is missing or only partially in place. Any open catch basin requires maintenance.	Cover/grate is in place, meets design standards, and is secured
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 1/2 inch of thread.	Mechanism opens with proper tools.
	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure. (Intent is keep cover from sealing off access to maintenance.)	Cover can be removed by one maintenance person.
Ladder	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, not securely attached to basin wall, misalignment, rust, cracks, or sharp edges.	Ladder meets design standards and allows maintenance person safe access.
Metal Grates (If Applicable)	Grate opening Unsafe	Grate with opening wider than 7/8 inch.	Grate opening meets design standards.
	Trash and Debris	Trash and debris that is blocking more than 20% of grate surface inletting capacity.	Grate free of trash and debris.
	Damaged or Missing.	Grate missing or broken member(s) of the grate.	Grate is in place, meets the design standards, and is installed and aligned with the flow path.

Appendix 7: Special Reports and Studies

1. N/A