PRELIMINARY STORMWATER SITE PLAN

Chehalis Industrial Park
2844 Jackson Highway
Chehalis, WA

Prepared for:
Puget Western, Inc.
20000 North Creek Parkway, Building H
Bothell, WA 98011

August 25, 2021
Our Job No. 14030

Preliminary Stormwater Site Plan

Chehalis Industrial Park

Chehalis, Washington

Our Job No. 14030

BARGHAUSEN

TABLE OF CONTENTS

TAP 1.0

1.0 PROJECT OVERVIEW

This project is located on a 69.4-acre parcel within the Northwest quarter of Section 11, Township 13 North, Range 02 West, Willamette Meridian, City of Chehalis, Lewis County, Washington. The property address is currently listed as 2844 Jackson Highway. The proposed development will convert approximately 80% of the parcel to impervious surfaces.

The proposed project will consist of construction of an approximately 1,001,615 square foot warehouse use building, with associated trailer and civilian parking, areas for loading docks, landscaping, utility connections and a detention pond. Existing ditches and low category wetlands will be filled to accommodate for the proposed development. Wetland mitigation strategies will be implemented to the greatest extent feasible onsite, and mitigation bank credits will be purchased as needed for the unavoidable wetland impacts.

A detention pond will be constructed for the purpose of stormwater flow control. Water leaving the detention pond will be discharged to the existing, natural discharge point to the western border of the parcel, flowing to the existing downstream ditch system. Prior to discharge water will be treated by a Modular Wetland Unit which has general use level designation (GULD) by the Department of Ecology (DOE) for enhanced and phosphorous treatment.

TAP 2.0

2.0 ANALYSIS OF THE MINIMUM REQUIREMENTS

Minimum Requirement No. 1: Preparation of Stormwater Site Plan:

Response: This document hereby fulfills the requirement for a Stormwater Site Plan.

Minimum Requirement No. 2: Construction Stormwater Pollution Prevention:

Response: A SWPPP will be prepared for this project with final construction plans.

Minimum Requirement No. 3: Source Control of Pollution:

Response: All known available and reasonable Source Control BMPs will be applied to this project in accordance with those applicable to a warehouse project per the Department of Ecology's Stormwater Management Manual. Potential pollutant sources from warehouse operations include loading and unloading areas, outside storage of materials and equipment and fueling and maintenance areas. The main types of pollutants from these activities include oil and grease, as well as an increase of total suspended solids (TSS). At a minimum the parking lot will be swept on a regular basis, trash enclosures will be covered, and the owner will be educated about the proper use of pesticides and fertilizers. No storage of industrial products or chemicals will occur outside, eliminating these items as a potential source of pollution.

Minimum Requirement No. 4: Preservation of Natural Drainage System and Outfalls:

Response: Under existing conditions stormwater is collected by existing agricultural ditches and conveyed to the northwestern corner of the parcel. The proposed improvements release stormwater from detention and conveys runoff along direct discharge to connect to the existing ditch system.

Minimum Requirement No. 5: On-Site Stormwater Management:

Response: On site BMP's will be utilized to the maximum extent feasible. However, the existing site is soil is not suitable for infiltration. Additionally, a high groundwater table and seasonal fluctuations in groundwater elevations further limit the ability for subsurface soils to infiltrate. Therefore, the use of infiltration for stormwater management on this project is infeasible. For this reason detention facilities on-site will be provided.

Minimum Requirement No. 6: Runoff Treatment:

Response: Enhanced Water quality treatment will be provided for all new pollution generating surfaces. Water quality will be provided by a Modular Wetland System has general use level designations (GULD) for enhanced and phosphorous treatment as determined by the Department of Ecology (DOE).

Minimum Requirement No. 7: Flow Control:

Response: The proposed mean of flow control for this site is a detention pond on the south side of the site, which will detain all stormwater runoff onsite. Detention facilities and their associated flow control structure have been designed to match runoff durations for half of the two-year through the 50-year storm per the DOE manual.

Minimum Requirement No. 8: Wetlands Protection:

Response: Wetland delineation and buffers are shown on plan set. For wetlands being preserved, general protection and protection from pollutants will be implemented to the greatest extent feasible.

Minimum Requirement No. 9: Operation and Maintenance:

Response: A Maintenance and Source Control Manual will be provided for this site with the final engineering review documents.

Minimum Requirement No. 10: Off-Site Analysis and Mitigation

Response: The off-site analysis is provided in the following section of this report.

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

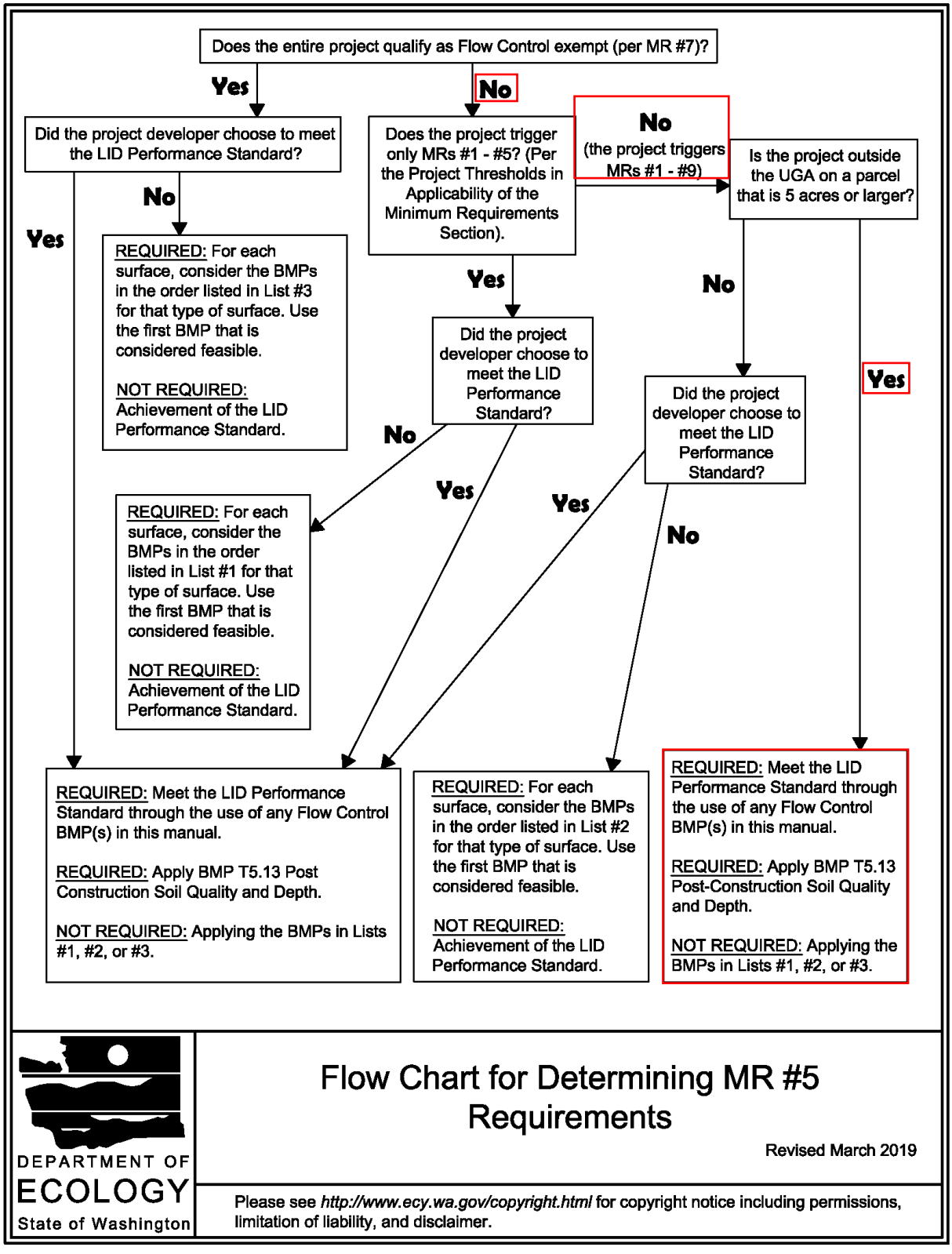


Figure I-3.5: Flow Chart for Determining Wetland Protection Level Requirements

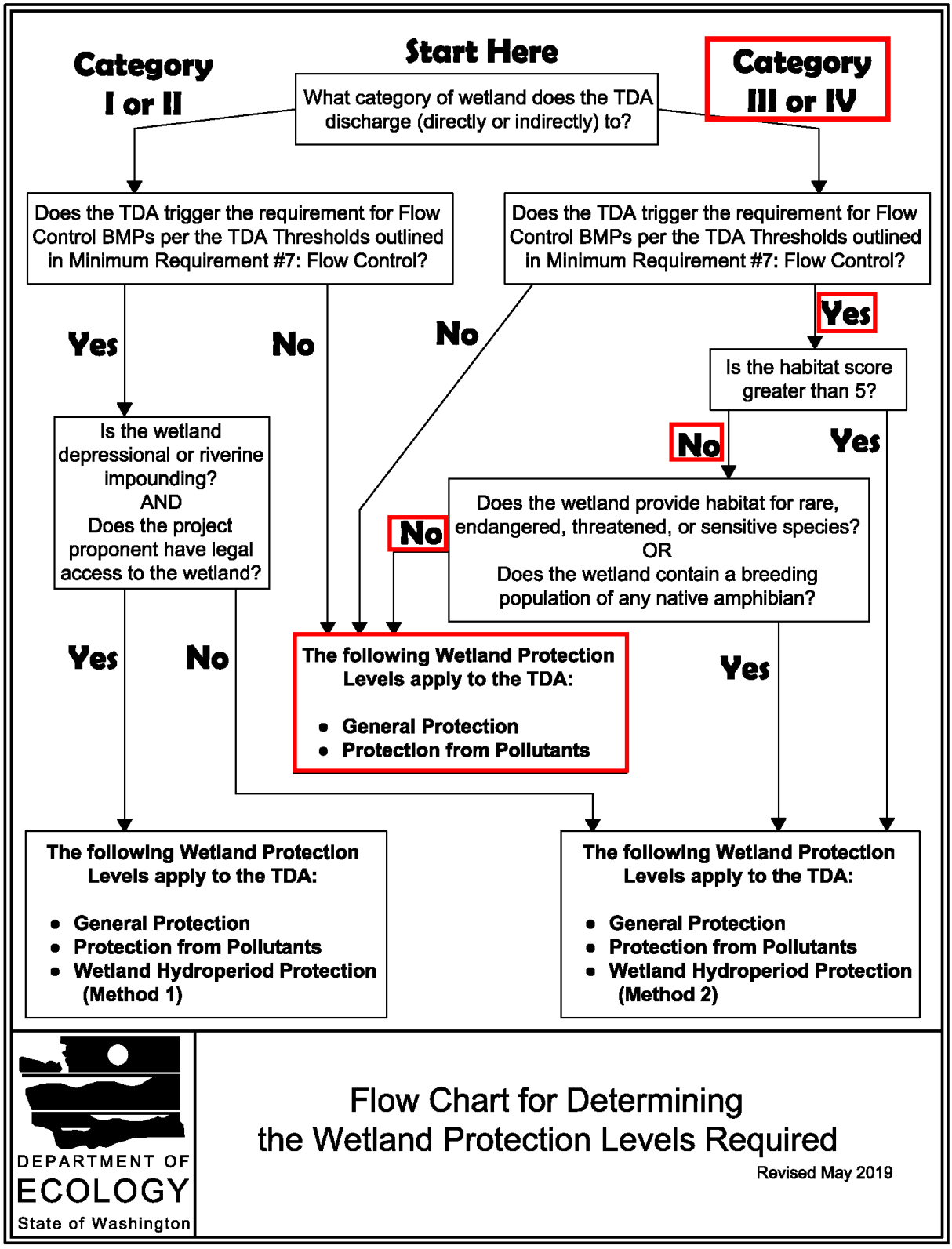
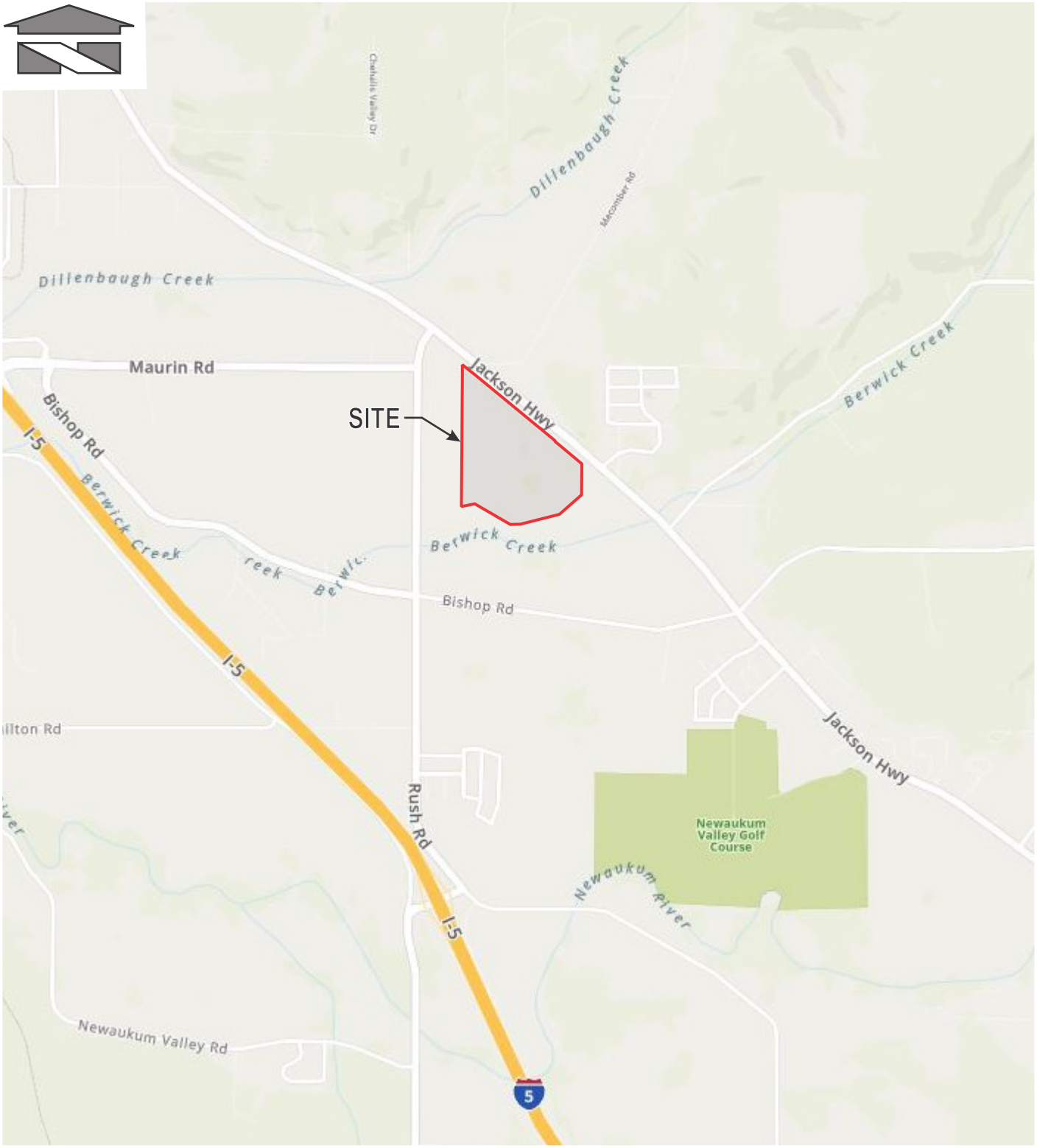


FIGURE 1
VICINITY MAP



REFERENCE: MapQuest (2021)

Scale:
Horizontal: **N.T.S.** Vertical: **N/A**

Barghausen Consulting Engineers, Inc.
18215 72nd Avenue South
Kent, WA 98032
425.251.6222 **barghausen.com**

For:
Chehalis Industrial Park
Chehalis, Washington

Title:
VICINITY MAP

Job Number
14030

DATE: 3/09/21

P:\14000s\14030\exhibit\graphics\14030 vmap.cdr

FIGURE 2
ACCESSOR'S MAP

REFERENCE: Lewis County GIS Web Map (2021)

Scale:
Horizontal: **N.T.S.** Vertical: **N/A**

Barghausen Consulting Engineers, Inc.
18215 72nd Avenue South
Kent, WA 98032
425.251.6222 **barghausen.com**

For:
Chehalis Industrial Park
Chehalis, Washington

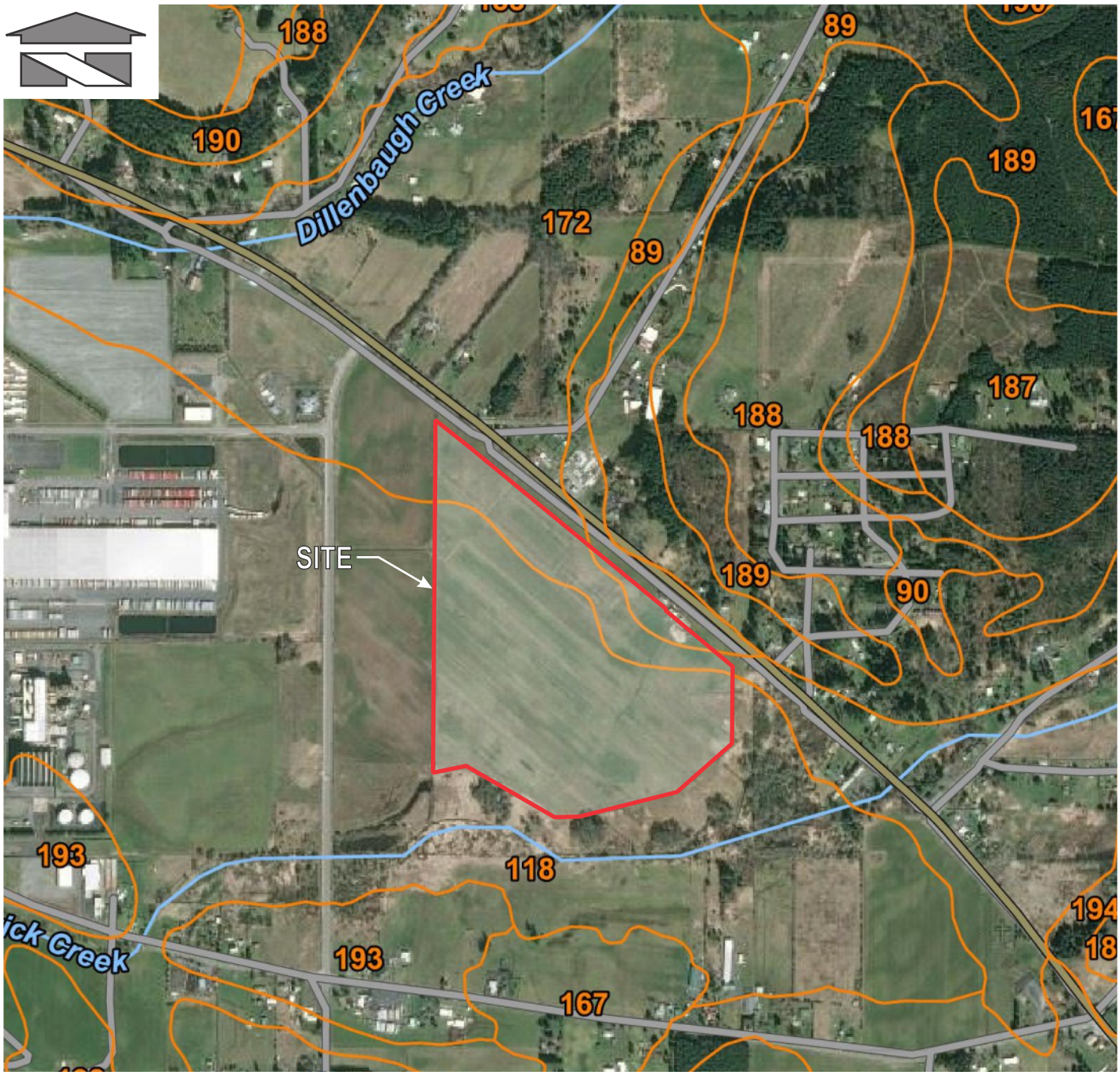
Title:
ASSESSOR MAP

Job Number
14030

DATE: 3/09/21

P:\14000s\14030\exhibit\graphics\14030 amap.cdr

FIGURE 3
SOIL MAP



REFERENCE: USDA, Natural Resources Conservation Service

LEGEND:		HSG
118	= Lacamas silt loam, 0-3% slopes	C/D
172	= Reed silty clay loam	D
89	= Galvin silt loam, 0-8% slopes	C/D

Scale:
Horizontal: **N.T.S.** Vertical: **N/A**

Barghausen
Consulting Engineers, Inc.
18215 72nd Avenue South
Kent, WA 98032
425.251.6222 barghausen.com

For:
Chehalis Industrial Park
Chehalis, Washington

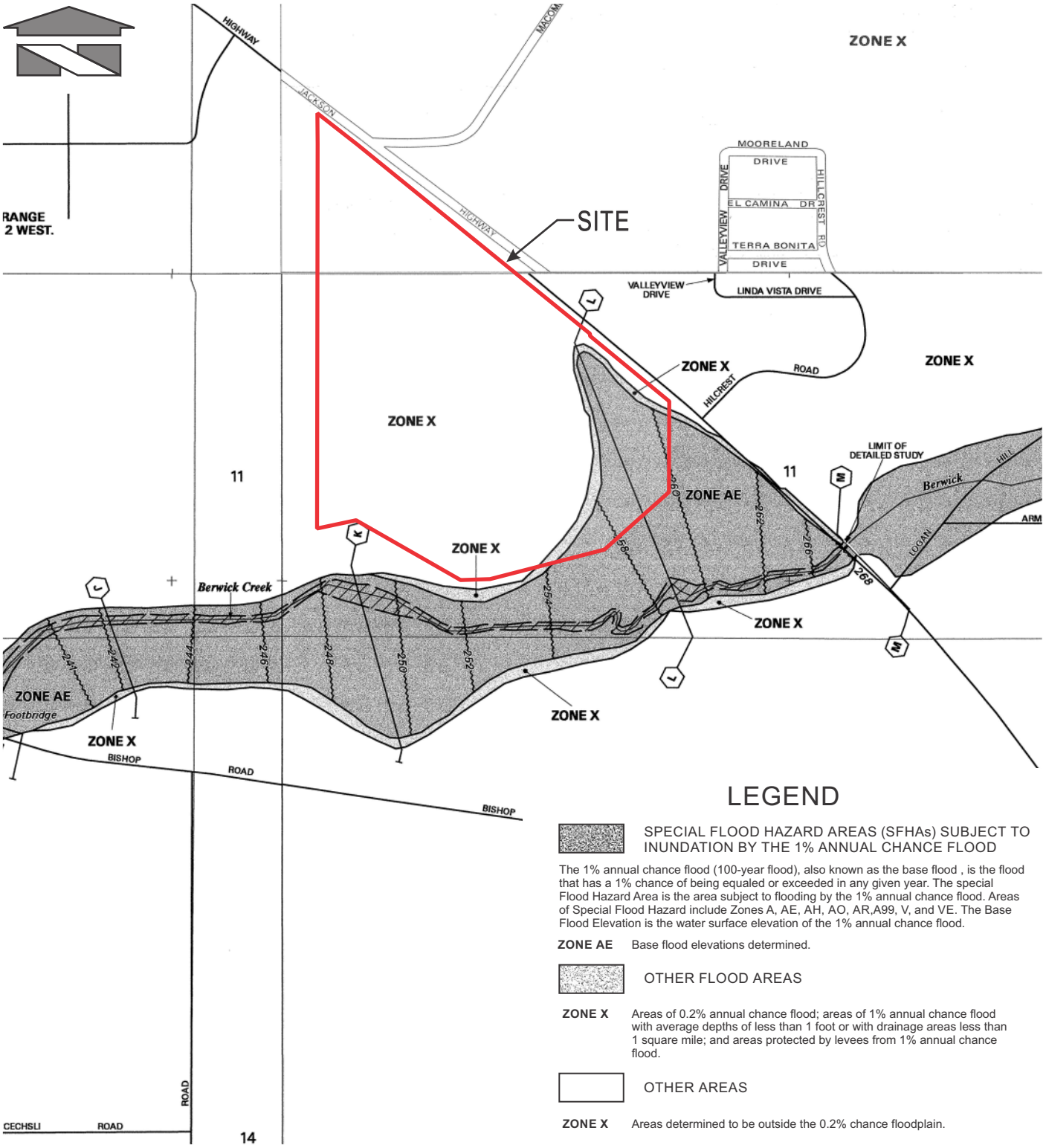
Job Number
14030

Title:
SOIL SURVEY MAP

DATE: 3/09/21

P:\14000s\14030\exhibit\graphics\14030 soil.cdr

FIGURE 4
FEMA MAP



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood , is the flood that has a 1% chance of being equaled or exceeded in any given year. The special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR,A99, V, and VE. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood.

ZONE AE Base flood elevations determined.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% chance floodplain.

REFERENCE: Federal Emergency Management Agency (Portion of Map 5301021782C, July 2006)

Scale:
Horizontal: **N.T.S.** Vertical: **N/A**

Barghausen
Consulting Engineers, Inc.
18215 72nd Avenue South
Kent, WA 98032
425.251.6222 barghausen.com

For:
Chehalis Industrial Park
Chehalis, Washington

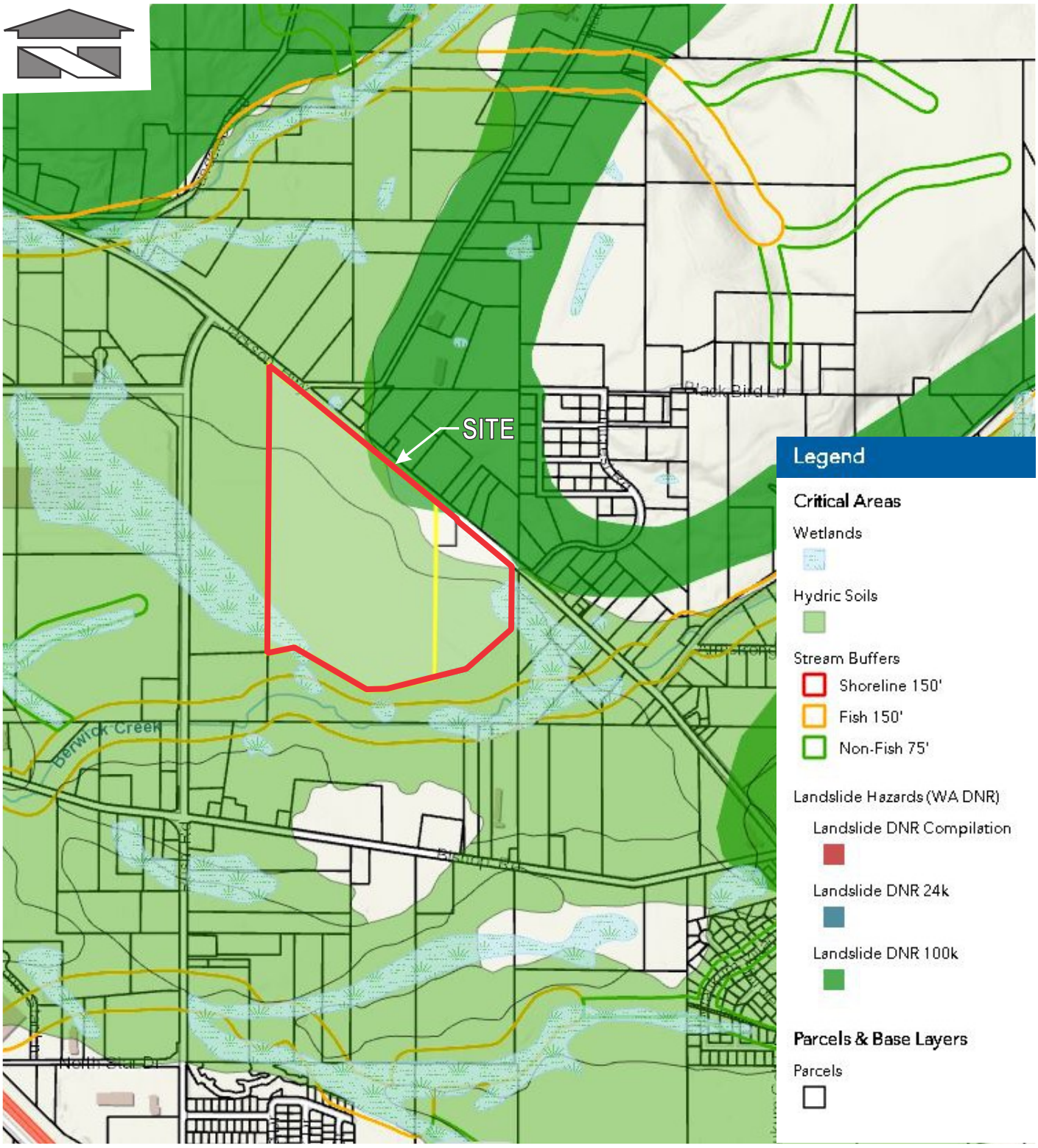
Job Number
14030

Title:
FEMA MAP

DATE: 3/09/21

P:\14000s\14030\exhibit\graphics\14030 fema.cdr

FIGURE 5
ENVIRONMENAL CRITICAL AREA MAP



REFERENCE: Lewis County GIS Web Map (2021)

Scale:
Horizontal: **N.T.S.** Vertical: **N/A**

Barghausen Consulting Engineers, Inc.
18215 72nd Avenue South
Kent, WA 98032
425.251.6222 **barghausen.com**

For:
Chehalis Industrial Park
Chehalis, Washington

Title:
SENSITIVE AREAS MAP

Job Number
14030

DATE: 3/09/21

P:\14000s\14030\exhibit\graphics\14030 sens.cdr

TAP 3.0

3.0 EXISTING CONDITIONS SUMMARY

This project is located on a 69.4-acre parcel within the Northwest quarter of Section 11, Township 13 North, Range 02 West, Willamette Meridian, City of Chehalis, Lewis County, Washington. The property address is currently listed as 0 Jackson Highway. The site is mostly flat with grades ranging from around 246 to 278. The onsite soil are mapped by the U.S. Department of agriculture Soil Conservation Services Soils Maps as Lacamas silt loam, which is a hydrological soils group Type C and is highly conducive to runoff with little to no infiltration. All stormwater runoff is currently captured by existing conveyance ditches onsite which connects into an existing ditch at the northwest corner of property.

TAP 4.0

4.0 OFF-SITE ANALYSIS REPORT

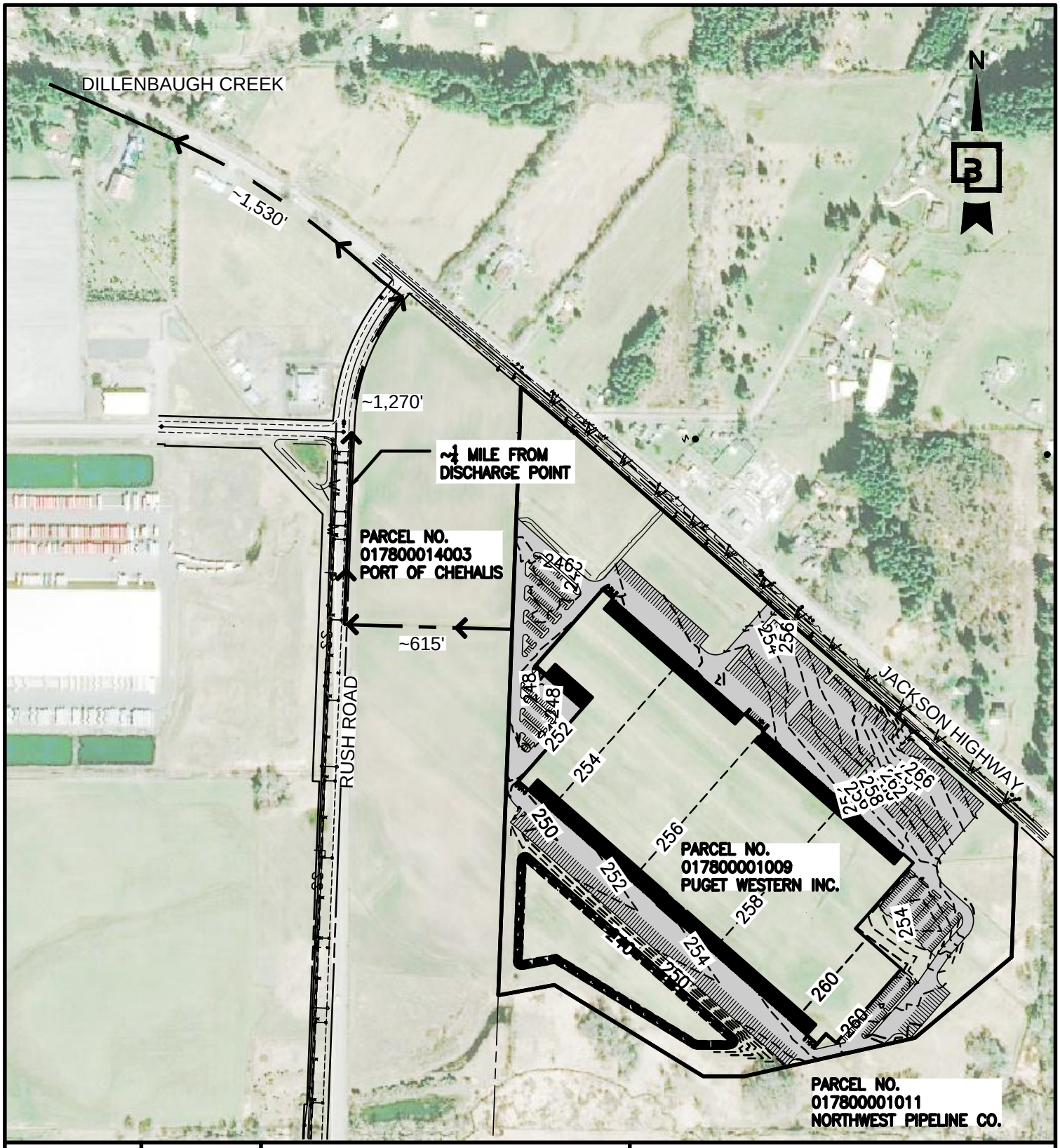
4.1 Define and map the study area

The existing topography of the site is relatively flat with slopes that are relatively between 0 and 8 percent of undeveloped agricultural area. Six covered structures exist along the northeastern portion of the site, with access off Jackson Highway. Five existing conveyance ditches run across the entire site, providing drainage for previous agricultural performance. There also exists 25 identified wetlands onsite, labeled A-Y. The proposed mitigation plan compensates for the loss of these wetlands by providing additional wetland functions elsewhere on the site and by supplying an overall net improvement of water quality, hydrologic functions, and native habitat conditions. The site's natural discharge location is toward the northwest corner of the property to an existing ditch. No existing or potential drainage issues were found onsite or along the downstream path.

Based on the available information, there appears to be some contributing upstream tributary area to the project site. The site slopes gradually to the northwest corner, with some offsite, undeveloped area being collected by the existing ditch system. Berwick Creek borders the site to the southeast and collects upstream runoff prior to reaching the site. Areas to the northwest slope toward Jackson Highway and are collected in existing ditch systems which convey storm water runoff further downstream, with the south ditch line converging with the natural discharge point.

See the Downstream Exhibit on the following page for a map delineating the downstream path.

FIGURE 6
DOWNSTREAM EXHIBIT MAP



Job Number 14030	Designed BHE Drawn DTC Checked JSM Approved BHE Date 01/16/2021	Scale: Horizontal NTS Vertical NTS	For: CHEHALIS INDUSTRIAL PARK
Sheet 1 of 1		BARGHAUSEN CONSULTING ENGINEERS, INC. 18215 72ND AVENUE SOUTH KENT, WA 98032 425.251.6222 BARGHAUSEN.COM	Title: DOWNSTREAM CONVEYANCE MAP

P:\14000s\14030\exhibit\14030 DOWNSTREAM.dwg 12/30/2020 9:01 AM SGEBREGZIABHER

4.2 Review all available information

- *Adopted Basin Plans*: The project is within the Upper Chehalis River Basin of the Upper Chehalis (Water Resource Inventory Area 23) watershed.

- *Finalized Drainage Studies:* No drainage studies were found for the site or surrounding drainage system.

- *Groundwater Management Area Plans:* Refer to USGS published, "Hydrogeologic Framework and Groundwater/Surface-Water Interactions of the Chehalis River Basin, Southwestern Washington" (Scientific Investigations Report 2011-5160) for more information regarding groundwater management.

- *Critical Drainage Area Maps*: Critical areas such as wetland conditions, construction setbacks and stream habitats were based on the attached report provided by Soundview Consultants.

- *Floodplain and Floodway FEMA Maps*: The southeast portion of the site is located within the 100-year floodplain. Refer FEMA map for additional information.

- *Other Off-Site Analysis Reports*: No other Off-Site Analysis Reports were reviewed for this project.

4.3 Field inspect the study area

The field reconnaissance for the off-site drainage analysis was conducted on December 29th, 2020. On the day of the site visit, conditions were overcast.

Upstream Drainage Basin

A portion of the adjacent parcel to the east of the site (Parcel no. 017800001011) appears to slope toward the site and has been modeled as offsite tributary area. The conditions of the upstream drainage basin are undeveloped, and have been modeled as forested.

On-site Drainage Basin

The on-site stormwater runoff typically drains to the northwest portion of the site. Existing irrigation ditches convey stormwater runoff in directed paths toward the existing, offsite ditch running north parallel with Rush Road. Upon reaching the intersection of Rush Road and Jackson Highway, a culvert conveys stormwater runoff along the existing ditch line west, eventually converging with Dillenbaugh Creek.

A series of photos for the on-site area follows:

On the northwest corner of the parcel, facing east.

Existing irrigation ditch running east-west on the northern portion of the site.

Irrigation ditches converging on the northern portion of the site. .

Downstream Drainage Path

Refer to the Downstream Exhibit in Section 4.1. Stormwater runoff typically sheet flows to the northwest corner of the site, following the natural topography. Five existing irrigation ditches collect stormwater runoff and convey runoff to a concentrated point along the western boundary. From here, stormwater continues along existing irrigation ditches, across the adjacent parcel (Parcel no. 017800014003), to the west for approximately 615 feet. Upon reaching the western boundary, stormwater is collected by an existing ditch line running parallel with Rush Road, and is conveyed north for approximately 1,270 feet. Along this ditch line, stormwater runoff has traveled over ¼ mile from the site's discharge point. Through existing concrete culvert lines, stormwater is conveyed further west, crossing Rush Road, and travels along existing ditch lines for approximately 1,530 feet until runoff converges with Dillenbaugh Creek. This convergence point is approximately ½ mile from the site's discharge location.

Stormwater runoff for the developed site will be detained and treated on site. After proper treatment, stormwater will be conveyed to the same existing discharge location along the western property line, maintaining the existing downstream path. Detention release rates will match preexisting conditions up to the 50-year storm event, therefore not increasing the risk of erosion or flooding. No signs of erosion or flooding were found along the downstream path.

A series of photos for the downstream path follows:

Irrigation ditch leaving site along the western property line.

Irrigation ditch continuing west across adjacent parcel.

Existing ditch parallel with Rush Road, facing north.

Concrete culvert near intersection of Rush Road and Jackson Highway.

Stormwater runoff converging with Dillenbaugh Creek.

TAP 5.0

5.0 PERMANENT STORMWATER CONTROL PLAN

A. EXISTING SITE HYDROLOGY

The existing site is relatively flat with slopes that are relatively between 0 and 8 percent and with soils consisting of topsoil/agricultural soil, silt, and silty clay loam. The site is not conducive to infiltration due to the high percentage of fines. Five existing conveyance ditches run across the entire site, providing drainage for previous agricultural performance. There also exists 25 identified wetlands onsite, labeled A-Y. The site's natural discharge location is toward the northwest corner of the property to an existing ditch. No existing or potential drainage issues were found onsite or along the downstream path.

For all stormwater calculations the predeveloped condition of the site was modeled as a flat forest with type 'C' soil. Therefore, the detention facilities for this development were sized to match runoff durations for pre-developed conditions.

Pre-Developed Peak Runoff Rates

Return Period	Flows(cfs)
2-Year	4.13
5-Year	5.66
10-Year	6.67
25-Year	7.95
50-Year	8.90
100-Year	9.86

B. DEVELOPED SITE HYDROLOGY

Under developed conditions the site was modeled in WWHM as 80% impervious, totaling 57.61 acres of impervious surfaces and 14.1 acres of landscaped areas. Detention facilities were sized to match flow durations for 50% of the 2-year through the 50-year storm per the DOE manual. Under developed conditions all stormwater runoff will be captured and routed to the proposed detention facilities. Water will then be released via a flow control structure into the site's existing natural discharge location is toward the northwest corner of the property to an existing ditch.

C. PERFORMANCE STANDARDS AND GOALS

Detention facilities were sized to match flow durations for 50% of the two-year through the 50-year storm per the DOE manual in accordance with City of Chehalis standards. All flow control and water quality sizing calculations were performed using the 2012 Western Washington Hydrology Model. As this is a commercial site enhanced water quality treatment is being provided for all pollution generating surfaces. The Modified Rational Method will be used for pipe conveyance sizing calculations in order to ensure that the proposed storm system is adequately sized to convey the 25-year storm event. Calculations will be included with the final storm drainage report.

D. LOW IMPACT DEVELOPMENT FEATURES

All LID options listed in the DOE manual have been considered for this site. However, slow draining soils onsite make the use of any infiltration facilities infeasible. In addition, dispersion is not possible due to a lack of native vegetation onsite. Therefore, all flow control will be provided via stormwater detention.

E. FLOW CONTROL SYSTEM

Flow control is required for all new impervious surfaces on this site. For stormwater modeling purposes new impervious surfaces include 22.99 acres of new building, 25.27 acres of new pavement, and 4.52 acres of detention pond area. All stormwater runoff will be routed to the proposed detention facilities via a system of new catch basins and piping.

The proposed detention system will be consisting of a detention pond located in the southwest corner of the site. Water will be released from detention via a flow control structure into the existing into the site's existing natural discharge location is toward the northwest corner of the property to an existing ditch. These facilities were sized using Western Washington Hydrology Model 2012 software to match predeveloped flow durations for 50% of the two-year through the 50-year storm. Please see the attached WWHM printout for all calculations related to the sizing of these facilities.

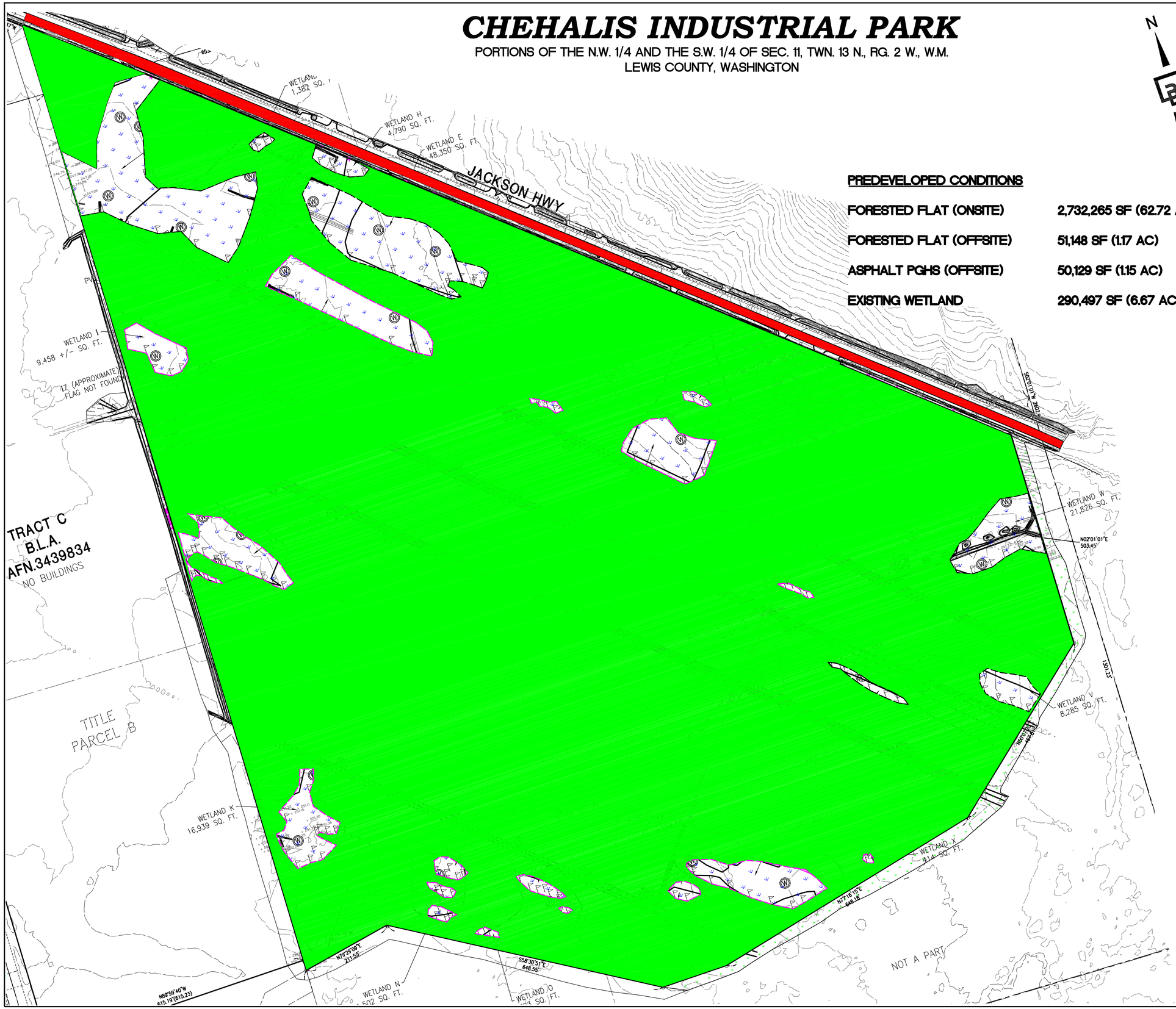
Mitigated Peak Runoff Rates

Return Period	Flow (cfs)
2-Year	1.94
5-Year	2.49
10-Year	2.90
25-Year	3.46
50-Year	3.92
100-Year	4.40

FIGURE 7
PREDEVELOPED BASIN MAP

CHEHALIS INDUSTRIAL PARK

PORTIONS OF THE N.W. 1/4 AND THE S.W. 1/4 OF SEC. 11, TWN. 13 N., RG. 2 W., W.M.
LEWIS COUNTY, WASHINGTON



PREDEVELOPED CONDITIONS

FORESTED FLAT (ONSITE)	2,732,265 SF (62.72 AC)
FORESTED FLAT (OFFSITE)	51,148 SF (1.17 AC)
ASPHALT PGHS (OFFSITE)	50,129 SF (1.15 AC)
EXISTING WETLAND	290,497 SF (6.67 AC)

N

0 50' 100' 200'
SCALE: 1"=100'

No.	Date	By	Ckd.	Appr.	Revision

Title: CHEHALIS INDUSTRIAL PARK

For: PUGET WESTERN, INC.
19515 NORTH CREEK PARKWAY, SUITE 310
BOTHELL, WA 98011
(425) 487-6567

BENJAMIN H. ELDRIDGE — STATE OF WASHINGTON — 42... — REGISTERED PROFESSIONAL ENGINEER
EXPIRATION

Scale: Horizontal / Vertical

Designed SAR
Drawn SAR
Checked BHE
Approved DKB
Date 10/19/20

Barghausen Consulting Engineers, Inc.
18215 72nd Avenue South
Kent, WA 98032
425.251.6222 barghausen.com

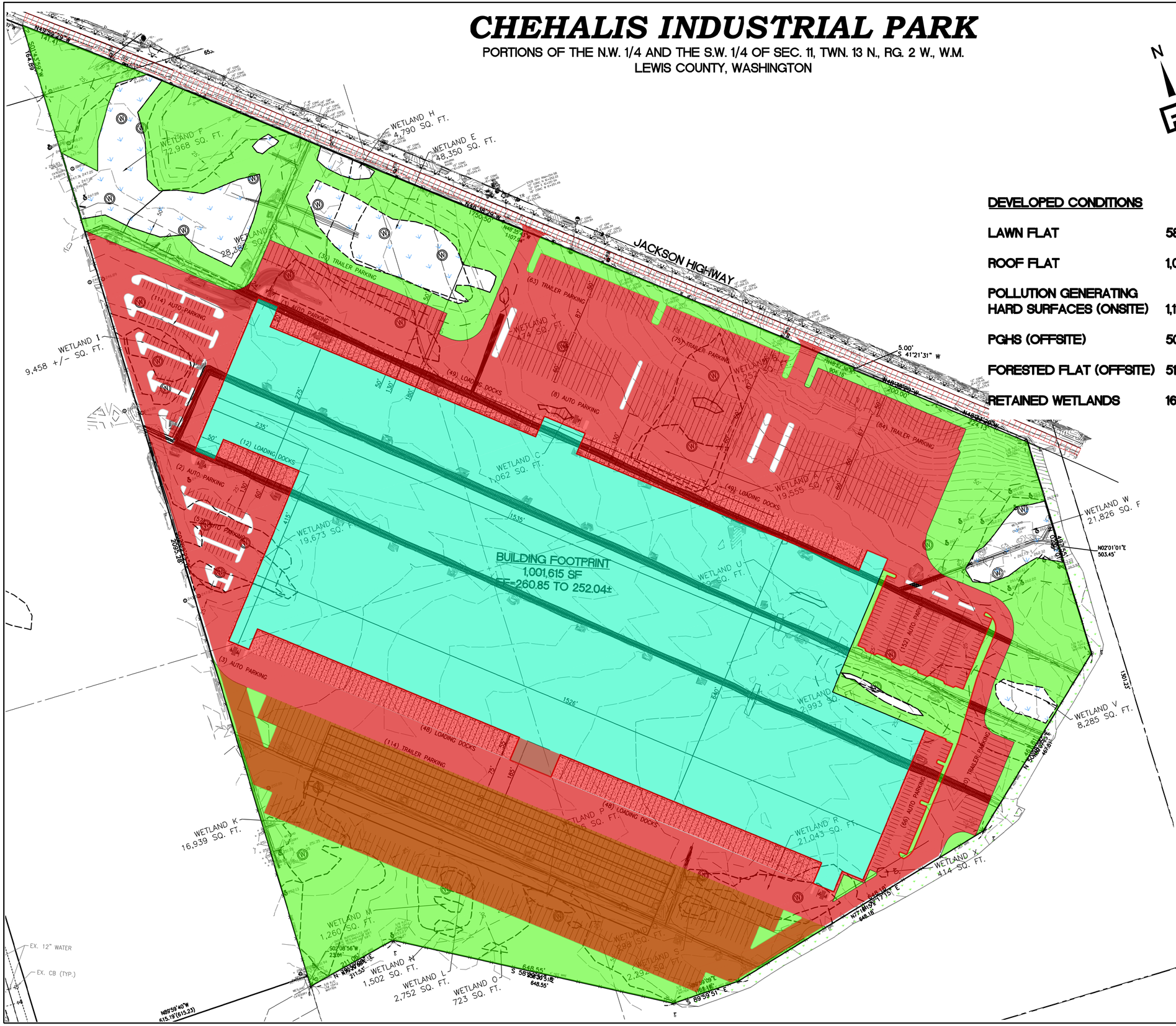
Job Number 14030
Sheet ___ of ___

P:\14000s\14030\preliminary\14030-basin.dwg 3/18/2021 12:55 PM DCASEY

FIGURE 8
DEVELOPED BASIN MAP

CHEHALIS INDUSTRIAL PARK

PORTIONS OF THE N.W. 1/4 AND THE S.W. 1/4 OF SEC. 11, TWN. 13 N., RG. 2 W., W.M.
LEWIS COUNTY, WASHINGTON



N

0 50' 100' 200'
SCALE: 1"=100'

DEVELOPED CONDITIONS

LAWN FLAT	586,033 SF (13.45 AC)	
ROOF FLAT	1,002,115 SF (23.01 AC)	
POLLUTION GENERATING HARD SURFACES (ONSITE)	1,118,497 SF (25.68 AC)	
PGHS (OFFSITE)	50,129 SF (1.15 AC)	
FORESTED FLAT (OFFSITE)	51,148 SF (1.17 AC)	
RETAINED WETLANDS	160,225 SF (3.68 AC)	

No.	Date	By	Ckd.	Appr.	Revision

Title:

FOR
CHEHALIS INDUSTRIAL PARK

For:

PUGET WESTERN, INC.
20000 N CREEK PARKWAY
BUILDING H
BOTHELL, WA 98011

BENJAMIN H. ELDRIDGE
STATE OF WASHINGTON
42766
REGISTERED
PROFESSIONAL ENGINEER

Scale: Horizontal Vertical

Designed JM Drawn DTC Checked BHE Approved BHE Date 8/31/21

Barghausen
Consulting Engineers, Inc.
18215 72nd Avenue South
Kent, WA 98032
425.251.6222
barghausen.com

Job Number 14030

Sheet 14 of

P:\14000s\14030\preliminary\14030-basin.dwg 8/31/2021 11:18 AM SGEBRECZADHER

F. WATER QUALITY SYSTEM

Water quality is required for this development. All stormwater runoff from pollution generating surface will receive enhanced water quality treatment by a Modular Wetland System prior to entering the detention pond

G. CONVEYANCE SYSTEM ANALYSIS AND DESIGN

The conveyance system will be sized using the Modified Rational Method with 25-year precipitation event using a minimum 6.3 minute initial time of concentration and Manning's 'n' value of 0.012 for pipes. Conveyance system sizing calculations will be provided with documents for final engineering review.

FIGURE 9
CONVEYANCE CALCULATIONS

WWHM2012

PROJECT REPORT

General Model Information

Project Name:	14030 det pond 9 ft live
Site Name:	Chehalis Industrial Park
Site Address:	0 Jackson Way
City:	Chehalis
Report Date:	8/24/2021
Gage:	Olympia
Data Start:	1955/10/01
Data End:	2008/09/30
Timestep:	15 Minute
Precip Scale:	0.800
Version Date:	2019/09/13
Version:	4.2.17

POC Thresholds

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

Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C, Forest, Flat	63.9
Pervious Total	63.9

Impervious Land Use	acre
ROADS FLAT	1.15
POND	6.67
Impervious Total	7.82
Basin Total	71.72

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C, Lawn, Flat	12.93
C, Forest, Flat	1.17
Pervious Total	14.1

Impervious Land Use	acre
ROADS FLAT	1.15
ROOF TOPS FLAT	22.99
PARKING FLAT	25.27
POND	8.2
Impervious Total	57.61
Basin Total	71.71

Element Flows To:

Surface	Interflow	Groundwater
Trapezoidal Pond 1	Trapezoidal Pond 1	

Routing Elements
Predeveloped Routing

Mitigated Routing

Trapezoidal Pond 1

Bottom Length:	330.00 ft.	
Bottom Width:	330.00 ft.	
Depth:	10 ft.	
Volume at riser head:	26.7594 acre-feet.	
Side slope 1:	3 To 1	
Side slope 2:	3 To 1	
Side slope 3:	3 To 1	
Side slope 4:	3 To 1	
Discharge Structure		
Riser Height:	9 ft.	
Riser Diameter:	18 in.	
Orifice 1 Diameter:	5.9 in.	Elevation:0 ft.
Orifice 2 Diameter:	1.8 in.	Elevation:4 ft.
Orifice 3 Diameter:	3 in.	Elevation:6.75 ft.
Element Flows To:		
Outlet 1	Outlet 2	

Pond Hydraulic Table

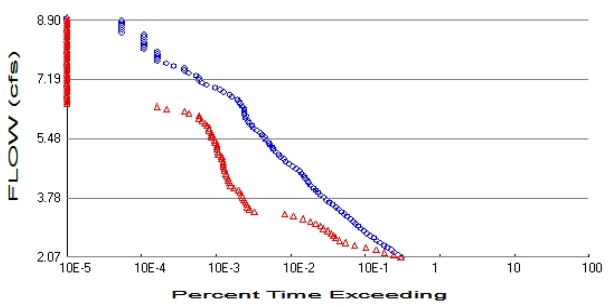
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	2.500	0.000	0.000	0.000
0.1111	2.510	0.278	0.314	0.000
0.2222	2.520	0.557	0.445	0.000
0.3333	2.530	0.838	0.545	0.000
0.4444	2.540	1.120	0.629	0.000
0.5556	2.550	1.403	0.704	0.000
0.6667	2.561	1.687	0.771	0.000
0.7778	2.571	1.972	0.833	0.000
0.8889	2.581	2.258	0.890	0.000
1.0000	2.591	2.545	0.944	0.000
1.1111	2.602	2.834	0.995	0.000
1.2222	2.612	3.124	1.044	0.000
1.3333	2.622	3.414	1.090	0.000
1.4444	2.633	3.706	1.135	0.000
1.5556	2.643	3.999	1.178	0.000
1.6667	2.653	4.294	1.219	0.000
1.7778	2.664	4.589	1.259	0.000
1.8889	2.674	4.886	1.298	0.000
2.0000	2.685	5.184	1.335	0.000
2.1111	2.695	5.483	1.372	0.000
2.2222	2.706	5.783	1.408	0.000
2.3333	2.716	6.084	1.442	0.000
2.4444	2.727	6.386	1.476	0.000
2.5556	2.737	6.690	1.510	0.000
2.6667	2.748	6.995	1.542	0.000
2.7778	2.758	7.301	1.574	0.000
2.8889	2.769	7.608	1.605	0.000
3.0000	2.780	7.916	1.636	0.000
3.1111	2.790	8.226	1.666	0.000
3.2222	2.801	8.536	1.695	0.000
3.3333	2.812	8.848	1.724	0.000
3.4444	2.822	9.161	1.753	0.000
3.5556	2.833	9.475	1.781	0.000

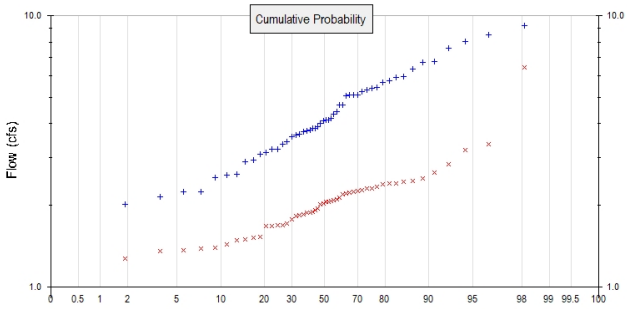
3.6667	2.844	9.791	1.808	0.000
3.7778	2.855	10.10	1.836	0.000
3.8889	2.866	10.42	1.862	0.000
4.0000	2.876	10.74	1.889	0.000
4.1111	2.887	11.06	1.944	0.000
4.2222	2.898	11.38	1.982	0.000
4.3333	2.909	11.70	2.017	0.000
4.4444	2.920	12.03	2.050	0.000
4.5556	2.931	12.35	2.081	0.000
4.6667	2.942	12.68	2.112	0.000
4.7778	2.953	13.01	2.142	0.000
4.8889	2.964	13.34	2.171	0.000
5.0000	2.975	13.67	2.200	0.000
5.1111	2.986	14.00	2.228	0.000
5.2222	2.997	14.33	2.255	0.000
5.3333	3.008	14.66	2.283	0.000
5.4444	3.019	15.00	2.309	0.000
5.5556	3.030	15.33	2.336	0.000
5.6667	3.041	15.67	2.362	0.000
5.7778	3.052	16.01	2.387	0.000
5.8889	3.064	16.35	2.413	0.000
6.0000	3.075	16.69	2.438	0.000
6.1111	3.086	17.03	2.462	0.000
6.2222	3.097	17.38	2.487	0.000
6.3333	3.108	17.72	2.511	0.000
6.4444	3.120	18.07	2.535	0.000
6.5556	3.131	18.42	2.559	0.000
6.6667	3.142	18.76	2.582	0.000
6.7778	3.154	19.11	2.646	0.000
6.8889	3.165	19.46	2.719	0.000
7.0000	3.176	19.82	2.773	0.000
7.1111	3.188	20.17	2.820	0.000
7.2222	3.199	20.53	2.864	0.000
7.3333	3.211	20.88	2.905	0.000
7.4444	3.222	21.24	2.944	0.000
7.5556	3.234	21.60	2.981	0.000
7.6667	3.245	21.96	3.017	0.000
7.7778	3.257	22.32	3.052	0.000
7.8889	3.268	22.68	3.087	0.000
8.0000	3.280	23.05	3.120	0.000
8.1111	3.291	23.41	3.153	0.000
8.2222	3.303	23.78	3.185	0.000
8.3333	3.315	24.14	3.217	0.000
8.4444	3.326	24.51	3.248	0.000
8.5556	3.338	24.88	3.278	0.000
8.6667	3.350	25.26	3.309	0.000
8.7778	3.361	25.63	3.338	0.000
8.8889	3.373	26.00	3.367	0.000
9.0000	3.385	26.38	3.396	0.000
9.1111	3.396	26.75	4.013	0.000
9.2222	3.408	27.13	5.090	0.000
9.3333	3.420	27.51	6.364	0.000
9.4444	3.432	27.89	7.612	0.000
9.5556	3.444	28.28	8.633	0.000
9.6667	3.456	28.66	9.317	0.000
9.7778	3.467	29.04	9.840	0.000
9.8889	3.479	29.43	10.29	0.000
10.000	3.491	29.82	10.73	0.000

10.111	3.503	30.21	11.13	0.000

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 63.9
Total Impervious Area: 7.82

Mitigated Landuse Totals for POC #1
Total Pervious Area: 14.1
Total Impervious Area: 57.61

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	4.132467
5 year	5.659919
10 year	6.671354
25 year	7.949847
50 year	8.903229
100 year	9.858083

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	1.936469
5 year	2.493492
10 year	2.901473
25 year	3.462807
50 year	3.915394
100 year	4.398546

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1956	4.138	2.060
1957	6.781	2.307
1958	3.213	1.385
1959	3.907	2.028
1960	5.093	2.829
1961	3.650	1.949
1962	2.155	1.393
1963	6.734	2.261
1964	4.676	1.872
1965	4.138	1.684

1966	2.938	1.435
1967	3.842	1.884
1968	3.139	1.683
1969	2.586	1.490
1970	3.356	1.921
1971	4.023	2.208
1972	5.262	2.448
1973	3.226	2.228
1974	3.753	1.888
1975	6.363	1.513
1976	5.322	2.334
1977	3.797	1.352
1978	5.104	2.010
1979	5.964	1.675
1980	3.734	2.108
1981	5.915	2.066
1982	3.435	2.242
1983	5.768	2.094
1984	4.432	1.821
1985	2.236	1.525
1986	5.669	2.410
1987	8.064	2.631
1988	2.601	1.843
1989	3.584	1.679
1990	7.617	2.314
1991	9.184	3.189
1992	2.895	1.717
1993	1.909	1.362
1994	2.020	1.261
1995	3.643	2.132
1996	5.406	2.465
1997	3.844	2.189
1998	5.113	1.853
1999	4.687	2.394
2000	5.083	2.278
2001	2.249	1.272
2002	4.324	2.505
2003	2.533	1.502
2004	4.111	2.410
2005	3.087	1.779
2006	4.180	2.068
2007	5.424	3.361
2008	8.527	6.451

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	9.1844	6.4512
2	8.5268	3.3609
3	8.0635	3.1894
4	7.6172	2.8291
5	6.7809	2.6310
6	6.7338	2.5051
7	6.3633	2.4651
8	5.9639	2.4482
9	5.9149	2.4103
10	5.7684	2.4095
11	5.6686	2.3939

12	5.4242	2.3342
13	5.4063	2.3142
14	5.3219	2.3065
15	5.2617	2.2778
16	5.1125	2.2606
17	5.1037	2.2422
18	5.0929	2.2275
19	5.0832	2.2075
20	4.6872	2.1894
21	4.6757	2.1318
22	4.4320	2.1084
23	4.3236	2.0937
24	4.1805	2.0684
25	4.1382	2.0661
26	4.1375	2.0596
27	4.1113	2.0284
28	4.0227	2.0100
29	3.9072	1.9489
30	3.8443	1.9205
31	3.8420	1.8880
32	3.7967	1.8839
33	3.7527	1.8723
34	3.7341	1.8535
35	3.6501	1.8430
36	3.6428	1.8210
37	3.5838	1.7792
38	3.4354	1.7174
39	3.3564	1.6836
40	3.2255	1.6830
41	3.2129	1.6788
42	3.1389	1.6752
43	3.0866	1.5248
44	2.9381	1.5130
45	2.8950	1.5020
46	2.6014	1.4898
47	2.5862	1.4351
48	2.5330	1.3927
49	2.2492	1.3854
50	2.2364	1.3619
51	2.1545	1.3524
52	2.0204	1.2721
53	1.9086	1.2613

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
2.0662	5705	5538	97	Pass
2.1353	5137	4479	87	Pass
2.2044	4629	3356	72	Pass
2.2734	4113	2591	62	Pass
2.3425	3656	1883	51	Pass
2.4115	3299	1326	40	Pass
2.4806	2962	1010	34	Pass
2.5497	2663	842	31	Pass
2.6187	2410	743	30	Pass
2.6878	2163	695	32	Pass
2.7568	1937	645	33	Pass
2.8259	1767	579	32	Pass
2.8950	1644	514	31	Pass
2.9640	1494	466	31	Pass
3.0331	1372	404	29	Pass
3.1021	1277	344	26	Pass
3.1712	1179	272	23	Pass
3.2403	1060	202	19	Pass
3.3093	979	155	15	Pass
3.3784	887	60	6	Pass
3.4474	812	52	6	Pass
3.5165	746	49	6	Pass
3.5856	673	48	7	Pass
3.6546	611	46	7	Pass
3.7237	559	44	7	Pass
3.7927	515	42	8	Pass
3.8618	473	41	8	Pass
3.9309	431	39	9	Pass
3.9999	401	37	9	Pass
4.0690	375	32	8	Pass
4.1381	344	29	8	Pass
4.2071	323	28	8	Pass
4.2762	309	27	8	Pass
4.3452	290	27	9	Pass
4.4143	278	26	9	Pass
4.4834	260	25	9	Pass
4.5524	243	24	9	Pass
4.6215	221	24	10	Pass
4.6905	198	23	11	Pass
4.7596	175	23	13	Pass
4.8287	159	23	14	Pass
4.8977	149	22	14	Pass
4.9668	135	22	16	Pass
5.0358	128	20	15	Pass
5.1049	118	20	16	Pass
5.1740	108	19	17	Pass
5.2430	104	19	18	Pass
5.3121	97	19	19	Pass
5.3811	94	18	19	Pass
5.4502	87	18	20	Pass
5.5193	83	16	19	Pass
5.5883	77	16	20	Pass
5.6574	72	16	22	Pass

5.7264	66	15	22	Pass
5.7955	59	15	25	Pass
5.8646	56	14	25	Pass
5.9336	52	13	25	Pass
6.0027	50	12	24	Pass
6.0717	46	11	23	Pass
6.1408	46	11	23	Pass
6.2099	44	8	18	Pass
6.2789	44	7	15	Pass
6.3480	44	4	9	Pass
6.4170	42	3	7	Pass
6.4861	39	0	0	Pass
6.5552	38	0	0	Pass
6.6242	36	0	0	Pass
6.6933	30	0	0	Pass
6.7624	28	0	0	Pass
6.8314	23	0	0	Pass
6.9005	21	0	0	Pass
6.9695	18	0	0	Pass
7.0386	14	0	0	Pass
7.1077	12	0	0	Pass
7.1767	11	0	0	Pass
7.2458	11	0	0	Pass
7.3148	10	0	0	Pass
7.3839	8	0	0	Pass
7.4530	7	0	0	Pass
7.5220	7	0	0	Pass
7.5911	5	0	0	Pass
7.6601	4	0	0	Pass
7.7292	3	0	0	Pass
7.7983	3	0	0	Pass
7.8673	3	0	0	Pass
7.9364	3	0	0	Pass
8.0054	3	0	0	Pass
8.0745	2	0	0	Pass
8.1436	2	0	0	Pass
8.2126	2	0	0	Pass
8.2817	2	0	0	Pass
8.3507	2	0	0	Pass
8.4198	2	0	0	Pass
8.4889	2	0	0	Pass
8.5579	1	0	0	Pass
8.6270	1	0	0	Pass
8.6960	1	0	0	Pass
8.7651	1	0	0	Pass
8.8342	1	0	0	Pass
8.9032	1	0	0	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #1

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

LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
Trapezoidal Pond 1 POC	☐	8610.97			☐	0.00			
Total Volume Infiltrated		8610.97	0.00	0.00		0.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Failed

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic

Mitigated Schematic

Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1955 10 01        END    2008 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   14030 det pond 9 ft live.wdm
MESSU       25   Pre14030 det pond 9 ft live.MES
            27   Pre14030 det pond 9 ft live.L61
            28   Pre14030 det pond 9 ft live.L62
            30   POC14030 det pond 9 ft live1.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:15
      PERLND      10
      IMPLND       1
      IMPLND      14
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Basin  1                   MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                        in  out           ***
   10     C, Forest, Flat         1    1    1    1   27    0
  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    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           ***
    1      ROADS/FLAT             1    1    1   27    0
   14      POND                   1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

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

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

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    1         0    0    0    0    0
   14         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    1            400      0.01       0.1       0.1
   14            400      0.01       0.1       0.1
```

```
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    1              0         0
   14              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    1              0         0
   14              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                 <--Area-->     <-Target->   MBLK   ***
<Name>   #                 <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND  10                       63.9     COPY   501     12
PERLND  10                       63.9     COPY   501     13
IMPLND   1                       1.15     COPY   501     15
IMPLND  14                       6.67     COPY   501     15

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

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



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

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

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

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

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

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
  END HYDR-PARM2
```

```
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                         ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    0.8            PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    0.8            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***
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    501 FLOW     ENGL      REPL
END EXT TARGETS

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

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

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


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1955 10 01        END    2008 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   14030 det pond 9 ft live.wdm
MESSU       25   Mit14030 det pond 9 ft live.MES
            27   Mit14030 det pond 9 ft live.L61
            28   Mit14030 det pond 9 ft live.L62
            30   POC14030 det pond 9 ft live1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      16
      PERLND      10
      IMPLND       1
      IMPLND       4
      IMPLND      11
      IMPLND      14
      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        Trapezoidal Pond  1         MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
   16     C, Lawn, Flat           1    1    1    1   27    0
   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 ***
   16         0    0    1    0    0    0    0    0    0    0    0    0
```

```
   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  *********
   16         0    0    4    0    0    0    0    0    0    0    0    0    1    9
   10         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   16         0    0    0    0    0    0    0    0    0    0    0
   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
   16              0       4.5      0.03       400      0.05       0.5     0.996
   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
   16              0         0         2         2         0         0         0
   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 ***
   16            0.1      0.25      0.25         6       0.5      0.25
   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
   16              0         0         0         0       2.5         1         0
   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           ***
    1      ROADS/FLAT             1    1    1   27    0
    4      ROOF TOPS/FLAT         1    1    1   27    0
   11      PARKING/FLAT           1    1    1   27    0
   14      POND                   1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

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

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

```
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    1         0    0    4    0    0    0    1    9
    4         0    0    4    0    0    0    1    9
   11         0    0    4    0    0    0    1    9
   14         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    1         0    0    0    0    0
    4         0    0    0    0    0
   11         0    0    0    0    0
   14         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    1            400      0.01       0.1       0.1
    4            400      0.01       0.1       0.1
   11            400      0.01       0.1       0.1
   14            400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    1              0         0
    4              0         0
   11              0         0
   14              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    1              0         0
    4              0         0
   11              0         0
   14              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                 <--Area-->     <-Target->   MBLK   ***
<Name>   #                 <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND  16                      12.93     RCHRES   1      2
PERLND  16                      12.93     RCHRES   1      3
PERLND  10                       1.17     RCHRES   1      2
PERLND  10                       1.17     RCHRES   1      3
IMPLND   1                       1.15     RCHRES   1      5
IMPLND   4                      22.99     RCHRES   1      5
IMPLND  11                      25.27     RCHRES   1      5
IMPLND  14                        8.2     RCHRES   1      5

******Routing******
PERLND  16                      12.93     COPY     1     12
PERLND  10                       1.17     COPY     1     12
IMPLND   1                       1.15     COPY     1     15
IMPLND   4                      22.99     COPY     1     15
IMPLND  11                      25.27     COPY     1     15
IMPLND  14                        8.2     COPY     1     15
PERLND  16                      12.93     COPY     1     13
PERLND  10                       1.17     COPY     1     13
RCHRES   1                          1     COPY   501     16
END SCHEMATIC
```

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



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

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<----------------><---> User T-series  Engl Metr LKFG             ***
                                      in  out                               ***
    1     Trapezoidal Pond-007    1    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

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

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

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

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
    1              1      0.06       0.0       0.0       0.5       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                      ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
         *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
    1             0         4.0  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
  FTABLE      1
   91    4
     Depth      Area    Volume  Outflow1 Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
  0.000000  2.500000  0.000000  0.000000
  0.111111  2.510111  0.278340  0.314877
  0.222222  2.520243  0.557804  0.445304
  0.333333  2.530395  0.838395  0.545384
  0.444444  2.540567  1.120115  0.629755
  0.555556  2.550760  1.402966  0.704087
  0.666667  2.560973  1.686951  0.771289
  0.777778  2.571207  1.972073  0.833087
  0.888889  2.581461  2.258332  0.890608
```

1.000000	2.591736	2.545732	0.944632
1.111111	2.602030	2.834274	0.995730
1.222222	2.612346	3.123962	1.044330
1.333333	2.622681	3.414797	1.090767
1.444444	2.633037	3.706781	1.135307
1.555556	2.643414	3.999917	1.178163
1.666667	2.653811	4.294208	1.219515
1.777778	2.664228	4.589654	1.259510
1.888889	2.674666	4.886259	1.298273
2.000000	2.685124	5.184025	1.335912
2.111111	2.695602	5.482955	1.372519
2.222222	2.706101	5.783049	1.408175
2.333333	2.716621	6.084312	1.442950
2.444444	2.727160	6.386744	1.476906
2.555556	2.737721	6.690348	1.510099
2.666667	2.748301	6.995127	1.542578
2.777778	2.758902	7.301083	1.574387
2.888889	2.769524	7.608218	1.605566
3.000000	2.780165	7.916534	1.636151
3.111111	2.790827	8.226034	1.666175
3.222222	2.801510	8.536719	1.695667
3.333333	2.812213	8.848593	1.724655
3.444444	2.822936	9.161656	1.753163
3.555556	2.833680	9.475913	1.781216
3.666667	2.844444	9.791364	1.808833
3.777778	2.855229	10.10801	1.836035
3.888889	2.866034	10.42586	1.862840
4.000000	2.876860	10.74491	1.889264
4.111111	2.887705	11.06516	1.944632
4.222222	2.898572	11.38662	1.982482
4.333333	2.909458	11.70929	2.017171
4.444444	2.920365	12.03317	2.050075
4.555556	2.931293	12.35826	2.081733
4.666667	2.942241	12.68457	2.112428
4.777778	2.953209	13.01210	2.142330
4.888889	2.964198	13.34084	2.171555
5.000000	2.975207	13.67081	2.200185
5.111111	2.986236	14.00200	2.228282
5.222222	2.997286	14.33442	2.255894
5.333333	3.008356	14.66806	2.283060
5.444444	3.019447	15.00294	2.309812
5.555556	3.030558	15.33905	2.336179
5.666667	3.041690	15.67640	2.362183
5.777778	3.052842	16.01498	2.387844
5.888889	3.064014	16.35481	2.413181
6.000000	3.075207	16.69588	2.438209
6.111111	3.086420	17.03819	2.462943
6.222222	3.097653	17.38175	2.487395
6.333333	3.108907	17.72656	2.511577
6.444444	3.120182	18.07262	2.535500
6.555556	3.131476	18.41993	2.559174
6.666667	3.142792	18.76850	2.582608
6.777778	3.154127	19.11833	2.646515
6.888889	3.165483	19.46942	2.719808
7.000000	3.176860	19.82177	2.773665
7.111111	3.188256	20.17539	2.820866
7.222222	3.199674	20.53028	2.864282
7.333333	3.211111	20.88643	2.905136
7.444444	3.222569	21.24386	2.944087
7.555556	3.234048	21.60256	2.981539
7.666667	3.245546	21.96254	3.017762
7.777778	3.257066	22.32379	3.052946
7.888889	3.268605	22.68633	3.087232
8.000000	3.280165	23.05015	3.120729
8.111111	3.291746	23.41526	3.153522
8.222222	3.303347	23.78165	3.185681
8.333333	3.314968	24.14934	3.217263
8.444444	3.326610	24.51831	3.248314
8.555556	3.338272	24.88858	3.278875
8.666667	3.349954	25.26015	3.308981

```
  8.777778  3.361657  25.63302  3.338661
  8.888889  3.373380  26.00719  3.367941
  9.000000  3.385124  26.38266  3.396846
  9.111111  3.396888  26.75944  4.013200
  9.222222  3.408673  27.13753  5.090551
  9.333333  3.420478  27.51692  6.364015
  9.444444  3.432303  27.89763  7.612713
  9.555556  3.444149  28.27966  8.633726
  9.666667  3.456015  28.66300  9.317879
  9.777778  3.467901  29.04766  9.839981
  9.888889  3.479808  29.43365  10.29799
  10.00000  3.491736  29.82095  10.72952
  END FTABLE  1
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    0.8            PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    0.8            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   STAGE  1 1        1      WDM   1001 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       16
RCHRES     ROFLOW                          COPY           INPUT  MEAN
  END MASS-LINK   16


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

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.

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

TAP 6.0

6.0 CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN

SWPPP shall be provided with final engineering review.

TAP 7.0

7.0 SPECIAL REPORT AND STUDY.

Biological Evaluation

SEPA Check list

TAP 8.0

8.0 OTHER PERMITS

Other permits for this project include:

- Site Development Permit
- Building Permit
- Water Main Extension Permit
- Sanitary Sewer Extension Permit
- Right-of-Way Use Permit

TAP 9.0

9.0 OPERATION AND MAINTENANCE MANUAL

Operation and Maintenance Manual will be provided at final engineering review.

TAP 10.0

10.0 BOND QUANTITIES WORKSHEET

Bond quantities will be provided as required by the City of Chehalis at final engineering review.