Drainage Summary

Project Name: Legend Auto Parking
Project Address: 1720 River Road Puyallup WA
Parcel No.: 042020-8065
Owner/ Applicant: Legend Auto
Submittal Date: November 10, 2023
Resubmittal Date: November 13, 2024
Updates from prior submittal highlighted in **grey.**

Interlaken Engineering and Design, PLLC
Seattle | (206) 470 – 9572 | www.interlakenengineering.com

Project Overview

The project site is located in Puyallup on a 50,094 sf (1.15 acre) lot zoned General Commercial (CG). The site contains a gas station in the northern portion which is not being disturbed by this project. The existing gas station contains 5,026 sf of roof area and 20,288 sf of paved area. The project proposes to pave the southern portion of the lot for merchandise display of automobiles. Access will be taken from the adjacent lot to the east, 1830 River Road.

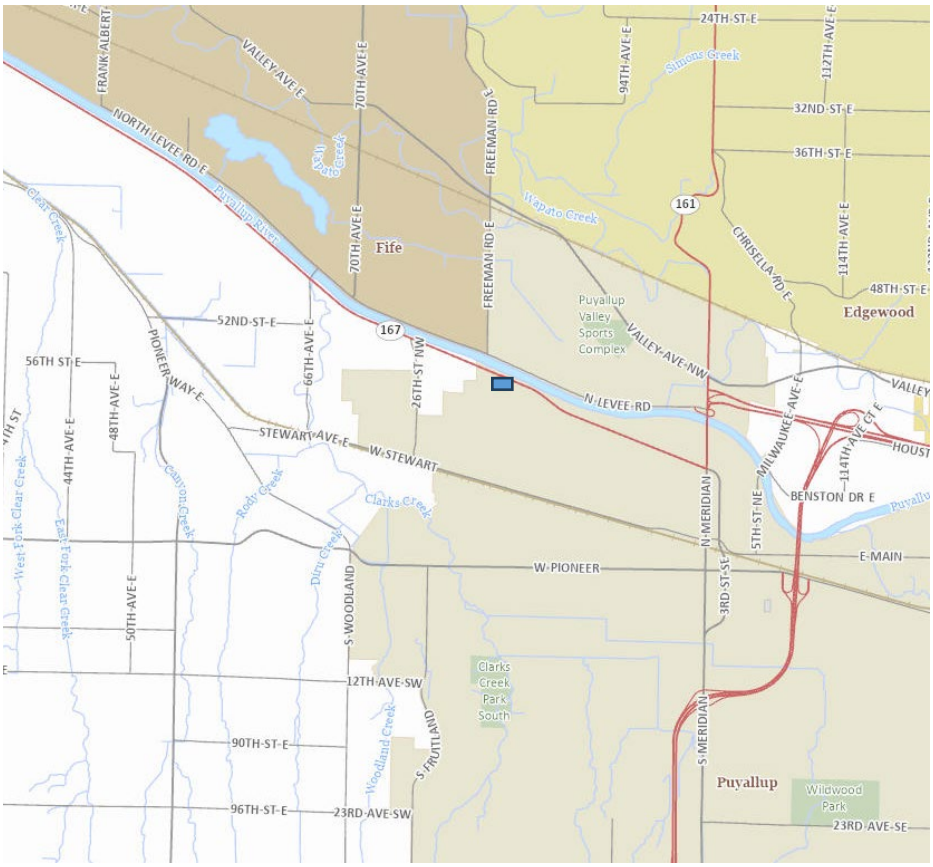

Figure 1: Locus map with project site highlighted.

Existing Conditions

The project site is located in Puyallup on a 1.15 -acre lot zoned CG (Parcel No 042020-8065) on the south side of River Road. The site is in the Puyallup River South drainage basin, which drains to the Puyallup River. A drainage basin fact sheet has been included with this report.

The lot presently contains a gas station, with a convenience store and pumps in the northern portion of the lot. The lot is relatively flat, with a slight slope to the west. All existing impervious is to remain. Runoff from the existing improvements is collected and routed through the public drainage system to the Puyallup River.

Proposed Conditions

The owner proposes to construct a parking lot in the southern portion of the lot for the display of automobiles. Access to the parking lot will be taken from 1820 Puyallup Road located to the east.

The proposed project will result in a total of 13,933 sf of new plus replaced hard surface. Proposed hard surface will consist entirely of the new proposed parking lot.

Jurisdictional Requirements

The proposed project is subject to Minimum Requirements #1-9 (hereafter MR) as outlined below with a brief summary of how they will be met.

MR #1: Preparation of Storm Water Site Plans	Stormwater Site Plans are included with this submittal. Please see C3.
MR #2: Construction Stormwater Pollution Prevention Plan (CSWPPP)	A Construction Stormwater Pollution Prevention Plan has been prepared as part of the Stormwater Site Plan packet that is included with this submittal. Please see C2.
MR #3: Source Control of Pollution	A Temporary Erosion and Sediment Control Plan is included with this submittal. Please see C2.
MR #4: Preservation of Natural Drainage Systems and Outfalls	The proposed development will not alter the existing drainage pattern for this lot. Under existing conditions flows infiltrate on site, or disperse across the site to various off-site catch basins. Both cases result in flows reaching the nearby Puyallup River. The proposed conditions will infiltrate all runoff on site. This maintains the natural drainage system to the maximum extent practical.
MR #5: On-site Stormwater Management	Full Dispersion is infeasible because minimum setbacks and flow path lengths cannot be met. Infiltration BMPs are feasible and proposed to the maximum extent practical. The proposed parking lot will be entirely mitigated by permeable pavement.
MR #6: Runoff Treatment	All generated runoff will be mitigated via infiltration by permeable pavement, no additional water quality measures are required per 2019 SWMMWW Figure III-1.1.
MR #7: Flow Control	Given the implementation of permeable pavement, the proposed development does not cause a 0.15 cfs increase using 15-minute time steps. Flow Control is not required.
MR #8: Wetlands Protection	There are no wetlands in the immediate vicinity of the proposed project.
MR #9: Operations and Maintenance	Operations and Maintenance instructions for BMPs requiring maintenance have been included in the Appendix.

Infiltration Feasibility Assessment

On-Site Infiltration is feasible. A report prepared by HydroCon LLC, dated July 20th, 2023 states that the site is underlaid by 9’ of sandy loam, at which, perched groundwater was encountered. Given the 9’ zone adequate for infiltration, infiltration is feasible. The full report is included in the appendices. A report

prepared by GeoResources dated March 15, 2024 and included wet season monitoring similarly concluded permeable pavement is feasible for the project. The full report is included in the appendices.

Offsite Runoff
The proposed project is located near the Puyallup River and is generally flat. Minimal offsite flows enter the project site, as all adjacent lots are similar commercial lots with mitigation measures, or connections to the public drainage system. All flows either drain towards the Puyallup River directly, or enter the public system which outfalls into the Puyallup River.

Hydrology/ Hydraulic Analysis
Formal hydrology and pipe flow hydraulic calculations were not completed for the proposed project. All runoff is to be mitigated using permeable pavement and no pipes or hydraulic conveyance systems are proposed.

Disturbed Soils
All disturbed soil areas to be amended per City of Puyallup detail 01.02.08.

MR #5 On-Site Stormwater Management – List Approach
Driveway:
Full Dispersion is **infeasible** for the project due to the lack of a 100 lf flowpath (2018 SWES D5-03.1.1).

Permeable Pavement is **feasible** for the project and proposed to the maximum extent practical. The proposed parking lot will be constructed entirely of hot mix permeable pavement. The permeable pavement will consist of 6" of wearing coarse, a 2" leveling coarse, a 6" reservoir coarse, a 6" sand coarse for runoff treatment, and 2" of scarified subgrade per SWMMWW BMP T5.15. The Soils Report prepared by GeoResources states that the soils do not meet the SWMMWW requirements for CEC, and as a result, soils below the proposed permeable pavement shall be compost amended.

MR #7 Flow Control
In order to meet the Flow Control Standard, the southern portion of the site has been modeled in accordance with the 2019 SWMMWW. The permeable pavement was modeled using a 6" free drainage course and an design infiltration rate of 1.0 in/hr. This rate was determined by GeoResources and the report is included in the appendices. The results, found using Western Washington Hydrology Model and 15-minute time steps indicates that there is no more than a 0.15 cfs increase in peak post development flows. The entire report is included in the appendices.

Appendix
1) Phase II Environmental Site Characterization Prepared by HydroCon July 20, 2023
2) Soils Report Prepared by GeoResources March 15, 2024
3) Soils Report Addendum: Groundwater Monitoring by GeoResources April 8, 2024
4) SWMMWW Figure 3.1 – Flow Chart for Determining Requirements for New Development
5) WWHM Project Report
6) Puyallup-White Drainage Basin Fact Sheet

Phase II Environmental Site Characterization

Legend Auto Sales
Vacant Lot
1720 River Road
Puyallup, WA 98371
HydroCon Project Number: 10149-001.00

Prepared for:
Legend Auto Sales
1632 River Road
Puyallup, WA 98371

July 20, 2023

Prepared by:

HydroCon, LLC
314 W 15th Street, Suite 300 Vancouver, Washington 98660
p: (360) 703-6079 f: (360) 703-6086
www.hydroconllc.net

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1.0 INTRODUCTION

HydroCon was retained by Legend Auto Sales to complete a Phase II Site Characterization to provide a baseline on the environmental health of a vacant lot prior to repurposing as auto sales parking. The proposed parking site is located at 1720 River Road in Puyallup, Washington (Figure 1).

The scope of work included advancing six temporary soil borings distributed across the property; observation and field screening of soil; collection of soil samples; collection of one groundwater sample; laboratory analysis of the soil and groundwater samples for total petroleum hydrocarbons (TPH) using Northwest Method NWTPH-HCID; and a discussion of laboratory analytical results.

2.0 PERMITING AND HEALTH AND SAFETY

2.1 Permits

No permits were necessary to complete the scope of work.

2.2 Health and Safety Plan

HydroCon prepared a site-specific health and safety plan (HASP) to govern health and safety protocols used during this investigation. Work was performed using Occupational Safety and Health Administration (OSHA) Level D work attire consisting of hard hats, safety glasses, protective gloves, and protective boots.

2.3 Underground Utility Locates

Prior to the commencement of any subsurface activities public utility notification was requested through the Washington One Call Service (ticket number 23243455). In addition, HydroCon contracted with LineScape Inc. to perform private utility locates for the site.

3.0 SOIL BORING AND SAMPLING ACTIVITIES

This section provides a discussion of the fieldwork procedures used to complete the Phase II Site Characterization.

3.1 Temporary Soil Borings

Anderson Environmental Contracting, LLC (AEC) was subcontracted to perform the drilling services. A total of six (6) borings (HC01 through HC06). On June 26th, HC01 through HC05 were advanced to a maximum depth of 15 feet bgs and HC06 was advanced to a depth of 20 feet bgs to evaluate current

soil and groundwater conditions at the site. The soil borings were advanced using direct-push drilling techniques. Borings were placed around the property to attain the most site coverage as shown on Figure 2.

Each boring was advanced in five-foot intervals to its maximum depth of 15 to 20 feet bgs. Continuous soil samples were collected using a five-foot long "macro" core tube sampler equipped with new, clear polyethylene liners. All soil cores were inspected for lithologic composition, presence of water, and field screened for the presence of petroleum hydrocarbons (explained in further detail in Section 3.2). Boring logs detailing the lithology, field screening results, and sample depths are included in Appendix A.

All dedicated drilling and sampling tools were decontaminated between boring locations using a hot water pressure washer. All investigation derived waste (IDW) was contained in a labeled 55-gallon drum which is temporarily being stored at the site pending disposal to a licensed disposal facility.

3.2 Field Screening

Field screening methods were used to evaluate the potential presence of hydrocarbons in soil and fort the selection of sampling locations for laboratory analysis. Field screening consisted of volatile organic vapor measurements using a photoionization detector (PID), sheen testing, visual observations (staining, etc.), and olfactory observations. The PID was calibrated before use at the site to a test gas standard consisting of 100 ppm isobutylene. A portion of each soil sample was placed in a sealable plastic baggie. The tip of the PID was inserted into the plastic bag in the airspace above the soil sample and the PID measurement was recorded on the field notes. Sheen testing consisted of placing a small portion of soil in clear water and observing the water for the presence of hydrocarbon sheen. Because several factors can affect PID readings (e.g. moisture, temperature, and background conditions), HydroCon determined that a value of 2 ppm or greater may indicate the presence of organic vapors originating from contaminants at the site.

3.3 Soil and Groundwater Sampling

HydroCon selected two soil samples per boring for laboratory analysis based on field screening results. The sample with the highest PID reading was selected from each boring. Soil samples collected from near surface soils and soils at the groundwater interface were submitted from the borings where no field indication of contamination was present.

The selected soil samples were removed from the polyethylene tubing using a new pair of disposable gloves and placed directly into labeled laboratory prepared jars and sealed with Teflon-lined lids. Soil samples were placed into laboratory supplied containers and immediately placed in an ice filled cooler along with chain-of-custody documentation for delivery to Friedman and Bruya in Seattle, Washington.

After the completion of soil sampling, one soil boring (HC06) were fitted with temporary wells constructed with 1-inch diameter PVC well materials including a 10-foot length of slotted well screen and blank PVC casing.

A minimum of 1 liter of water was purged from the temporary well prior to sample collection. The groundwater samples were collected from the temporary well using a peristaltic pump and new, low-density polyethylene (LDPE) tubing. Groundwater samples were placed in laboratory supplied containers and then placed in an iced cooler for delivery to Friedman and Bruya in Seattle, Washington.

3.4 Laboratory Analysis

The soil and groundwater samples submitted to the laboratory were analyzed for TPH using Northwest Method NWTPH-HCID.

4.0 INVESTIGATION RESULTS

This section documents the results of the field investigation.

4.1 Subsurface Conditions

The soil underlying the site is composed of unconsolidated sediments (sand, silt, and gravels) that extend to the maximum depth investigated 20 feet bgs. The uppermost soil, surface to 9 feet bgs consists of light brown fine sandy loam with trace non-plastic fines. This is underlain by a medium brown fine to medium sand with trace non-plastic fines to a depth of 18 feet bgs. Below this material is a black medium grained clean sand. Perched groundwater was encountered at a depth of 9 feet bgs in each boring. This perched zone appeared in a 6-to-8-inch lens, groundwater was encountered at a depth of 18 feet bgs with in the black sand zone and was very productive. The inferred groundwater direction at this Site is to the north toward the nearby Puyallup River.

4.2 Field Screening Results

Results of field screening did not indicate any evidence of petroleum impacted soil. PID readings recorded at all borings were 0.0 parts per million (ppm) and sheen testing of the soil did not product a sheen. No hydrocarbon odor or staining was observed in any of the sample cores.

4.3 Soil Sampling Results

Soil analytical results are reported as milligrams per kilogram (mg/kg) which is equal to ppm. The results are summarized on Table 1. The laboratory analytical reports are included in Appendix B.

No analytes were detected above the laboratory method reporting limit (MRL).

4.4 Groundwater Sampling Results

Groundwater analytical results are reported as micrograms per liter (µg/L) which is equal to parts per billion (ppb). The groundwater sampling results are summarized on Table 2.

No analytes were detected above the laboratory method reporting limit (MRL).

5.0 DISCUSSION

The following section provides a discussion of the results of the investigation.

5.1 Discussion

Based on the field observations and analytical results of the six borings (HC01 through HC06) advanced across the Site, there is no indication of petroleum hydrocarbon contamination above the MRL in soil or groundwater at the site.

6.0 QUALIFICATIONS

HydroCon's services were performed in a manner consistent with generally accepted practices of the profession undertaken in similar studies in the same geographical area during the same time period. HydroCon makes no warranties, either expressed or implied, regarding the findings, conclusions or recommendations. Please note that HydroCon does not warrant the work of laboratories, regulatory agencies, or other third parties supplying information used in the preparation of the report.

Findings and conclusions resulting from these services are based upon information derived from the on-site activities and other services performed under this scope of work; such information is subject to change over time. Certain indicators of the presence of hazardous substances, petroleum products, or other constituents may have been latent, inaccessible, unobservable, nondetectable or not present during these services, and we cannot represent that the site contains no hazardous substances, toxic materials, petroleum products, or other latent conditions beyond those identified during this monitoring. Subsurface conditions may vary from those encountered at specific sampling locations or during other surveys, tests, assessments, investigations, or exploratory services; the data, interpretations and findings are based solely upon data obtained at the time and within the scope of these services.

This report is intended for the sole use of **Legend Auto Sales**. This report may not be used or relied upon by any other party without the written consent of HydroCon. The scope of services performed in execution of this evaluation may not be appropriate to satisfy the needs of other users, and use or re-use of this document or the findings, conclusions, or recommendations is at the risk of said user.

The conclusions presented in this report are, in part, based upon subsurface sampling performed at selected locations and depths. There may be conditions between borings or samples that differ significantly from those presented in this report and which cannot be predicted by this study.

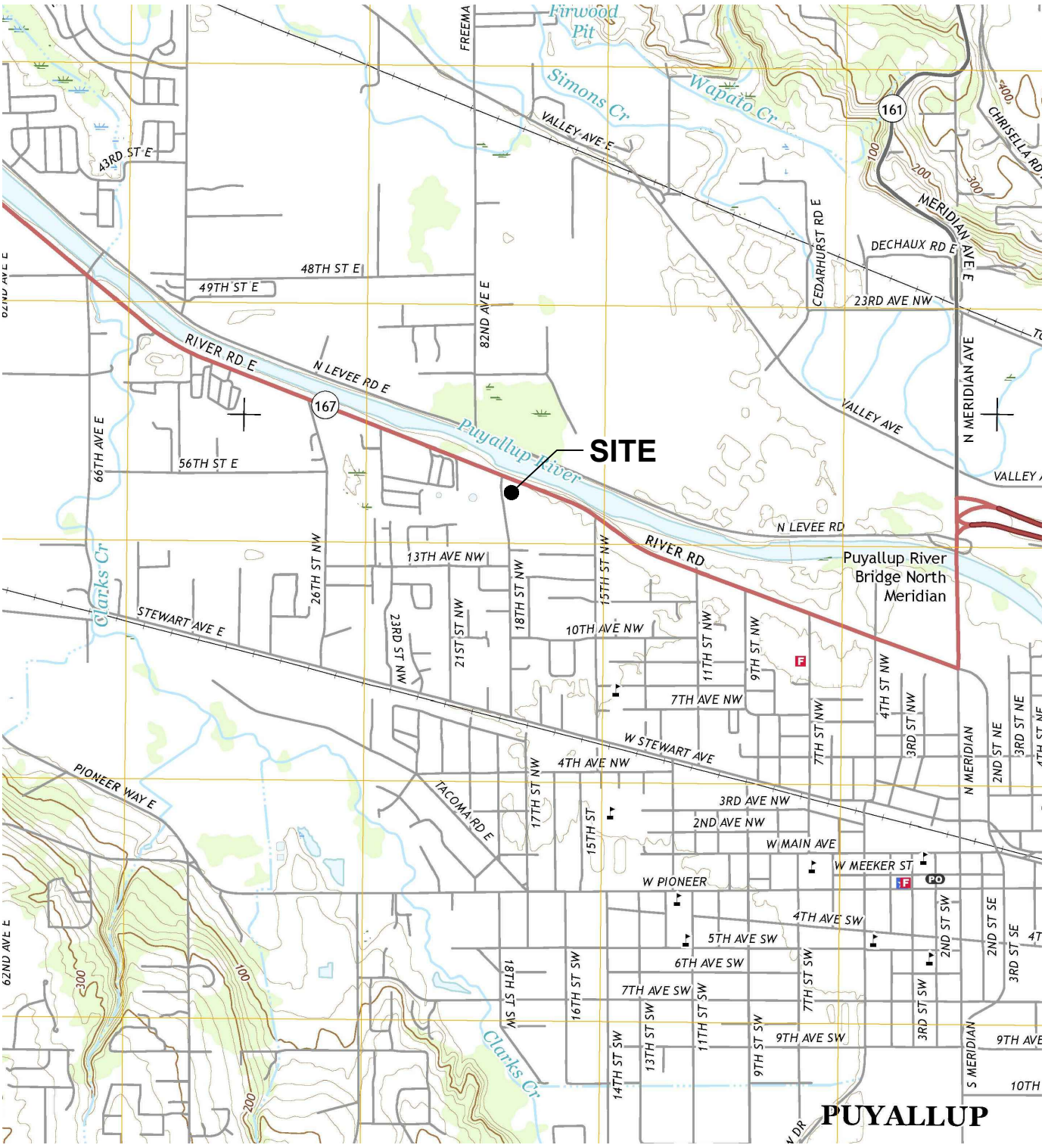
Signature:

Report Prepared By:

Robert A. Honsberger
Project Geologist

Craig Hultgren, LHG
Principal Geologist

State of Washington
Hydrogeologist
1809
Licensed Geologist
CRAIG HULTGREN



NOTE(S):
USGS, PUYALLUP QUADRANGLE
WASHINGTON-PIERCE CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

0 2000 4000
SCALE IN FEET
1" = 2000'

N
W E
S

HydroCon
1339 Commerce Ave, Suite 211, Longview, Wa. 98632
Ph (360)-703-6086

DATE: 7-10-23
DWN: JJT
CHK: RH
APPROVED: RH
PRJ. MGR: CH
PROJECT NO: 10149-001.00

FIGURE 1
SITE LOCATION MAP

RIVER ROAD SHELL
1720 RIVER ROAD
PUYALLUP, WA.

I:\Autocad Files\Hydrocon-Autocad\10149-001.00 River Rd Shell\2023\July 2023\10149-001.00_BM-071023.dwg

Legend

- Property Boundary
- ⊕ Boring Location
- W Water
- P Power
- G Gas
- COM Communication

N

W E

S

0 40 80

SCALE IN FEET

1" = 40'

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DATE: 7-10-23
DWN: JJT
CHK: RH
APPROVED: RH
PRJ. MGR: CH
PROJECT NO: 10149-001.00

FIGURE 2
SITE FEATURES

LEGEND AUTO SALES
1720 RIVER ROAD
PUYALLUP, WA.

I:\Autocad Files\Hydrocon-Autocad\10149-001.00 River Rd Shell\2023\July 2023\10149-001.00_BM-071023.dwg

Table 1
Summary of Soil Analytical Results - Temporary Borings
Legend Auto Sales - 1720 River Road
Puyallup, Washington

	Fuels		
	GRPH	DRPH	ORPH
	mg/kg	mg/kg	mg/kg
MTCA Method A Cleanup Level	**30/100**	**2,000**	**2,000**
Benzene (Non Detect)	**100**		
Benzene (Detect)	**30**		
Temporary Borings			
Sample ID / **Date**			
HC01-02 / 6/26/2023	<20	<50	<250
HC01-09 / 6/26/2023	<20	<50	<250
HC02-02 / 6/26/2023	<20	<50	<250
HC02-09 / 6/26/2023	<20	<50	<250
HC03-02 / 6/26/2023	<20	<50	<250
HC03-09 / 6/26/2023	<20	<50	<250
HC04-02 / 6/26/2023	<20	<50	<250
HC04-09 / 6/26/2023	<20	<50	<250
HC05-02 / 6/26/2023	<20	<50	<250
HC05-09 / 6/26/2023	<20	<50	<250
HC06-02 / 6/26/2023	<20	<50	<250
HC06-09 / 6/26/2023	<20	<50	<250

Notes
Red denotes concentration in excess of MTCA Method Cleanup Level for Soil.
Black bold denotes concentration above the MRL but below the cleanup level
GRPH (gasoline range petroleum hydrocarbons) analyzed by Method NWTPH-HCID.
DRPH (diesel range petroleum hydrocarbons) and ORPH (oil range petroleum hydrocarbons) analyzed by Method NWTPH-HCID.
MTCA Method A Cleanup Levels, WAC 173-340-720 through 173-340-760, revised Nov., 2007
< = less than method reporting limit shown

Table 2

Summary of Groundwater Analytical Results - Temporary Borings

Legend Auto Sales - 1720 River Road

Puyallup, Washington

		Fuels		
		GRPH	DRPH	ORPH
MTCA Method A Groundwater Cleanup Levels		**1,000/800**	**500**	**500**
Sample ID	**Date**	**ug/L**	**ug/L**	**ug/L**
HC06-W	6/26/23	<200	<500	<500

Notes

- = Not measured/not analyzed

< = Not detected at a concentration exceeding the laboratory Method Reporting Limit (MRL)

ug/L = micrograms per liter

Bold denotes concentration detected above laboratory MRL but below the cleanup level

Red denotes concentration exceeds MTCA Method A cleanup level.

MTCA Method A Cleanup Levels, Table 740-1 of Section 900 of Chapter 173-340 of the Was

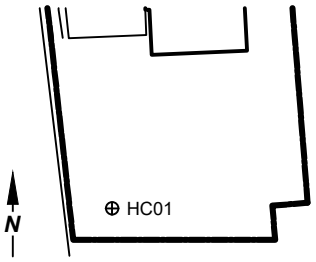
APPENDIX A
BORING LOGS

HydroCon
1339 Commerce Ave, Suite 211
Longview, WA 98632
Phone: 360-703-6079

WELL/BORING NUMBER: HC01

PROJECT NAME: Legend Auto Sales
PROJECT NUMBER: 10149-001.00
PROJECT LOCATION: Puyallup, WA
LOGGED BY: R. Honsberger
REVIEWED BY: C. Hultgren
DATE: 7-11-23

LOCATION MAP



DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Composition, Density or Consistency, Moisture, Odor, Geological Interpretation)	DEPTH (FT.)	SYMBOL	WELL DETAILS	SAMPLE ID	PID	FIRST WATER	BLOW COUNTS	BOREHOLE/WELL CONSTRUCTION DETAILS
Topsoil, grass, and gravel	0							
Sand (SP), brown, 95% fine sand and 5% nonplastic silt, dry, no hydrocarbon odor.				HC01-02	0			
	5				0			
					0			
					0			
Perched water at 9' bgs				HC01-09				
Sand (SP), brown, 100% medium to fine, damp to moist, no hydrocarbon odor. Grain size change at 10' bgs.	10				0			
					0			
					0			
BOTTOM OF BORING AT 15' B.G.S.	15			HC01-15	0			
Boring backfilled with hydrated bentonite upon completion.	20							
	25							
	30							

DRILLING CONTRACTOR: AEC
DRILLING METHOD: Direct Push LAR
BOREHOLE DIAMETER: 2-Inch
SAMPLING METHOD: Macro Core
WELL TAG ID: --

CASING ELEVATION: --
GROUND SURFACE ELEVATION: --
NORTHING: 23' N of SW corner of property
EASTING: 28.5' E of SW coner of property

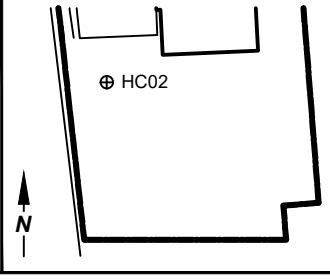
HydroCon

1339 Commerce Ave, Suite 211
Longview, WA 98632
Phone: 360-703-6079

WELL/BORING NUMBER HC02

PROJECT NAME: Legend Auto Sales
PROJECT NUMBER: 10149-001.00
PROJECT LOCATION: Puyallup, WA
LOGGED BY: R. Honsberger
REVIEWED BY: C. Hultgren
DATE: 7-11-23

LOCATION MAP



DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Composition, Density or Consistency, Moisture, Odor, Geological Interpretation)	DEPTH (FT.)	SYMBOL	WELL DETAILS	SAMPLE ID	PID	FIRST WATER	BLOW COUNTS	BOREHOLE/WELL CONSTRUCTION DETAILS
Topsoil, grass, and gravel	0							
Sand (SP), brown, 95% fine sand and 5% nonplastic silt, dry, no hydrocarbon odor.				HC02-02	0			
	5				0			
					0			
					0			
Perched water at 9' bgs				HC02-09				
Sand (SP), brown, 100% medium to fine, damp to moist, no hydrocarbon odor. Grain size change at 10' bgs.	10				0			
					0			
					0			
BOTTOM OF BORING AT 15' B.G.S.	15			HC02-15	0			
Boring backfilled with hydrated bentonite upon completion.	20							
	25							
	30							

DRILLING CONTRACTOR: AEC
DRILLING METHOD: Direct Push LAR
BOREHOLE DIAMETER: 2-Inch
SAMPLING METHOD: Macro Core
WELL TAG ID: --

CASING ELEVATION: --
GROUND SURFACE ELEVATION: --
NORTHING: 20' S of SW corner of building
EASTING: 41' W of SW coner of building

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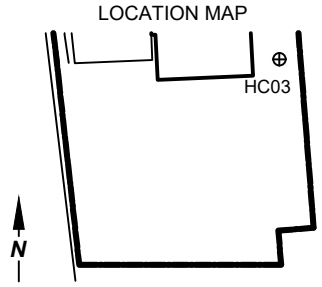
Longview, WA 98632
Phone: 360-703-6079

WELL/BORING NUMBER: HC03

PROJECT NAME: Legend Auto Sales
PROJECT NUMBER: 10149-001.00
PROJECT LOCATION: Puyallup, WA
LOGGED BY: R. Honsberger
REVIEWED BY: C. Hultgren
DATE: 7-11-23

LOCATION MAP



DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Composition, Density or Consistency, Moisture, Odor, Geological Interpretation)	DEPTH (FT.)	SYMBOL	WELL DETAILS	SAMPLE ID	PID	FIRST WATER	BLOW COUNTS	BOREHOLE/WELL CONSTRUCTION DETAILS
Topsoil, grass, and gravel	0							
Sand (SP), brown, 95% fine sand and 5% nonplastic silt, dry, no hydrocarbon odor.				HC03-02	0			
	5				0			
					0			
					0			
Perched water at 9' bgs				HC03-09				
Sand (SP), brown, 100% medium to fine, damp to moist, no hydrocarbon odor. Grain size change at 10' bgs.	10				0			
					0			
					0			
BOTTOM OF BORING AT 15' B.G.S.	15			HC03-15	0			
Boring backfilled with hydrated bentonite upon completion.	20							
	25							
	30							

DRILLING CONTRACTOR: AEC
DRILLING METHOD: Direct Push LAR
BOREHOLE DIAMETER: 2-Inch
SAMPLING METHOD: Macro Core
WELL TAG ID: --

CASING ELEVATION: --
GROUND SURFACE ELEVATION: --
NORTHING: 12' N of SE corner of building
EASTING: 19.3' E of SE coner of building

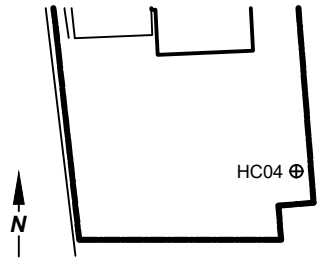
Hydro Con

1339 Commerce Ave, Suite 211
Longview, WA 98632
Phone: 360-703-6079

WELL/BORING NUMBER: HC04

PROJECT NAME: Legend Auto Sales
PROJECT NUMBER: 10149-001.00
PROJECT LOCATION: Puyallup, WA
LOGGED BY: R. Honsberger
REVIEWED BY: C. Hultgren
DATE: 7-11-23

LOCATION MAP



DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Composition, Density or Consistency, Moisture, Odor, Geological Interpretation)	DEPTH (FT.)	SYMBOL	WELL DETAILS	SAMPLE ID	PID	FIRST WATER	BLOW COUNTS	BOREHOLE/WELL CONSTRUCTION DETAILS
Topsoil, grass, and gravel	0							
Sand (SP), brown, 95% fine sand and 5% nonplastic silt, dry, no hydrocarbon odor.				HC04-02	0			
	5				0			
					0			
					0			
Perched water at 9' bgs				HC04-09				
Sand (SP), brown, 100% medium to fine, damp to moist, no hydrocarbon odor. Grain size change at 10' bgs.	10				0			
					0			
					0			
BOTTOM OF BORING AT 15' B.G.S.	15			HC04-15	0			
Boring backfilled with hydrated bentonite upon completion.	20							
	25							
	30							

DRILLING CONTRACTOR: AEC
DRILLING METHOD: Direct Push LAR
BOREHOLE DIAMETER: 2-Inch
SAMPLING METHOD: Macro Core
WELL TAG ID: --

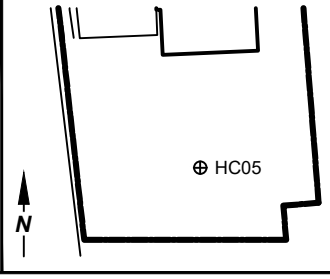
CASING ELEVATION: --
GROUND SURFACE ELEVATION: --
NORTHING: 23' N of SE corner of property
EASTING: 12.8' W of SE corner of property

HydroCon
1339 Commerce Ave, Suite 211
Longview, WA 98632
Phone: 360-703-6079

WELL/BORING NUMBER: HC05

PROJECT NAME: Legend Auto Sales
PROJECT NUMBER: 10149-001.00
PROJECT LOCATION: Puyallup, WA
LOGGED BY: R. Honsberger
REVIEWED BY: C. Hultgren
DATE: 7-11-23

LOCATION MAP



DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Composition, Density or Consistency, Moisture, Odor, Geological Interpretation)	DEPTH (FT.)	SYMBOL	WELL DETAILS	SAMPLE ID	PID	FIRST WATER	BLOW COUNTS	BOREHOLE/WELL CONSTRUCTION DETAILS
Topsoil, grass, and gravel	0							
Sand (SP), brown, 95% fine sand and 5% nonplastic silt, dry, no hydrocarbon odor.				HC05-02	0			
	5				0			
					0			
					0			
Perched water at 9' bgs				HC05-09				
Sand (SP), brown, 100% medium to fine, damp to moist, no hydrocarbon odor. Grain size change at 10' bgs.	10				0			
					0			
					0			
BOTTOM OF BORING AT 15' B.G.S.	15			HC05-15	0			
Boring backfilled with hydrated bentonite upon completion.	20							
	25							
	30							

DRILLING CONTRACTOR: AEC
DRILLING METHOD: Direct Push LAR
BOREHOLE DIAMETER: 2-Inch
SAMPLING METHOD: Macro Core
WELL TAG ID: --

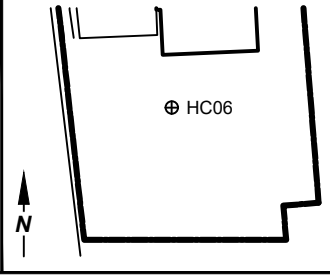
CASING ELEVATION: --
GROUND SURFACE ELEVATION: --
NORTHING: 53' N of SW corner of property
EASTING: 63' E of SE corner of property

HydroCon
1339 Commerce Ave, Suite 211
Longview, WA 98632
Phone: 360-703-6079

WELL/BORING NUMBER: HC06

PROJECT NAME: Legend Auto Sales
PROJECT NUMBER: 10149-001.00
PROJECT LOCATION: Puyallup, WA
LOGGED BY: R. Honsberger
REVIEWED BY: C. Hultgren
DATE: 7-11-23

LOCATION MAP



DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Composition, Density or Consistency, Moisture, Odor, Geological Interpretation)	DEPTH (FT.)	SYMBOL	WELL DETAILS	SAMPLE ID	PID	FIRST WATER	BLOW COUNTS	BOREHOLE/WELL CONSTRUCTION DETAILS
Topsoil, grass, and gravel	0							
Sand (SP), brown, 95% fine sand and 5% nonplastic silt, dry, no hydrocarbon odor.				HC06-02	0			
	5				0			
					0			
					0			
Perched water at 9' bgs				HC06-09				
Sand (SP), brown, 100% medium to fine, damp to moist, no hydrocarbon odor. Grain size change at 10' bgs.	10				0			
					0			
					0			
	15				0			
					0			
Sand (SP), black, 100% medium sand, becomes wet at 18' bgs, no hydrocarbon odor.				HC06-18	0	▽		
	20				0			
BOTTOM OF BORING AT 20' B.G.S. Collect groundwater sample HC06-W Temporary screen set 5' to 20' bgs. Boring backfilled with hydrated bentonite upon completion.								
	25							
	30							

DRILLING CONTRACTOR: AEC
DRILLING METHOD: Direct Push LAR
BOREHOLE DIAMETER: 2-Inch
SAMPLING METHOD: Macro Core
WELL TAG ID: --

CASING ELEVATION: --
GROUND SURFACE ELEVATION: --
NORTHING: 97' N of SW corner of property
EASTING: 64' E of SW corner of property

APPENDIX B
LABORATORY REPORTS AND CHAIN-OF-CUSTODY DOCUMENTAITON

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Vineta Mills, M.S.
Eric Young, B.S.

5500 4th Avenue South
Seattle, WA 98108
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

June 30, 2023

Rob Honsberger, Project Manager
HydroCon
1339 Commerce Ave, Suite 211
Longview, WA 98632

Dear Mr Honsberger:

Included are the results from the testing of material submitted on June 26, 2023 from the Legend Auto Sales 10149-001.00, F&BI 306400 project. There are 5 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
HDC0630R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on June 26, 2023 by Friedman & Bruya, Inc. from the HydroCon Legend Auto Sales 10149-001.00, F&BI 306400 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	HydroCon
306400 -01	HC01-02
306400 -02	HC01-09
306400 -03	HC01-15
306400 -04	HC02-02
306400 -05	HC02-09
306400 -06	HC02-15
306400 -07	HC03-02
306400 -08	HC03-09
306400 -09	HC03-15
306400 -10	HC04-02
306400 -11	HC04-09
306400 -12	HC04-15
306400 -13	HC05-02
306400 -14	HC05-09
306400 -15	HC05-15
306400 -16	HC06-02
306400 -17	HC06-09
306400 -18	HC06-18
306400 -19	HC06-W

All quality control requirements were acceptable.

Date of Report: 06/30/23
Date Received: 06/26/23
Project: Legend Auto Sales 10149-001.00, F&BI 306400
Date Extracted: 06/27/23
Date Analyzed: 06/27/23

RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR GASOLINE, DIESEL AND HEAVY OIL BY NWTPH-HCID

Results Reported on a Dry Weight Basis
Results Reported as Not Detected (ND) or Detected (D)

THE DATA PROVIDED BELOW WAS PERFORMED PER THE GUIDELINES ESTABLISHED BY THE WASHINGTON DEPARTMENT OF ECOLOGY AND WERE NOT DESIGNED TO PROVIDE INFORMATION WITH REGARDS TO THE ACTUAL IDENTIFICATION OF ANY MATERIAL PRESENT

Sample ID Laboratory ID	Gasoline	Diesel	Heavy Oil	Surrogate (% Recovery) (Limit 50-150)
HC01-02 306400-01	ND	ND	ND	110
HC01-09 306400-02	ND	ND	ND	113
HC02-02 306400-04	ND	ND	ND	114
HC02-09 306400-05	ND	ND	ND	113
HC03-02 306400-07	ND	ND	ND	114
HC03-09 306400-08	ND	ND	ND	117
HC04-02 306400-10	ND	ND	ND	116
HC04-09 306400-11	ND	ND	ND	112
HC05-02 306400-13	ND	ND	ND	119
HC05-09 306400-14	ND	ND	ND	110
HC06-02 306400-16	ND	ND	ND	119

ND - Material not detected at or above 20 mg/kg gas, 50 mg/kg diesel and 250 mg/kg heavy oil.

Date of Report: 06/30/23
Date Received: 06/26/23
Project: Legend Auto Sales 10149-001.00, F&BI 306400
Date Extracted: 06/27/23
Date Analyzed: 06/27/23

RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR GASOLINE, DIESEL AND HEAVY OIL BY NWTPH-HCID

Results Reported on a Dry Weight Basis
Results Reported as Not Detected (ND) or Detected (D)

THE DATA PROVIDED BELOW WAS PERFORMED PER THE GUIDELINES ESTABLISHED BY THE WASHINGTON DEPARTMENT OF ECOLOGY AND WERE NOT DESIGNED TO PROVIDE INFORMATION WITH REGARDS TO THE ACTUAL IDENTIFICATION OF ANY MATERIAL PRESENT

Sample ID Laboratory ID	Gasoline	Diesel	Heavy Oil	Surrogate (% Recovery) (Limit 50-150)
HC06-09 306400-17	ND	ND	ND	116
Method Blank 03-1514 MB2	ND	ND	ND	116

ND - Material not detected at or above 20 mg/kg gas, 50 mg/kg diesel and 250 mg/kg heavy oil.

Date of Report: 06/30/23
Date Received: 06/26/23
Project: Legend Auto Sales 10149-001.00, F&BI 306400
Date Extracted: 06/27/23
Date Analyzed: 06/27/23

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR GASOLINE, DIESEL AND HEAVY OIL BY NWTPH-HCID
Results Reported as Not Detected (ND) or Detected (D)

THE DATA PROVIDED BELOW WAS PERFORMED PER THE GUIDELINES ESTABLISHED BY THE WASHINGTON DEPARTMENT OF ECOLOGY AND WERE NOT DESIGNED TO PROVIDE INFORMATION WITH REGARDS TO THE ACTUAL IDENTIFICATION OF ANY MATERIAL PRESENT

Sample ID Laboratory ID	Gasoline	Diesel	Heavy Oil	Surrogate (% Recovery) (Limit 50-150)
HC06-W 306400-19	ND	ND	ND	116
Method Blank 03-1510 MB2	ND	ND	ND	115

ND - Material not detected at or above 0.2 mg/L gas, 0.5 mg/L diesel and 0.5 mg/L heavy oil.

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria, biased low; or, the calibration results for the analyte were outside of acceptance criteria, biased high, with a detection for the analyte in the sample. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht – The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the standard reporting limit. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

k – The calibration results for the analyte were outside of acceptance criteria, biased high, and the analyte was not detected in the sample.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

306400

Report To Robert Horsburgh

Company HydroCon

Address

City, State, ZIP Vancouver WA

Phone Email

SAMPLE CHAIN OF CUSTODY 06/26/23

VS-B4/VW1/I2/H3

Page # 1 of 2

SAMPLERS (signature)

PROJECT NAME: Legend auto Sales 10149-001.00

PO #

REMARKS

Project specific RLs? - Yes / No

INVOICE TO

TURNAROUND TIME
- ☑ Standard turnaround
- ☐ RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- ☐ Archive samples
- ☐ Other
- Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED: NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082					Notes
HC01-02	01 A-E	6-26-23	0930	Soil	5				X								
HC01-09	02 ↓		0935		5				X								
HC01-15	03		0940		1												Hold
HC02-02	04 A-E		0945		5				X								
HC02-09	05 ↓		0950		5				X								
HC02-15	06		0955		1												Hold
HC03-02	07 A-E		1000		5				X								
HC03-09	08 ↓		1005		5				X								
HC03-15	09		1010		1												Hold
HC04-02	10 A-E		1015		5				X								

Samples received at 3 °C

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Robert A. Horsburgh	HCE	6-26-23	1323
Received by:	ANH PHAN	FSD	06/26/23	13:23
Relinquished by:				
Received by:				

Friedman & Bruya, Inc.
Ph. (206) 285-8282

306400 [redacted]

SAMPLE CHAIN OF CUSTODY

~~0610~~ 06/26/23 [redacted] VS-B4/VW1/I2/H3

Page # 2 of 2

Report To Rob Hansberger

Company Hydroconsult

Address

City, State, ZIP

Phone Email

SAMPLERS (signature)

PROJECT NAME: Lyons Auto Subs; 10199-001-00

PO #

REMARKS: Project specific RLs? - Yes / No

INVOICE TO

TURNAROUND TIME
☑ Standard turnaround
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☐ Archive samples
☐ Other
Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082					Notes
						ANALYSES REQUESTED											
HC04-09	11 A-E	6-26-23	1020	Soil	5				X								
HC04-15	12	"	1025	"	1												Hold
HC05-02	13 A-E	"	1030	"	5				X								
HC05-09	14 ↓	"	1035	"	5				X								
HC05-15	15	"	1040	"	1												Hold
HC06-02	16 A-E	"	1045	"	5				X								
HC06-09	17 ↓	"	1050	"	5				X								
HC06-18	19	"	1100	"	1												Hold
HC06-W	19 A-D	1	1130	Water	4				X								
																	Samples received at 3 °C

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Robert A. Hansberger	HCE	6-26-23	1323
Received by:	ANH PHAN	FBD	06/26/23	13:23
Relinquished by:				
Received by:				

Friedman & Bruya, Inc.
Ph. (206) 285-8282

GEORESOURCES
earth science & geotechnical engineering
4809 Pacific Hwy. E. | Fife, Washington 98424 | 253.896.1011 | www. georesources.rocks

March 15, 2024

Legend Auto
1632 River Road
Puyallup, Washington 98371

Attn: Vlad Moskalenko
(253) 840-5167
vlad@legendautosales.com

Soils Report
Proposed Parking Area
1720 River Road
Puyallup, Washington
PN: 0420208065
Doc ID: LegendAuto.RiverRd.SR

INTRODUCTION

This *Soils Report* summarizes our site observations, explorations, and geological data review and addresses the feasibility of stormwater infiltration for the proposed parking to be constructed at 1720 River Road in Puyallup, Washington. The approximate site location is shown in Figure 1.

Our understanding of the project is based on our correspondence with your agent Filipp Kapustin; our February 20, 2024 site visit and subsurface explorations; our understanding of the City of Puyallup's development codes; and our experience in the site area. We understand that you propose to pave the southern portion of the site using permeable pavement, creating a parking lot with approximately 39 spaces. We were not provided with a site plan prior to the preparation of this document.

Because of the amount of new hard surfacing associated with the project, the City of Puyallup (the City) requires that a *Soils Report* be prepared in accordance with the Department of Ecology's *2019 Stormwater Management Manual for Western Washington* (2019 SWMMWW).

PURPOSE & SCOPE

The purpose of our services was to evaluate the surface and subsurface conditions across the site as a basis for developing geotechnical recommendations and conclusions. Specifically, the scope of services included the following:

1. Reviewing the available geologic, hydrogeologic, and geotechnical data for the site area;
2. Exploring surface and subsurface conditions by reconnoitering the site and monitoring the excavation of four hand augers at strategic locations across the site, and installing four shallow open standpipe piezometers (OSP) to depths of 10 feet below existing grade;
3. Describing surface and subsurface conditions, including soil type and depth to groundwater, if encountered;
4. Performing monitoring of groundwater levels during the prescriptive wet season (December 21 through March 21) as stated by the City;

5. Providing our opinion about the feasibility of onsite infiltration in accordance with the 2019 SWMMWW, including a design infiltration rate based on grain-size analysis; and,
6. Preparing this written *Soils Report* that satisfies the 2019 SWMMWW requirements and summarizes our site observations and conclusions, and our geotechnical recommendations, along with the supporting data.

The above scope of work was outlined in our February 13, 2024 *Proposal for Services*. We received your written confirmation to proceed the same day.

SITE CONDITIONS

Surface Conditions

As stated, the site is located at 1720 River Road in Puyallup, Washington in an area of existing commercial and residential development. The site consists of a single tax parcel, the northern portion of which is currently developed with an existing gas station and convenience store. The southern portion of the parcel is undeveloped. According to Pierce County Public GIS, the site is roughly rectangular in shape, measures approximately 170 to 180 feet wide (east to west) by approximately 260 to 320 feet long (north to south), and encompasses approximately 1.15 acres. The site is bounded by existing commercial development to the east, residential development to the south, 18th Street NW to the west, and by River Road to the north.

According to topographic information obtained from Pierce County Public GIS and our site observations, the ground surface of the site is generally flat with approximately 0 to 2 feet of vertical relief. The existing site conditions and topography are shown on the Site & Exploration Map, Figure 3.

The northern portion of the site is paved with scattered landscape strips. Vegetation across the southern portion of the site, in the proposed project area, generally consists of grass lawn. No seeps, springs, or standing water were observed during our site visit. No areas of surficial erosion or slope movement were observed at the time of our site visit.

Site Soils

The USDA Natural Resource Conservation Service (NRCS) Web Soil Survey maps the site and site area to be underlain by Puyallup fine sandy loam (31A) soils. A detailed description of this soil type is included below, and an excerpt of the referenced NRCS map for the site vicinity is attached as Figure 3.

- *Puyallup fine sandy loam (31A)*: The Puyallup soils are derived from alluvium, form on slopes of 0 to 3 percent, are considered to have a "slight" erosion hazard when exposed, and are included in hydrologic soils group A.

Site Geology

According to an excerpt from the *Geologic Map of the Tacoma 1:100,000-scale Quadrangle, Washington* (Schuster et al, 2015) the site is in an area mapped as being underlain by alluvium (Qa). No landslides, mass wasting deposits, or alluvial fans are mapped within 300 feet of the site. A detailed description of the deposit mapped at the site is included below, and an excerpt of the referenced geologic map is included as Figure 4.

- *Alluvium (Qa):* Alluvial soils generally consist of normally consolidated, stratified deposits of sand, silt, clay, and occasional peat that were deposited along the Puyallup River channel. The existing topography, as well as the surficial and shallow soils in the area, are the result of fluvial action, including down-cutting by the river, channel meandering and migration, and flood deposits.

Subsurface Explorations

On February 20, 2024, we visited the site and excavated four hand augers to depths of approximately 9 to 10 feet below existing ground surface. The specific number, locations, and depths of our explorations were selected by GeoResources personnel based on the configuration of the proposed development and were adjusted in the field based on site access limitations. An open standpipe piezometer was installed in each hand auger exploration to monitor groundwater levels throughout the remainder of the wet season. A field representative from our office continuously monitored the explorations, maintained logs of the subsurface conditions encountered, obtained representative soil samples, and observed pertinent site features. Soil densities presented on the logs were estimated based on the difficulty of excavation and our experience. Representative soil samples obtained from the explorations were placed in sealed plastic containers and taken to our laboratory for further examination and testing as deemed necessary. Table 1, below summarizes the approximate functional locations, surface elevations, and termination depths of our explorations.

TABLE 1:
APPROXIMATE LOCATIONS, ELEVATIONS, AND DEPTHS OF EXPLORATIONS

Exploration Number	Functional Location	Surface Elevation (feet)	Termination Depth (feet)	Termination Elevation[1] (feet)
HA-1	NE portion of proposed parking area	30	10	20
HA-2	SE portion of proposed parking area	30	9	21
HA-3	SW portion of proposed parking area	30	10	20
HA-4	NW portion of proposed parking area	30	10	20

Notes:
[1] = Surface elevations estimated by interpolating between contours on the *Pierce County Public GIS website (NAVD88)*

The explorations completed as part of this evaluation indicate the subsurface conditions at specific locations only, as actual conditions can vary across the site. Furthermore, the nature and extent of such variation would not become evident until additional explorations are performed or until construction activities have begun. We anticipate the soils encountered in our explorations are representative of the soils in the site area.

The soils encountered were visually classified in accordance with the Unified Soil Classification System (USCS) and ASTM D2488. The USCS is included in Appendix A as Figure A-1. The approximate locations of our hand augers are indicated on the attached Site & Exploration Plan, Figure 2, while the descriptive logs of our explorations are included in Appendix A.

Subsurface Conditions

Our explorations encountered relatively uniform subsurface conditions that, in our opinion, agree with the mapped stratigraphy. Detailed descriptions of the encountered soil types are included below.

- *Topsoil:* At the locations explored, we encountered approximately a half foot of topsoil.
- *Alluvium:* Underlying the topsoil our explorations encountered gray to brown silty fine sand and sandy silt in a loose to medium dense/medium stiff, moist to wet condition to the full depths explored. We interpret these soils to be consistent with the mapped alluvium deposits.

Laboratory Testing

Geotechnical laboratory tests were performed on three samples retrieved from the test pits to estimate index engineering properties of the soils encountered. Laboratory testing included visual soil classification per ASTM D2487 and ASTM D2488, moisture content determinations per ASTM D2216, and grain size analyses per ASTM D6913 standard procedures. Two shallow soil samples were also submitted to a third party laboratory for cation exchange capacity and organic content testing. The results of the laboratory tests are included in Appendix B and below in Table 2.

TABLE 2:
LABORATORY TEST RESULTS FOR ON-SITE SOILS

Grain Size Analyses					
Soil Type	**Sample**	**Gravel Content (percent)**	**Sand Content (percent)**	**Silt/Clay Content (percent)**	**Moisture (percent)**
SM	HA-1, S-1, 2′	0.0	75.5	24.5	12.6
ML	HA-2, S-4, 8′	0.0	16.3	83.7	37.4
SM	HA-4, S-1, 2½′	0.0	76.2	23.8	10.6

Cation Exchange Capacity & Organic Content Determinations		
Sample	**Cation Exchange Capacity (mEQ/100g)**	**Organics Content (percent)**
HA-1, S-1, 2′	3.5	1.0
HA-3, S-1, 1′	5.9	1.8

Groundwater Conditions

At the locations and time of our explorations, groundwater seepage was encountered at approximately 7½ feet within hand auger HA-2. Groundwater seepage was not encountered in the other explorations. As stated, open standpipe piezometers were installed by GeoResources in each hand auger exploration. Groundwater readings within the piezometers will be manually measured on a weekly basis throughout the remainder of the wet season to be summarized in an addendum. To date, no groundwater has been measured in any of the piezometers.

It is our opinion that the groundwater encountered in hand auger HA-2/PZ-2 is indicative of a seasonal or fluctuating, discontinuous perched groundwater table. Perched groundwater typically develops when the vertical infiltration of precipitation through a more permeable soil such as silty fine sand is slowed at depth by a deeper, less permeable soil type such as the sandy silt. Based on our review

of nearby well logs, we estimate that static groundwater is approximately 10 to 15 feet below the ground surface. We anticipate fluctuations in the local groundwater levels will occur in response to precipitation patterns, off-site construction activities, and site utilization. As such, water level observations made at the time of our field investigation may vary from those encountered during the construction phase.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of our data review, site reconnaissance, and subsurface explorations, it is our opinion that the use of permeable pavement for the proposed parking area is feasible from a geotechnical standpoint.

Stormwater Infiltration Recommendations

The City of Puyallup has adopted the 2019 SWMMWW. Based on the results of our site reconnaissance, observations, subsurface explorations, and laboratory test results, it is our opinion that onsite infiltration of the stormwater runoff is feasible for the proposed development.

The soils encountered in our subsurface explorations appeared to be consistent with alluvium (Type A) deposits. Groundwater seepage was encountered at 7½ feet below existing grades in the area of hand auger HA-2/PZ-2 at the time of our February 2024 subsurface explorations. Based on the site configuration and our subsurface explorations, it is our opinion that the use of shallow Low Impact Development (LID) Best Management Practices (BMPs) to manage stormwater runoff generated by the proposed parking area into the shallow alluvium soils is feasible from a geotechnical standpoint, provided vertical and horizontal setbacks can be met.

Low Impact Development BMPs

LID infiltration BMPs such as pervious pavement could be considered to manage stormwater for this project. Per the 2019 SWMMWW, Volume V, Chapter 5, BMP T5.15, the use of permeable pavement is infeasible if saturated conditions would be created within 1 foot of the bottom elevation of the lowest layer and the seasonal high groundwater table or an underlying impermeable/low permeable layer.

Our explorations encountered silty fine sand alluvium soils to a depth of about 5½ to 9 feet below existing grades. As previously stated, the sandy silt soils encountered in hand auger HA-2/OSP-2 would be considered a relatively impermeable/low permeability layer. If grades at the site remain relatively the same, then the 1-foot vertical separation requirements appear to be able to be met.

Volume V, SSC-6 *Soil Physical and Chemical Suitability for Treatment* of the 2019 SWMMWW requires that treatment soils have a Cation Exchange Capacity (CEC) of at least 5 mEq/100g and a minimum organic content of 1 percent. Two shallow soil samples were submitted for testing. The results of the tests performed by AM Test indicate that the CEC for the alluvial soils at the site is about 3.5 to 5.9 mEq/100g and that the organic content is about 1.0 to 1.8 percent. The average of these results meet or exceed the requirements of the 2019 SWMMWW for organic content but not the requirement for CEC. Unless additional testing provides greater results for CEC testing, soil amendments would be required to provide water quality treatment for stormwater.

Design Infiltration Rate

Because the site soils are unconsolidated by glacial advance, the design infiltration rate can be determined based on the grain size analysis method as outlined in the 2019 SWMMWW, Volume V, V-5.4. After applying correction factors of 0.33 for site variability (CF_v), 0.4 for test method (CF_t), and 0.9 the quality of aggregate (CF_a), we recommend a long-term design infiltration rate of approximately **1 inch per hour within the upper alluvium soils encountered across the site**. All minimum separations, setback requirements, and infeasibility criteria per 2019 SWMMWW should be considered prior to the selection, design and location of any stormwater facility for the proposed development. Our infiltration rate analysis is included in Appendix C.

Construction Considerations

Suspended solids could clog the underlying soil and reduce the infiltration rate. To reduce potential clogging of the infiltration systems, the infiltration system should not be connected to the stormwater runoff system until after construction is complete and the site area is landscaped, paved or otherwise protected. Additional measures may also be taken during construction to minimize the potential of fines contamination of the proposed infiltration system, such as utilizing an alternative storm water management location during construction. All contractors working on the site should divert sediment laden stormwater away from proposed infiltration facilities during construction and landscaping activities. No concrete truck or other washout areas should be within the vicinity of the proposed infiltration facilities. After construction activities have been completed, periodic sweeping of the paved areas will help extend the life of the infiltration system.

LIMITATIONS

We have prepared this report for use by Legend Auto and other members of the design team for use in the permitting and design of a portion of this project. The data used in preparing this report and this report should be provided to prospective contractors for their bidding or estimating purposes only. Our report, conclusions and interpretations are based on subsurface explorations and data from others and limited site reconnaissance, and should not be construed as a warranty of the subsurface conditions.

Variations in subsurface conditions are possible between the explorations and may also occur with time. A contingency for unanticipated conditions should be included in the budget and schedule. Sufficient monitoring, testing and consultation should be provided by our firm during construction to confirm that the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes should the conditions revealed during the work differ from those anticipated, and to evaluate whether earthwork and foundation installation activities comply with contract plans and specifications.

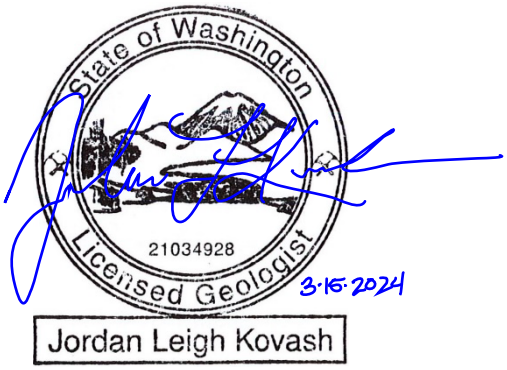
The scope of our services does not include services related to environmental remediation and construction safety precautions. Our recommendations are not intended to direct the contractor's methods, techniques, sequences, or procedures, except as specifically described in our report for consideration in design.

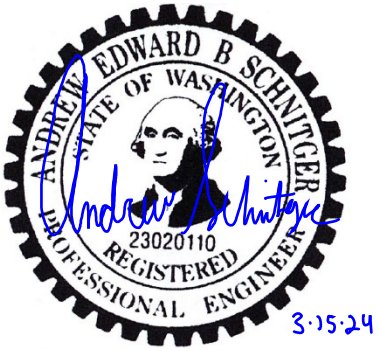
If there are any changes in the loads, grades, locations, configurations or type of facilities to be constructed, the conclusions and recommendations presented in this report may not be fully applicable. If such changes are made, we should be given the opportunity to review our recommendations and provide written modifications or verifications, as appropriate.

◆ ◆ ◆

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

Respectfully submitted,
GeoResources, LLC

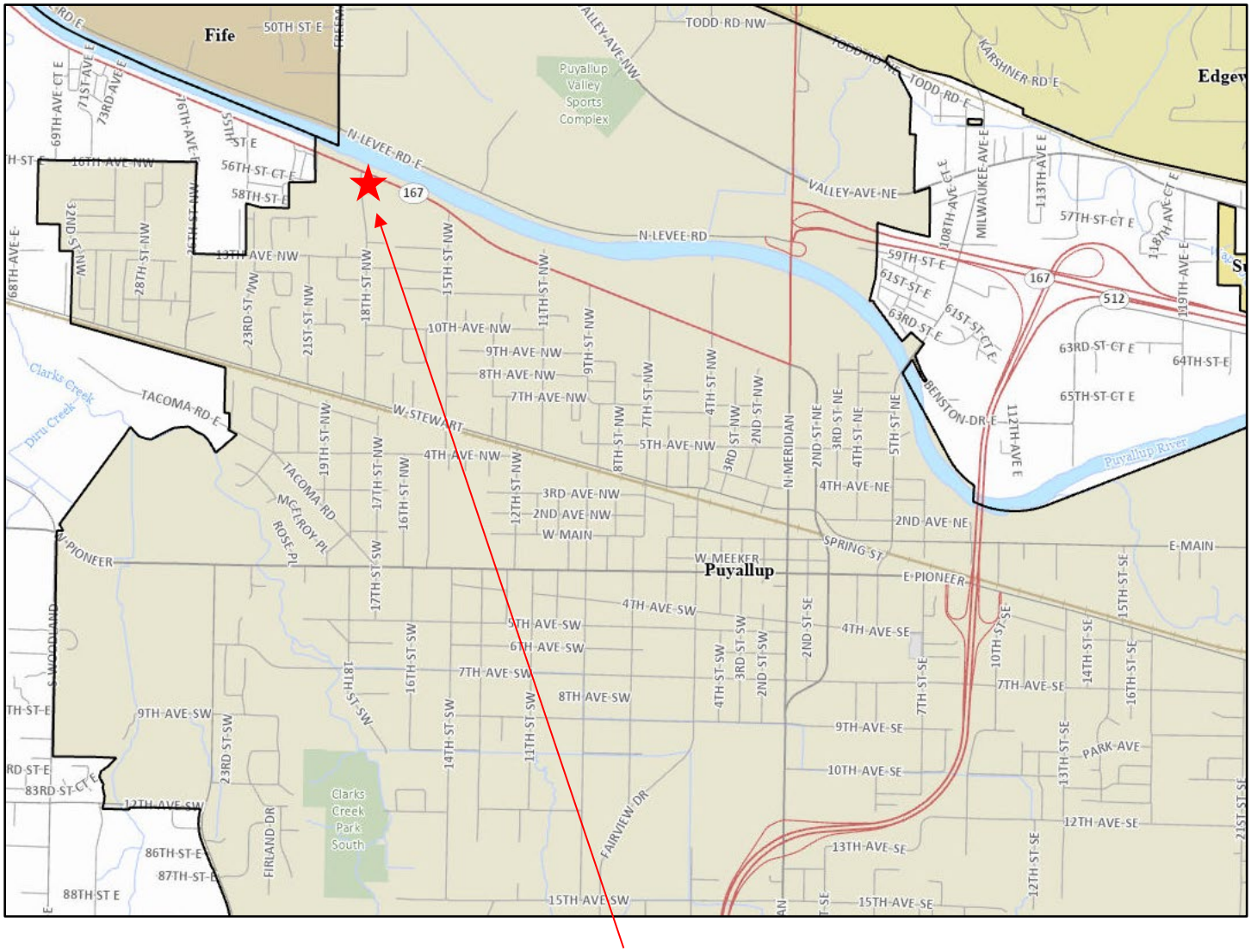




Jordan L. Kovash, LG
Project Geologist

Andrew E. Schnitger, PE
Senior Geotechnical Engineer

JLK:AES/jlk
Doc ID: LegendAuto.RiverRd.SR
Attachments: Figure 1: Site Vicinity Map
Figure 2: Site & Exploration Map
Figure 3: NRCS Soils Map
Figure 4: Geologic Map
Appendix A – Subsurface Explorations
Appendix B – Laboratory Test Results
Appendix C – Infiltration Analysis



Approximate Site Location

Figure created from the Pierce County Public GIS website (https://matterhornwab.co.pierce.wa.us/publicgis/)

Not to Scale

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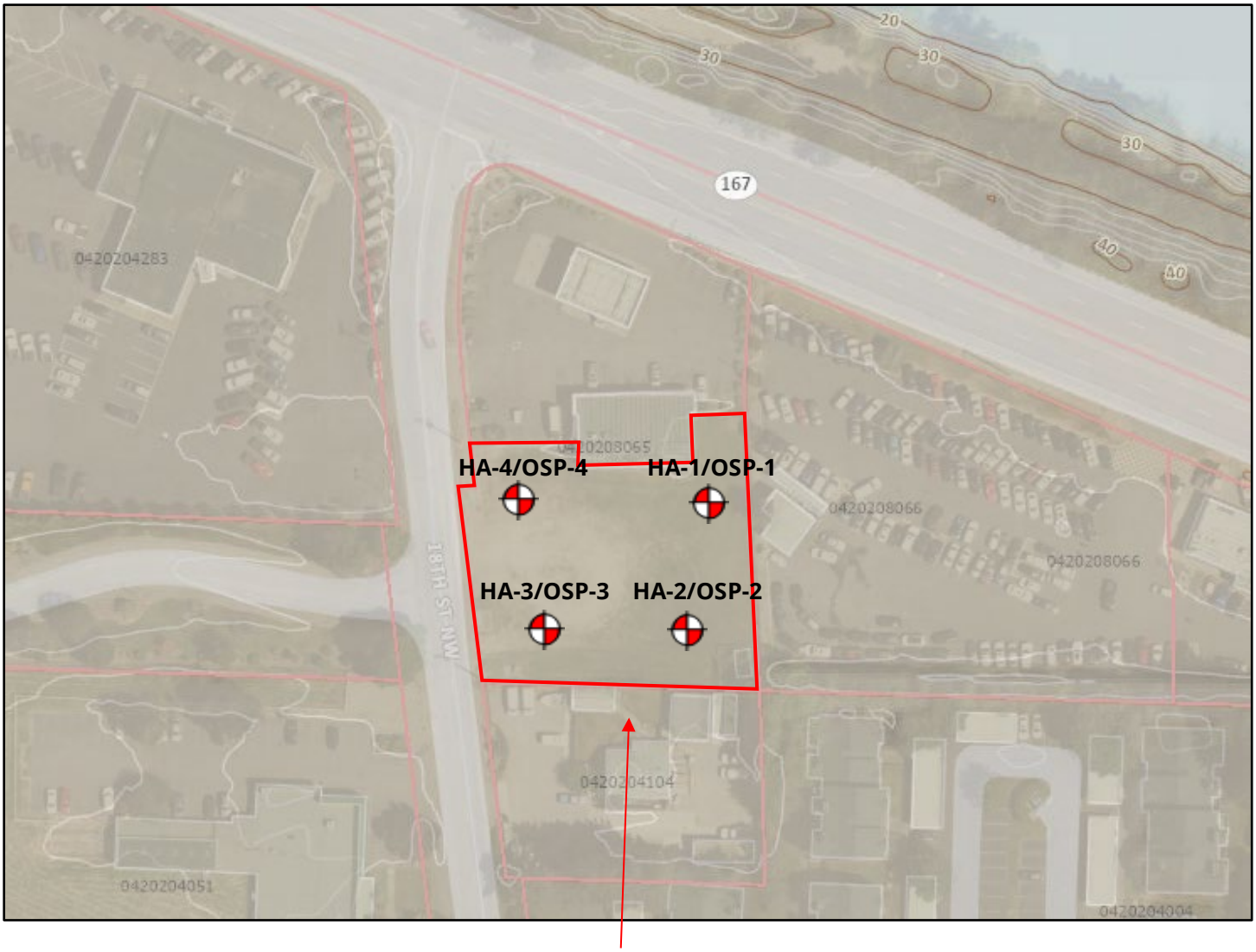
Site Location Map

Proposed Parking Area
1720 River Road
Puyallup, Washington
PN: 0420208065

Doc ID: LegendAuto.RiverRd.F	Mar 2024	Figure 1



Approximate Site Location

Figure created from the Pierce County Public GIS website
(https://matterhornwab.co.pierce.wa.us/publicgis/)

= number and approximate location of hand auger boring

Not to Scale

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Site & Exploration Map

Proposed Parking Area
1720 River Road
Puyallup, Washington
PN: 0420208065

Doc ID: LegendAuto.RiverRd.F	Mar 2024	Figure 2

Approximate Site Location

Figure created from Web Soil Survey
(http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx)

Soil Type	Soil Name	Parent Material	Slopes (percent)	Erosion Hazard	Hydrologic Soil Group
29A	Pilchuck fine sand	Alluvium	0 to 3	Slight	A
31A	Puyallup fine sandy loam				

N
W E
S

Not to Scale

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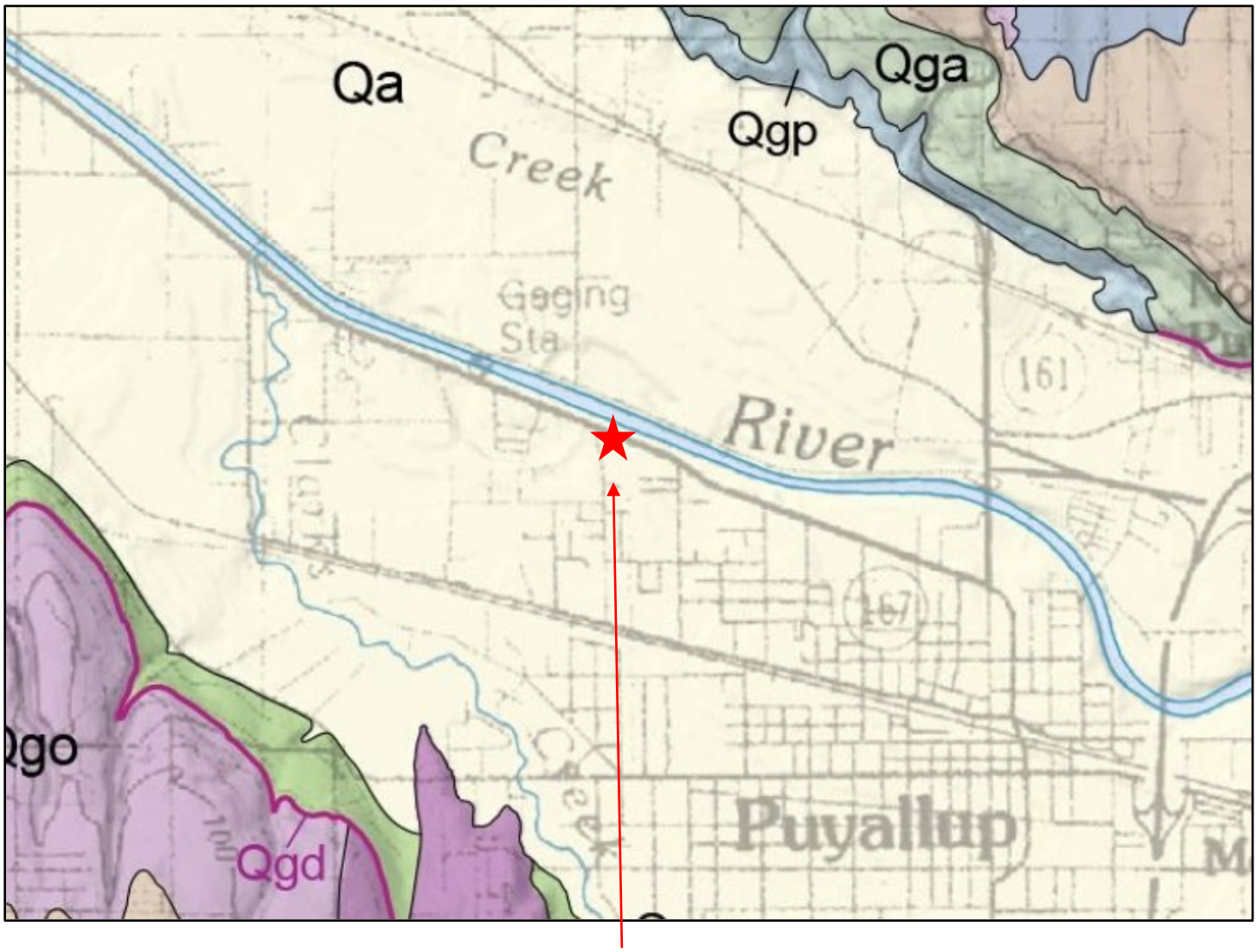
NRCS Soils Map

Proposed Parking Area
1720 River Road
Puyallup, Washington
PN: 0420208065

Doc ID: LegendAuto.RiverRd.F	Mar 2024	Figure 3



Approximate Site Location

An excerpt from the *Geologic Map of the Tacoma 1:100,000-scale Quadrangle, Washington* compiled by J. Eric Schuster, Ashley Cabibbo, Joseph F. Schilter, and Ian J. Hubert (2015)

Symbol	Geologic Unit
Qa	Alluvium

Not to Scale

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Geologic Map

Proposed Parking Area
1720 River Road
Puyallup, Washington
PN: 0420208065

Doc ID: LegendAuto.RiverRd.F	Mar 2024	Figure 4

Appendix A

Subsurface Explorations

SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOL	GROUP NAME
COARSE GRAINED SOILS More than 50% Retained on No. 200 Sieve	GRAVEL More than 50% Of Coarse Fraction Retained on No. 4 Sieve	CLEAN GRAVEL	GW	WELL-GRADED GRAVEL, FINE TO COARSE GRAVEL
			GP	POORLY-GRADED GRAVEL
		GRAVEL WITH FINES	GM	SILTY GRAVEL
			GC	CLAYEY GRAVEL
	SAND More than 50% Of Coarse Fraction Passes No. 4 Sieve	CLEAN SAND	SW	WELL-GRADED SAND, FINE TO COARSE SAND
			SP	POORLY-GRADED SAND
		SAND WITH FINES	SM	SILTY SAND
			SC	CLAYEY SAND
FINE GRAINED SOILS More than 50% Passes No. 200 Sieve	SILT AND CLAY Liquid Limit Less than 50	INORGANIC	ML	SILT
			CL	CLAY
		ORGANIC	OL	ORGANIC SILT, ORGANIC CLAY
	SILT AND CLAY Liquid Limit 50 or more	INORGANIC	MH	SILT OF HIGH PLASTICITY, ELASTIC SILT
			CH	CLAY OF HIGH PLASTICITY, FAT CLAY
		ORGANIC	OH	ORGANIC CLAY, ORGANIC SILT
HIGHLY ORGANIC SOILS			PT	PEAT

NOTES:

1. Field classification is based on visual examination of soil in general accordance with ASTM D2488-90.
2. Soil classification using laboratory tests is based on ASTM D6913.
3. Description of soil density or consistency are based on interpretation of blow count data, visual appearance of soils, and or test data.

SOIL MOISTURE MODIFIERS:

Dry- Absence of moisture, dry to the touch

Moist- Damp, but no visible water

Wet- Visible free water or saturated, usually soil is obtained from below water table

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Unified Soils Classification System

Proposed Parking Area
1720 River Road
Puyallup, Washington
PN: 0420208065

Hand Auger HA-1/OSP-1

Location: Northeast corner of the parcel
Approximate Elevation: 30’

Depth (ft)			Soil Type	Soil Description
0	-	½	-	Topsoil
½	-	9	SM	Gray brown silty fine SAND (loose to medium dense, moist) (Alluvium)
9	-	10	SP	Gray poorly-graded SAND (medium dense, moist) (Alluvium)

Terminated at 10 feet below the existing ground surface.
No caving observed at the time of excavation.
No groundwater seepage was observed at the time of excavation.
No mottling was observed at the time of excavation.
Piezo installed at 10 feet below the existing ground surface.

Hand Auger HA-2/OSP-2

Location: Southeast corner of parcel
Approximate Elevation: 30’

Depth (ft)			Soil Type	Soil Description
0	-	½	-	Topsoil
½	-	5	SM	Gray brown silty fine SAND (loose to medium dense, moist) (Alluvium)
5	-	8½	ML	Brown sandy SILT (soft to medium stiff, wet) (Alluvium)
8½	-	9	SP	Gray poorly-graded SAND (medium dense, moist) (Alluvium)

Terminated at 9 feet below ground surface.
No caving observed at the time of excavation.
Moderate groundwater seepage observed at about 7½ feet below existing grades.
No mottling was observed at the time of excavation.
Piezo installed at 8½ feet below the existing ground surface.

Logged by: CJC **Excavated on: February 20, 2024**

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Hand Auger Logs

Proposed Parking Area
1720 River Road
Puyallup, Washington
PN: 0420208065

Hand Auger HA-3/OSP-3

Location: Southwest corner of parcel
Approximate Elevation: 30'

Depth (ft)			Soil Type	Soil Description
0	-	½	-	Woodchips/gravel
½	-	5½	SM	Gray brown silty SAND (loose to medium dense, moist) (Alluvium)
5½	-	9	ML	Brown sandy SILT (soft to medium stiff, wet) (Alluvium)
9	-	10	SP	Gray poorly-graded SAND (medium dense, moist) (Alluvium)

Terminated at 10 feet below ground surface.
No caving observed at the time of excavation.
No groundwater seepage was observed at the time of excavation.
No mottling was observed at the time of excavation.
Piezo installed at 10 feet below the existing ground surface with a stickup of ¼ feet.

Hand Auger HA-4/OSP-4

Location: Northwest corner of parcel
Approximate Elevation: 30'

Depth (ft)			Soil Type	Soil Description
0	-	½	-	Topsoil
½	-	9	SM	Gray brown silty fine SAND (loose to medium dense, moist) (Alluvium)
9	-	10	SP	Gray poorly-graded SAND (medium dense, moist) (Alluvium)

Terminated at 10 feet below the existing ground surface.
No caving observed at the time of excavation.
No groundwater seepage was observed at the time of excavation.
No mottling was observed at the time of excavation.
Piezo installed at 10 feet below the existing ground surface with a stickup of ¼ feet.

Logged by: CJC **Excavated on: February 20, 2024**

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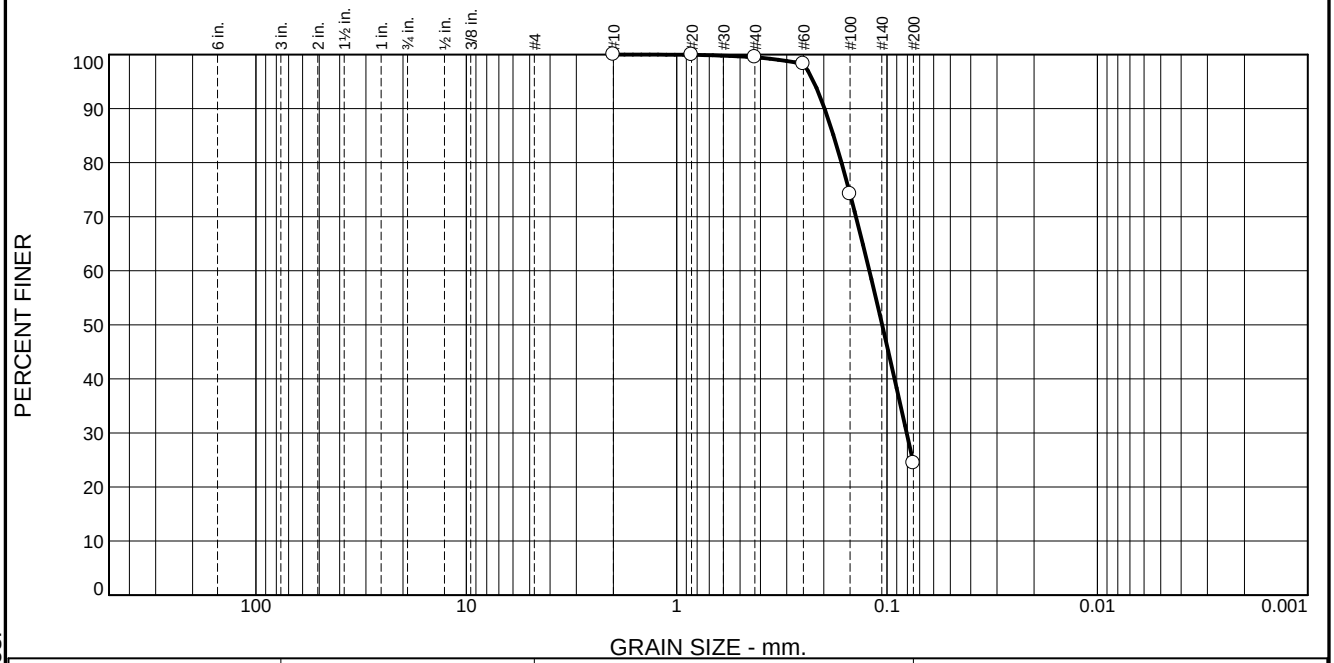
Hand Auger Logs

Proposed Parking Area
1720 River Road
Puyallup, Washington
PN: 0420208065

Appendix B

Laboratory Test Results

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.5	75.0	24.5	

Test Results (ASTM D 6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#10	100.0		
#20	100.0		
#40	99.5		
#60	98.3		
#100	74.2		
#200	24.5		

* (no specification provided)

Material Description

Silty SAND (SM)

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-2-4(0)

Coefficients

D_{90}= 0.1981 D_{85}= 0.1797 D_{60}= 0.1213
D_{50}= 0.1055 D_{30}= 0.0807 D_{15}=
D_{10}= C_u= C_c=

Remarks

Natural Moisture: 12.6%

Date Received: 2/20/24 **Date Tested:** 2/21/24

Tested By: MAW

Checked By: JLK

Title: PM

Location: HA-1, S-1 **Date Sampled:** 2/20/24
Sample Number: 104818 **Depth:** 2'

GeoResources, LLC

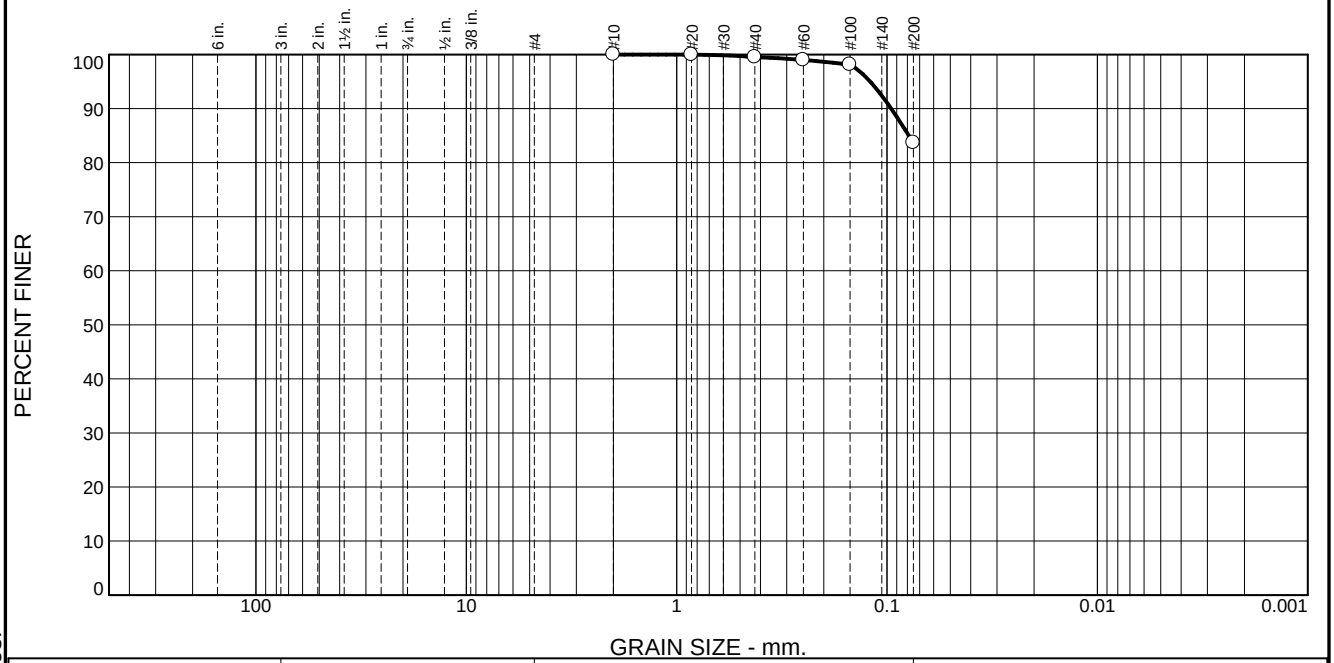
Fife, WA

Client: Legend Auto
Project: Proposed Parking Area

Project No: LegendAuto.RiverRd **Figure** B-1

Tested By: _____ **Checked By:** _____

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.5	15.8	83.7	

Test Results (ASTM D 6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#10	100.0		
#20	100.0		
#40	99.5		
#60	99.0		
#100	98.1		
#200	83.7		

* (no specification provided)

Material Description

SILT with sand (ML)

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= ML **AASHTO (M 145)=** A-4(0)

Coefficients

D_{90}= 0.0956 D_{85}= 0.0788 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Natural Moisture: 37.4%

Date Received: 2/20/24 **Date Tested:** 2/21/24

Tested By: MAW

Checked By: JLK

Title: PM

Location: HA-2, S-4 **Date Sampled:** 2/20/24
Sample Number: 104819 **Depth:** 8'

GeoResources, LLC

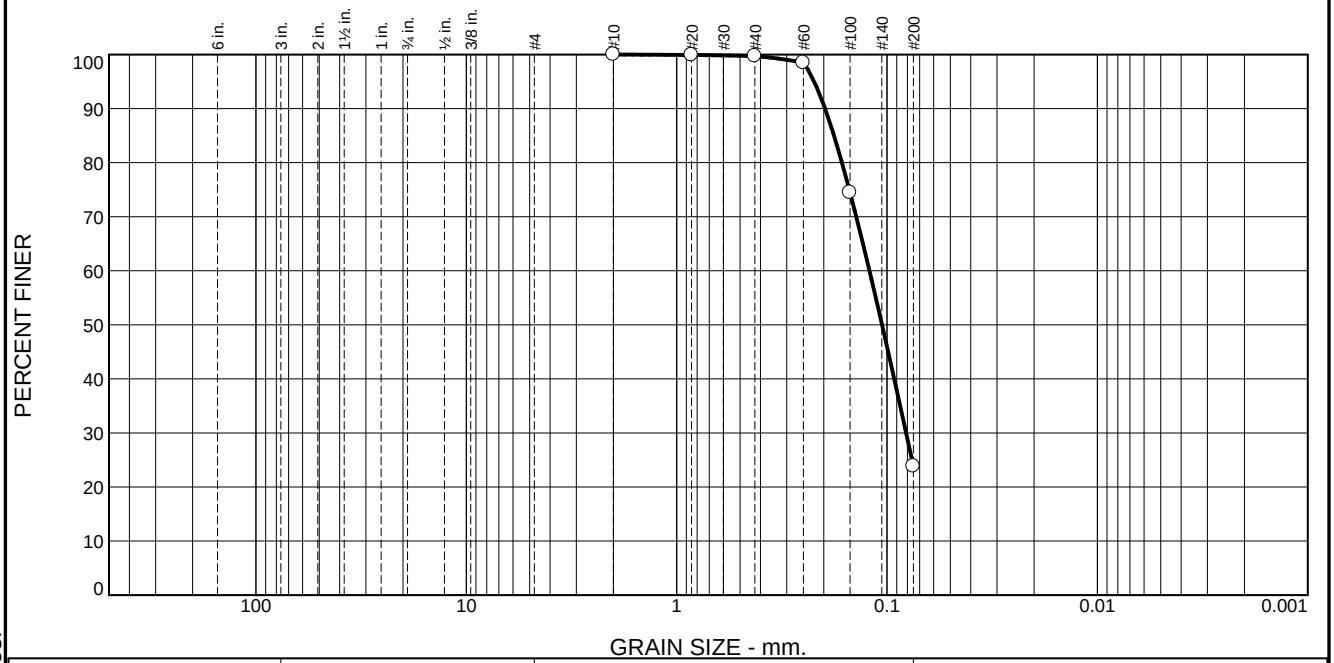
Fife, WA

Client: Legend Auto
Project: Proposed Parking Area

Project No: LegendAuto.RiverRd **Figure** B-2

Tested By: _____ **Checked By:** _____

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.3	75.9	23.8	

Test Results (ASTM D 6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#10	100.0		
#20	99.9		
#40	99.7		
#60	98.5		
#100	74.5		
#200	23.8		

* (no specification provided)

Material Description

Silty SAND (SM)

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-2-4(0)

Coefficients

D_{90}= 0.1971 D_{85}= 0.1788 D_{60}= 0.1212
D_{50}= 0.1056 D_{30}= 0.0812 D_{15}=
D_{10}= C_u= C_c=

Remarks

Natural Moisture: 10.6%

Date Received: 2/20/24 **Date Tested:** 2/21/24

Tested By: MAW

Checked By: JLK

Title: PM

Location: HA-4, S-1 **Date Sampled:** 2/20/24
Sample Number: 104820 **Depth:** 2.5'

GeoResources, LLC

Fife, WA

Client: Legend Auto
Project: Proposed Parking Area

Project No: LegendAuto.RiverRd **Figure** B-3

Tested By: _____ **Checked By:** _____

Am Test Inc.
13600 NE 126TH PL
Suite C
Kirkland, WA 98034
(425) 885-1664
www.amtestlab.com

Professional Analytical Services

ANALYSIS REPORT

GEORESOURCES LLC
4809 PAC HWY E
FIFE, WA 98424
Attention: JORDAN KOVASH
Project Name: LEGEND AUTO.RIVER RD
All results reported on an as received basis.

Date Received: 02/22/24
Date Reported: 3/ 8/24

AMTEST Identification Number **24-A003960**
Client Identification **104818,HA-1,S-1**
Sampling Date **02/20/24, 09:00**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Cation Exchange Capacity	3.5	meq/100g		0.5	SW-846 9081	HV	03/07/24

Miscellaneous

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANLST	DATE
Organic Matter	1.0	%			SM 2540G	HV	02/27/24

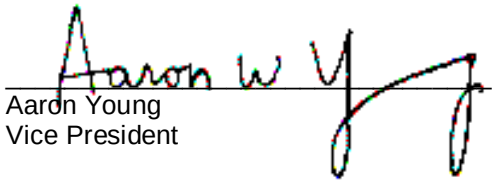
AMTEST Identification Number **24-A003961**
Client Identification **104820,HA-3,S-1**
Sampling Date **02/20/24, 10:00**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Cation Exchange Capacity	5.9	meq/100g		0.5	SW-846 9081	HV	03/07/24

Miscellaneous

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANLST	DATE
Organic Matter	1.8	%			SM 2540G	HV	02/27/24



Aaron Young
Vice President

Appendix C

Infiltration Rate Calculations

2019 Stormwater Management Manual for Western Washington

LegendAuto.RiverRd

Puyallup, Washington

Massman Calculation Sheet (pre 2019 SWMMWW Massman Calcs & CFs)

Soil Grain Size Analysis Method

Procudure based on 2019 SWMMWW, Volume V, V-5.4

$K_{sat} = 10^{(-1.57 + 1.90D_{10} + 0.015D_{60} - 0.013D_{90} - 2.08F_{fines})}$ (provides Ksat in cm/s)

$K_{sat} = [10^{(-1.57 + 1.90D_{10} + 0.015D_{60} - 0.013D_{90} - 2.08F_{fines})}]*1417$ (provides Ksat in in/hr)

Sample Information				Sieve Data				Unfactored Rate	
I.D.	Test Pit	Depth (ft)	Layer Thickness (ft)	D_{10}	D_{60}	D_{90}	F_{fines}	Individual K_{sat} (cm/s)	Equivalent K_{sat} (in/hr)
104818	HA-1	2		0	0.1213	0.1981	0.245	0.008	11.776
104820	HA-4	2.5		0.000	0.12	0.1971	0.238	0.009	12.178

Effective Average Hydraulic Conductivity, K_{equiv}

Based on either:

1) Average K_{sat} determined using harmonic mean
2) Lowest conductive layer, if within 5ft of bottom of pond

k_{equiv}=	11.974	Har. Mean
	11.776	Lowest
	11.776	To Use

Site Variability & number of location tested (CF_v)

	0.33 to 1.0

Factor to use for calculations: 0.33

Test Method (CF_t)

Large-scale PIT	0.75
Small-scale PIT	0.5
Other small-scale (e.g. Double ring, falling head)	0.4
Grain Size Method	0.4

Factor to use for calculations: 0.4

Quality of Pavement Aggregate Base Material (CF_a)

	0.9 - 1.0

Factor to use for calculations: 0.9

$I_{design} = I_{measured} * CF_t * CF_v * CF_a$: **1.40** in/hr

Design Value Based on Grain Size Analysis: 1.00 in/hr

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Infiltration Analysis - Alluvium

Proposed Parking
1720 River Road
Puyallup, Washington
PN: 0420208065

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April 8, 2024

Legend Auto
1632 River Road
Puyallup, Washington 98371

Attn: Vlad Maskalenko
(253) 840-5167
vlad@legendautosales.com

Soils Report Addendum: Groundwater Monitoring
Proposed Parking Area
1720 River Road
Puyallup, Washington
PN: 0420208065
Doc ID: LegendAuto.RiverRd.SRa

INTRODUCTION

This *Soils Report Addendum* summarizes our seasonal groundwater monitoring for the proposed parking area to be located at 1720 River Road in Puyallup, Washington. The northern portion of the site is currently developed with an existing gas station, convenience store, and associated utilities. We previously completed a *Soils Report* for the site dated March 15, 2024.

Our understanding of the project is based on our email correspondences with Filipp Kapustin; our February 20, 2024 subsurface explorations and subsequent ground water monitoring; our understanding of the City of Puyallup (the City) development codes; and our experience in the site area. We understand that you propose to pave the southern portion of the site using permeable pavement, creating a parking lot with approximately 39 spaces. We were not provided with a site plan prior to the preparation of this document.

To satisfy the groundwater monitoring requirements of the adopted 2019 *Stormwater Management Manual for Western Washington* (SWMMWW), we installed four shallow open standpipe piezometers across the site on February 20, 2024 and recorded groundwater levels through April 2, 2024.

PURPOSE & SCOPE

The purpose of our services was to evaluate the surface and subsurface conditions at the site and to determine seasonal high groundwater levels at the site. Specifically, our scope of services for the project included the following:

1. Monitoring groundwater levels at the site during the prescriptive wet season (February 2024 through March 2024) as required by the City; and,
2. Preparing this *Soils Report Addendum* to our March 15, 2024 *Soils Report* summarizing our site observations and conclusions.

The above scope of work was summarized in our *Proposal for Geotechnical Services* dated February 13, 2024. We received your written authorization to proceed the same day.

CONCLUSIONS

No groundwater was recorded with our open standpipe piezometers. Based on the lack of groundwater, we estimate that seasonal high groundwater occurs at elevations below 28 feet (NAVD 88). This elevation is approximately 10.0 feet below existing grades.

Groundwater Monitoring

Four open standpipe piezometers were installed at the site on February 20, 2024. The locations of the open standpipe piezometers are shown on the Site & Exploration Plan, Figure 1. At the time of installation, moderate groundwater seepage was observed in hand auger HA-2 at about 7 ½ feet below the existing grades. Groundwater readings were measured on a bi-monthly basis from February 20, 2024 to April 2, 2024 using a water level meter.

Based on our wet season monitoring, it appears that seasonal high groundwater does not occur within 10 feet of the existing ground surface. Vertical separation requirements appear to be feasible at the site for the proposed parking area provided significant grading is not proposed.

LIMITATIONS

We have prepared this report for use by Legend Auto and other members of the design team, for use in the design of a portion of this project. The data used in preparing this report and this report should be provided to prospective contractors for their bidding or estimating purposes only. Our report, conclusions, and interpretations are based on our subsurface explorations, and limited site reconnaissance, and they should not be construed as a warranty of the subsurface conditions.

Variations in subsurface conditions are possible between the explorations and may also occur with time. A contingency for unanticipated conditions should be included in the budget and schedule. Sufficient monitoring, testing, and consultation should be provided by our firm during construction to confirm that the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes should the conditions revealed during the work differ from those anticipated, and to evaluate whether earthwork and foundation installation activities comply with contract plans and specifications.

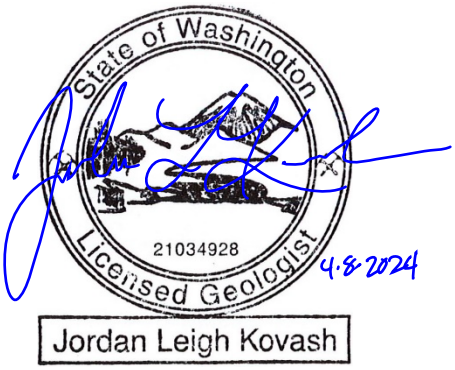
The scope of our services does not include services related to environmental remediation and/or construction safety precautions. Our recommendations are not intended to direct the contractor's methods, techniques, sequences, or procedures, except as specifically described in our report for consideration in design.

If there are any changes in the loads, grades, locations, configurations, or type of facilities to be constructed, the conclusions and recommendations presented in this report may not be fully applicable. If such changes are made, we should be given the opportunity to review our recommendations and provide written modifications or verifications, as appropriate.

◆ ◆ ◆

We have appreciated working for you on this project. Please do not hesitate to call at your earliest convenience if you have any questions or comments.

Respectfully submitted,
GeoResources, LLC



Jordan L. Kovash, LG
Project Geologist

Eric W. Heller, LG, PE
Senior Geotechnical Engineer

JLK:EWH/jlk
Doc ID: LegendAuto.RiverRd.SRa
Attachments: Figure 1 – Site & Exploration Map

Approximate Site Location

Figure created from the Pierce County Public GIS website
(https://matterhornwab.co.pierce.wa.us/publicgis/)

= number and approximate location of hand auger boring

Not to Scale

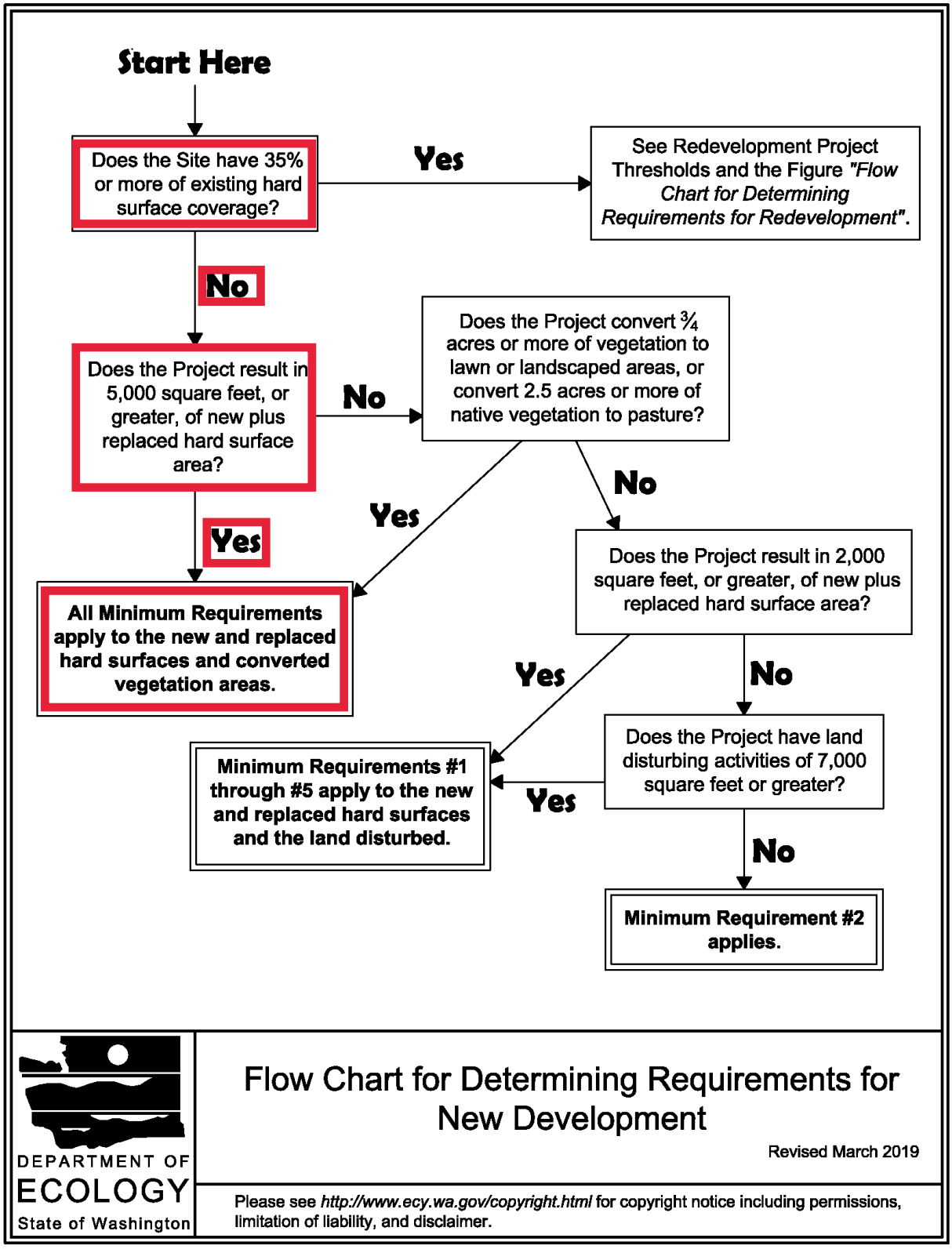
GEORESOURCES
earth science & geotechnical engineering
4809 Pacific Hwy. E. | Fife, WA 98424 | 253.896.1011 | www.georesources.rocks

Site & Exploration Map

Proposed Parking Area
1720 River Road
Puyallup, Washington
PN: 0420208065

Doc ID: LegendAuto.RiverRd.F	Apr 2024	Figure 1

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



WWHM2012

PROJECT REPORT

General Model Information

Project Name:	default[49]
Site Name:	
Site Address:	
City:	
Report Date:	10/9/2024
Gage:	SPU 158 Year 5min
Data Start:	10/01/1901
Data End:	09/30/2059
Timestep:	15 Minute
Precip Scale:	1.000
Version Date:	2021/08/18
Version:	4.2.18

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
A B, Forest, Flat	0.58
Pervious Total	0.58

Impervious Land Use	acre
Impervious Total	0
Basin Total	0.58

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 1

Bypass:	Yes
GroundWater:	No
Pervious Land Use	acre
A B, Lawn, Flat	0.26
Pervious Total	0.26
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.26

Element Flows To:

Surface	Interflow	Groundwater

Lateral I Basin 1

Bypass:	No
Impervious Land Use	acre
ROADS FLAT	0.32

Element Flows To:

Outlet 1	Outlet 2
Permeable Pavement 1	

Mitigated Routing

Permeable Pavement 1

Pavement Area:0.3197 acre.Pavement Length:118.00 ft.
Pavement Width: 118.00 ft.
Pavement slope 1:0.01 To 1
Pavement thickness: 0.25
Pour Space of Pavement: 0
Material thickness of second layer: 0.5
Pour Space of material for second layer: 0.25
Material thickness of third layer: 0
Pour Space of material for third layer: 0
Infiltration On
Infiltration rate: 1
Infiltration safety factor: 1
Total Volume Infiltrated (ac-ft.): 246.482
Total Volume Through Riser (ac-ft.): 0
Total Volume Through Facility (ac-ft.): 246.482
Percent Infiltrated: 100
Total Precip Applied to Facility: 0
Total Evap From Facility: 10.575
Element Flows To:
Outlet 1 Outlet 2

Permeable Pavement Hydraulic Table

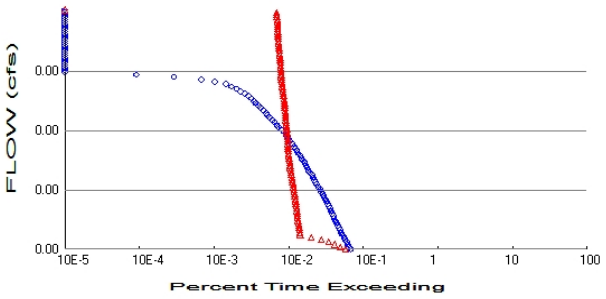
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.319	0.000	0.000	0.000
0.0056	0.319	0.000	0.000	0.322
0.0111	0.319	0.000	0.000	0.322
0.0167	0.319	0.001	0.000	0.322
0.0222	0.319	0.001	0.000	0.322
0.0278	0.319	0.002	0.000	0.322
0.0333	0.319	0.002	0.000	0.322
0.0389	0.319	0.003	0.000	0.322
0.0444	0.319	0.003	0.000	0.322
0.0500	0.319	0.004	0.000	0.322
0.0556	0.319	0.004	0.000	0.322
0.0611	0.319	0.004	0.000	0.322
0.0667	0.319	0.005	0.000	0.322
0.0722	0.319	0.005	0.000	0.322
0.0778	0.319	0.006	0.000	0.322
0.0833	0.319	0.006	0.000	0.322
0.0889	0.319	0.007	0.000	0.322
0.0944	0.319	0.007	0.000	0.322
0.1000	0.319	0.008	0.000	0.322
0.1056	0.319	0.008	0.000	0.322
0.1111	0.319	0.008	0.000	0.322
0.1167	0.319	0.009	0.000	0.322
0.1222	0.319	0.009	0.000	0.322
0.1278	0.319	0.010	0.000	0.322
0.1333	0.319	0.010	0.000	0.322
0.1389	0.319	0.011	0.000	0.322
0.1444	0.319	0.011	0.000	0.322
0.1500	0.319	0.012	0.000	0.322
0.1556	0.319	0.012	0.000	0.322

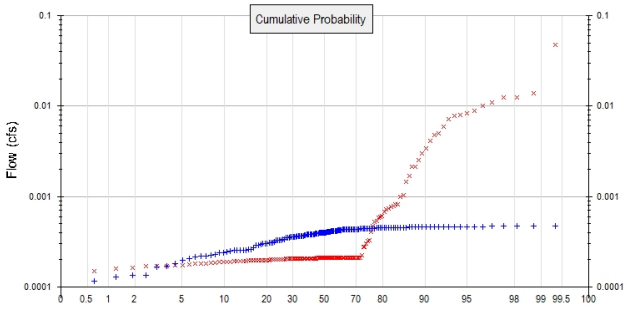
0.1611	0.319	0.012	0.000	0.322
0.1667	0.319	0.013	0.000	0.322
0.1722	0.319	0.013	0.000	0.322
0.1778	0.319	0.014	0.000	0.322
0.1833	0.319	0.014	0.000	0.322
0.1889	0.319	0.015	0.000	0.322
0.1944	0.319	0.015	0.000	0.322
0.2000	0.319	0.016	0.000	0.322
0.2056	0.319	0.016	0.000	0.322
0.2111	0.319	0.016	0.000	0.322
0.2167	0.319	0.017	0.000	0.322
0.2222	0.319	0.017	0.000	0.322
0.2278	0.319	0.018	0.000	0.322
0.2333	0.319	0.018	0.000	0.322
0.2389	0.319	0.019	0.000	0.322
0.2444	0.319	0.019	0.000	0.322
0.2500	0.319	0.020	0.000	0.322
0.2556	0.319	0.020	0.000	0.322
0.2611	0.319	0.020	0.000	0.322
0.2667	0.319	0.021	0.000	0.322
0.2722	0.319	0.021	0.000	0.322
0.2778	0.319	0.022	0.000	0.322
0.2833	0.319	0.022	0.000	0.322
0.2889	0.319	0.023	0.000	0.322
0.2944	0.319	0.023	0.000	0.322
0.3000	0.319	0.024	0.000	0.322
0.3056	0.319	0.024	0.000	0.322
0.3111	0.319	0.024	0.000	0.322
0.3167	0.319	0.025	0.000	0.322
0.3222	0.319	0.025	0.000	0.322
0.3278	0.319	0.026	0.000	0.322
0.3333	0.319	0.026	0.000	0.322
0.3389	0.319	0.027	0.000	0.322
0.3444	0.319	0.027	0.000	0.322
0.3500	0.319	0.028	0.000	0.322
0.3556	0.319	0.028	0.000	0.322
0.3611	0.319	0.028	0.000	0.322
0.3667	0.319	0.029	0.000	0.322
0.3722	0.319	0.029	0.000	0.322
0.3778	0.319	0.030	0.000	0.322
0.3833	0.319	0.030	0.000	0.322
0.3889	0.319	0.031	0.000	0.322
0.3944	0.319	0.031	0.000	0.322
0.4000	0.319	0.032	0.000	0.322
0.4056	0.319	0.032	0.000	0.322
0.4111	0.319	0.032	0.000	0.322
0.4167	0.319	0.033	0.000	0.322
0.4222	0.319	0.033	0.000	0.322
0.4278	0.319	0.034	0.000	0.322
0.4333	0.319	0.034	0.000	0.322
0.4389	0.319	0.035	0.000	0.322
0.4444	0.319	0.035	0.000	0.322
0.4500	0.319	0.036	0.000	0.322
0.4556	0.319	0.036	0.000	0.322
0.4611	0.319	0.036	0.000	0.322
0.4667	0.319	0.037	0.000	0.322
0.4722	0.319	0.037	0.000	0.322
0.4778	0.319	0.038	0.000	0.322

0.4833	0.319	0.038	0.000	0.322
0.4889	0.319	0.039	0.000	0.322
0.4944	0.319	0.039	0.000	0.322
0.5000	0.319	0.040	0.000	0.322

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.58
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.26
Total Impervious Area: 0.639651

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.000377
5 year	0.000466
10 year	0.000507
25 year	0.000545
50 year	0.000566
100 year	0.000583

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.000294
5 year	0.000906
10 year	0.001871
25 year	0.004521
50 year	0.008503
100 year	0.01566

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1902	0.000	0.000
1903	0.000	0.000
1904	0.000	0.000
1905	0.000	0.000
1906	0.000	0.000
1907	0.000	0.000
1908	0.000	0.000
1909	0.000	0.000
1910	0.000	0.001
1911	0.000	0.000

1912	0.000	0.047
1913	0.000	0.001
1914	0.000	0.000
1915	0.000	0.000
1916	0.000	0.000
1917	0.000	0.000
1918	0.000	0.000
1919	0.000	0.000
1920	0.000	0.000
1921	0.000	0.000
1922	0.000	0.001
1923	0.000	0.001
1924	0.000	0.000
1925	0.000	0.000
1926	0.000	0.000
1927	0.000	0.000
1928	0.000	0.000
1929	0.000	0.003
1930	0.000	0.000
1931	0.000	0.000
1932	0.000	0.000
1933	0.000	0.000
1934	0.000	0.013
1935	0.000	0.000
1936	0.000	0.000
1937	0.000	0.000
1938	0.000	0.000
1939	0.000	0.000
1940	0.000	0.000
1941	0.000	0.000
1942	0.000	0.000
1943	0.000	0.000
1944	0.000	0.000
1945	0.000	0.000
1946	0.000	0.000
1947	0.000	0.000
1948	0.000	0.000
1949	0.000	0.000
1950	0.000	0.000
1951	0.000	0.000
1952	0.000	0.007
1953	0.000	0.001
1954	0.000	0.000
1955	0.000	0.000
1956	0.000	0.000
1957	0.000	0.000
1958	0.000	0.010
1959	0.000	0.008
1960	0.000	0.000
1961	0.000	0.005
1962	0.000	0.000
1963	0.000	0.000
1964	0.000	0.000
1965	0.000	0.004
1966	0.000	0.000
1967	0.000	0.000
1968	0.000	0.000
1969	0.000	0.000

1970	0.000	0.000
1971	0.000	0.001
1972	0.000	0.001
1973	0.000	0.002
1974	0.000	0.003
1975	0.000	0.001
1976	0.000	0.001
1977	0.000	0.000
1978	0.000	0.008
1979	0.000	0.000
1980	0.000	0.000
1981	0.000	0.000
1982	0.000	0.000
1983	0.000	0.001
1984	0.000	0.000
1985	0.000	0.000
1986	0.000	0.000
1987	0.000	0.000
1988	0.000	0.000
1989	0.000	0.000
1990	0.000	0.000
1991	0.000	0.001
1992	0.000	0.002
1993	0.000	0.001
1994	0.000	0.000
1995	0.000	0.000
1996	0.000	0.006
1997	0.000	0.000
1998	0.000	0.000
1999	0.000	0.000
2000	0.000	0.000
2001	0.000	0.000
2002	0.000	0.000
2003	0.000	0.000
2004	0.000	0.000
2005	0.000	0.012
2006	0.000	0.000
2007	0.000	0.000
2008	0.000	0.000
2009	0.000	0.000
2010	0.000	0.000
2011	0.000	0.000
2012	0.000	0.000
2013	0.000	0.000
2014	0.000	0.000
2015	0.000	0.000
2016	0.000	0.000
2017	0.000	0.000
2018	0.000	0.011
2019	0.000	0.009
2020	0.000	0.000
2021	0.000	0.002
2022	0.000	0.000
2023	0.000	0.001
2024	0.000	0.014
2025	0.000	0.000
2026	0.000	0.001
2027	0.000	0.000

2028	0.000	0.000
2029	0.000	0.000
2030	0.000	0.003
2031	0.000	0.000
2032	0.000	0.000
2033	0.000	0.000
2034	0.000	0.000
2035	0.000	0.000
2036	0.000	0.000
2037	0.000	0.000
2038	0.000	0.000
2039	0.000	0.000
2040	0.000	0.000
2041	0.000	0.000
2042	0.000	0.000
2043	0.000	0.001
2044	0.000	0.005
2045	0.000	0.000
2046	0.000	0.000
2047	0.000	0.000
2048	0.000	0.000
2049	0.000	0.000
2050	0.000	0.000
2051	0.000	0.000
2052	0.000	0.000
2053	0.000	0.000
2054	0.000	0.000
2055	0.000	0.000
2056	0.000	0.000
2057	0.000	0.000
2058	0.000	0.000
2059	0.000	0.008

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0005	0.0475
2	0.0005	0.0139
3	0.0005	0.0125
4	0.0005	0.0124
5	0.0005	0.0110
6	0.0005	0.0101
7	0.0005	0.0089
8	0.0005	0.0083
9	0.0005	0.0080
10	0.0005	0.0079
11	0.0005	0.0072
12	0.0005	0.0059
13	0.0005	0.0050
14	0.0005	0.0048
15	0.0005	0.0041
16	0.0005	0.0034
17	0.0005	0.0030
18	0.0005	0.0025
19	0.0005	0.0022
20	0.0005	0.0021
21	0.0005	0.0017
22	0.0005	0.0014

23	0.0005	0.0010
24	0.0005	0.0010
25	0.0005	0.0008
26	0.0005	0.0008
27	0.0005	0.0008
28	0.0005	0.0008
29	0.0005	0.0007
30	0.0004	0.0007
31	0.0004	0.0007
32	0.0004	0.0006
33	0.0004	0.0006
34	0.0004	0.0006
35	0.0004	0.0005
36	0.0004	0.0005
37	0.0004	0.0005
38	0.0004	0.0004
39	0.0004	0.0003
40	0.0004	0.0003
41	0.0004	0.0003
42	0.0004	0.0003
43	0.0004	0.0003
44	0.0004	0.0002
45	0.0004	0.0002
46	0.0004	0.0002
47	0.0004	0.0002
48	0.0004	0.0002
49	0.0004	0.0002
50	0.0004	0.0002
51	0.0004	0.0002
52	0.0004	0.0002
53	0.0004	0.0002
54	0.0004	0.0002
55	0.0004	0.0002
56	0.0004	0.0002
57	0.0004	0.0002
58	0.0004	0.0002
59	0.0004	0.0002
60	0.0004	0.0002
61	0.0004	0.0002
62	0.0004	0.0002
63	0.0004	0.0002
64	0.0004	0.0002
65	0.0004	0.0002
66	0.0004	0.0002
67	0.0004	0.0002
68	0.0004	0.0002
69	0.0004	0.0002
70	0.0004	0.0002
71	0.0004	0.0002
72	0.0004	0.0002
73	0.0004	0.0002
74	0.0004	0.0002
75	0.0004	0.0002
76	0.0004	0.0002
77	0.0004	0.0002
78	0.0004	0.0002
79	0.0004	0.0002
80	0.0004	0.0002

81	0.0004	0.0002
82	0.0004	0.0002
83	0.0004	0.0002
84	0.0004	0.0002
85	0.0004	0.0002
86	0.0004	0.0002
87	0.0004	0.0002
88	0.0004	0.0002
89	0.0004	0.0002
90	0.0004	0.0002
91	0.0004	0.0002
92	0.0004	0.0002
93	0.0004	0.0002
94	0.0004	0.0002
95	0.0004	0.0002
96	0.0004	0.0002
97	0.0004	0.0002
98	0.0004	0.0002
99	0.0004	0.0002
100	0.0004	0.0002
101	0.0004	0.0002
102	0.0004	0.0002
103	0.0004	0.0002
104	0.0004	0.0002
105	0.0004	0.0002
106	0.0004	0.0002
107	0.0004	0.0002
108	0.0004	0.0002
109	0.0004	0.0002
110	0.0004	0.0002
111	0.0004	0.0002
112	0.0004	0.0002
113	0.0004	0.0002
114	0.0003	0.0002
115	0.0003	0.0002
116	0.0003	0.0002
117	0.0003	0.0002
118	0.0003	0.0002
119	0.0003	0.0002
120	0.0003	0.0002
121	0.0003	0.0002
122	0.0003	0.0002
123	0.0003	0.0002
124	0.0003	0.0002
125	0.0003	0.0002
126	0.0003	0.0002
127	0.0003	0.0002
128	0.0003	0.0002
129	0.0003	0.0002
130	0.0003	0.0002
131	0.0003	0.0002
132	0.0003	0.0002
133	0.0003	0.0002
134	0.0003	0.0002
135	0.0003	0.0002
136	0.0003	0.0002
137	0.0003	0.0002
138	0.0003	0.0002

139	0.0003	0.0002
140	0.0002	0.0002
141	0.0002	0.0002
142	0.0002	0.0002
143	0.0002	0.0002
144	0.0002	0.0002
145	0.0002	0.0002
146	0.0002	0.0002
147	0.0002	0.0002
148	0.0002	0.0002
149	0.0002	0.0002
150	0.0002	0.0002
151	0.0002	0.0002
152	0.0002	0.0002
153	0.0002	0.0002
154	0.0001	0.0002
155	0.0001	0.0002
156	0.0001	0.0002
157	0.0001	0.0001
158	0.0001	0.0001

Duration Flows

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0002	3738	3203	85	Pass
0.0002	3569	2728	76	Pass
0.0002	3411	2284	66	Pass
0.0002	3297	1890	57	Pass
0.0002	3161	1505	47	Pass
0.0002	3035	1110	36	Pass
0.0002	2907	790	27	Pass
0.0002	2792	779	27	Pass
0.0002	2689	770	28	Pass
0.0002	2615	762	29	Pass
0.0002	2512	753	29	Pass
0.0002	2428	746	30	Pass
0.0002	2327	737	31	Pass
0.0002	2231	725	32	Pass
0.0002	2174	721	33	Pass
0.0002	2095	718	34	Pass
0.0002	2029	710	34	Pass
0.0003	1963	702	35	Pass
0.0003	1893	694	36	Pass
0.0003	1853	691	37	Pass
0.0003	1777	688	38	Pass
0.0003	1713	678	39	Pass
0.0003	1642	669	40	Pass
0.0003	1587	663	41	Pass
0.0003	1501	654	43	Pass
0.0003	1470	651	44	Pass
0.0003	1368	641	46	Pass
0.0003	1311	635	48	Pass
0.0003	1259	625	49	Pass
0.0003	1210	616	50	Pass
0.0003	1172	612	52	Pass
0.0003	1131	601	53	Pass
0.0003	1068	594	55	Pass
0.0003	1011	590	58	Pass
0.0003	970	580	59	Pass
0.0003	941	577	61	Pass
0.0003	913	571	62	Pass
0.0003	872	567	65	Pass
0.0003	822	562	68	Pass
0.0003	793	557	70	Pass
0.0003	753	549	72	Pass
0.0003	714	547	76	Pass
0.0003	682	544	79	Pass
0.0004	655	541	82	Pass
0.0004	624	539	86	Pass
0.0004	570	537	94	Pass
0.0004	551	533	96	Pass
0.0004	527	529	100	Pass
0.0004	503	527	104	Fail
0.0004	477	526	110	Fail
0.0004	440	522	118	Fail
0.0004	408	516	126	Fail
0.0004	384	513	133	Fail
0.0004	356	509	142	Fail

0.0004	333	507	152	Fail
0.0004	306	502	164	Fail
0.0004	283	498	175	Fail
0.0004	274	497	181	Fail
0.0004	252	492	195	Fail
0.0004	233	487	209	Fail
0.0004	217	487	224	Fail
0.0004	198	486	245	Fail
0.0004	189	484	256	Fail
0.0004	176	477	271	Fail
0.0004	159	473	297	Fail
0.0004	143	466	325	Fail
0.0004	124	462	372	Fail
0.0004	110	460	418	Fail
0.0004	95	454	477	Fail
0.0005	80	450	562	Fail
0.0005	57	444	778	Fail
0.0005	37	441	1191	Fail
0.0005	16	439	2743	Fail
0.0005	5	438	8760	Fail
0.0005	0	437	n/a	Fail
0.0005	0	435	n/a	Fail
0.0005	0	432	n/a	Fail
0.0005	0	429	n/a	Fail
0.0005	0	429	n/a	Fail
0.0005	0	427	n/a	Fail
0.0005	0	423	n/a	Fail
0.0005	0	418	n/a	Fail
0.0005	0	416	n/a	Fail
0.0005	0	414	n/a	Fail
0.0005	0	411	n/a	Fail
0.0005	0	407	n/a	Fail
0.0005	0	405	n/a	Fail
0.0005	0	402	n/a	Fail
0.0005	0	400	n/a	Fail
0.0005	0	399	n/a	Fail
0.0005	0	397	n/a	Fail
0.0005	0	395	n/a	Fail
0.0005	0	394	n/a	Fail
0.0005	0	392	n/a	Fail
0.0005	0	392	n/a	Fail
0.0006	0	392	n/a	Fail
0.0006	0	390	n/a	Fail
0.0006	0	385	n/a	Fail
0.0006	0	381	n/a	Fail
0.0006	0	380	n/a	Fail

The development has an increase in flow durations from 1/2 Predeveloped 2 year flow to the 2 year flow or more than a 10% increase from the 2 year to the 50 year flow.
The development has an increase in flow durations for more than 50% of the flows for the range of the duration analysis.

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
Permeable Pavement 1 POC	☐	224.30			☐	100.00			
Total Volume Infiltrated		224.30	0.00	0.00		100.00	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

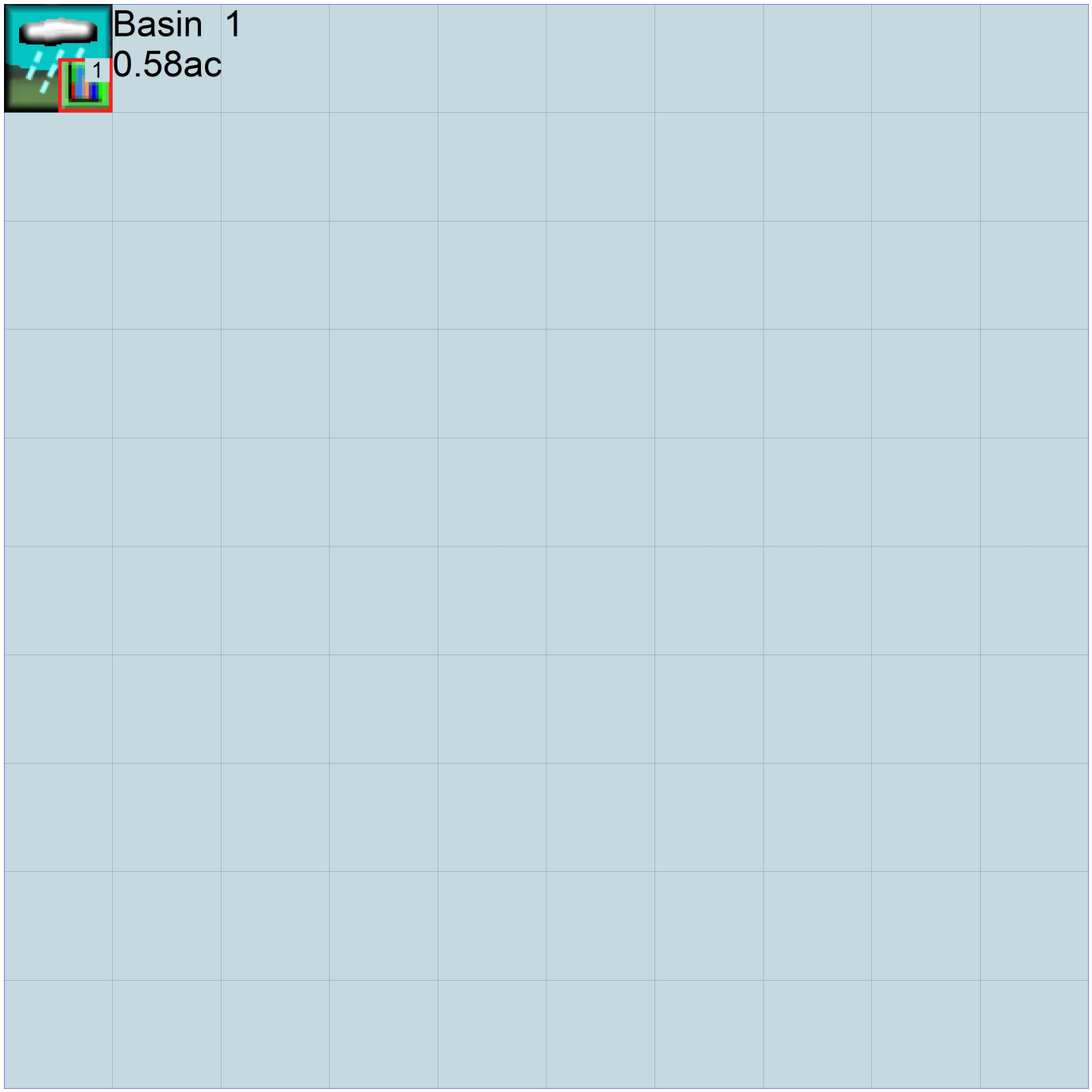
No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

Appendix

Predeveloped Schematic



Mitigated Schematic

Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1901 10 01        END    2059 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   default[49].wdm
MESSU       25   Predefault[49].MES
            27   Predefault[49].L61
            28   Predefault[49].L62
            30   POCdefault[49]1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND       1
      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           ***
    1     A/B, 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 ***
    1         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  *********
    1         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 ***
    1         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
    1              0         5         2       400      0.05       0.3     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
    1              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
    1          0.2       0.5      0.35         0       0.7       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
    1              0         0         0         0         3         1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
  END GEN-INFO
  *** Section IWATER***

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

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

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

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

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

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

```
END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND   1                        0.58     COPY   501     12
PERLND   1                        0.58     COPY   501     13

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

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



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

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

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

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

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

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

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
```

```
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    501 FLOW     ENGL      REPL
END EXT TARGETS

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

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


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1901 10 01        END    2059 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   default[49].wdm
MESSU       25   Mitdefault[49].MES
            27   Mitdefault[49].L61
            28   Mitdefault[49].L62
            30   POCdefault[49]1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND       7
      IMPLND      16
      IMPLND      17
      RCHRES       1
      COPY         1
      COPY       501
      COPY       601
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Permeable Pavement  1       MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  601         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
    7     A/B, Lawn, 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 ***
    7         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  *********
    7         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 ***
    7         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
    7             0         5       0.8       400      0.05       0.3     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
    7             0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                                 ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
    7          0.1       0.5      0.25         0       0.7      0.25
  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
    7             0         0         0         0         3         1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                    in  out           ***
   16      ROADS/FLAT             1    1    1   27    0
   17      Porous Pavement        1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
   16         0    0    1    0    0    0
   17         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
   16         0    0    4    0    0    0    1    9
   17         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     ***
   16         0    0    0    0    0
   17         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
```

```
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
   16            400      0.01       0.1       0.1
   17            400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
   16              0         0
   17              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
   16              0         0
   17              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Lateral I Basin  1***
IMPLND  16                     1.0011     IMPLND  17     53
IMPLND  17                     0.3197     RCHRES   1      5
Basin  1***
PERLND   7                        0.26     COPY   501     12
PERLND   7                        0.26     COPY   601     12
PERLND   7                        0.26     COPY   501     13
PERLND   7                        0.26     COPY   601     13

******Routing******
IMPLND  16                        0.32     COPY     1     15
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     Permeable Paveme-009    2    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  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      0.02       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
   91    5
     Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)     (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.319651  0.000000  0.000000  0.000000
  0.005556  0.319651  0.000444  0.000000  0.322315
  0.011111  0.319651  0.000888  0.000000  0.322315
  0.016667  0.319651  0.001332  0.000000  0.322315
  0.022222  0.319651  0.001776  0.000000  0.322315
  0.027778  0.319651  0.002220  0.000000  0.322315
  0.033333  0.319651  0.002664  0.000000  0.322315
  0.038889  0.319651  0.003108  0.000000  0.322315
  0.044444  0.319651  0.003552  0.000000  0.322315
  0.050000  0.319651  0.003996  0.000000  0.322315
  0.055556  0.319651  0.004440  0.000000  0.322315
  0.061111  0.319651  0.004884  0.000000  0.322315
  0.066667  0.319651  0.005328  0.000000  0.322315
  0.072222  0.319651  0.005771  0.000000  0.322315
  0.077778  0.319651  0.006215  0.000000  0.322315
  0.083333  0.319651  0.006659  0.000000  0.322315
  0.088889  0.319651  0.007103  0.000000  0.322315
  0.094444  0.319651  0.007547  0.000000  0.322315
  0.100000  0.319651  0.007991  0.000000  0.322315
  0.105556  0.319651  0.008435  0.000000  0.322315
  0.111111  0.319651  0.008879  0.000000  0.322315
  0.116667  0.319651  0.009323  0.000000  0.322315
  0.122222  0.319651  0.009767  0.000000  0.322315
  0.127778  0.319651  0.010211  0.000000  0.322315
  0.133333  0.319651  0.010655  0.000000  0.322315
  0.138889  0.319651  0.011099  0.000000  0.322315
  0.144444  0.319651  0.011543  0.000000  0.322315
  0.150000  0.319651  0.011987  0.000000  0.322315
  0.155556  0.319651  0.012431  0.000000  0.322315
  0.161111  0.319651  0.012875  0.000000  0.322315
  0.166667  0.319651  0.013319  0.000000  0.322315
  0.172222  0.319651  0.013763  0.000000  0.322315
  0.177778  0.319651  0.014207  0.000000  0.322315
  0.183333  0.319651  0.014651  0.000000  0.322315
  0.188889  0.319651  0.015095  0.000000  0.322315
  0.194444  0.319651  0.015539  0.000000  0.322315
  0.200000  0.319651  0.015983  0.000000  0.322315
  0.205556  0.319651  0.016427  0.000000  0.322315
  0.211111  0.319651  0.016870  0.000000  0.322315
  0.216667  0.319651  0.017314  0.000000  0.322315
```

```
  0.222222  0.319651  0.017758  0.000000  0.322315
  0.227778  0.319651  0.018202  0.000000  0.322315
  0.233333  0.319651  0.018646  0.000000  0.322315
  0.238889  0.319651  0.019090  0.000000  0.322315
  0.244444  0.319651  0.019534  0.000000  0.322315
  0.250000  0.319651  0.019978  0.000000  0.322315
  0.255556  0.319651  0.020422  0.000000  0.322315
  0.261111  0.319651  0.020866  0.000000  0.322315
  0.266667  0.319651  0.021310  0.000000  0.322315
  0.272222  0.319651  0.021754  0.000000  0.322315
  0.277778  0.319651  0.022198  0.000000  0.322315
  0.283333  0.319651  0.022642  0.000000  0.322315
  0.288889  0.319651  0.023086  0.000000  0.322315
  0.294444  0.319651  0.023530  0.000000  0.322315
  0.300000  0.319651  0.023974  0.000000  0.322315
  0.305556  0.319651  0.024418  0.000000  0.322315
  0.311111  0.319651  0.024862  0.000000  0.322315
  0.316667  0.319651  0.025306  0.000000  0.322315
  0.322222  0.319651  0.025750  0.000000  0.322315
  0.327778  0.319651  0.026194  0.000000  0.322315
  0.333333  0.319651  0.026638  0.000000  0.322315
  0.338889  0.319651  0.027082  0.000000  0.322315
  0.344444  0.319651  0.027526  0.000000  0.322315
  0.350000  0.319651  0.027969  0.000000  0.322315
  0.355556  0.319651  0.028413  0.000000  0.322315
  0.361111  0.319651  0.028857  0.000000  0.322315
  0.366667  0.319651  0.029301  0.000000  0.322315
  0.372222  0.319651  0.029745  0.000000  0.322315
  0.377778  0.319651  0.030189  0.000000  0.322315
  0.383333  0.319651  0.030633  0.000000  0.322315
  0.388889  0.319651  0.031077  0.000000  0.322315
  0.394444  0.319651  0.031521  0.000000  0.322315
  0.400000  0.319651  0.031965  0.000000  0.322315
  0.405556  0.319651  0.032409  0.000000  0.322315
  0.411111  0.319651  0.032853  0.000000  0.322315
  0.416667  0.319651  0.033297  0.000000  0.322315
  0.422222  0.319651  0.033741  0.000000  0.322315
  0.427778  0.319651  0.034185  0.000000  0.322315
  0.433333  0.319651  0.034629  0.000000  0.322315
  0.438889  0.319651  0.035073  0.000000  0.322315
  0.444444  0.319651  0.035517  0.000000  0.322315
  0.450000  0.319651  0.035961  0.000000  0.322315
  0.455556  0.319651  0.036405  0.000000  0.322315
  0.461111  0.319651  0.036849  0.000000  0.322315
  0.466667  0.319651  0.037293  0.000000  0.322315
  0.472222  0.319651  0.037737  0.000000  0.322315
  0.477778  0.319651  0.038181  0.000000  0.322315
  0.483333  0.319651  0.038625  0.000000  0.322315
  0.488889  0.319651  0.039068  0.000000  0.322315
  0.494444  0.319651  0.039512  0.000000  0.322315
  0.500000  0.319651  0.039956  0.000000  0.322315
  END FTABLE  1
END FTABLES

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

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY     1 OUTPUT MEAN   1 1     48.4      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    801 FLOW     ENGL      REPL
```

```
COPY   601 OUTPUT MEAN   1 1     48.4      WDM    901 FLOW     ENGL      REPL
END EXT TARGETS

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

  MASS-LINK       53
IMPLND     IWATER SURO                     IMPLND         EXTNL  SURLI
  END MASS-LINK   53


END MASS-LINK

END RUN
```

Mitigated HSPF Message File

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WWHM2012

PROJECT REPORT

General Model Information

Project Name:	default[49]
Site Name:	
Site Address:	
City:	
Report Date:	10/9/2024
Gage:	SPU 158 Year 5min
Data Start:	10/01/1901
Data End:	09/30/2059
Timestep:	15 Minute
Precip Scale:	1.000
Version Date:	2021/08/18
Version:	4.2.18

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
A B, Forest, Flat	0.58
Pervious Total	0.58

Impervious Land Use	acre
Impervious Total	0
Basin Total	0.58

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A B, Lawn, Flat	0.26
Pervious Total	0.26

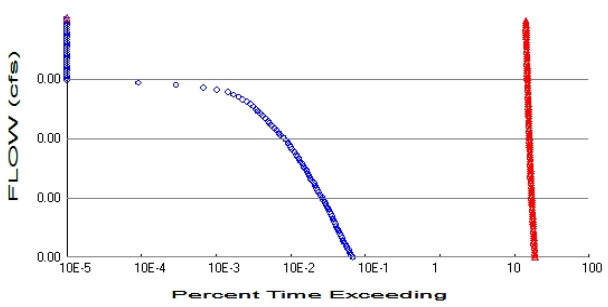
Impervious Land Use	acre
ROADS FLAT	0.32
Impervious Total	0.32
Basin Total	0.58

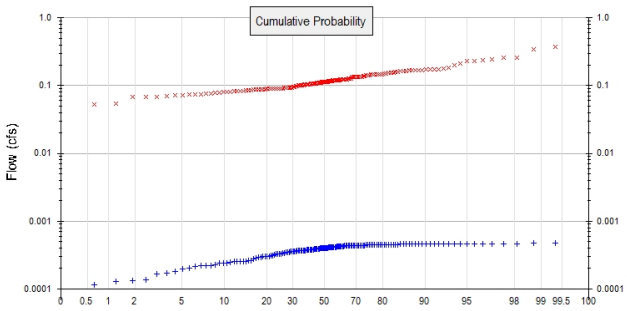
Element Flows To:

Surface	Interflow	Groundwater

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.58
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.26
Total Impervious Area: 0.32

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.000377
5 year	0.000466
10 year	0.000507
25 year	0.000545
50 year	0.000566
100 year	0.000583

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.112554
5 year	0.151409
10 year	0.179696
25 year	0.218463
50 year	0.249613
100 year	0.282772

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1902	0.000	0.133
1903	0.000	0.147
1904	0.000	0.166
1905	0.000	0.075
1906	0.000	0.084
1907	0.000	0.112
1908	0.000	0.092
1909	0.000	0.113
1910	0.000	0.108
1911	0.000	0.121

1912	0.000	0.246
1913	0.000	0.088
1914	0.000	0.368
1915	0.000	0.075
1916	0.000	0.141
1917	0.000	0.053
1918	0.000	0.113
1919	0.000	0.069
1920	0.000	0.092
1921	0.000	0.079
1922	0.000	0.125
1923	0.000	0.087
1924	0.000	0.163
1925	0.000	0.068
1926	0.000	0.133
1927	0.000	0.108
1928	0.000	0.080
1929	0.000	0.160
1930	0.000	0.168
1931	0.000	0.081
1932	0.000	0.087
1933	0.000	0.087
1934	0.000	0.141
1935	0.000	0.075
1936	0.000	0.104
1937	0.000	0.155
1938	0.000	0.076
1939	0.000	0.096
1940	0.000	0.168
1941	0.000	0.166
1942	0.000	0.125
1943	0.000	0.124
1944	0.000	0.178
1945	0.000	0.135
1946	0.000	0.105
1947	0.000	0.082
1948	0.000	0.112
1949	0.000	0.174
1950	0.000	0.098
1951	0.000	0.149
1952	0.000	0.170
1953	0.000	0.155
1954	0.000	0.091
1955	0.000	0.085
1956	0.000	0.084
1957	0.000	0.091
1958	0.000	0.116
1959	0.000	0.119
1960	0.000	0.089
1961	0.000	0.255
1962	0.000	0.110
1963	0.000	0.081
1964	0.000	0.236
1965	0.000	0.108
1966	0.000	0.089
1967	0.000	0.124
1968	0.000	0.105
1969	0.000	0.094

1970	0.000	0.107
1971	0.000	0.104
1972	0.000	0.344
1973	0.000	0.200
1974	0.000	0.144
1975	0.000	0.150
1976	0.000	0.159
1977	0.000	0.068
1978	0.000	0.123
1979	0.000	0.121
1980	0.000	0.119
1981	0.000	0.112
1982	0.000	0.091
1983	0.000	0.124
1984	0.000	0.123
1985	0.000	0.140
1986	0.000	0.071
1987	0.000	0.125
1988	0.000	0.075
1989	0.000	0.068
1990	0.000	0.090
1991	0.000	0.135
1992	0.000	0.128
1993	0.000	0.146
1994	0.000	0.100
1995	0.000	0.078
1996	0.000	0.105
1997	0.000	0.094
1998	0.000	0.111
1999	0.000	0.121
2000	0.000	0.106
2001	0.000	0.085
2002	0.000	0.155
2003	0.000	0.090
2004	0.000	0.135
2005	0.000	0.259
2006	0.000	0.121
2007	0.000	0.136
2008	0.000	0.112
2009	0.000	0.085
2010	0.000	0.110
2011	0.000	0.115
2012	0.000	0.107
2013	0.000	0.101
2014	0.000	0.098
2015	0.000	0.164
2016	0.000	0.103
2017	0.000	0.165
2018	0.000	0.108
2019	0.000	0.146
2020	0.000	0.120
2021	0.000	0.101
2022	0.000	0.171
2023	0.000	0.212
2024	0.000	0.229
2025	0.000	0.110
2026	0.000	0.121
2027	0.000	0.135

2028	0.000	0.053
2029	0.000	0.087
2030	0.000	0.174
2031	0.000	0.055
2032	0.000	0.092
2033	0.000	0.116
2034	0.000	0.091
2035	0.000	0.112
2036	0.000	0.091
2037	0.000	0.122
2038	0.000	0.116
2039	0.000	0.233
2040	0.000	0.091
2041	0.000	0.116
2042	0.000	0.133
2043	0.000	0.148
2044	0.000	0.101
2045	0.000	0.082
2046	0.000	0.091
2047	0.000	0.112
2048	0.000	0.093
2049	0.000	0.137
2050	0.000	0.102
2051	0.000	0.144
2052	0.000	0.110
2053	0.000	0.094
2054	0.000	0.186
2055	0.000	0.114
2056	0.000	0.147
2057	0.000	0.072
2058	0.000	0.138
2059	0.000	0.172

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0005	0.3680
2	0.0005	0.3436
3	0.0005	0.2588
4	0.0005	0.2548
5	0.0005	0.2459
6	0.0005	0.2361
7	0.0005	0.2330
8	0.0005	0.2287
9	0.0005	0.2115
10	0.0005	0.1995
11	0.0005	0.1859
12	0.0005	0.1781
13	0.0005	0.1738
14	0.0005	0.1736
15	0.0005	0.1724
16	0.0005	0.1712
17	0.0005	0.1701
18	0.0005	0.1684
19	0.0005	0.1679
20	0.0005	0.1664
21	0.0005	0.1664
22	0.0005	0.1645

23	0.0005	0.1641
24	0.0005	0.1633
25	0.0005	0.1604
26	0.0005	0.1589
27	0.0005	0.1553
28	0.0005	0.1552
29	0.0005	0.1549
30	0.0004	0.1497
31	0.0004	0.1486
32	0.0004	0.1476
33	0.0004	0.1470
34	0.0004	0.1469
35	0.0004	0.1464
36	0.0004	0.1461
37	0.0004	0.1444
38	0.0004	0.1443
39	0.0004	0.1412
40	0.0004	0.1407
41	0.0004	0.1403
42	0.0004	0.1382
43	0.0004	0.1375
44	0.0004	0.1357
45	0.0004	0.1353
46	0.0004	0.1350
47	0.0004	0.1349
48	0.0004	0.1348
49	0.0004	0.1335
50	0.0004	0.1330
51	0.0004	0.1326
52	0.0004	0.1281
53	0.0004	0.1251
54	0.0004	0.1251
55	0.0004	0.1245
56	0.0004	0.1241
57	0.0004	0.1241
58	0.0004	0.1239
59	0.0004	0.1233
60	0.0004	0.1230
61	0.0004	0.1222
62	0.0004	0.1214
63	0.0004	0.1213
64	0.0004	0.1210
65	0.0004	0.1210
66	0.0004	0.1210
67	0.0004	0.1195
68	0.0004	0.1195
69	0.0004	0.1193
70	0.0004	0.1163
71	0.0004	0.1162
72	0.0004	0.1159
73	0.0004	0.1157
74	0.0004	0.1154
75	0.0004	0.1138
76	0.0004	0.1133
77	0.0004	0.1132
78	0.0004	0.1125
79	0.0004	0.1124
80	0.0004	0.1123

81	0.0004	0.1120
82	0.0004	0.1119
83	0.0004	0.1116
84	0.0004	0.1111
85	0.0004	0.1104
86	0.0004	0.1102
87	0.0004	0.1098
88	0.0004	0.1096
89	0.0004	0.1085
90	0.0004	0.1084
91	0.0004	0.1082
92	0.0004	0.1081
93	0.0004	0.1073
94	0.0004	0.1070
95	0.0004	0.1062
96	0.0004	0.1051
97	0.0004	0.1048
98	0.0004	0.1046
99	0.0004	0.1044
100	0.0004	0.1042
101	0.0004	0.1025
102	0.0004	0.1024
103	0.0004	0.1014
104	0.0004	0.1009
105	0.0004	0.1007
106	0.0004	0.1002
107	0.0004	0.0982
108	0.0004	0.0976
109	0.0004	0.0956
110	0.0004	0.0943
111	0.0004	0.0937
112	0.0004	0.0935
113	0.0004	0.0927
114	0.0003	0.0925
115	0.0003	0.0920
116	0.0003	0.0917
117	0.0003	0.0915
118	0.0003	0.0913
119	0.0003	0.0912
120	0.0003	0.0911
121	0.0003	0.0910
122	0.0003	0.0909
123	0.0003	0.0907
124	0.0003	0.0902
125	0.0003	0.0902
126	0.0003	0.0893
127	0.0003	0.0885
128	0.0003	0.0877
129	0.0003	0.0873
130	0.0003	0.0871
131	0.0003	0.0868
132	0.0003	0.0866
133	0.0003	0.0854
134	0.0003	0.0852
135	0.0003	0.0850
136	0.0003	0.0837
137	0.0003	0.0836
138	0.0003	0.0821

139	0.0003	0.0819
140	0.0002	0.0814
141	0.0002	0.0811
142	0.0002	0.0804
143	0.0002	0.0790
144	0.0002	0.0778
145	0.0002	0.0759
146	0.0002	0.0755
147	0.0002	0.0748
148	0.0002	0.0747
149	0.0002	0.0746
150	0.0002	0.0723
151	0.0002	0.0713
152	0.0002	0.0692
153	0.0002	0.0683
154	0.0001	0.0683
155	0.0001	0.0683
156	0.0001	0.0547
157	0.0001	0.0533
158	0.0001	0.0529

Duration Flows

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0002	3738	1040424	27833	Fail
0.0002	3569	1035438	29011	Fail
0.0002	3411	1030452	30209	Fail
0.0002	3297	1027128	31153	Fail
0.0002	3161	1022142	32336	Fail
0.0002	3035	1017710	33532	Fail
0.0002	2907	1012724	34837	Fail
0.0002	2792	1008292	36113	Fail
0.0002	2689	1004414	37352	Fail
0.0002	2615	1001090	38282	Fail
0.0002	2512	996658	39675	Fail
0.0002	2428	992779	40888	Fail
0.0002	2327	988347	42473	Fail
0.0002	2231	984469	44126	Fail
0.0002	2174	981699	45156	Fail
0.0002	2095	977821	46674	Fail
0.0002	2029	973943	48001	Fail
0.0003	1963	970065	49417	Fail
0.0003	1893	966187	51039	Fail
0.0003	1853	960093	51812	Fail
0.0003	1777	956215	53810	Fail
0.0003	1713	952891	55627	Fail
0.0003	1642	949567	57829	Fail
0.0003	1587	946243	59624	Fail
0.0003	1501	942919	62819	Fail
0.0003	1470	940149	63955	Fail
0.0003	1368	936825	68481	Fail
0.0003	1311	934055	71247	Fail
0.0003	1259	930731	73926	Fail
0.0003	1210	927961	76690	Fail
0.0003	1172	925191	78941	Fail
0.0003	1131	922421	81558	Fail
0.0003	1068	919097	86057	Fail
0.0003	1011	916327	90635	Fail
0.0003	970	913557	94181	Fail
0.0003	941	911341	96848	Fail
0.0003	913	908570	99514	Fail
0.0003	872	905800	103876	Fail
0.0003	822	903030	109857	Fail
0.0003	793	900260	113525	Fail
0.0003	753	897490	119188	Fail
0.0003	714	895828	125466	Fail
0.0003	682	893058	130946	Fail
0.0004	655	890288	135921	Fail
0.0004	624	888072	142319	Fail
0.0004	570	885302	155316	Fail
0.0004	551	883640	160370	Fail
0.0004	527	880870	167148	Fail
0.0004	503	878654	174682	Fail
0.0004	477	876438	183739	Fail
0.0004	440	873668	198560	Fail
0.0004	408	872006	213726	Fail
0.0004	384	869790	226507	Fail
0.0004	356	867020	243544	Fail

0.0004	333	864804	259700	Fail
0.0004	306	862588	281891	Fail
0.0004	283	860372	304018	Fail
0.0004	274	858710	313397	Fail
0.0004	252	856494	339878	Fail
0.0004	233	854278	366642	Fail
0.0004	217	852062	392655	Fail
0.0004	198	850400	429494	Fail
0.0004	189	848738	449067	Fail
0.0004	176	846522	480978	Fail
0.0004	159	844306	531010	Fail
0.0004	143	842644	589261	Fail
0.0004	124	840428	677764	Fail
0.0004	110	838766	762514	Fail
0.0004	95	837104	881162	Fail
0.0005	80	834888	1043609	Fail
0.0005	57	832672	1460828	Fail
0.0005	37	831010	2245972	Fail
0.0005	16	828794	5179962	Fail
0.0005	5	827686	16553720	Fail
0.0005	0	825470	n/a	Fail
0.0005	0	823808	n/a	Fail
0.0005	0	822145	n/a	Fail
0.0005	0	819929	n/a	Fail
0.0005	0	818821	n/a	Fail
0.0005	0	816605	n/a	Fail
0.0005	0	814943	n/a	Fail
0.0005	0	813281	n/a	Fail
0.0005	0	811619	n/a	Fail
0.0005	0	809957	n/a	Fail
0.0005	0	808295	n/a	Fail
0.0005	0	806633	n/a	Fail
0.0005	0	804971	n/a	Fail
0.0005	0	803309	n/a	Fail
0.0005	0	801647	n/a	Fail
0.0005	0	800539	n/a	Fail
0.0005	0	798877	n/a	Fail
0.0005	0	796661	n/a	Fail
0.0005	0	794999	n/a	Fail
0.0005	0	793337	n/a	Fail
0.0005	0	792229	n/a	Fail
0.0006	0	790567	n/a	Fail
0.0006	0	789459	n/a	Fail
0.0006	0	787797	n/a	Fail
0.0006	0	786135	n/a	Fail
0.0006	0	784473	n/a	Fail

The development has an increase in flow durations from 1/2 Predeveloped 2 year flow to the 2 year flow or more than a 10% increase from the 2 year to the 50 year flow.
The development has an increase in flow durations for more than 50% of the flows for the range of the duration analysis.

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
Total Volume Infiltrated		0.00	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

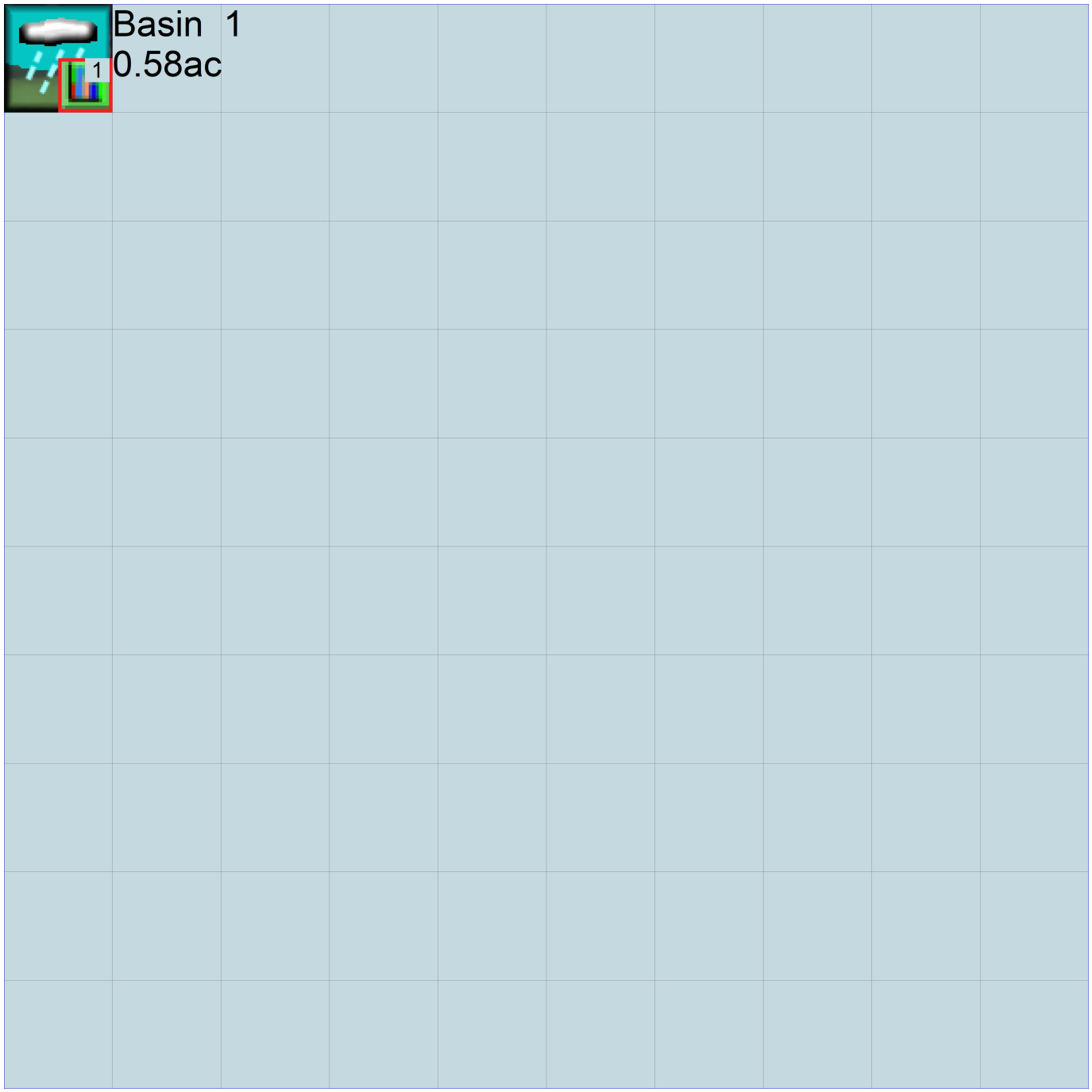
No PERLND changes have been made.

IMPLND Changes

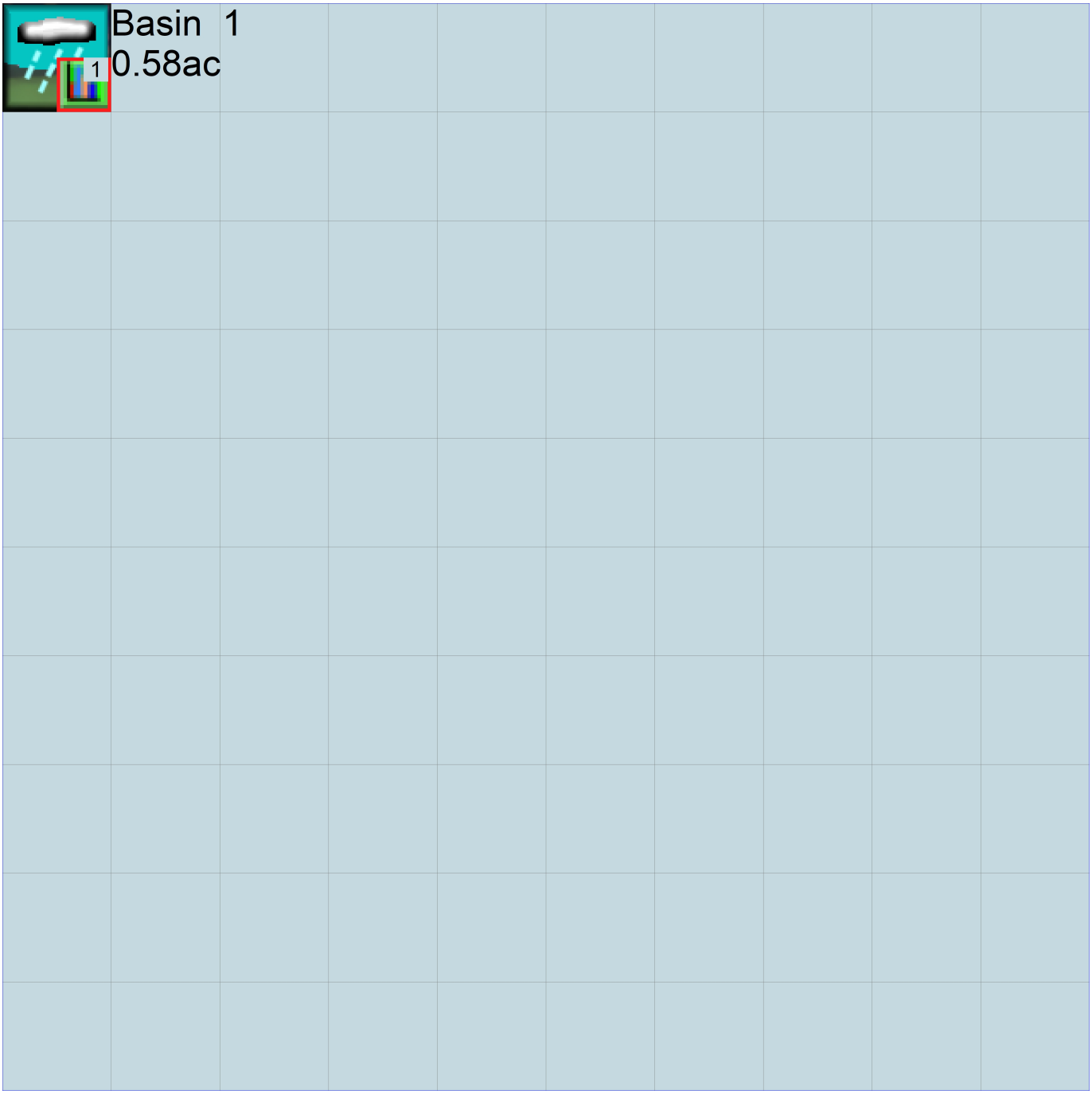
No IMPLND changes have been made.

Appendix

Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1901 10 01        END    2059 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   default[49].wdm
MESSU       25   Predefault[49].MES
            27   Predefault[49].L61
            28   Predefault[49].L62
            30   POCdefault[49]1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND       1
      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           ***
    1     A/B, 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 ***
    1         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  *********
    1         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 ***
    1         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
    1              0         5         2       400      0.05       0.3     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
    1              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
    1          0.2       0.5      0.35         0       0.7       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
    1              0         0         0         0         3         1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
  END GEN-INFO
  *** Section IWATER***

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

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

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

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

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

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

```
END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND   1                       0.58     COPY   501     12
PERLND   1                       0.58     COPY   501     13

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

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



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

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

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

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

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

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

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
```

```
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    501 FLOW     ENGL      REPL
END EXT TARGETS

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

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


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1901 10 01        END    2059 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   default[49].wdm
MESSU       25   Mitdefault[49].MES
            27   Mitdefault[49].L61
            28   Mitdefault[49].L62
            30   POCdefault[49]1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND       7
      IMPLND       1
      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           ***
    7     A/B, Lawn, 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 ***
    7         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  *********
    7         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 ***
    7         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
    7             0         5       0.8       400      0.05       0.3     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
    7             0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                            ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
    7          0.1       0.5      0.25         0       0.7      0.25
  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
    7             0         0         0         0         3         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
  END GEN-INFO
  *** Section IWATER***

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

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    1         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
  END IWAT-PARM2

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

```
  END IWAT-PARM3

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

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND   7                        0.26     COPY   501     12
PERLND   7                        0.26     COPY   501     13
IMPLND   1                        0.32     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    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY     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       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 HSPF Message File

Disclaimer

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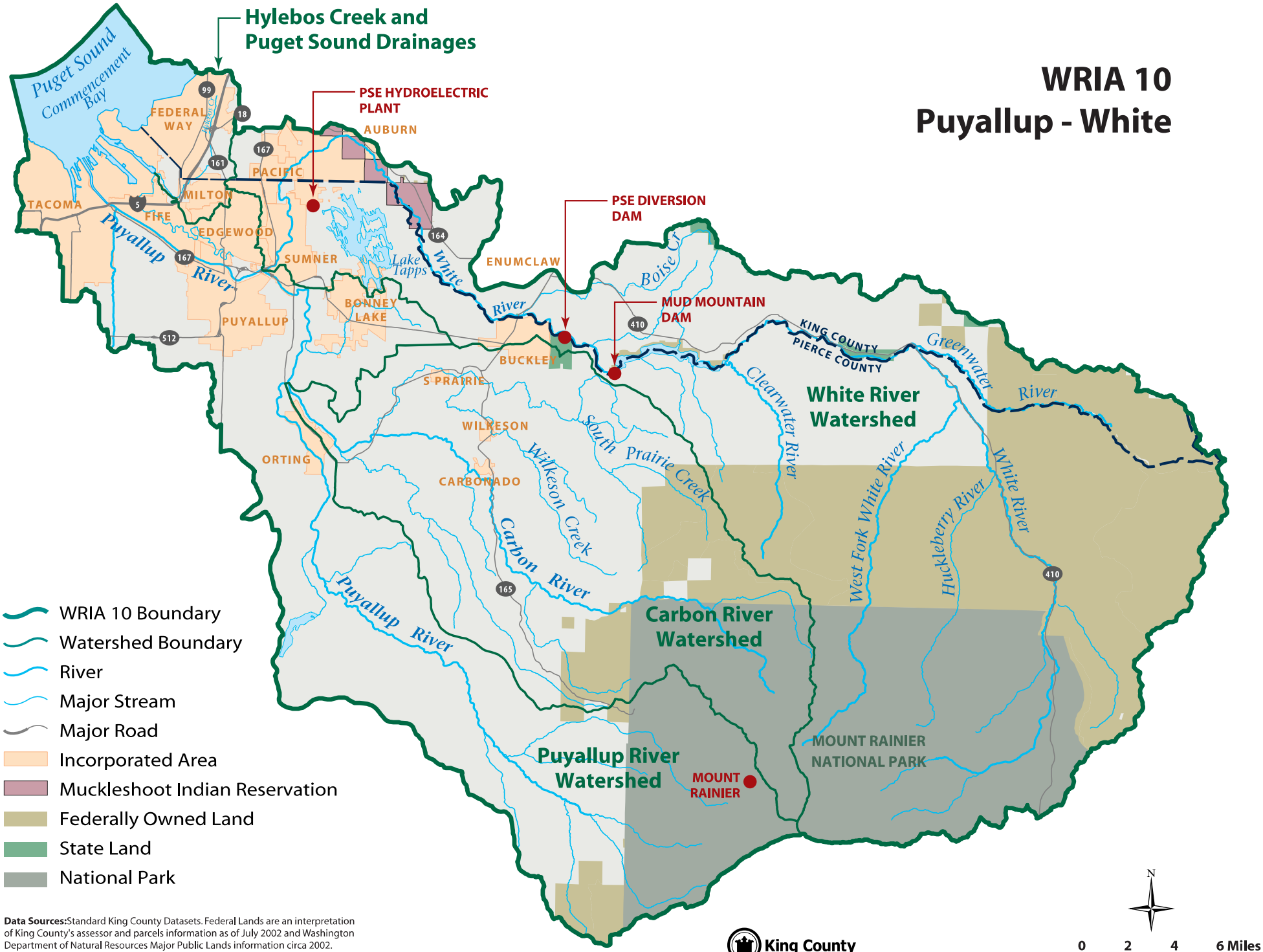

Data Sources: Standard King County Datasets. Federal Lands are an interpretation of King County's assessor and parcels information as of July 2002 and Washington Department of Natural Resources Major Public Lands information circa 2002.

Prepared by: DNRP GIS Unit and WLR Visual Communications & Web Unit.

File name: 0307WRIA10map.ai wgab

King County
Department of Natural Resources and Parks
Water and Land Resources Division

July 2003