Puyallup School District
Sparks Stadium
Parking Lot Expansion

Preliminary
Stormwater Site Plan

Prepared for:

Puyallup School District
323 12th St NW
Puyallup, WA 98371

Contact: Les Gerstmann
Phone: (253) 435-6673
GerstLF@puyallup.sd.org

Prepared by:
Sitts & Hill Engineers, Inc.
4815 Center Street
Tacoma, Washington 98409

Contact: Rick Hand, PE
Phone: (253) 474-9449
rickh@sittshill.com

October 2024

Job Number 19,474

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Plan Preparation

"I hereby state that this Stormwater Site Plan for Sparks Stadium Parking Lot Expansion has been prepared by me or under my supervision and meets the standard of care and expertise which is usual and customary in this community for professional engineers. I understand that the City of Puyallup does not and will not assume liability for the sufficiency, suitability, or performance of the stormwater system prepared by me."

RICHARD C. HAND
STATE OF WASHINGTON
26780
REGISTERED
PROFESSIONAL ENGINEER

PRELIMINARY

TABLE OF CONTENTS

_Toc179354095

1 Project Overview and Conditions Summary

1.1 Purpose

The purpose of this report is to comply with stormwater requirements detailed in the Washington State Department of Ecology Stormwater Management Manual for Western Washington (herein after referred to as the Manual), in accordance with the City of Puyallup Phase II Municipal Stormwater Permit (NPDES), the City of Puyallup Municipal Code (herein after referred to as PMC) Section 21.10.040, and the City of Puyallup Development Engineering Design Guidelines, Section 200 Documents.

1.2 Project Overview

The Puyallup School District (herein after referred to as PSD) proposes to expand the existing parking lot facilities located at District's Sparks Stadium site. Sparks Stadium is located at 601 7th Ave SW, Puyallup, WA 9837, or parcel 0420284126. See the vicinity map included in Appendix A.

The parcel contains the existing Sparks Stadium, two (2) grandstand seating stands, two (2) ticket booths, a storage building and 158 parking stalls. No building improvements are proposed. The project proposes to provide a net increase of 51 stalls so that there will be a total of 209 stalls when the project is complete. To accomplish this, the following stall work is proposed:

158 existing stalls
64 new stalls will be added
11 existing stalls will be removed
<u>5 existing stalls will be converted/removed to 3 ADA stalls added</u>
209 stalls

Of the 64 new stalls, 2 stalls will be electric vehicle (EV) stalls and another 2 will be EV ready. The ADA code requires 7 ADA stalls for the site; the project is providing 8 ADA stalls within the 209 stalls. See site plan included in Appendix B.

The majority of the improvements will occur in the Southwest corner of the site. The two (2) portable buildings that were present at the time of topographic survey work and have since been removed. Parking lot lighting is also proposed. Project landscaping will conform with City of Puyallup Vegetation Management Standards (VMS). The project zoning and comprehensive mapping is PF-Public Facilities.

The project anticipates the following permits:
City of Puyallup Conditional Use Permit (CUP,) PLCUP20240081
SEPA
City of Puyallup Site Development Permit, TBD
Potentially a DOE Construction Stormwater Permit (CSWGP).

1.3 Existing Conditions

The existing project site topography is flat and generally slopes in the southwesterly direction. The surfacing generally consists of grass/landscaping with 2 portable buildings that have been relocated and some existing impervious parking lot pavement.

The existing soils are Puyallup Fine Sandy Loam, according to the National Resource Conservation Service (herein after referred to NRCS) Soil Survey. See Appendix C. These soils are consistent with the silty sand soils found in the Geotechnical Engineer

Report, see Appendix D Geotechnical Report. Groundwater monitoring data shows a seasonally high groundwater table within 3' of the surface.

The project site is located in the following Critical Area Zones per City of Puyallup (see Appendix E):

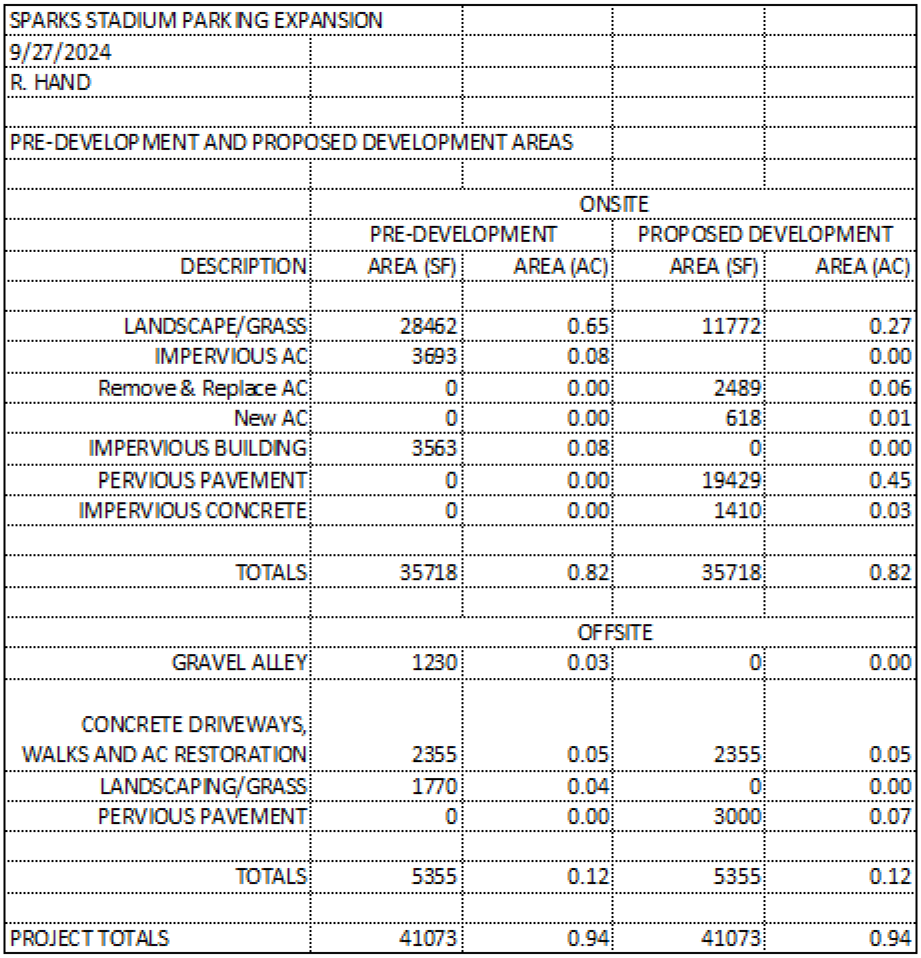
- Aquifer Recharge Area
- Wellhead Protection Area
- Volcanic Hazard Area/Zone
- Seismic Liquefaction Zone.

The site is not located within Flood, Landslide or Wetland critical areas.

1.4 Proposed Conditions

The parking lot addition project proposes removal of existing vegetation, including 8 trees and installation of a 64 stall surface parking facility that will increase the net parking lot capacity by 51 stalls. The project proposes pervious pavement surfacing, storm drainage treatment and flow control via pervious pavement. The project proposes to provide electrical lighting, landscaping improvements and offsite alley and driveway improvements.

The project surfacing details are summarized below:



SPARKS STADIUM PARKING EXPANSION				
9/27/2024				
R. HAND				
PRE-DEVELOPMENT AND PROPOSED DEVELOPMENT AREAS				
	ONSITE			
	PRE-DEVELOPMENT		PROPOSED DEVELOPMENT	
DESCRIPTION	AREA (SF)	AREA (AC)	AREA (SF)	AREA (AC)
LANDSCAPE/GRASS	28462	0.65	11772	0.27
IMPERVIOUS AC	3693	0.08		0.00
Remove & Replace AC	0	0.00	2489	0.06
New AC	0	0.00	618	0.01
IMPERVIOUS BUILDING	3563	0.08	0	0.00
PERVIOUS PAVEMENT	0	0.00	19429	0.45
IMPERVIOUS CONCRETE	0	0.00	1410	0.03
TOTALS	35718	0.82	35718	0.82
	OFFSITE			
GRAVEL ALLEY	1230	0.03	0	0.00
CONCRETE DRIVEWAYS, WALKS AND AC RESTORATION	2355	0.05	2355	0.05
LANDSCAPING/GRASS	1770	0.04	0	0.00
PERVIOUS PAVEMENT	0	0.00	3000	0.07
TOTALS	5355	0.12	5355	0.12
PROJECT TOTALS	41073	0.94	41073	0.94

2 Discussion of Minimum Requirements

According to the City of Puyallup's adopted DOE Stormwater Manual Flow charts (see Appendix F), all Minimum Requirements, minimum requirements 1-9 are applicable. The minimum requirements apply to the new and replaced hard surfaces and converted vegetation areas. Below is a discussion of the minimum requirements.

2.1 Minimum Requirement #1 – Prepare a Stormwater Site Plan

This Report and accompanying drawings are prepared in accordance with the Manual, Volume 1, Chapter 3, Section 3.4.1

2.2 Minimum Requirement #2 – Construction Stormwater Pollution Prevention

A Construction Stormwater Pollution Prevention Plan (CSWPPP) will be prepared in accordance with DOE Stormwater manual requirements. All elements will be discussed and addressed in a separate report document and submitted at the site development submittal time.

2.3 Minimum Requirement #3 – Source Control for Pollution

The project does not introduce any new source control BMPs. Source Control BMPs that apply to this project shall continue to be practiced in conformance with the Manual Volume II, Chapter 3. Construction BMPs are included in the CSWPPP.

2.4 Minimum Requirement #4 – Preservation of Natural Drainage System and Outfalls

The project proposes to dispose of stormwater through the permeable pavement into the underlying soils and aquifer, whereby preserving the natural drainage system and outfall location.

2.5 Minimum Requirement #5 – On-site Stormwater Management

The project proposal is not flow control exempt. According to the City's adopted DOE Stormwater Manual, the project will comply with MR#5 through list 2 requirements: provide soil amendments in accordance with BMP T5.13 for the landscape areas and the other hard surface areas, such as, removed and replaced imperious asphaltic concrete, new asphaltic concrete, new impervious concrete walks and pervious pavements will be handled with permeable pavement structure. (See Appendix G).

2.6 Minimum Requirement #6 – Runoff Treatment

Runoff treatment will be provided in the compost amended soils located at the permeable pavement subgrade. The Western Washington Hydrology Model (WWHM) will determine if the facility passes or not. The project will comply with MR#6 requirements.

2.7 Minimum Requirement #7 – Flow Control

Flow Control will be provided in the permeable pavement structure through the voids in the underlying base rock materials. The Western Washington Hydrology Model (WWHM) will determine if the facility passes or not. The project complies with WWHM modeling requirements.

2.8 Minimum Requirement #8 – Wetland Protection

There are no wetlands located on or near the project site.

2.9 Minimum Requirement #9 – Operations and Maintenance

An Operations & Maintenance (O&M) Manual will be prepared for the project at the site development permit submittal time.

2.10 Optional Guidance #1 – Financial Liability

The School District is not required to bond the project by state laws.

2.11 Optional Guidance #2 – Off-site Analysis and Mitigation

The project proposes to provide similar pervious pavement for adjacent alley way improvements and impervious concrete and asphalt improvements at the two (2) driveways. The impervious concrete driveway and walkway improvements are essentially replacement of existing impervious facilities.

3 Offsite Analysis Report

The project proposes to provide similar pervious pavement for adjacent alley way improvements and provide impervious concrete and asphalt improvements at the two (2) driveways. A offsite analysis will be provided with the full Stormwater Site Plan Report. For the preliminary Stormwater Site Plan Report, it can be seen without calculation that the pervious pavement concept will work and comply with all Minimum Requirements since the onsite areas comply.

The impervious concrete driveway and walkway improvements are essentially replacement of existing impervious facilities.

4 Permanent Stormwater Control Plan

The project proposes permeable pavement for its permanent stormwater controls. Pervious pavement may be accomplished with traditional pervious concrete pavement or with permeable pavers. Permeable pavement is typically underlain by a small aggregate top course over a larger aggregate base course. The aggregate has void spaces within the rock. The void spaces within the rock provides the flow control. Flow control is determined by WWHM modeling. The proposed facility passes (see Appendix H).

Stormwater treatment is provided by compost amended subgrade or the permeable pavement.

With permeable pavers, the block or pavers are not permeable, but the slits or slots between the blocks is filled with small aggregate. This type of permeable pavement provides maintenance advantages.

The site has a seasonally high groundwater table, to within 3' of the ground surface. The site soils are a silty sand or group B soils. The soils have infiltrations opportunities. In order to create the most feasible option stormwater disposal BMP, permeable pavement is the only option available. Permeable pavement provides opportunities to comply with MR#4 -7. Infiltration ponds, trenches or bioretention facilities are not feasible.

5 Special Reports and Studies

A geotechnical Report is provided in Appendix D.

6 Other Permits

The project anticipates the following permits will be required:

City of Puyallup Conditional Use Permit (CUP,) PLCUP20240081
SEPA
City of Puyallup Site Development Permit, TBD
Potentially a DOE Construction Stormwater Permit (CSWGP).

7 Operations and Maintenance Manual

An O&M Manual will be provided under separate cover. We anticipate that the O&M Manual will include the O&M for the pervious pavement.

8 Declarations of Covenant for Privately Maintained Flow Control and Runoff Treatment BMPs

The School District will provide a facility stormwater maintenance covenant at either the project completion or at permit approval.

9 Declaration of Covenant for Privately Maintained LID BMPs

The School District will provide a facility LID covenant at either the project completion or at permit approval.

Appendices

Appendix A Vicinity Map

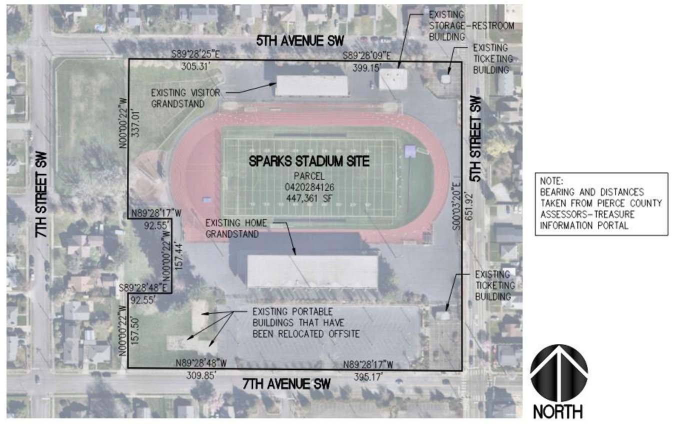
Appendix B Site Plan

VICINITY MAP

SCALE: N.T.S.

SITE MAP

SCALE: 1"=100'



APPROVED

BY ____________
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE ____________

NOTE: THIS APPROVAL IS VOID AFTER 180 DAYS FROM APPROVAL DATE.
THE CITY WILL NOT BE RESPONSIBLE FOR ERRORS AND/OR OMISSIONS ON THESE PLANS.
FIELD CONDITIONS MAY DICTATE CHANGES TO THESE PLANS AS DETERMINED BY THE DEVELOPMENT ENGINEERING MANAGER.

LEGEND

═	CONCRETE CURB
—×—×—	CHAIN-LINK FENCE
▪	SIGNAGE
○	GATE POST
∘	GATE HOLD OPEN POST
✱	PROPOSED LIGHT POLE
← —	PAVEMENT MARKINGS
✳	LANDSCAPE TREE
TP	TREE PROTECTION
▨	ASPHALT
░	CONCRETE SIDEWALK
░	LANDSCAPING
▭	BUS TURN LOOP

EV = ELECTRIC VEHICLE

EVR = ELECTRIC VEHICLE READY

SITE INFORMATION

PARCEL: 0420284126

ADDRESS: 601 7TH AVENUE SW, PUYALLUP, WA 98371

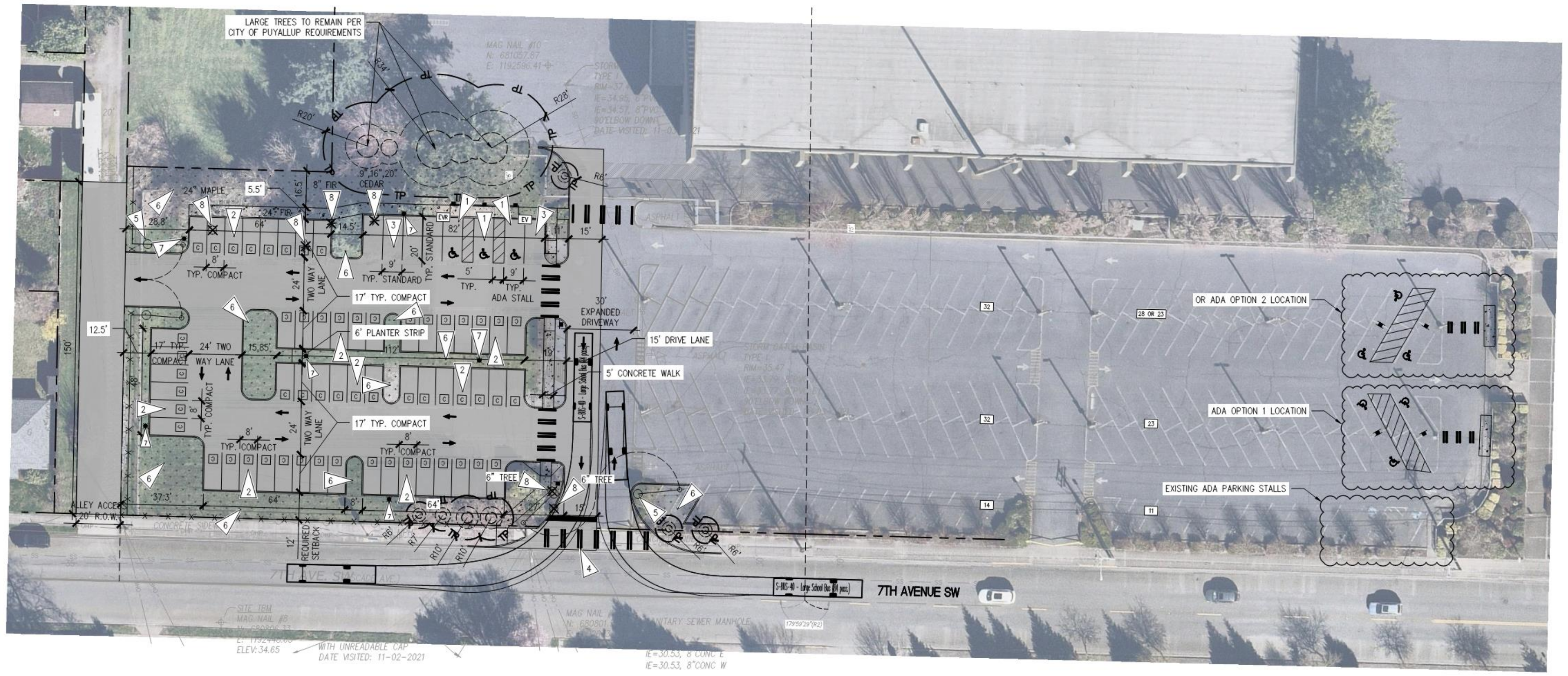
OWNER: PUYALLUP SCHOOL DISTRICT

GENERAL NOTES

1. PARKING LAYOUT FOLLOWS GUIDELINES FROM THE THE PUYALLUP MUNICIPAL CODE 20.55.035 AISLE AND DRIVEWAY DIMENSIONS
   - 1.1 EXISTING PARKING SPACES: 158 TOTAL (154 STANDARD, 4 ADA, 0 COMPACT)
   - 1.2 EXISTING PARKING STALLS REMOVED: 11 TOTAL (9 STANDARD, 2 ADA, 0 COMPACT)
   - 1.3 NEW PARKING SPACES PROVIDED: 64 TOTAL (5 STANDARD, 3 ADA AND 56 COMPACT)
     CODE REQUIRED ADA SPACES: 3
     CODE REQUIRED EV SPACES: 1 + 1 ADA
     CODE REQUIRED EVR SPACES: 1 + 1 ADA
   - 1.4 PROPOSED DEVELOPMENT: EXISTING + NEW
     CODE REQUIRED ADA SPACES FOR EXISTING + NEW: 7
   - 1.5 PROPOSAL: REMOVE 5 EXISTING EAST STANDARD AND PROVIDE 3 ADA.
   - 1.6 209 TOTAL STALLS (145 STANDARD, 8 ADA, 56 COMPACT)
2. ADA PARKING STALLS FOLLOW THE 2010 ADA STANDARDS FOR ACCESSIBLE DESIGN ADOPTED BY THE CITY OF PUYALLUP
3. DRIVEWAY APPROACH PER CITY OF PUYALLUP STANDARD DETAIL 01.02.16
4. VEGETATION AND LANDSCAPING FOLLOW GUIDELINES FROM THE PUYALLUP MUNICIPAL CODE 20.58 LANDSCAPE REQUIREMENTS
5. CRITICAL ROOT ZONE PROTECTION DIMENSIONS FOLLOW GUIDELINES IN THE PUYALLUP MUNICIPAL CODE 20.58 LANDSCAPING REQUIREMENTS
6. SIGHT DISTANCE REQUIREMENTS TBD
7. SCHOOL BUS FOLLOW STANDARD DESIGN IN AASHTO-GEOMETRIC DESIGN OF HIGHWAY AND STREETS
8. PAVEMENT MARKINGS PER CITY OF PUYALLUP STANDARD DETAIL 01.03.11

KEY NOTES

1	ADA STALL
2	COMPACT STALL
3	STANDARD STALL
4	DRIVEWAY APPROACH
5	MANUAL SWING GATES
6	LANDSCAPE – TBD BY LICENSED LANDSCAPE ARCHITECT
7	LIGHT POLE – COORDINATE WITH ELECTRICAL DRAWINGS
8	REMOVE EXISTING TREE



EVENT PARKING LAYOUT DESIGN OPTION 6

SCALE: 1"=30'

NORTH

HORIZONTAL SCALE: 1"=30'

30 0 30 60

CUP DRAWING EXHIBIT

CITY OF PUYALLUP PRE-APPLICATION FEEDBACK + EV PARKING AND ADA PARKING

R. HAND
2024-09-18 REV 1

811 Call 811 two business days before you dig

REVISIONS

APPROVALS
DESIGNED SAJ
DRAWN SAJ
CHECKED RH
DATE 08/02/2024
SCALE AS NOTED

SEAL
RICHARD C. HAND
26780
PRELIMINARY

PREPARED BY
sh sitts&hill
CIVIL | STRUCTURAL | SURVEY
4815 CENTER STREET | TACOMA, WA. 98409
PHONE: (253) 474-9449 | FAX: (253) 474-0153
http://www.sittshill.com/

PREPARED FOR
PUYLLUP SCHOOL DISTRICT
323 12TH ST NW
PUYALLUP, WA 98374

PROJECT
SPARKS STADIUM
EVENT PARKING LOT
PUYALLUP, WASHINGTON 98371

SHEET TITLE
PRELIMINARY
PARKING LAYOUT
OPTION 6

SHEET NO.
EX 6

PROJECT NO.
19474

APPROVED

BY ____________
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE ____________

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THE CITY WILL NOT BE RESPONSIBLE FOR ERRORS AND/OR OMISSIONS ON THESE PLANS.
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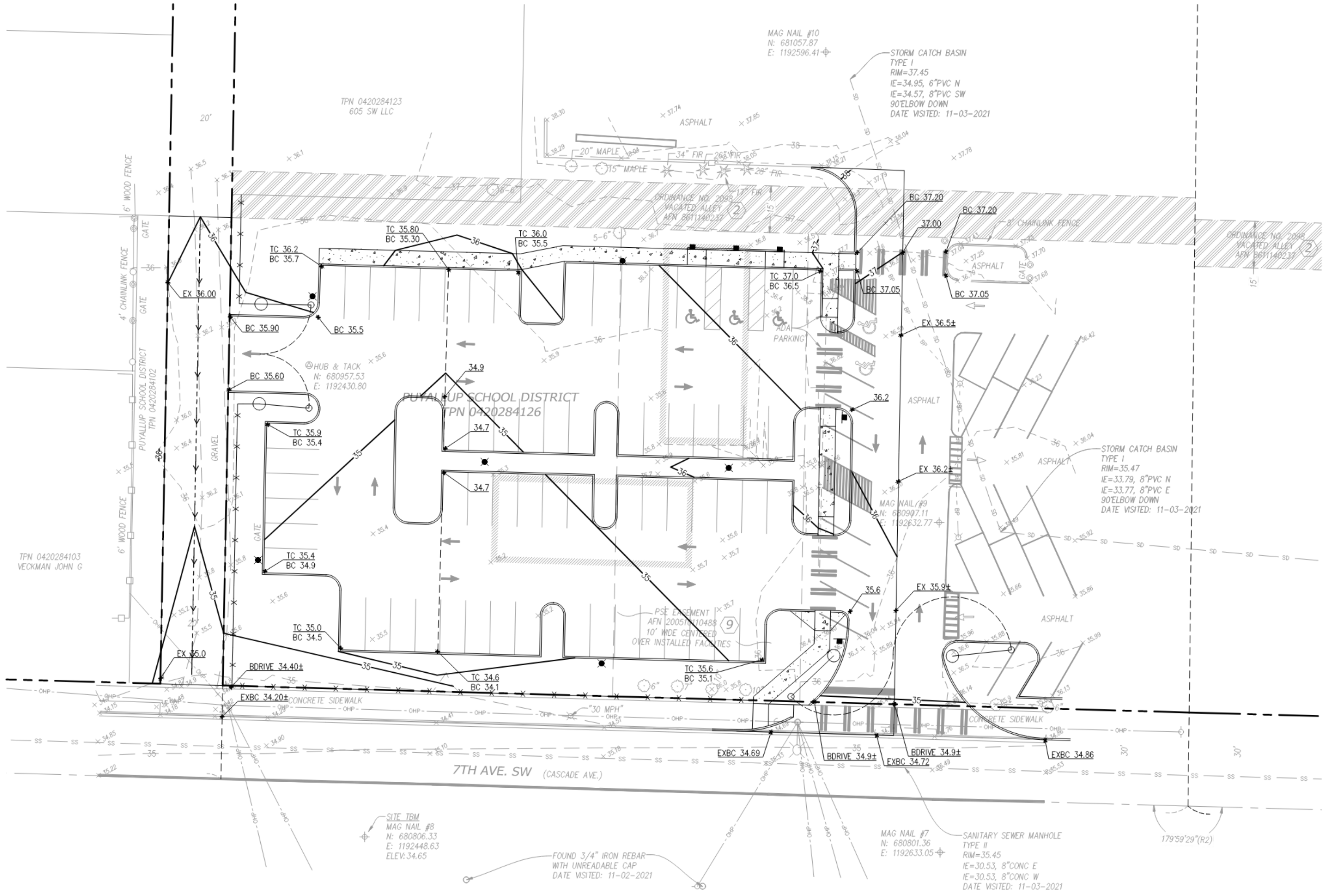
LEGEND

PROPOSED FEATURES

——36——	PROPOSED CONTOUR
– – – – – –	GRADE BREAK
– – – –➤	FLOW LINE

GENERAL NOTES

KEY NOTES



GRADING AND DRAINAGE PLAN
SCALE: 1"=20'

NORTH

HORIZONTAL SCALE: 1"=20'
20 0 20 40

Call 811
two business days
before you dig

REVISIONS

APPROVALS

DESIGNED	RCH
DRAWN	KLK
CHECKED	RCH
DATE	09/13/2024
SCALE	AS NOTED

SEAL
PRELIMINARY
RICHARD C. HANDY
26780

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PUYALLUP, WASHINGTON 98371

SHEET TITLE
GRADING AND DRAINAGE PLAN

SHEET NO.
C3.0

PROJECT NO.
19474

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VICINITY MAP

SCALE: N.T.S.

GENERAL NOTES FOR LIGHTING FIXTURE SCHEDULE

1. PROVIDE BALLASTS TO ACCOMMODATE DUAL LEVEL SWITCHING FOR ALL 3 AND 4 LAMP FIXTURES.
2. SEE DRAWINGS FOR EMERGENCY LIGHTING FIXTURES.
3. FOR LIGHTING CONTROLS WHICH INCLUDE DAYLIGHT, OCCUPANCY SENSORS AND TIME CLOCK CONTROLS, THE ELECTRICAL CONTRACTOR SHALL PROVIDE TESTING OF THE CONTROL DEVICES, COMPONENTS, EQUIPMENT AND SYSTEMS TO MAKE SURE THEY ARE CALIBRATED, ADJUSTED AND OPERATE IN ACCORDANCE WITH DRAWINGS AND SPECIFICATIONS. SEQUENCES OF OPERATION SHALL BE FUNCTIONALLY TESTED IN THE PRESENCE OF THE ENGINEER. A COMPLETE REPORT OF TEST PROCEDURES AND RESULTS SHALL BE PREPARED AND FILED WITH THE OWNER.

LIGHTING FIXTURE SCHEDULE

SYMBOL	FIXTURE DESCRIPTION	MANUFACTURER/MODEL #	LUMENS	V	W	MOUNTING & REMARKS
AL1	SITE AREA LIGHTING LED WITH HOUSE SIDE SHIELD	MCGRAW-EDISON# GALN-SA1C-840-U-SL4-XX-HSS MCGRAW-EDISON# RSS4A20SXX1X	4922	120/ 277	57	STANDARD FINISH BY ARCHITECT. PROVIDE WITH INTEGRAL SENSOR FOR CONTROL. SEE POLE BASE DETAIL FOR REQUIREMENTS.
AL2	SITE AREA LIGHTING LED	MCGRAW-EDISON# GALN-SA1C-840-U-SL4-XX MCGRAW-EDISON# RSS4A20SXX1X	5856	120/277	57	STANDARD FINISH BY ARCHITECT. PROVIDE WITH INTEGRAL SENSOR FOR CONTROL. SEE POLE BASE DETAIL FOR REQUIREMENTS.
AL3	DUAL HEAD SITE AREA LIGHTING LED	MCGRAW-EDISON# GALN-SA1C-840-U-5WQ-XX-MA1037-XX MCGRAW-EDISON# RSS4A20SXX1X	12522	120/277	114	STANDARD FINISH BY ARCHITECT. PROVIDE WITH INTEGRAL SENSOR FOR CONTROL. SEE POLE BASE DETAIL FOR REQUIREMENTS.

APPROVED

BY ______________
CITY OF PUYALLUP
DEVELOPMENT ENGINEERING

DATE ______________

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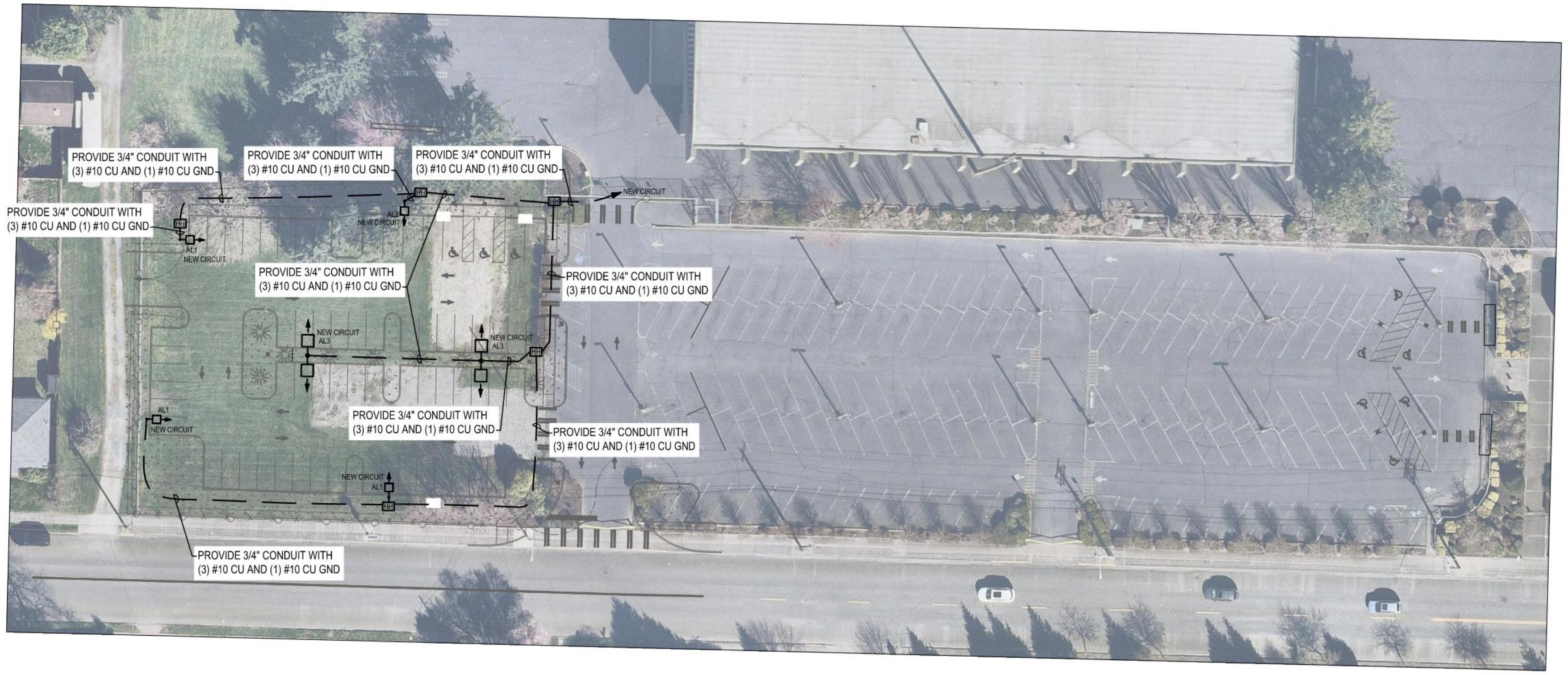

EVENT PARKING LAYOUT DESIGN OPTION 6 - ELECTRICAL

SCALE: 1"=30'

NORTH

HORIZONTAL SCALE: 1"=30'
30 0 30 60

811
Know what's below.
Call before you dig.

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PHONE: (253) 474-9449 | FAX: (253) 474-0153
http://www.sittshill.com/

Project No.:	19474	Project Mgr.:	RCH
Proj. Engineer:	SAJ	Proj. Drafter:	SAJ

REVISIONS

APPROVALS
DESIGNED BM
DRAWN JL
CHECKED BM
DATE 08/01/2024
SCALE AS NOTED

SEAL

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SHEET NO.

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19474

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Appendix C NRCS Soils Survey

United States
Department of
Agriculture

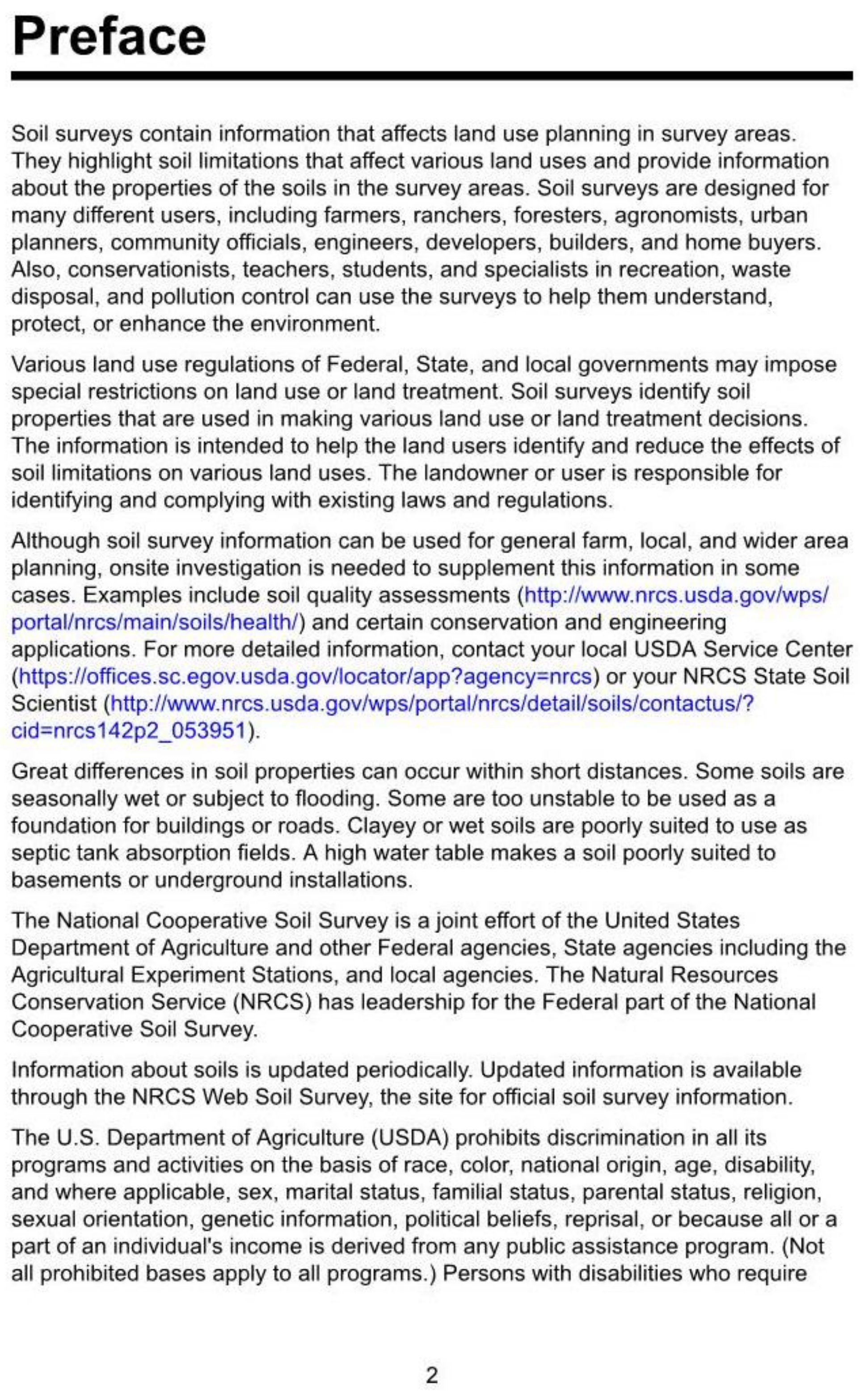
Natural
Resources
Conservation
Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Pierce County Area, Washington

Sparks Stadium Parking Lot Addition

November 19, 2021



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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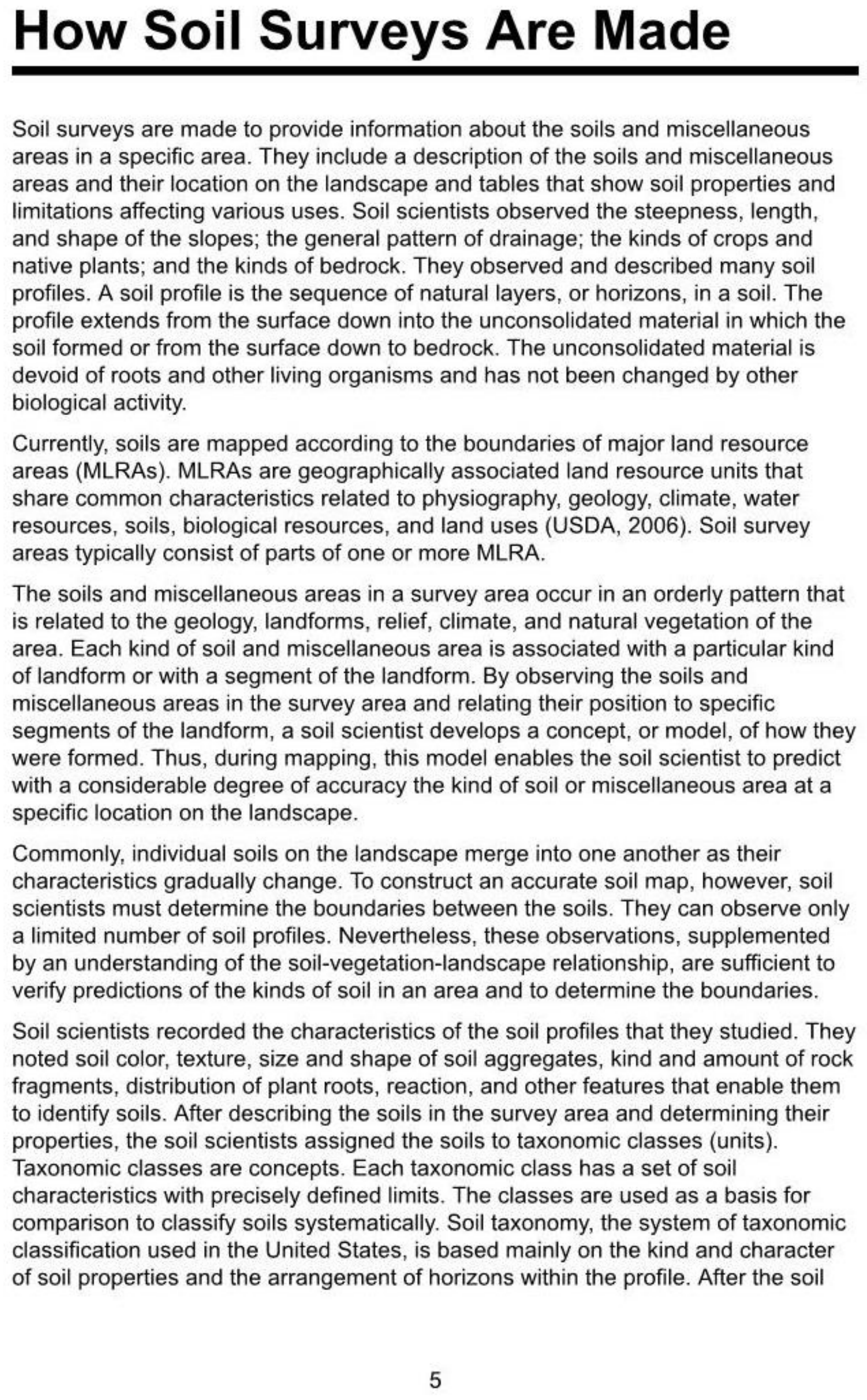


How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

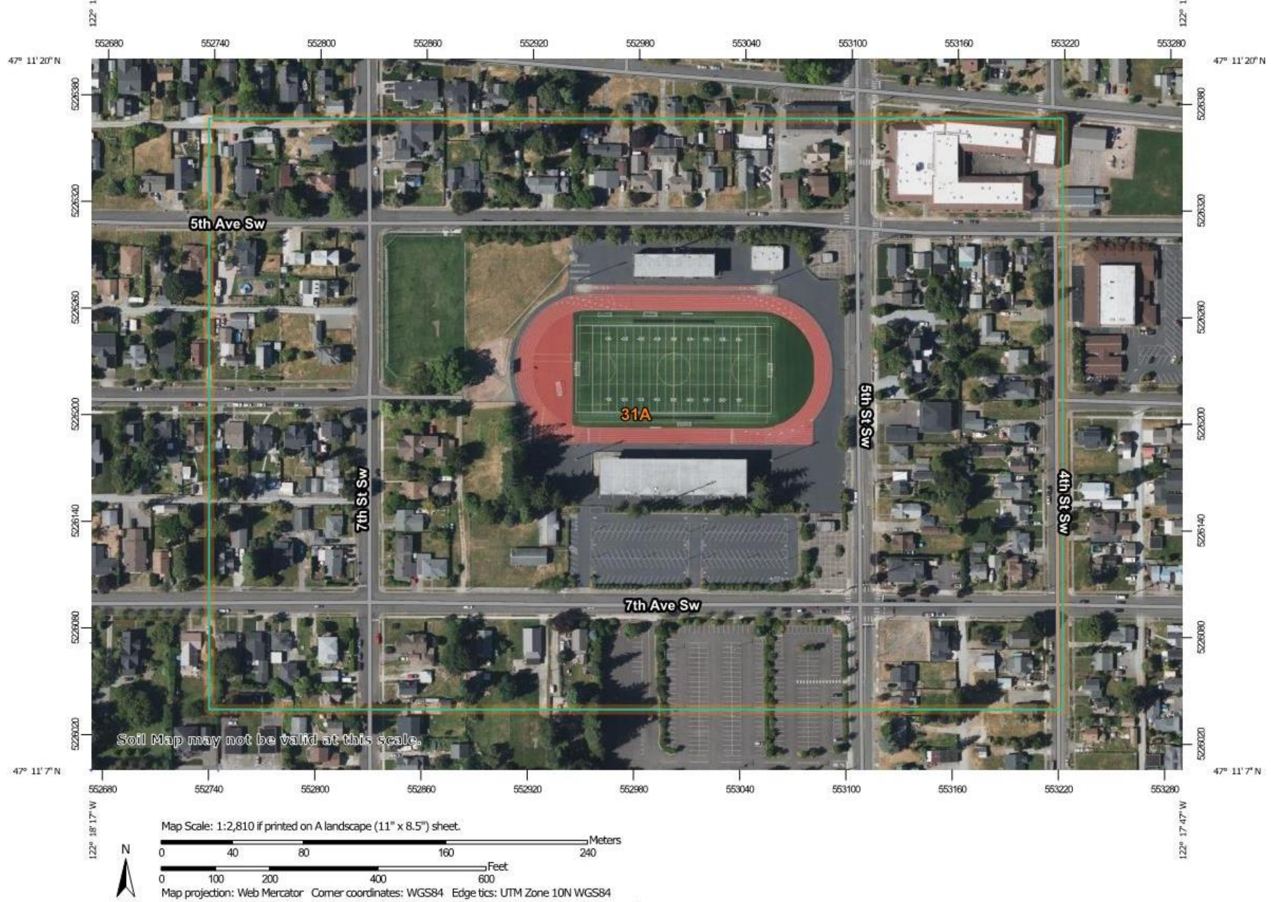
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

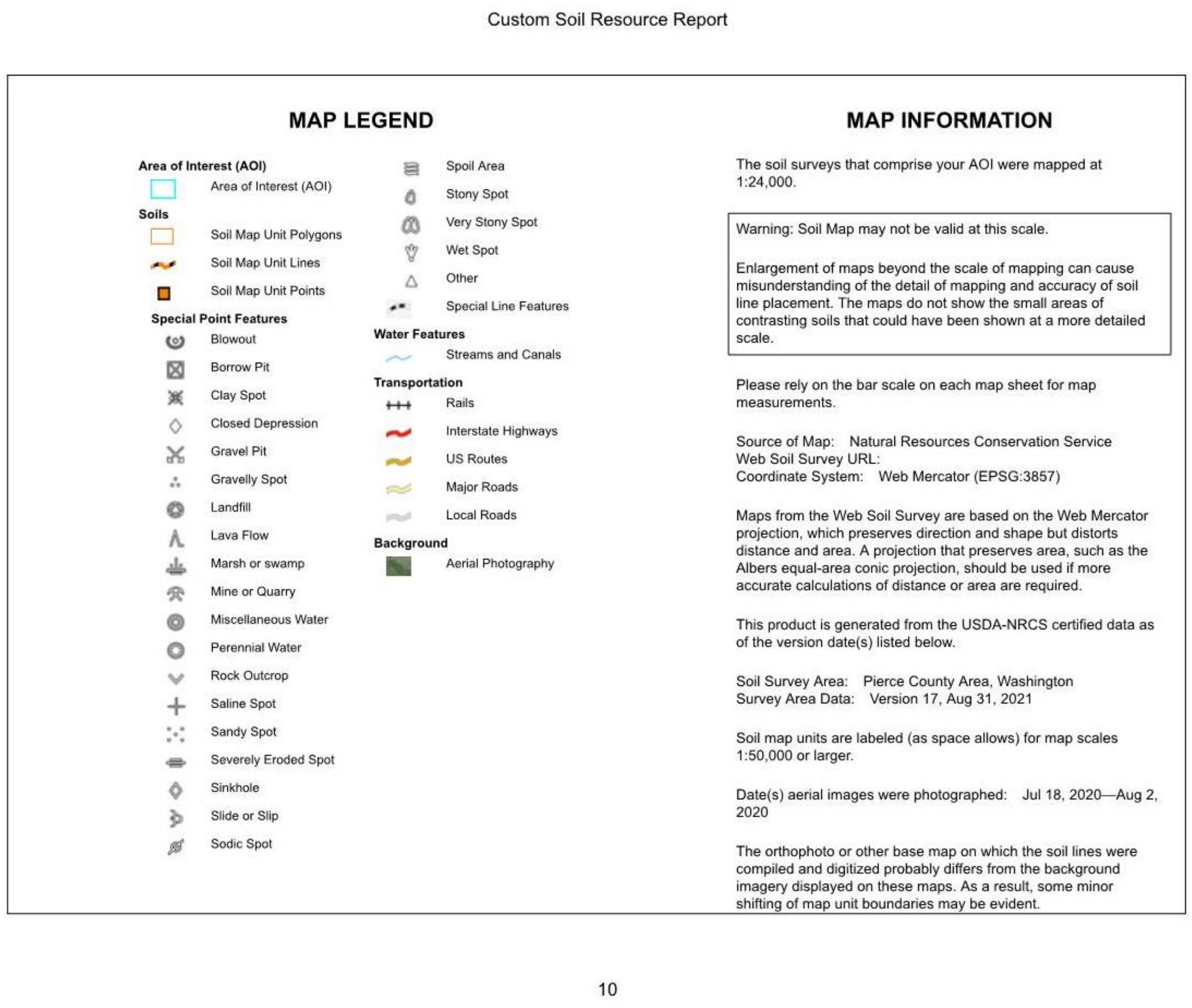
The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:2,810 if printed on A landscape (11" x 8.5") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84



MAP LEGEND

Area of Interest (AOI)
- ▭ Area of Interest (AOI)

Soils
- ▭ Soil Map Unit Polygons
- 〰 Soil Map Unit Lines
- ■ Soil Map Unit Points

Special Point Features
- ◎ Blowout
- ☒ Borrow Pit
- ✱ Clay Spot
- ◇ Closed Depression
- ✕ Gravel Pit
- ∴ Gravelly Spot
- ● Landfill
- ʌ Lava Flow
- ⫫ Marsh or swamp
- ⚒ Mine or Quarry
- ◎ Miscellaneous Water
- ◎ Perennial Water
- ∨ Rock Outcrop
- + Saline Spot
- ⁘ Sandy Spot
- ⊖ Severely Eroded Spot
- ◇ Sinkhole
- ⋗ Slide or Slip
- ø Sodic Spot
- ≡ Spoil Area
- ◊ Stony Spot
- ◊◊ Very Stony Spot
- ♆ Wet Spot
- △ Other
- ▪ Special Line Features

Water Features
- ∼ Streams and Canals

Transportation
- ┼┼┼ Rails
- ∼ Interstate Highways
- ∼ US Routes
- ∼ Major Roads
- ∼ Local Roads

Background
- ▩ Aerial Photography

MAP INFORMATION

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

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

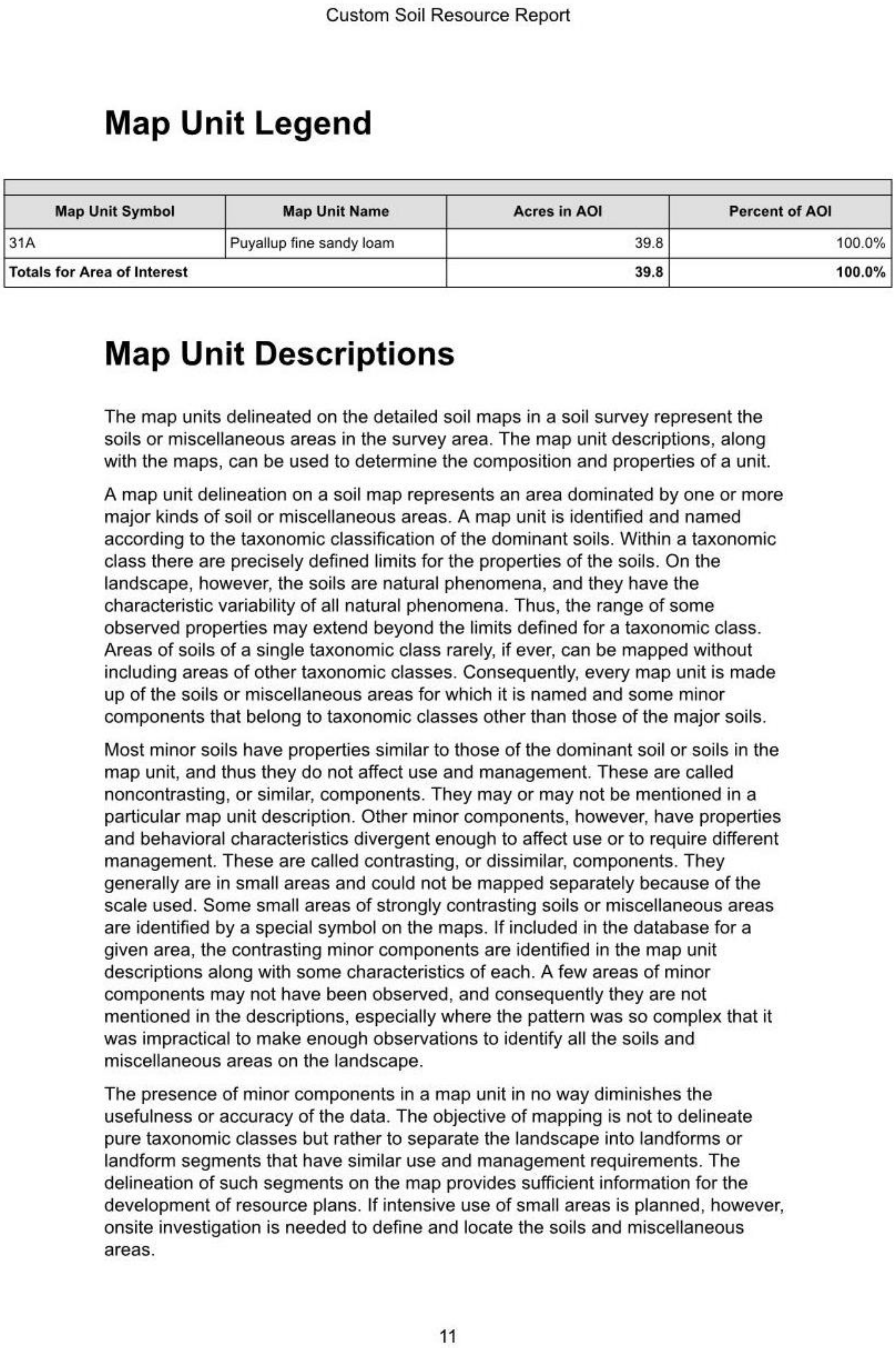
This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Pierce County Area, Washington
Survey Area Data: Version 17, Aug 31, 2021

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

Date(s) aerial images were photographed: Jul 18, 2020—Aug 2, 2020

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



Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
31A	Puyallup fine sandy loam	39.8	100.0%
Totals for Area of Interest		**39.8**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Pierce County Area, Washington

31A—Puyallup fine sandy loam

Map Unit Setting

National map unit symbol: 2hq9
Elevation: 0 to 390 feet
Mean annual precipitation: 35 to 60 inches
Mean annual air temperature: 50 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Puyallup and similar soils: 85 percent
Minor components: 2 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Puyallup

Setting

Landform: Terraces, flood plains
Parent material: Alluvium

Typical profile

H1 - 0 to 13 inches: ashy fine sandy loam
H2 - 13 to 29 inches: loamy fine sand
H3 - 29 to 60 inches: fine sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: About 48 to 79 inches
Frequency of flooding: OccasionalNone
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: A
Ecological site: F002XA008WA - Puget Lowlands Riparian Forest
Forage suitability group: Droughty Soils (G002XN402WA)
Other vegetative classification: Droughty Soils (G002XN402WA)
Hydric soil rating: No

Minor Components

Briscot, undrained

Percent of map unit: 2 percent
Landform: Depressions
Other vegetative classification: Seasonally Wet Soils (G002XN202WA)
Hydric soil rating: Yes

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Appendix D Geotechnical Report

Geotechnical Engineering Report

Sparks Stadium Parking Lot Expansion
615 7th Ave SW
Puyallup, Washington 98371
Parcel No. 5000550290

February 15, 2022

prepared for:

Sitts & Hill Engineers, Inc.
Attention: Richard C. Hand, P.E.
4815 Center Street
Tacoma, WA 98409

prepared by:

Migizi Group, Inc.
PO Box 44840
Tacoma, WA 98448
(253) 537-9400

MGI Project Z0194

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APPENDIX A

MIGIZI GROUP, INC.

PO Box 44840
Tacoma, Washington 98448

PHONE (253) 537-9400
FAX (253) 537-9401

February 15, 2022

Sitts & Hill Engineers, Inc.
4815 Center Street
Tacoma, WA 98409

Attention: Richard C. Hand, P.E.

Subject: **Geotechnical Engineering Report**
Sparks Stadium Parking Lot Expansion
615 7th Ave SW
Puyallup, Washington 98371
Parcel No. 0420284126

MGI Project Z0194

Dear Mr. Hand:

Migizi Group, Inc. (MGI) is pleased to submit this report describing the results of our geotechnical evaluation for the proposed Sparks Stadium parking lot expansion at Puyallup High School. We previously prepared an infiltration letter for the Sparks Stadium Grass Practice Field dated December 14, 2016.

This report has been prepared for the exclusive use of Sitts & Hill Engineers, Inc., and their consultants, for specific application to this project, in accordance with generally accepted geotechnical engineering practice.

1.0 SITE AND PROJECT DESCRIPTION

The main campus of the Puyallup High School is located northeast of the intersection of 7th St SW and W Pioneer Ave in downtown Puyallup, Washington, as shown on the enclosed Topographic and Location Map (Figure 1). Adjacent properties to the north and northwest also service the high school, containing a gymnasium, pool, softball/baseball field, portables, and staff and student parking. Sparks Stadium is located south of the high school main campus and serves as the venue for football, soccer and track and field sporting events.

Improvement plans call for the construction of supplemental parking immediately west of the existing stadium parking lot on the south side of the main structure. The proposed improvement area has been under ownership by the Puyallup School District and is occupied by grass fields and portable structures. The new parking lot will join the existing parking lot at grade and will also include one or more entrance improvements. If feasible, the supplemental parking area will be constructed utilizing pervious pavement materials.

2.0 EXPLORATORY METHODS

We explored surface and subsurface conditions at the project site on January 4-5, 2022. Our exploration and evaluation program comprised the following elements:

- Surface reconnaissance of the site,
- Two test pit explorations (designated TP-1 & TP-2), advanced on January 5, 2022,
- One auger boring exploration (designated MW-1) with a 20-foot groundwater monitoring well installed, advanced on January 4, 2022,
- One Small-Scale Pilot Infiltration Test (PIT) (designated INF-1), conducted on January 5, 2022,
- Four groundwater monitoring site visits conducted between January 18, 2022 and February 7, 2022, and
- A review of published geologic and seismologic maps and literature.

Table 1 (page 3) summarizes the approximate functional locations and termination depths of our subsurface explorations, and Figure 2 depicts their approximate relative locations. The following sections describe the procedures used for excavation of the test pits and auger borings.

TABLE 1
APPROXIMATE LOCATIONS AND DEPTHS OF EXPLORATIONS

Exploration	Functional Location	Termination Depth (feet)
TP-1	West-central portion of the site	10
TP-2	South-central portion of the site	9.5
MW-1	North-central portion of the site	21.5

The specific number and locations of our explorations were selected in relation to the existing site features, under the constraints of surface access, underground utility conflicts, and budget considerations.

It should be realized that the explorations performed and utilized for this evaluation reveal subsurface conditions only at discrete locations across the project site and that actual conditions in other areas could vary. Furthermore, the nature and extent of any such variations would not become evident until additional explorations are performed or until construction activities have begun. If significant variations are observed at that time, we may need to modify our conclusions and recommendations contained in this report to reflect the actual site conditions.

2.1 Test Pit Procedures

Our exploratory test pits were excavated with a rubber-tracked, mini-excavator operated by an excavation contractor under subcontract to MGI. An engineering geologist from our firm observed the test pit excavations, collected soil samples, and logged the subsurface conditions.

The enclosed test pit logs indicate the vertical sequence of soils and materials encountered in our test pits, based on our field classifications. Where a soil contact was observed to be gradational or undulating, our logs indicate the average contact depth. We estimated the relative density and consistency of the in-situ soils by means of the excavation characteristics and the stability of the test pit sidewalls. Our logs also indicate the approximate depths of any sidewall caving or groundwater seepage observed in the test pits. The soils were classified visually in general accordance with the system described in Figure A-1, which includes a key to the exploration log. Summary logs of our explorations are included as Figures A-2 and A-3.

2.2 Auger Boring Procedures

Our exploratory boring was advanced through the soil with a hollow-stem auger, using a truck-mounted drill rig, operated by an independent drilling firm working under subcontract to MGI. An engineering geologist from our firm continuously observed the boring, logged the subsurface conditions, and collected representative soil samples. All samples were stored in watertight containers and later transported to a laboratory for further visual examination and testing. After the borings were completed, the boreholes were backfilled in accordance with state requirements.

Throughout the drilling operation, soil samples were obtained at 2½ to 5-foot depth intervals by means of the Standard Penetration Test (SPT) per American Society for Testing and Materials (ASTM:D-1586), or using a large split-spoon sampler. This testing and sampling procedure consists of driving a standard 2-inch-outside-diameter steel split-spoon sampler 18 inches into the soil with a 140-pound hammer free-falling 30 inches. The number of blows struck during the final 12 inches is recorded on the boring logs. If a total of 50 blows are struck within any 6-inch interval, the driving is stopped, and the blow count is recorded as 50 blows for the actual penetration distance. The resulting blow count values indicate the relative density of granular soils and the relative consistency of cohesive soils.

The enclosed boring log describes the vertical sequence of soils and materials encountered in the boring, based primarily on our field classifications and supported by our subsequent laboratory examination and testing. Where a soil contact was observed to be gradational, our logs indicate the average contact depth. Where a soil type changed between sample intervals, we inferred the contact depth. Our log also graphically indicates the blow count, sample type, sample number, and approximate depth of each soil sample obtained from the borings, as well as any laboratory tests performed on these soil samples. If any groundwater was encountered in a borehole, the approximate groundwater depth is depicted on the boring logs. Groundwater depth estimates are typically based on the moisture content of soil samples, the wetted height on the drilling rods, and the water level measured in the borehole after the auger has been extracted. The soils were classified visually in general accordance with the system described in Figure A-1, which includes a key to our exploration logs. A summary log of our exploration is included as Figure A-4.

2.3 Infiltration Test Procedures

In-situ field infiltration testing was performed for determination of a Design Infiltration Rate in general accordance with the Small-Scale PIT procedures, as described in V-5.4 of the 2019 Washington State Department of Ecology Stormwater Management Manual for Western Washington, as adopted by the City of Puyallup. The first step of this test procedure was to identify a suitable soil stratum for stormwater retention, and once completed, perform an excavation within this soil group with a minimum surface area of 12 square feet (sf). Once the excavation was completed, a vertical measuring rod marked in half-inch increments was installed towards the center of the test area. Water was then introduced into the test area, being conveyed through a 4-inch corrugated pipe to a splash block at the bottom of the excavation. Once 12 inches of water was developed at the bottom of the excavation, the test surface was saturated prior to testing. After the saturation period was completed, a steady state flow rate was developed in order to maintain 12 inches of head at the bottom of the test surface. This steady state rate was maintained for one hour. After completion of the steady state period, water was no longer introduced into the excavation, and infiltration of the existing water was allowed. We recorded the falling head rate for one hour, for comparison with the steady state rate.

3.0 SITE CONDITIONS

The following sections present our observations, measurements, findings, and interpretations regarding surface, soil, groundwater, infiltration and seismic conditions, and liquefaction potential.

3.1 Surface Conditions

As previously indicated, the main campus of the Puyallup High School is located northeast of the intersection of 7th St SW and W Pioneer Ave in downtown Puyallup, Washington. Adjacent properties to the north and northwest also service the high school, containing a gymnasium, pool, softball/baseball field, portables, and staff and student parking. Sparks Stadium is located south of the high school main campus and serves as the venue for football, soccer and track and field sporting events. The proposed supplemental parking area is located immediately west of the existing stadium parking lot on the south side of the main structure. This property has been under ownership by the Puyallup School District and is occupied by grass fields and portable structures. The proposed improvement area is elongated lengthwise from east to west, spanning approximately 200 feet along this orientation, and extends upwards of 150 feet from north to south.

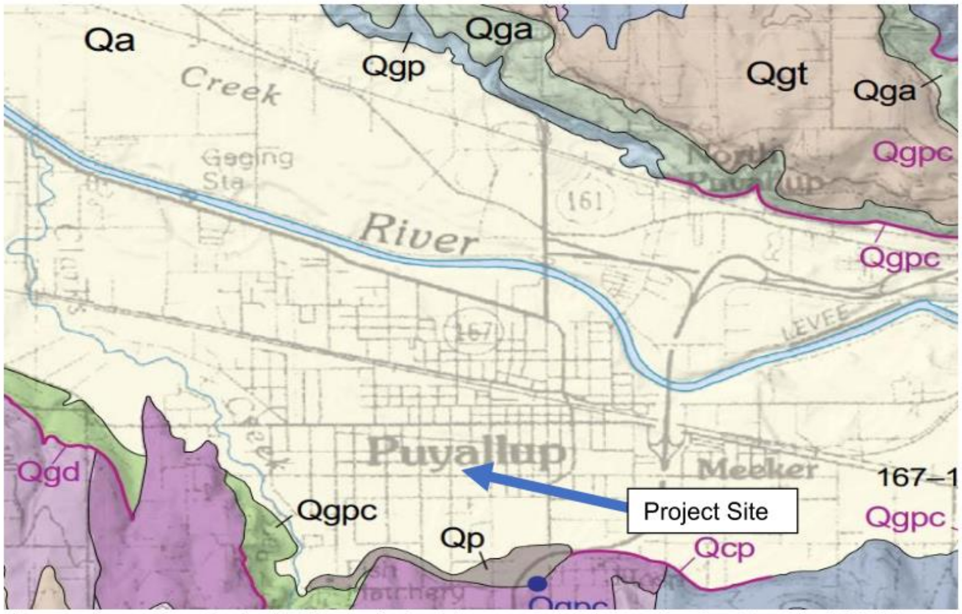
Topographically, the project area is relatively level, with minimal grade change being observed over its extent. Vegetation onsite is largely limited to lawn grasses, though a mature growth of cedar and fir trees line the north margin of the improvement area.

No hydrologic features were observed on site, such as seeps, springs, ponds and streams.

3.2 Soil Conditions

We observed subsurface conditions through the advancement of two test pit explorations and one auger boring exploration adjacent to proposed improvements. Soil conditions were relatively consistent, generally comprised of a surface mantle of sod and topsoil, underlain by fine-grained alluvial soils associated with the flood plains of the Puyallup River. Alluvial soils, as encountered onsite, ranged in composition from a fine sand with silt to mottled sandy silt. In general, the more fine-grained sandy silt horizon was observed in close proximity to existing grade, extending through a depth of approximately 3 feet. Beneath this depth, alluvial soils were primarily comprised of fine silty sand of intermittent lenses of fine sand with silt. Alluvial soils were encountered in a very loose to medium dense in situ condition, with silty sand alluvial soils being observed through the termination of all of our subsurface explorations; a maximum depth of 21 ½ feet.

In the *Geologic Map of the Tacoma 1:100,000-scale Quadrangle, Washington,* as prepared by the Washington State Department of Natural Resources Division of Geology and Earth Resources (WSDNR) (2015), the entire project area is mapped as containing Qa, or Holocene alluvium, which is described as loose, stratified to massively bedded fluvial silt, sand, and gravel; typically, well rounded and moderately to well sorted; locally includes sandy to silty estuarine deposits. The National Cooperative Soil Survey (NCSS) for Pierce County, classifies all soils onsite as 31A – Puyallup fine sandy loam, which reportedly forms from alluvium and produces landforms such as flood plains and terraces. Our field observations generally correspond with the site classification performed by the WSDNR and the NCSS.



Excerpt from the Geologic Map of the Tacoma 1:100,000-scale Quadrangle, Washington (WSDNR)(2015)

The enclosed exploration logs (Appendix A) provide a detailed description of the soil strata encountered in our subsurface explorations.

3.3 Groundwater Conditions

We encountered groundwater at a depth of 5½ to 8½ feet at the time of our subsurface explorations between January 4-5, 2022. Subsequent groundwater monitoring of the well was conducted between January 18th through February 7th of 2022; with four measurements being taken. Seasonally high groundwater rose within 2.75 feet below the rim of the well during our January 18th site visit; with subsequent measurements showing groundwater levels gradually descending. Our groundwater measuring regime will continue along a weekly basis through April of 2022, as dictated in governing stormwater design manuals. Seasonally perched groundwater may also be encountered during an extended period of precipitation due to the poor permeability of site soils and as evidenced by soil mottling.

3.4 Infiltration Conditions

As indicated in the *Soil Conditions* section of this report, the project area is underlain by fine-grained alluvial soils associated with the flood plains of the Puyallup River. This material ranged in composition from fine sand with silt to sandy silt and was typically observed in a very loose to medium dense in situ condition; generally becoming more consolidated with depth. Given the high seasonal water table, as outlined in the previous section, large-scale infiltration facilities, such as trenches, dry wells or ponds, are not feasible for this project. However, we believe that existing hydrogeologic conditions can support pervious pavements, as proposed for this project.

On January 5, 2022, an engineering geologist from MGI performed field infiltration testing using the procedures noted at the onset of this report. The field test (INF-1) was performed towards the southwest corner of the site, between test pit explorations TP-1 and TP-2, as indicated in the attached Figure 2. As described in the *Infiltration Test Procedures* section of this report, there are two complementary portions of the Small PIT procedure used to determine a field infiltration rate: the steady-state period and the falling head period. In our experience, the falling head period is generally more conservative and provides a more accurate evaluation of infiltration conditions. The result of the falling head portion of our Small PIT procedure is recorded in Table 2 (below).

TABLE 2
FALLING HEAD PERIOD TEST RESULTS

Test Pit Exploration	Depth of Test Surface (feet)	Field Infiltration Rate (in/hr)
INF-1	3	1.5

A design infiltration rate is determined by applying an appropriate correction factor to the measured infiltration rate. As described in the SWMMWW, this total correction factor (CF_T) should be equal to:

$$CF_T = CF_v \times CF_t \times CF_m$$

Where CF_v accounts for site variability and number of locations tested, CF_t accounts for uncertainty with the test method, and CF_m accounts for siltation and biofouling. The SWMMWW recommends using a value between 0.33 and 1 for CF_v, a value of 0.5 for CF_t, and a value of 0.9 for CF_m. For this evaluation we used a value of 0.75 for CF_v, giving us a $CF_T = 0.3375$. Applying this value to our measured infiltration rate, we recommend using a design infiltration rate of **0.5 inches per hour** for pervious pavements constructed using the silty sand alluvial deposits that underlie the project area as the primary infiltrative medium.

3.5 Seismic Conditions

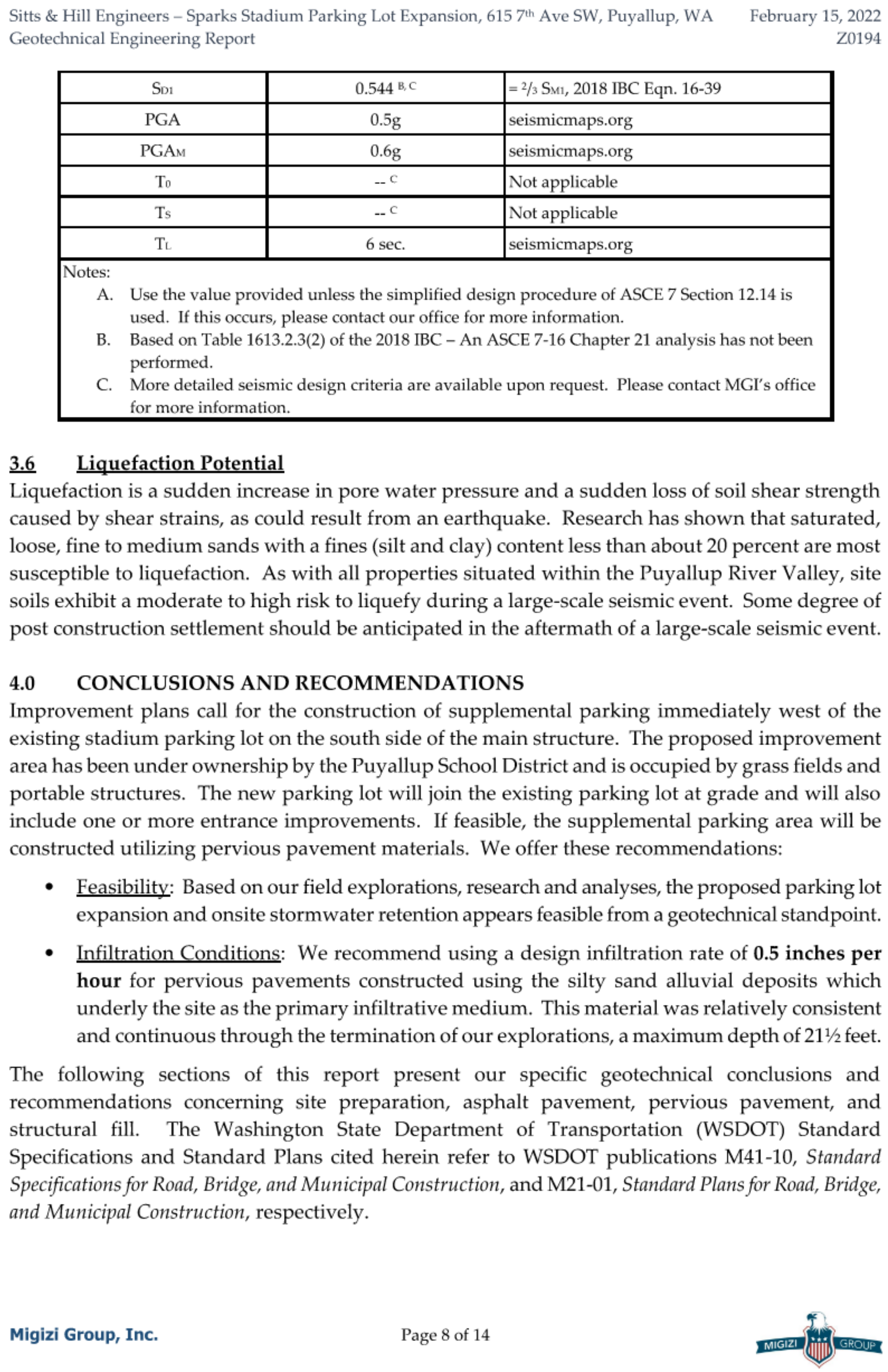
The site is in the Puget Sound basin which has experienced several earthquakes. A detailed description of the regional seismicity is beyond the scope of this report; however, previous regional earthquakes can be split into two general categories: 1.) large earthquakes with a moment magnitude greater than 8.0 ($M_W > 8.0$), and 2.) modest size earthquakes with a moment magnitude generally less than 7.25 ($M_W < 7.25$). In all cases, the thickness of the soil between the bedrock and the ground surface can change (usually amplify) the seismically induced ground motions and therefore the inertial loads acting on surface structures.

"Site Class" is a classification system used by the IBC and ASCE 7 to provide some insight to the potential for ground motion amplification. The site class is based on the properties of the upper 100 feet of the soil and rock materials at the site. MGI used a combination of onsite explorations and our review of the geologic mapping of the site to derive a site class for the site. Based on evaluation and the definitions of Site Class as provided in Table 20.3-1 of ASCE 7-16 (as required by the 2018 International Building Code), the soil conditions on this site satisfy the definition of Site Class D. Our evaluation assumes the soil conditions encountered in the bottom of our explorations, and those from nearby properties, is similar to or increasing in density/consistency down to 100 feet below ground surface.

The 2018 IBC considers earthquake shaking having a 2 percent probability of exceedance in 50 years (i.e. a 2475-year return period), as the code-based design requirement. Using the third-party graphical user interface tools made available by the USGS at https://seismicmaps.org, MGI derived the design ground motions to be used for design of the structures. Our evaluation used ASCE 7-16 as the code reference, Risk Category I/II/III, and Site Class D (Default). The results of our evaluation are provided in Table 2 (page 7):

TABLE 3
SEISMIC DESIGN PARAMETERS

Parameter	Value	Basis
Site Class	D	Table 20.3-1 of ASCE 7-16
S_S	1.274	seismicmaps.org
F_a	1.2[A]	seismicmaps.org
S_{MS}	1.528	$= F_a \cdot S_S$, 2018 IBC Eqn. 16-36
S_{DS}	1.019	$= ^2/_3\ S_{MS}$, 2018 IBC Eqn. 16-38
S_1	0.439	seismicmaps.org
F_V	1.86 [B, C]	2018 IBC
S_{M1}	0.817 [B, C]	$= F_V \cdot S_1$, 2018 IBC Eqn. 16-37
Parameter	**Value**	**Basis**



S_{D1}	0.544 [B, C]	= $^{2}/_{3}$ S_{M1}, 2018 IBC Eqn. 16-39
PGA	0.5g	seismicmaps.org
PGA_M	0.6g	seismicmaps.org
T_0	-- [C]	Not applicable
T_S	-- [C]	Not applicable
T_L	6 sec.	seismicmaps.org

Notes:

A. Use the value provided unless the simplified design procedure of ASCE 7 Section 12.14 is used. If this occurs, please contact our office for more information.
B. Based on Table 1613.2.3(2) of the 2018 IBC – An ASCE 7-16 Chapter 21 analysis has not been performed.
C. More detailed seismic design criteria are available upon request. Please contact MGI's office for more information.

3.6 Liquefaction Potential

Liquefaction is a sudden increase in pore water pressure and a sudden loss of soil shear strength caused by shear strains, as could result from an earthquake. Research has shown that saturated, loose, fine to medium sands with a fines (silt and clay) content less than about 20 percent are most susceptible to liquefaction. As with all properties situated within the Puyallup River Valley, site soils exhibit a moderate to high risk to liquefy during a large-scale seismic event. Some degree of post construction settlement should be anticipated in the aftermath of a large-scale seismic event.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Improvement plans call for the construction of supplemental parking immediately west of the existing stadium parking lot on the south side of the main structure. The proposed improvement area has been under ownership by the Puyallup School District and is occupied by grass fields and portable structures. The new parking lot will join the existing parking lot at grade and will also include one or more entrance improvements. If feasible, the supplemental parking area will be constructed utilizing pervious pavement materials. We offer these recommendations:

- Feasibility: Based on our field explorations, research and analyses, the proposed parking lot expansion and onsite stormwater retention appears feasible from a geotechnical standpoint.
- Infiltration Conditions: We recommend using a design infiltration rate of **0.5 inches per hour** for pervious pavements constructed using the silty sand alluvial deposits which underly the site as the primary infiltrative medium. This material was relatively consistent and continuous through the termination of our explorations, a maximum depth of 21½ feet.

The following sections of this report present our specific geotechnical conclusions and recommendations concerning site preparation, asphalt pavement, pervious pavement, and structural fill. The Washington State Department of Transportation (WSDOT) Standard Specifications and Standard Plans cited herein refer to WSDOT publications M41-10, *Standard Specifications for Road, Bridge, and Municipal Construction*, and M21-01, *Standard Plans for Road, Bridge, and Municipal Construction*, respectively.

4.1 Site Preparation

Preparation of the project site should involve erosion control, temporary drainage, clearing, stripping, excavations, cutting, subgrade compaction, and filling.

Erosion Control: Before new construction begins, an appropriate erosion control system should be installed. This system should collect and filter all surface water runoff through silt fencing. We anticipate a system of berms and drainage ditches around construction areas will provide an adequate collection system. Silt fencing fabric should meet the requirements of WSDOT Standard Specification 9-33.2 Table 6. In addition, silt fencing should embed a minimum of 6 inches below existing grade. An erosion control system requires occasional observation and maintenance. Specifically, holes in the filter and areas where the filter has shifted above ground surface should be replaced or repaired as soon as they are identified.

Temporary Drainage: We recommend intercepting and diverting any potential sources of surface or near-surface water within the construction zones before stripping begins. Because the selection of an appropriate drainage system will depend on the water quantity, season, weather conditions, construction sequence, and contractor's methods, final decisions regarding drainage systems are best made in the field at the time of construction. Based on our current understanding of the construction plans, surface and subsurface conditions, we anticipate that curbs, berms, or ditches placed around the work areas will adequately intercept surface water runoff.

Clearing and Stripping: After surface and near-surface water sources have been controlled, sod, topsoil, and root-rich soil should be stripped from the site. Our subsurface explorations indicate that the organic horizon can reach thicknesses of up to 4 to 5 inches. Stripping is best performed during a period of dry weather.

Site Excavations: Based on our explorations, we expect that the vast majority of project excavations will encounter loose to medium dense alluvial sand and silt, which can be readily excavated utilizing standard excavation equipment.

Dewatering: Our explorations and groundwater monitoring regime indicates that seasonally high groundwater levels can rise within 3 feet of existing grade. If groundwater is encountered in shallow excavations above the water table, we anticipate that an internal system of ditches, sump holes, and pumps will be adequate to temporarily dewater excavations. For deeper excavations below the water table, expensive dewater equipment, such as well points, will be necessary in order to temporary dewater excavations.

Temporary Cut Slopes: At this time, final designs and construction sequencing have not been completed. To facilitate project planning we provide the following general comments regarding temporary slopes:

- All temporary soil slopes associated with site cutting or excavations should be adequately inclined to prevent sloughing and collapse,

- Temporary cut slopes in site soils should be no steeper than 1½H:1V, and
- Temporary slopes should conform to Washington Industrial Safety and Health Act (WISHA) regulations.

These general guidelines are necessarily somewhat conservative (steeper temporary slopes may be possible). As the project progresses, temporary grading plans are developed, final site features are better defined, and a contractor is engaged, MGI may modify these general guidelines to allow steeper slopes.

Subgrade Compaction: Exposed subgrades for the foundation of the proposed residences should be compacted to a firm, unyielding state before new concrete or fill soils are placed. Any localized zones of looser granular soils observed within a subgrade should be compacted to a density commensurate with the surrounding soils. In contrast, any organic, soft, or pumping soils observed within a subgrade should be overexcavated and replaced with a suitable structural fill material.

Site Filling: Our conclusions regarding the reuse of onsite soils and our comments regarding wet-weather filling are presented subsequently. Regardless of soil type, all fill should be placed and compacted according to our recommendations presented in the *Structural Fill* section of this report. Specifically, building pad fill soil should be compacted to a uniform density of at least 95 percent (based on ASTM:D-1557).

Onsite Soils: We offer the following evaluation of these onsite soils in relation to potential use as structural fill:

- *Surficial Organic Soil*: Where encountered, surficial organic soils like duff, topsoil, root-rich soil, and organic-rich fill soils are *not* suitable for use as structural fill under any circumstances, due to high organic content. Consequently, this material can be used only for non-structural purposes, such as in landscaping areas.
- *Alluvial Soils:* This soil unit appears directly below the organic-rich topsoil encountered across the project area. Due to fines contents occasionally exceeding 50 percent, these soils are extremely moisture sensitive and will be difficult, if not impossible, to reuse during wet weather conditions. Reuse is not recommended, and this material should only be used for non-structural purposes, such as in landscaping areas.

Permanent Slopes: All permanent cut slopes and fill slopes should be adequately inclined to reduce long-term raveling, sloughing, and erosion. We generally recommend that no permanent slopes be steeper than 2H:1V. For all soil types, the use of flatter slopes (such as 2½H:1V) would further reduce long-term erosion and facilitate revegetation.

Slope Protection: We recommend that a permanent berm, swale, or curb be constructed along the top edge of all permanent slopes to intercept surface flow. Also, a hardy vegetative groundcover should be established as soon as feasible, to further protect the slopes from runoff water erosion. Alternatively, permanent slopes could be armored with quarry spalls or a geosynthetic erosion mat.

4.2 Asphalt Pavement

Since asphalt pavements could potentially be used in the new parking areas and entryways, we offer the following comments and recommendations for pavement design and construction.

Subgrade Preparation: All soil subgrades should be thoroughly compacted, then proof-rolled with a loaded dump truck or heavy compactor. Any localized zones of yielding subgrade disclosed during this proof-rolling operation should be over excavated to a maximum depth of 12 inches and replaced with a suitable structural fill material. All structural fill should be compacted according to our recommendations given in the *Structural Fill* section. Specifically, the upper 2 feet of soils underlying pavement section should be compacted to at least 95 percent (based on ASTM D-1557), and all soils below 2 feet should be compacted to at least 90 percent.

Pavement Materials: For the base course, we recommend using imported washed crushed rock, such as "Crushed Surfacing Base Course" per WSDOT Standard Specification 9-03.9(3) but with a fines content of less than 5 percent passing the No. 200 Sieve. Although our explorations do not indicate a need for a pavement subbase, if a subbase course is needed, we recommend using imported, clean, well-graded sand and gravel such as "Ballast" or "Gravel Borrow" per WSDOT Standard Specifications 9-03.9(1) and 9-03.14, respectively.

Conventional Asphalt Sections: A conventional pavement section typically comprises an asphalt concrete pavement over a crushed rock base course. We recommend using the following conventional pavement sections:

	Minimum Thickness		
Pavement Course	**Automobile Parking Areas**	**Areas Subject to Truck Loads**	**High Traffic Driveways**
Asphalt Concrete Pavement	2 inches	3 inches	4 inches
Crushed Rock Base	4 inches	6 inches	8 inches
Granular Fill Subbase (if needed)	6 inches	9 inches	12 inches

Compaction and Observation: All subbase and base course material should be compacted to at least 95 percent of the Modified Proctor maximum dry density (ASTM D-1557), and all asphalt concrete should be compacted to at least 92 percent of the Rice value (ASTM D-2041). We recommend that an MGI representative be retained to observe the compaction of each course before any overlying layer is placed. For the subbase and pavement course, compaction is best observed by means of frequent density testing. For the base course, methodology observations and hand-probing are more appropriate than density testing.

Pavement Life and Maintenance: No asphalt pavement is maintenance-free. The above-described pavement sections present our minimum recommendations for an average level of performance during a 20-year design life; therefore, an average level of maintenance will likely be required.

Furthermore, a 20-year pavement life typically assumes that an overlay will be placed after about 10 years. Thicker asphalt and/or thicker base and subbase courses would offer better long-term performance but would cost more initially; thinner courses would be more susceptible to "alligator" cracking and other failure modes. As such, pavement design can be considered a compromise between a high initial cost and low maintenance costs versus a low initial cost and higher maintenance costs.

4.3 Pervious Pavement

We understand that pervious pavements will likely be used be used in the new parking areas and entryways. We offer the following comments and recommendations for pavement construction.

Subgrade Preparation: The existing subgrade under all pervious pavements must remain in an uncompacted condition to facilitate water infiltration. Traffic from construction equipment and vehicles should be limited to the extent practical prior to placement of the pavement section.

Any concentrated areas of fines accumulation due to ponding may be removed to a maximum depth of 6 inches. If desired, these areas may be re-leveled using clean sand. Materials meeting the requirements for "Sand Drainage Blanket" in Section 9-03.13(1) of the WSDOT Standard Specifications may be used for this purpose.

We recommend placement of a nonwoven filter fabric such as Mirafi 160N or equal over the prepared subgrade prior to construction of the pervious pavement section.

Construction Observation: We recommend that an MGI representative be retained to observe and document the placement of each course before any overlying layer is placed.

4.4 Structural Fill

The term "structural fill" refers to any material placed under foundations, retaining walls, slab-on-grade floors, sidewalks, pavements, and other structures. Our comments, conclusions, and recommendations concerning structural fill are presented in the following paragraphs.

Materials: Typical structural fill materials include clean sand, gravel, pea gravel, washed rock, crushed rock, well-graded mixtures of sand and gravel (commonly called "gravel borrow" or "pit-run"), and miscellaneous mixtures of silt, sand, and gravel. Recycled asphalt, concrete, and glass, which are derived from pulverizing the parent materials, are also potentially useful as structural fill in certain applications. Soils used for structural fill should not contain any organic matter or debris, nor any individual particles greater than about 6 inches in diameter.

Fill Placement: Clean sand, gravel, crushed rock, soil mixtures, and recycled materials should be placed in horizontal lifts not exceeding 8 inches in loose thickness, and each lift should be thoroughly compacted with a mechanical compactor.

Compaction Criteria: Using the Modified Proctor test (ASTM:D-1557) as a standard, we recommend that structural fill used for various onsite applications be compacted to the following minimum densities:

Fill Application	**Minimum Compaction**
Asphalt pavement base	95 percent
Asphalt pavement subgrade (upper 2 feet)	95 percent
Asphalt pavement subgrade (below 2 feet)	90 percent

Subgrade Observation and Compaction Testing: Regardless of material or location, all structural fill should be placed over firm, unyielding subgrades prepared in accordance with the *Site Preparation* section of this report. The condition of all subgrades should be observed by geotechnical personnel before filling or construction begins. Also, fill soil compaction should be verified by means of in-place density tests performed during fill placement so that adequacy of soil compaction efforts may be evaluated as earthwork progresses.

Soil Moisture Considerations: The suitability of soils used for structural fill depends primarily on their grain-size distribution and moisture content when they are placed. As the "fines" content (that soil fraction passing the U.S. No. 200 Sieve) increases, soils become more sensitive to small changes in moisture content. Soils containing more than about 5 percent fines (by weight) cannot be consistently compacted to a firm, unyielding condition when the moisture content is more than 2 percentage points above or below optimum. For fill placement during wet-weather site work, we recommend using "clean" fill, which refers to soils that have a fines content of 5 percent or less (by weight) based on the soil fraction passing the U.S. No. 4 Sieve.

5.0 RECOMMENDED ADDITIONAL SERVICES

Because the future performance and integrity of the structural elements will depend largely on proper site preparation, drainage, fill placement, and construction procedures, monitoring and testing by experienced geotechnical personnel should be considered an integral part of the construction process. Subsequently, we recommend that MGI be retained to provide the following post-report services:

- Review all construction plans and specifications to verify that our design criteria presented in this report have been properly integrated into the design,
- Prepare a letter summarizing all review comments (if required),
- Check all completed subgrades for footings and slab-on-grade floors before concrete is poured, in order to verify their bearing capacity, and
- Prepare a post-construction letter summarizing all field observations, inspections, and test results (if required).

6.0 CLOSURE

The conclusions and recommendations presented in this report are based, in part, on the explorations that we observed for this study; therefore, if variations in the subgrade conditions are observed at a later time, we may need to modify this report to reflect those changes. Also, because the future performance and integrity of the project elements depend largely on proper initial site preparation, drainage, and construction procedures, monitoring and testing by experienced geotechnical personnel should be considered an integral part of the construction process. MGI is available to provide geotechnical monitoring of soils throughout construction.

We appreciate the opportunity to be of service on this project. If you have any questions regarding this report or any aspects of the project, please feel free to contact our office.

Respectfully submitted,

MIGIZI GROUP, INC.

21013986
Zachary L. Logan

Zach L. Logan, L.G.
Project Geologist

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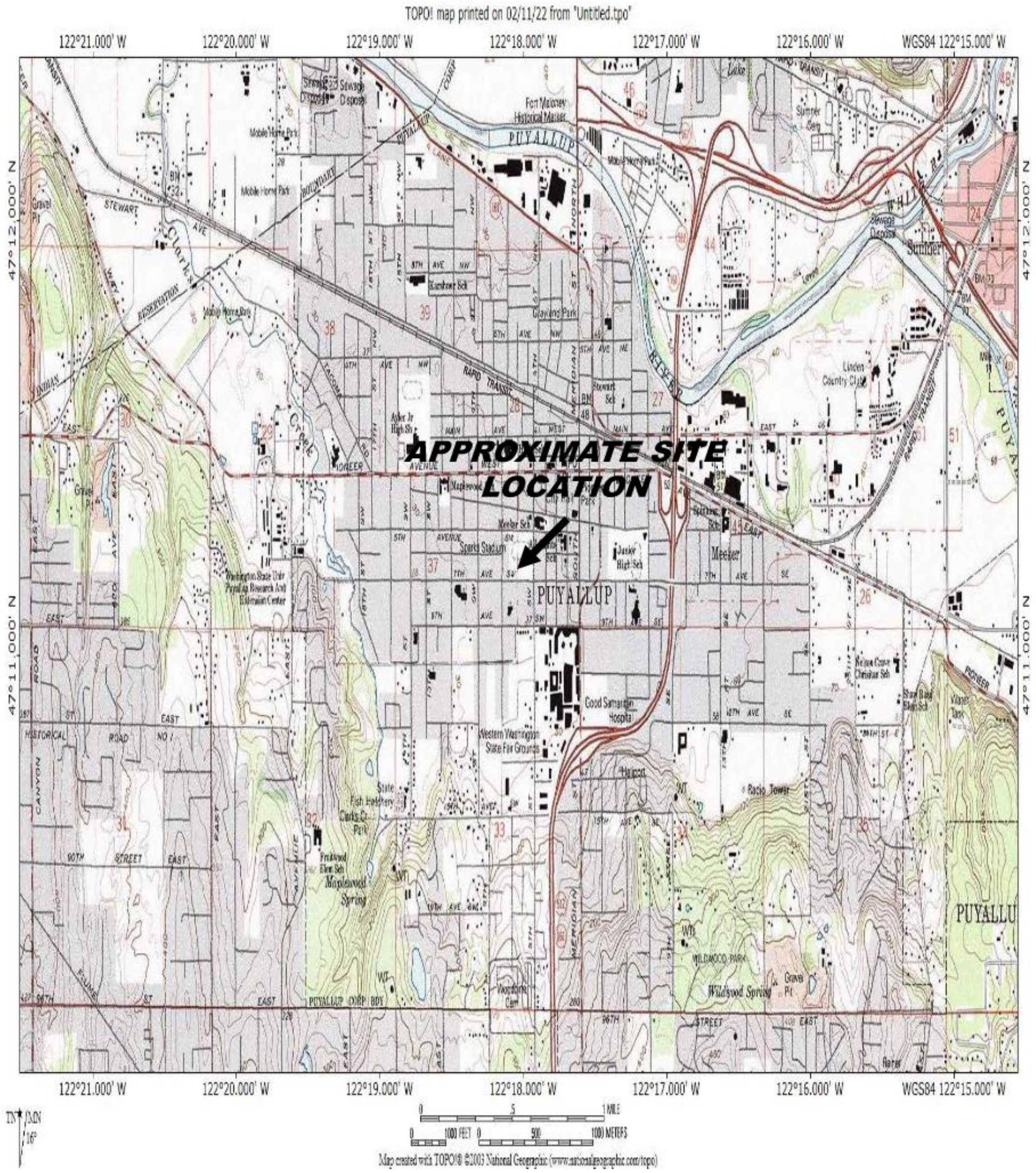
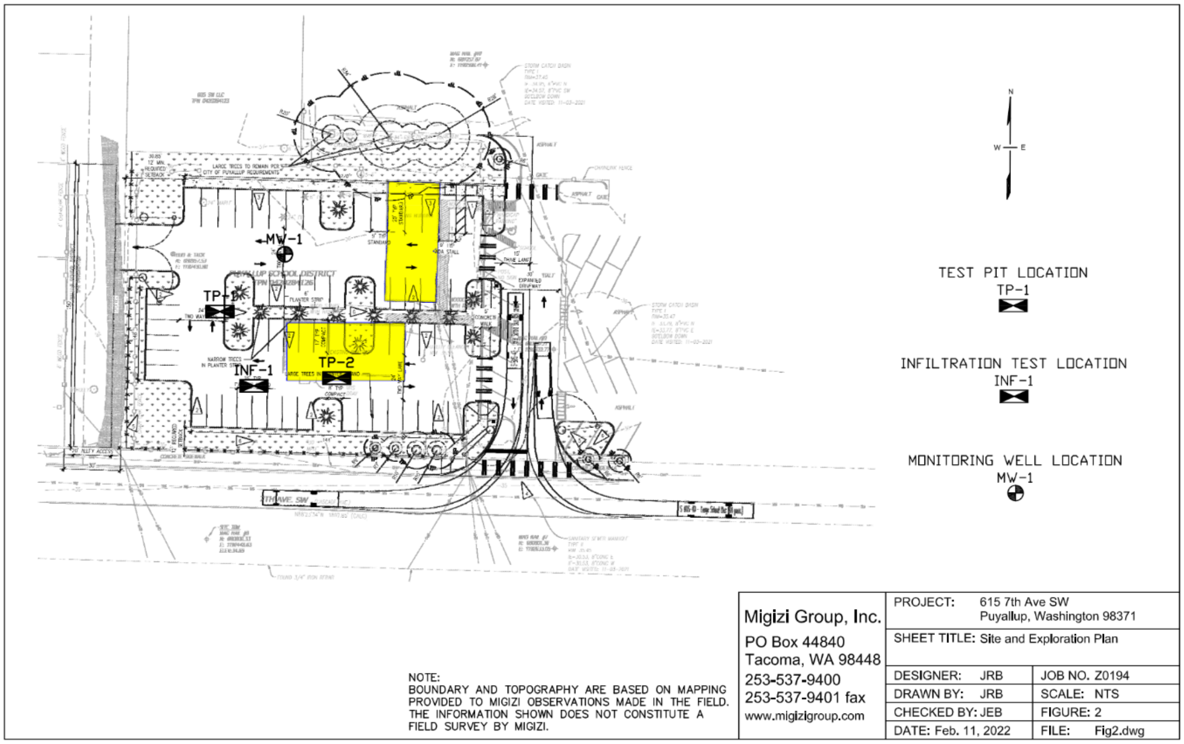
20640

02/15/22

James E. Brigham, P.E.
Senior Principal Engineer



MIGIZI GROUP	Location 615 7th Ave SW Puyallup, WA 98371	Job Number Z0194	Figure 1
P.O. Box 44840 Tacoma, WA 98448	Title Topographic and Location Map		Date 02/11/22



NOTE:
BOUNDARY AND TOPOGRAPHY ARE BASED ON MAPPING PROVIDED TO MIGIZI OBSERVATIONS MADE IN THE FIELD. THE INFORMATION SHOWN DOES NOT CONSTITUTE A FIELD SURVEY BY MIGIZI.

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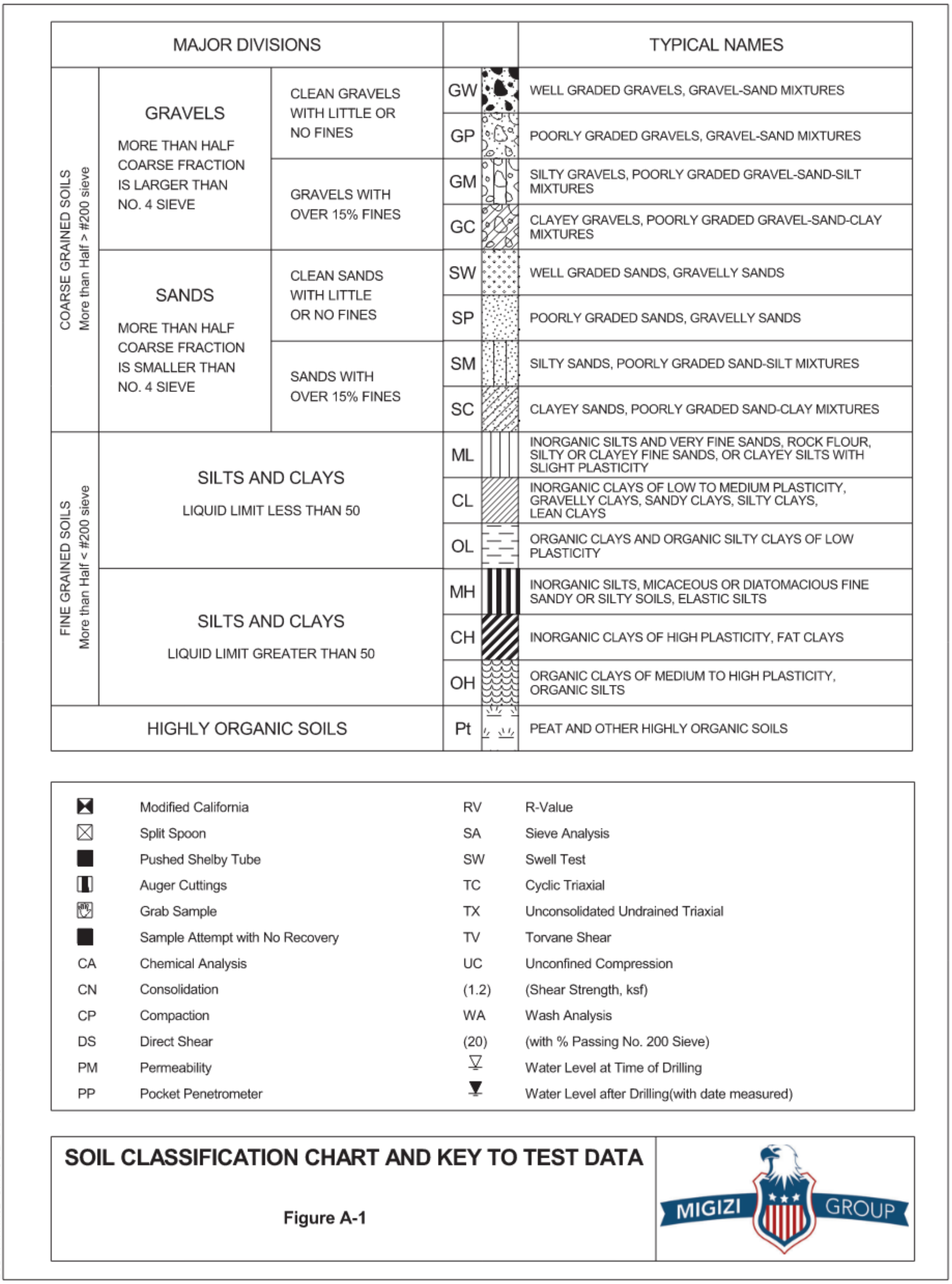
PROJECT: 615 7th Ave SW Puyallup, Washington 98371	
SHEET TITLE: Site and Exploration Plan	
DESIGNER: JRB	JOB NO. Z0194
DRAWN BY: JRB	SCALE: NTS
CHECKED BY: JEB	FIGURE: 2
DATE: Feb. 11, 2022	FILE: Fig2.dwg

APPENDIX A
SOIL CLASSIFICATION CHART AND KEY TO TEST DATA

LOG OF TEST PITS AND AUGER BORINGS



MAJOR DIVISIONS				TYPICAL NAMES
COARSE GRAINED SOILS More than Half > #200 sieve	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES
			GP	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES
		GRAVELS WITH OVER 15% FINES	GM	SILTY GRAVELS, POORLY GRADED GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, POORLY GRADED GRAVEL-SAND-CLAY MIXTURES
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL GRADED SANDS, GRAVELLY SANDS
			SP	POORLY GRADED SANDS, GRAVELLY SANDS
		SANDS WITH OVER 15% FINES	SM	SILTY SANDS, POORLY GRADED SAND-SILT MIXTURES
			SC	CLAYEY SANDS, POORLY GRADED SAND-CLAY MIXTURES
FINE GRAINED SOILS More than Half < #200 sieve	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS, OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC CLAYS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACIOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS

⧗	Modified California	RV	R-Value
⊠	Split Spoon	SA	Sieve Analysis
■	Pushed Shelby Tube	SW	Swell Test
◧	Auger Cuttings	TC	Cyclic Triaxial
✋	Grab Sample	TX	Unconsolidated Undrained Triaxial
■	Sample Attempt with No Recovery	TV	Torvane Shear
CA	Chemical Analysis	UC	Unconfined Compression
CN	Consolidation	(1.2)	(Shear Strength, ksf)
CP	Compaction	WA	Wash Analysis
DS	Direct Shear	(20)	(with % Passing No. 200 Sieve)
PM	Permeability	∇	Water Level at Time of Drilling
PP	Pocket Penetrometer	▼	Water Level after Drilling(with date measured)

SOIL CLASSIFICATION CHART AND KEY TO TEST DATA

Figure A-1

MIGIZI GROUP

LGD A NNNN02 GINT US LAB.GPJ 11/4/05

Migizi Group, Inc.
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Tacoma, WA 98448
Telephone: 253-537-9400

BORING NUMBER MW-1

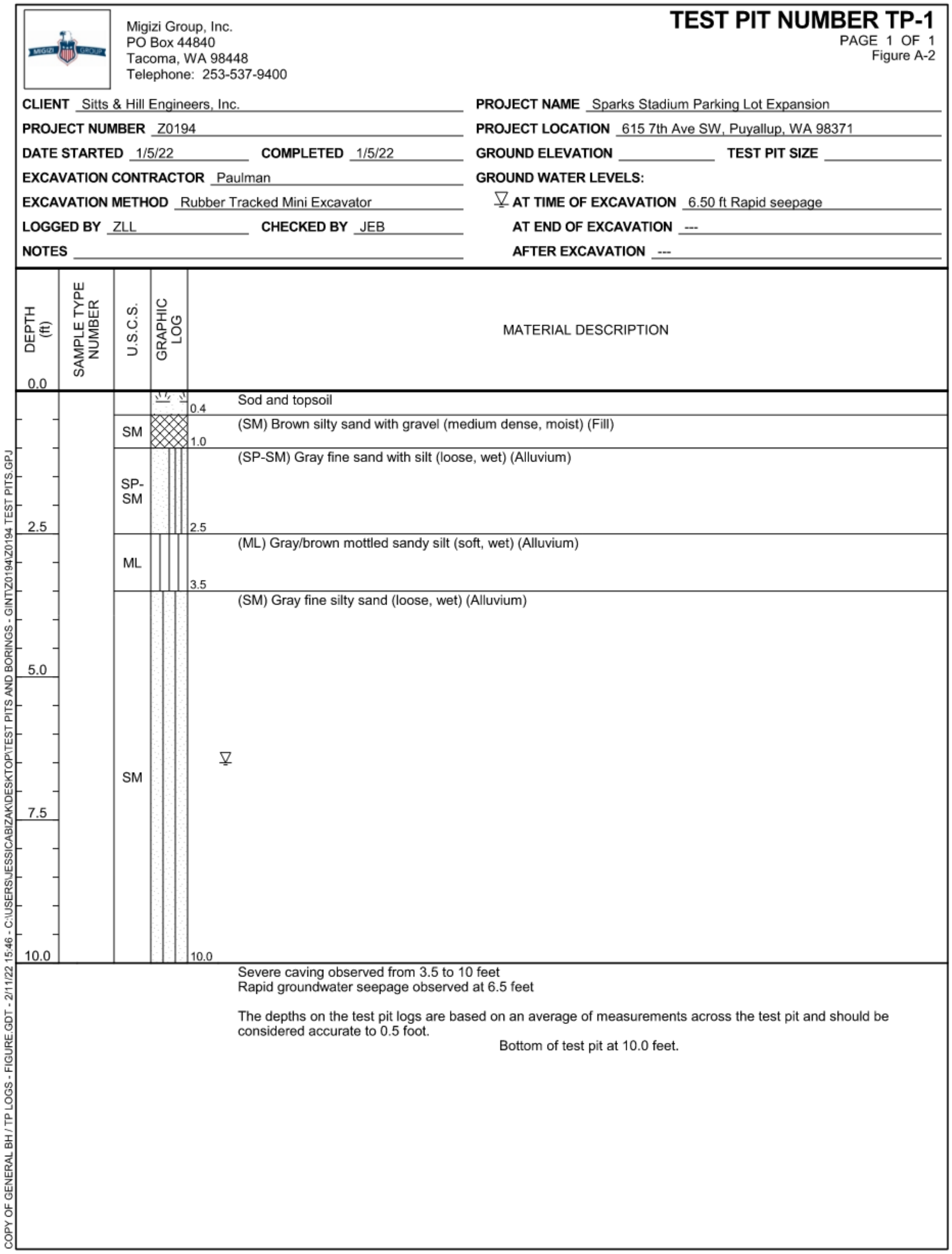
PAGE 1 OF 1
Figure A-4

CLIENT Sitts & Hill Engineers, Inc.
PROJECT NAME Sparks Stadium Parking Lot Expansion
PROJECT NUMBER Z0194
PROJECT LOCATION 615 7th Ave SW, Puyallup, WA 98371
DATE STARTED 1/4/22 **COMPLETED** 1/4/22
GROUND ELEVATION **HOLE SIZE** 4.25" HSA
DRILLING CONTRACTOR Holocene Drilling Inc.
GROUND WATER LEVELS:
DRILLING METHOD D50 Track Rig
▽ **AT TIME OF DRILLING** 8.50 ft
LOGGED BY ZLL **CHECKED BY** JEB
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0					0.5	Sod and topsoil
				SM		(SM) Red/brown fine silty sand (loose, moist)
	SS S-1	12	7-4-3 (7)		3.0	
				SP-SM		(SP-SM) Gray/brown fine sand with silt (loose, wet)
5					5.5	
	SS S-2	6	0-0-3 (3)	SM		(SM) Gray/brown fine silty sand (very loose, wet)
					8.0	
	SS S-3	12	4-5-4 (9)	SM		▽ (SM) Gray fine silty sand (loose, wet)
10	SS S-4	12	3-3-4 (7)			
15						Grades to medium dense
	SS S-5	12	4-4-6 (10)			
20	SS S-6	12	3-5-8 (13)		21.0	
				SP-SM	21.5	(SP-SM) Gray/brown fine sand with silt (medium dense, wet)

Bottom of borehole at 21.5 feet.

COPY OF GENERAL BH / TP LOGS - FIGURE.GDT - 2/11/22 16:01 - C:\USERS\JESSICABIZAK\DESKTOP\TEST PITS AND BORINGS - GINT\Z0194\Z0194 BORING LOG.GPJ



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TEST PIT NUMBER TP-1

PAGE 1 OF 1
Figure A-2

CLIENT Sitts & Hill Engineers, Inc.
PROJECT NAME Sparks Stadium Parking Lot Expansion
PROJECT NUMBER Z0194
PROJECT LOCATION 615 7th Ave SW, Puyallup, WA 98371
DATE STARTED 1/5/22 **COMPLETED** 1/5/22
GROUND ELEVATION **TEST PIT SIZE**
EXCAVATION CONTRACTOR Paulman
GROUND WATER LEVELS:
EXCAVATION METHOD Rubber Tracked Mini Excavator
▽ **AT TIME OF EXCAVATION** 6.50 ft Rapid seepage
LOGGED BY ZLL **CHECKED BY** JEB
AT END OF EXCAVATION ---
NOTES
AFTER EXCAVATION ---

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0.0			0.4	Sod and topsoil
		SM	1.0	(SM) Brown silty sand with gravel (medium dense, moist) (Fill)
2.5		SP-SM	2.5	(SP-SM) Gray fine sand with silt (loose, wet) (Alluvium)
		ML	3.5	(ML) Gray/brown mottled sandy silt (soft, wet) (Alluvium)
5.0 7.5 10.0		SM	10.0	(SM) Gray fine silty sand (loose, wet) (Alluvium) ▽

Severe caving observed from 3.5 to 10 feet
Rapid groundwater seepage observed at 6.5 feet

The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

Bottom of test pit at 10.0 feet.

COPY OF GENERAL BH / TP LOGS - FIGURE.GDT - 2/11/22 15:46 - C:\USERS\JESSICABIZAK\DESKTOP\TEST PITS AND BORINGS - GINT\Z0194\Z0194 TEST PITS.GPJ

Migizi Group, Inc.
PO Box 44840
Tacoma, WA 98448
Telephone: 253-537-9400

TEST PIT NUMBER TP-2

PAGE 1 OF 1
Figure A-3

CLIENT Sitts & Hill Engineers, Inc.
PROJECT NAME Sparks Stadium Parking Lot Expansion
PROJECT NUMBER Z0194
PROJECT LOCATION 615 7th Ave SW, Puyallup, WA 98371
DATE STARTED 1/5/22 **COMPLETED** 1/5/22
GROUND ELEVATION **TEST PIT SIZE**
EXCAVATION CONTRACTOR Paulman
GROUND WATER LEVELS:
EXCAVATION METHOD Rubber Tracked Mini Excavator
∇ **AT TIME OF EXCAVATION** 5.50 ft Rapid seepage
LOGGED BY ZLL **CHECKED BY** JEB
AT END OF EXCAVATION ---
NOTES
AFTER EXCAVATION ---

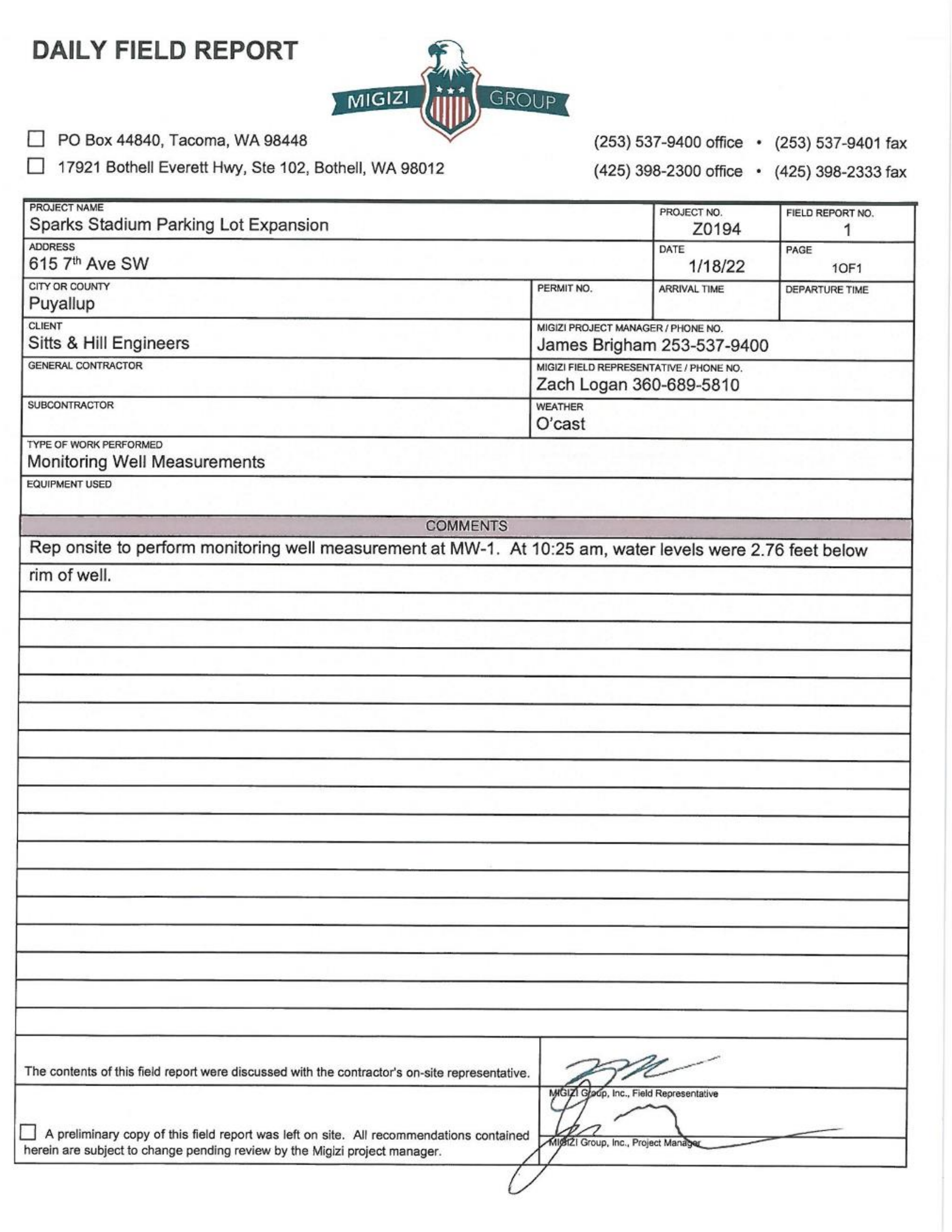
DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0.0			0.3	Sod and topsoil
		SM	1.0	(SM) Brown silty sand (loose, moist) (Alluvium)
2.5		ML	3.0	(ML) Gray/brown mottled sandy silt (soft, wet) (Alluvium)
5.0 7.5		SM	9.5	(SM) Gray fine silty sand (loose, wet) (Alluvium) ∇

Severe caving observed from 3 to 10 feet
Rapid groundwater seepage observed at 5.5 feet

The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

Bottom of test pit at 9.5 feet.

COPY OF GENERAL BH / TP LOGS - FIGURE.GDT - 2/11/22 15:46 - C:\USERS\JESSICABIZAK\DESKTOP\TEST PITS AND BORINGS - GINT\Z0194\Z0194 TEST PITS.GPJ



DAILY FIELD REPORT

MIGIZI GROUP

☐ PO Box 44840, Tacoma, WA 98448
☐ 17921 Bothell Everett Hwy, Ste 102, Bothell, WA 98012

(253) 537-9400 office • (253) 537-9401 fax
(425) 398-2300 office • (425) 398-2333 fax

PROJECT NAME Sparks Stadium Parking Lot Expansion		PROJECT NO. Z0194	FIELD REPORT NO. 1
ADDRESS 615 7th Ave SW		DATE 1/18/22	PAGE 1OF1
CITY OR COUNTY Puyallup	PERMIT NO.	ARRIVAL TIME	DEPARTURE TIME
CLIENT Sitts & Hill Engineers	MIGIZI PROJECT MANAGER / PHONE NO. James Brigham 253-537-9400		
GENERAL CONTRACTOR	MIGIZI FIELD REPRESENTATIVE / PHONE NO. Zach Logan 360-689-5810		
SUBCONTRACTOR	WEATHER O'cast		
TYPE OF WORK PERFORMED Monitoring Well Measurements			
EQUIPMENT USED			

COMMENTS

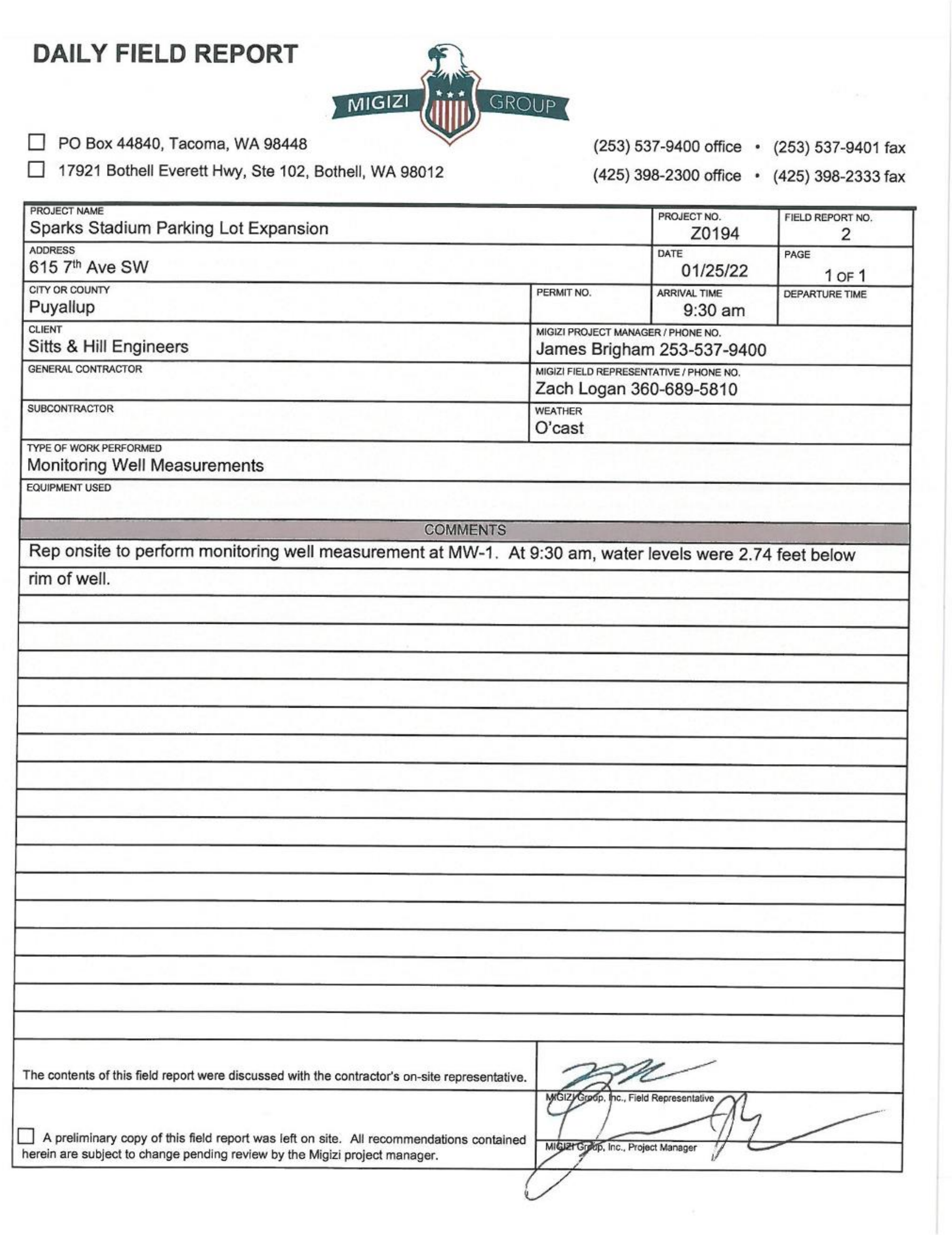
Rep onsite to perform monitoring well measurement at MW-1. At 10:25 am, water levels were 2.76 feet below rim of well.

The contents of this field report were discussed with the contractor's on-site representative.

MIGIZI Group, Inc., Field Representative

☐ A preliminary copy of this field report was left on site. All recommendations contained herein are subject to change pending review by the Migizi project manager.

MIGIZI Group, Inc., Project Manager



DAILY FIELD REPORT

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☐ 17921 Bothell Everett Hwy, Ste 102, Bothell, WA 98012

(253) 537-9400 office • (253) 537-9401 fax
(425) 398-2300 office • (425) 398-2333 fax

PROJECT NAME: Sparks Stadium Parking Lot Expansion
PROJECT NO.: Z0194
FIELD REPORT NO.: 2
ADDRESS: 615 7th Ave SW
DATE: 01/25/22
PAGE: 1 OF 1
CITY OR COUNTY: Puyallup
PERMIT NO.:
ARRIVAL TIME: 9:30 am
DEPARTURE TIME:
CLIENT: Sitts & Hill Engineers
MIGIZI PROJECT MANAGER / PHONE NO.: James Brigham 253-537-9400
GENERAL CONTRACTOR:
MIGIZI FIELD REPRESENTATIVE / PHONE NO.: Zach Logan 360-689-5810
SUBCONTRACTOR:
WEATHER: O'cast
TYPE OF WORK PERFORMED: Monitoring Well Measurements
EQUIPMENT USED:

COMMENTS

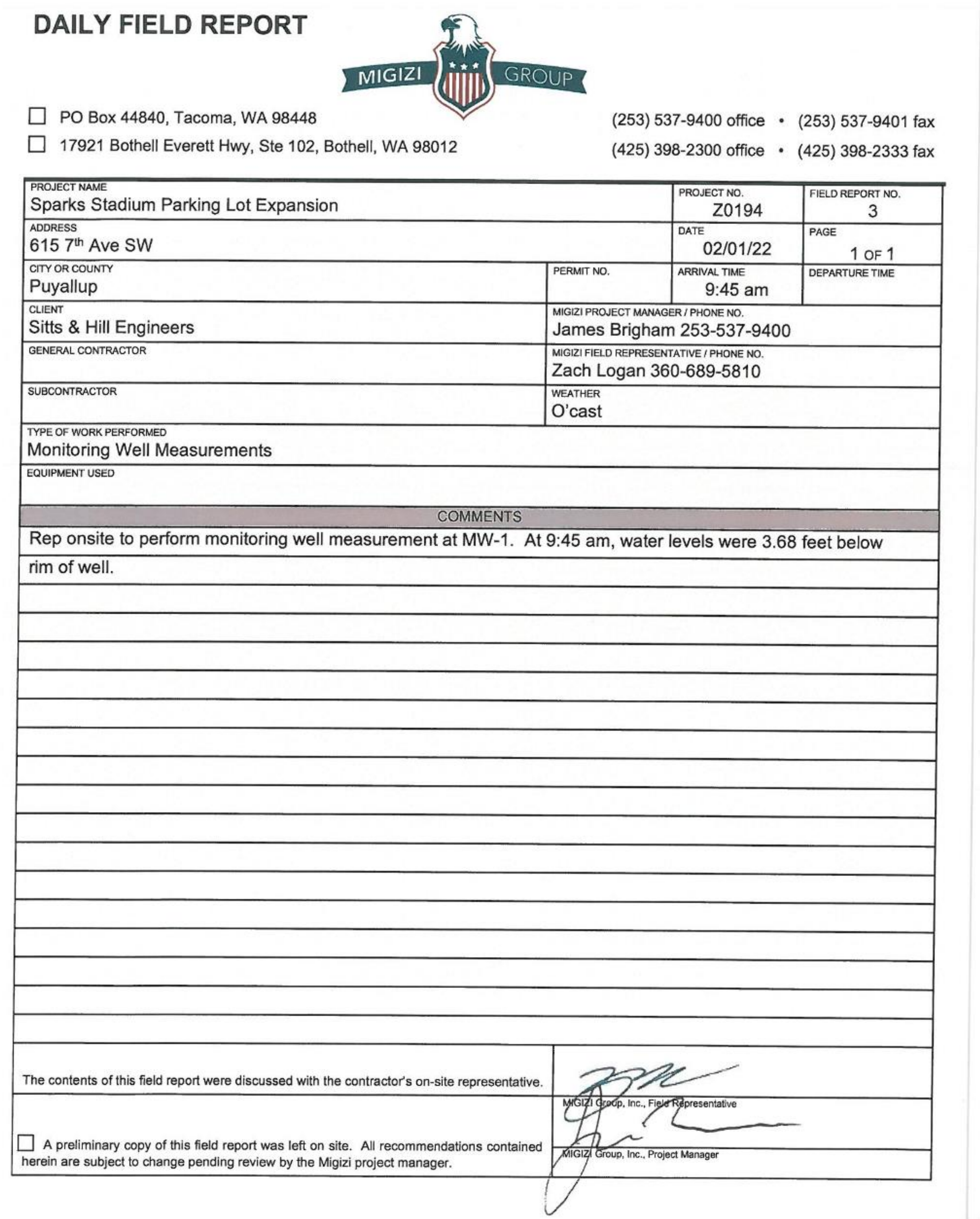
Rep onsite to perform monitoring well measurement at MW-1. At 9:30 am, water levels were 2.74 feet below rim of well.

The contents of this field report were discussed with the contractor's on-site representative.

MIGIZI Group, Inc., Field Representative

☐ A preliminary copy of this field report was left on site. All recommendations contained herein are subject to change pending review by the Migizi project manager.

MIGIZI Group, Inc., Project Manager



DAILY FIELD REPORT

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☐ 17921 Bothell Everett Hwy, Ste 102, Bothell, WA 98012 (425) 398-2300 office • (425) 398-2333 fax

PROJECT NAME Sparks Stadium Parking Lot Expansion		PROJECT NO. Z0194	FIELD REPORT NO. 3
ADDRESS 615 7th Ave SW		DATE 02/01/22	PAGE 1 OF 1
CITY OR COUNTY Puyallup	PERMIT NO.	ARRIVAL TIME 9:45 am	DEPARTURE TIME
CLIENT Sitts & Hill Engineers	MIGIZI PROJECT MANAGER / PHONE NO. James Brigham 253-537-9400		
GENERAL CONTRACTOR	MIGIZI FIELD REPRESENTATIVE / PHONE NO. Zach Logan 360-689-5810		
SUBCONTRACTOR	WEATHER O'cast		
TYPE OF WORK PERFORMED Monitoring Well Measurements			
EQUIPMENT USED			

COMMENTS

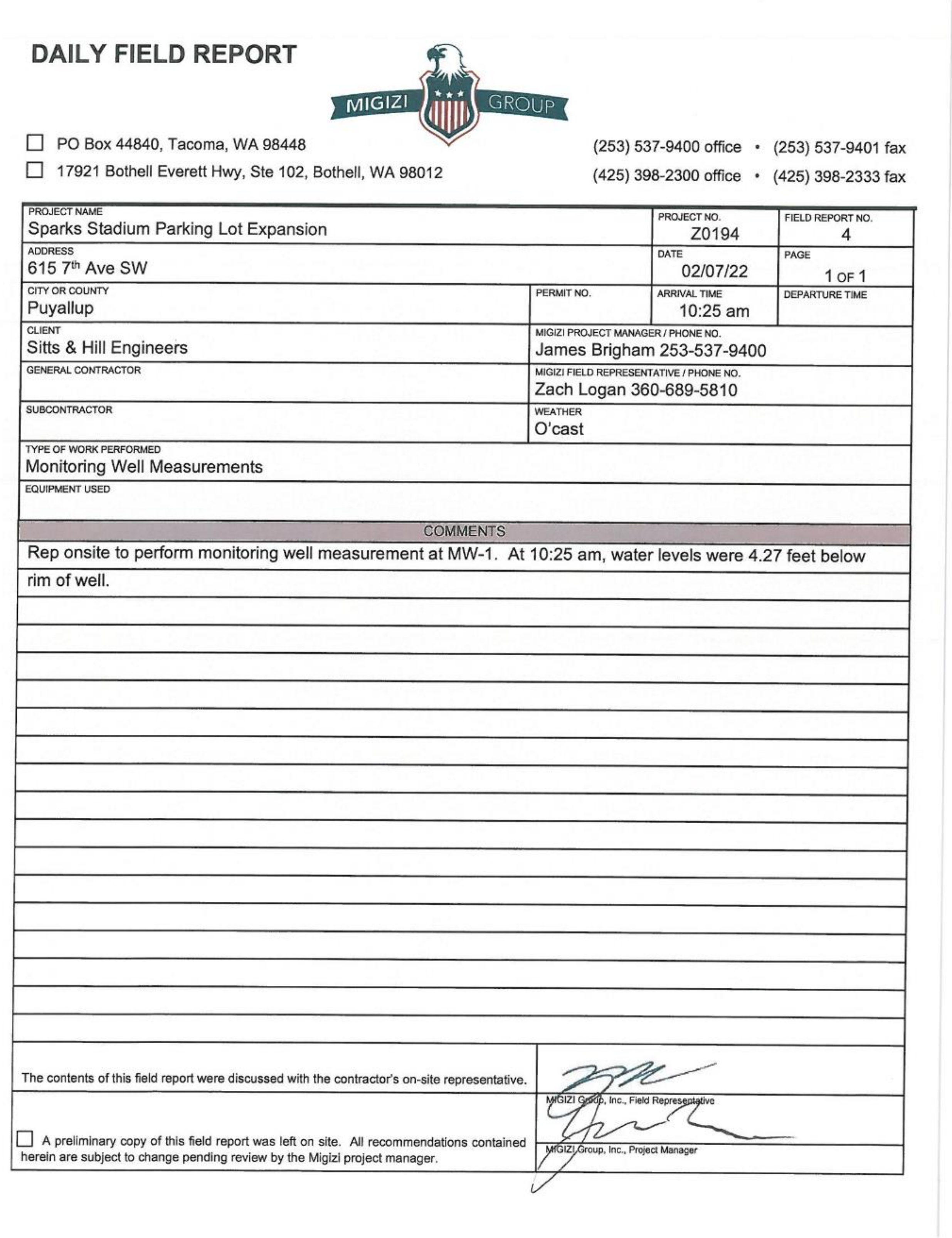
Rep onsite to perform monitoring well measurement at MW-1. At 9:45 am, water levels were 3.68 feet below rim of well.

The contents of this field report were discussed with the contractor's on-site representative.

MIGIZI Group, Inc., Field Representative

☐ A preliminary copy of this field report was left on site. All recommendations contained herein are subject to change pending review by the Migizi project manager.

MIGIZI Group, Inc., Project Manager



DAILY FIELD REPORT

MIGIZI GROUP

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☐ 17921 Bothell Everett Hwy, Ste 102, Bothell, WA 98012 (425) 398-2300 office • (425) 398-2333 fax

PROJECT NAME Sparks Stadium Parking Lot Expansion		PROJECT NO. Z0194	FIELD REPORT NO. 4
ADDRESS 615 7th Ave SW		DATE 02/07/22	PAGE 1 OF 1
CITY OR COUNTY Puyallup	PERMIT NO.	ARRIVAL TIME 10:25 am	DEPARTURE TIME
CLIENT Sitts & Hill Engineers	MIGIZI PROJECT MANAGER / PHONE NO. James Brigham 253-537-9400		
GENERAL CONTRACTOR	MIGIZI FIELD REPRESENTATIVE / PHONE NO. Zach Logan 360-689-5810		
SUBCONTRACTOR	WEATHER O'cast		
TYPE OF WORK PERFORMED Monitoring Well Measurements			
EQUIPMENT USED			

COMMENTS

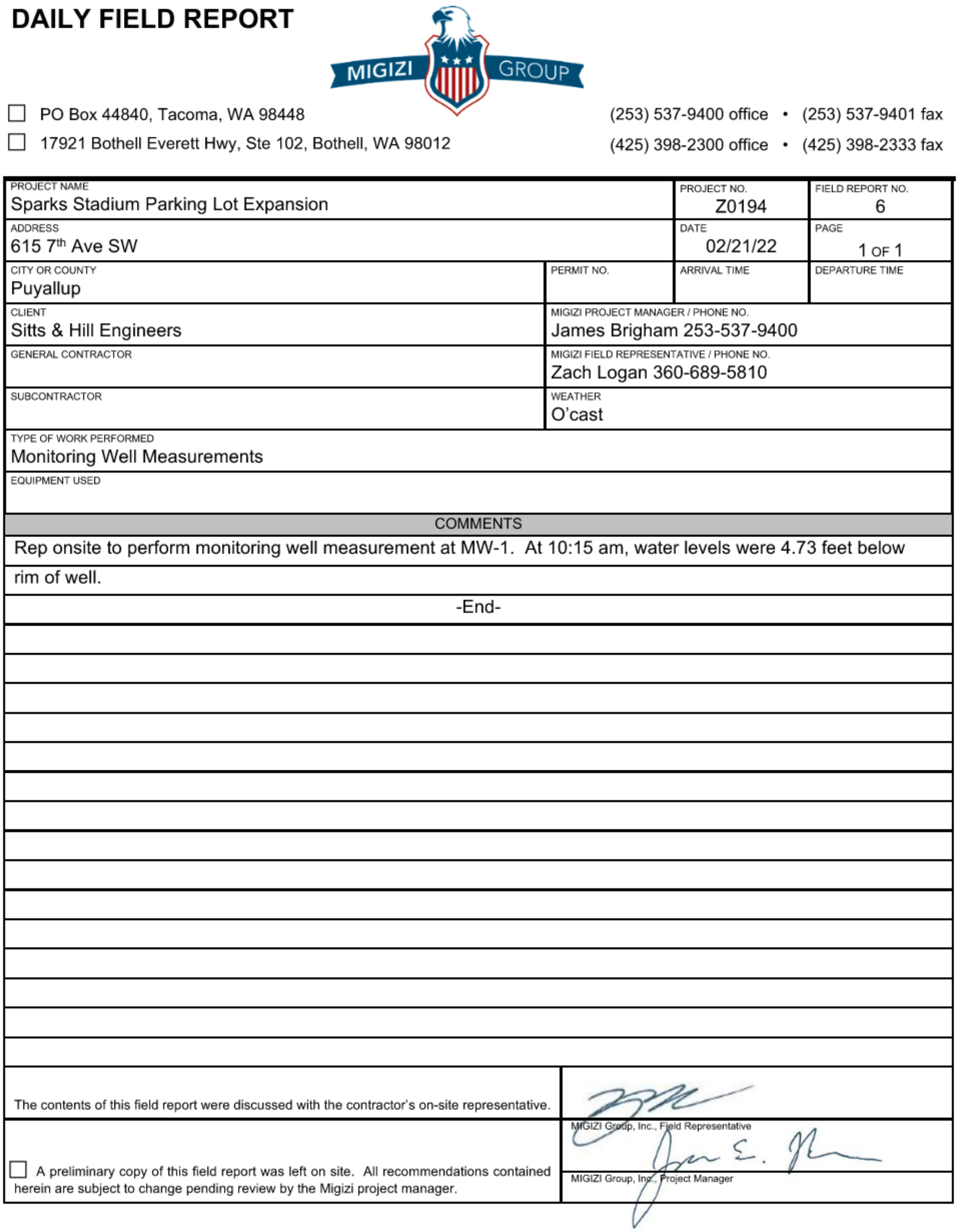
Rep onsite to perform monitoring well measurement at MW-1. At 10:25 am, water levels were 4.27 feet below rim of well.

The contents of this field report were discussed with the contractor's on-site representative.

MIGIZI Group, Inc., Field Representative

☐ A preliminary copy of this field report was left on site. All recommendations contained herein are subject to change pending review by the Migizi project manager.

MIGIZI Group, Inc., Project Manager



DAILY FIELD REPORT

MIGIZI GROUP

☐ PO Box 44840, Tacoma, WA 98448 (253) 537-9400 office • (253) 537-9401 fax
☐ 17921 Bothell Everett Hwy, Ste 102, Bothell, WA 98012 (425) 398-2300 office • (425) 398-2333 fax

PROJECT NAME Sparks Stadium Parking Lot Expansion		PROJECT NO. Z0194	FIELD REPORT NO. 6
ADDRESS 615 7th Ave SW		DATE 02/21/22	PAGE 1 OF 1
CITY OR COUNTY Puyallup	PERMIT NO.	ARRIVAL TIME	DEPARTURE TIME
CLIENT Sitts & Hill Engineers	MIGIZI PROJECT MANAGER / PHONE NO. James Brigham 253-537-9400		
GENERAL CONTRACTOR	MIGIZI FIELD REPRESENTATIVE / PHONE NO. Zach Logan 360-689-5810		
SUBCONTRACTOR	WEATHER O'cast		
TYPE OF WORK PERFORMED Monitoring Well Measurements			
EQUIPMENT USED			

COMMENTS

Rep onsite to perform monitoring well measurement at MW-1. At 10:15 am, water levels were 4.73 feet below rim of well.

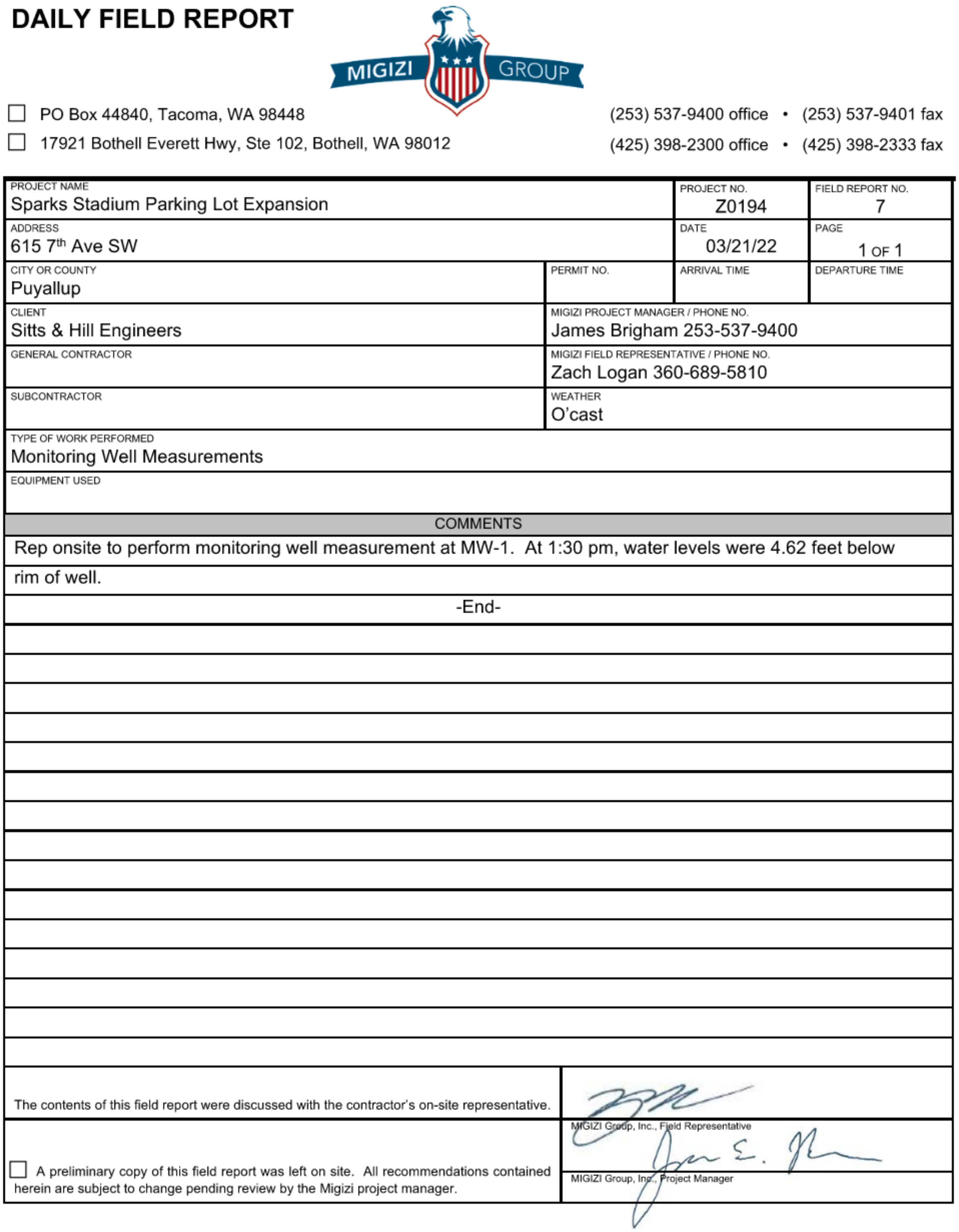
-End-

The contents of this field report were discussed with the contractor's on-site representative.

MIGIZI Group, Inc., Field Representative

☐ A preliminary copy of this field report was left on site. All recommendations contained herein are subject to change pending review by the Migizi project manager.

MIGIZI Group, Inc., Project Manager



DAILY FIELD REPORT

MIGIZI GROUP

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☐ 17921 Bothell Everett Hwy, Ste 102, Bothell, WA 98012 — (425) 398-2300 office • (425) 398-2333 fax

PROJECT NAME Sparks Stadium Parking Lot Expansion		PROJECT NO. Z0194	FIELD REPORT NO. 7
ADDRESS 615 7th Ave SW		DATE 03/21/22	PAGE 1 OF 1
CITY OR COUNTY Puyallup	PERMIT NO.	ARRIVAL TIME	DEPARTURE TIME
CLIENT Sitts & Hill Engineers	MIGIZI PROJECT MANAGER / PHONE NO. James Brigham 253-537-9400		
GENERAL CONTRACTOR	MIGIZI FIELD REPRESENTATIVE / PHONE NO. Zach Logan 360-689-5810		
SUBCONTRACTOR	WEATHER O'cast		
TYPE OF WORK PERFORMED Monitoring Well Measurements			
EQUIPMENT USED			

COMMENTS

Rep onsite to perform monitoring well measurement at MW-1. At 1:30 pm, water levels were 4.62 feet below rim of well.

-End-

The contents of this field report were discussed with the contractor's on-site representative.

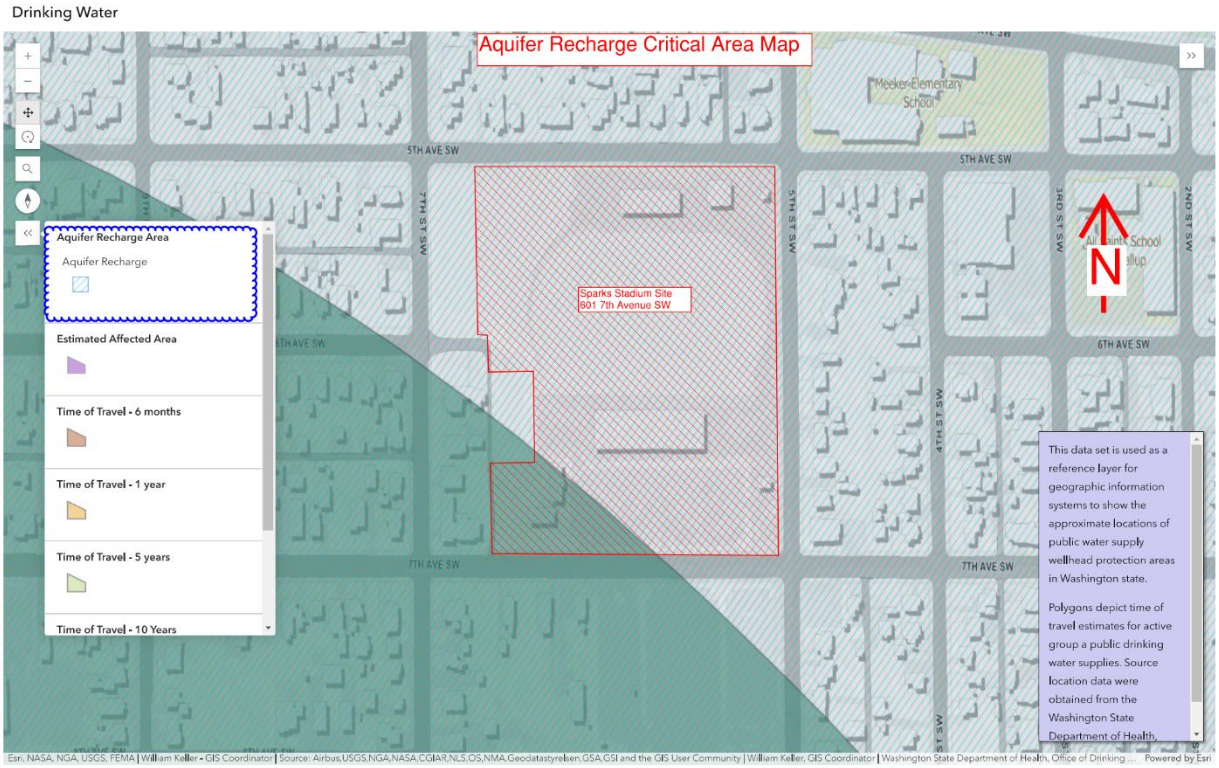
MIGIZI Group, Inc., Field Representative

☐ A preliminary copy of this field report was left on site. All recommendations contained herein are subject to change pending review by the Migizi project manager.

MIGIZI Group, Inc., Project Manager

Appendix E City of Puyallup Critical Areas

1. *Aquifer Recharge Areas*



Drinking Water

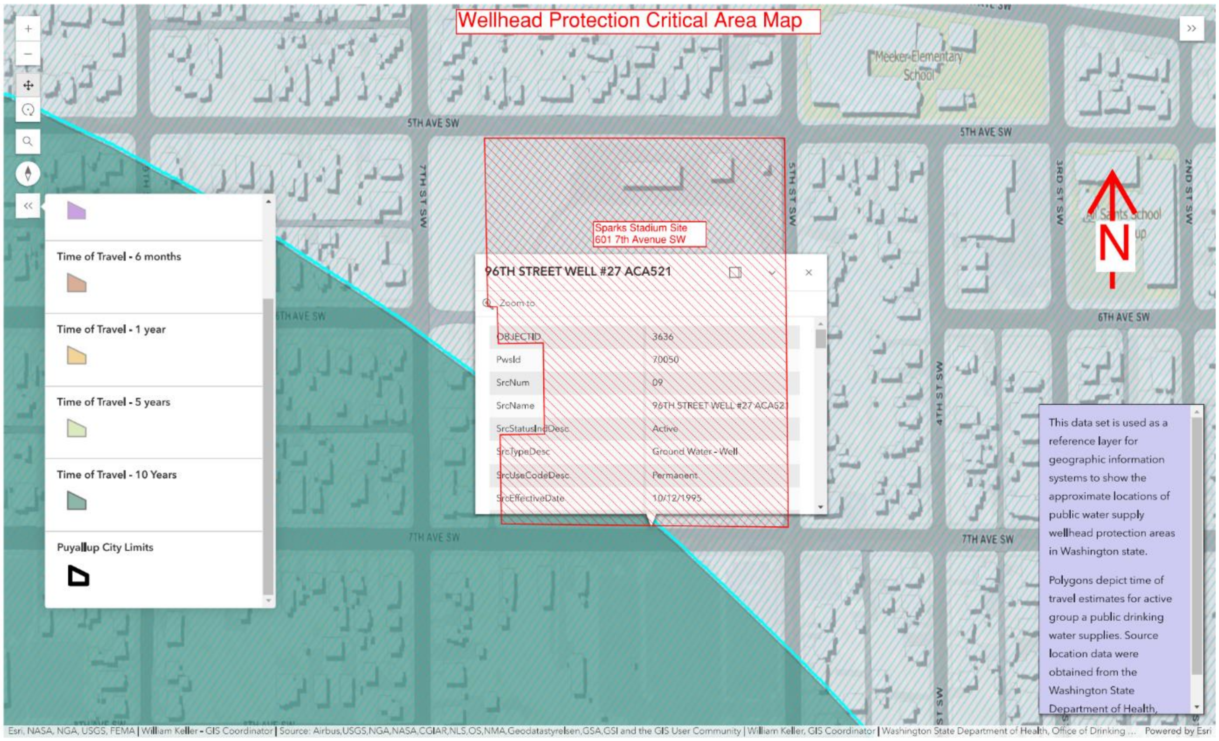
This data set is used as a reference layer for geographic information systems to show the approximate locations of public water supply wellhead protection areas in Washington state.

Polygons depict time of travel estimates for active group a public drinking water supplies. Source location data were obtained from the Washington State Department of Health,

Esri, NASA, NGA, USGS, FEMA | William Keller - GIS Coordinator | Source: Airbus,USGS,NGA,NASA,CGIAR,NLS,OS,NMA,Geodatastyrelsen,GSA,GSI and the GIS User Community | William Keller, GIS Coordinator | Washington State Department of Health, Office of Drinking ... Powered by Esri

2. Wellhead Protection

Drinking Water



96TH STREET WELL #27 ACA521

OBJECTID	3636
PwsId	70050
SrcNum	09
SrcName	96TH STREET WELL #27 ACA521
SrcStatusIndDesc	Active
SrcTypeDesc	Ground Water - Well
SrcUseCodeDesc	Permanent
SrcEffectiveDate	10/12/1995

Time of Travel - 6 months

Time of Travel - 1 year

Time of Travel - 5 years

Time of Travel - 10 Years

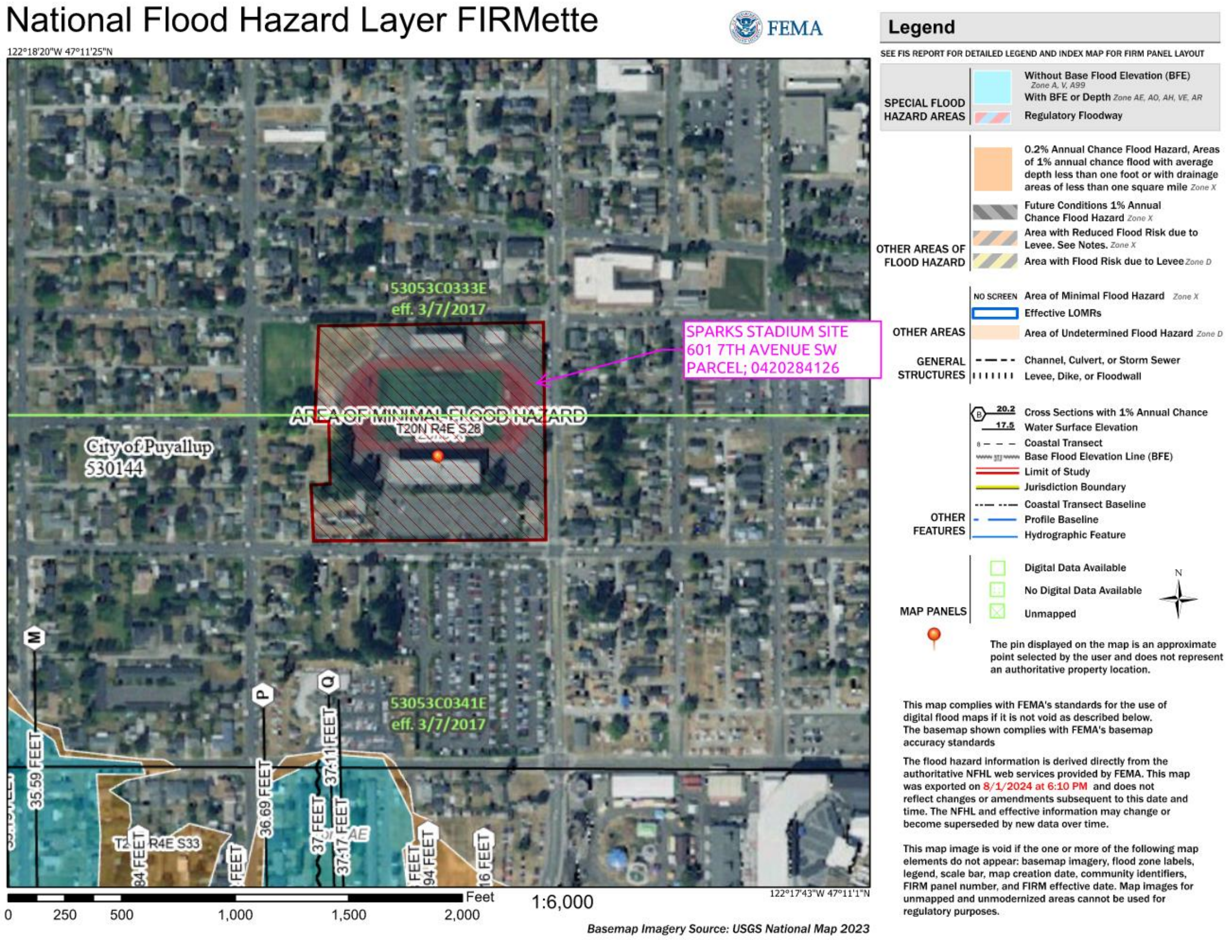
Puyallup City Limits

This data set is used as a reference layer for geographic information systems to show the approximate locations of public water supply wellhead protection areas in Washington state.

Polygons depict time of travel estimates for active group a public drinking water supplies. Source location data were obtained from the Washington State Department of Health,

Esri, NASA, NGA, USGS, FEMA | William Keller - GIS Coordinator | Source: Airbus,USGS,NGA,NASA,CGIAR,NLS,OS,NMA,Geodatastyrelsen,GSA,GSI and the GIS User Community | William Keller, GIS Coordinator | Washington State Department of Health, Office of Drinking ... Powered by Esri

3. Flood FEMA map



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

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 8/1/2024 at 6:10 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

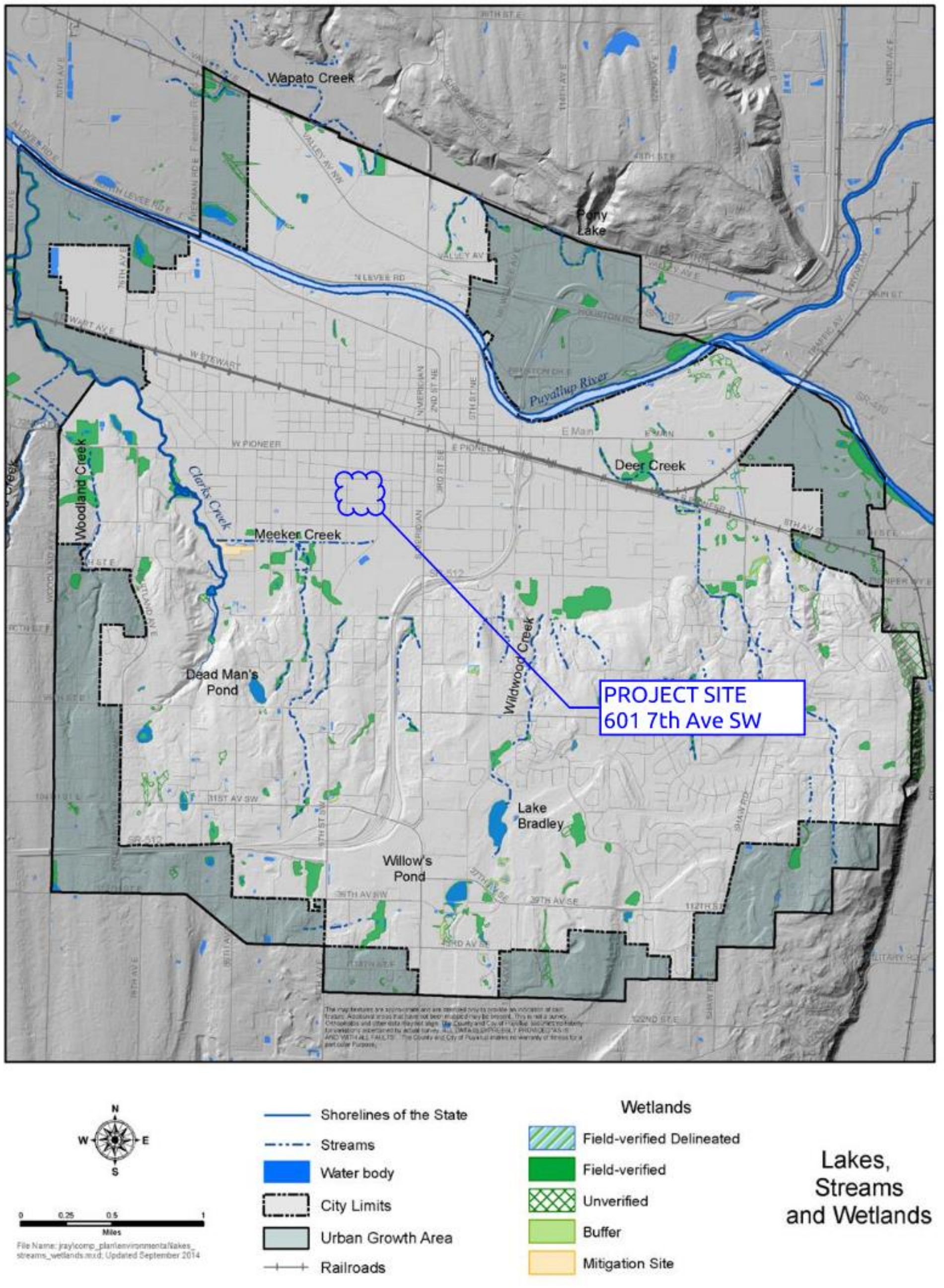
This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory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

Basemap Imagery Source: USGS National Map 2023

4. Lakes, Streams and Wetlands

NATURAL ENVIRONMENT

Map 2-7: Lakes, Streams and Wetlands



PROJECT SITE
601 7th Ave SW

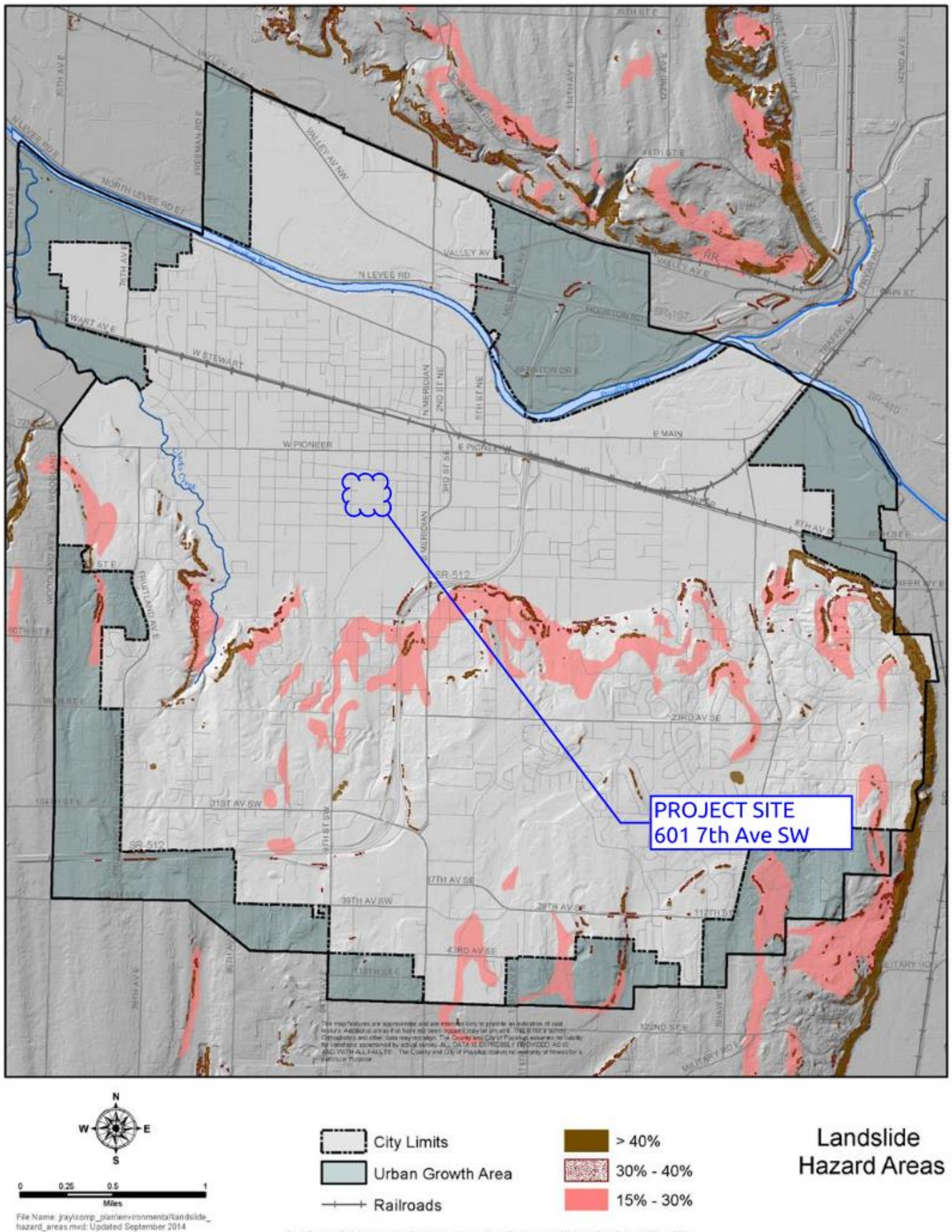
File Name: jray\comp_plan\environmental\lakes_streams_wetlands.mxd; Updated September 2014

PUYALLUP COMPREHENSIVE PLAN PAGE 2.15

5. Landslide Hazards

NATURAL ENVIRONMENT

Map 2-3: Landslide Hazard Areas



PROJECT SITE
601 7th Ave SW

File Name: jray\comp_plan\environmental\landslide_hazard_areas.mxd; Updated September 2014

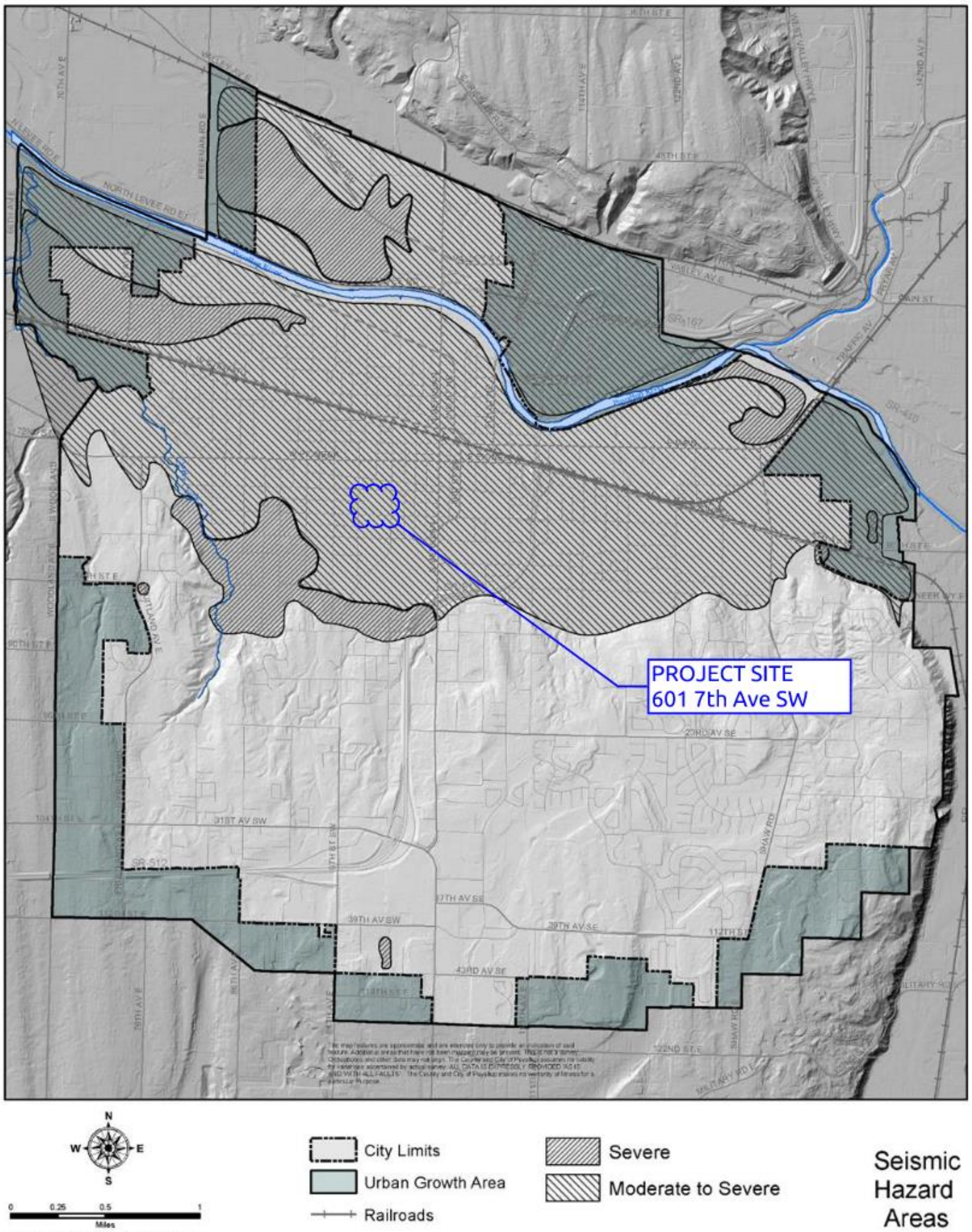
Data Source: Soil Conservation Study, Washington State Department of Natural Resources (30% - 40% and >40% data). Costal Zone Atlas of Washington, Volume VII (15% - 30% data), and Pierce County GIS (all data).

PUYALLUP COMPREHENSIVE PLAN PAGE 2.9

6. Seismic Hazards

NATURAL ENVIRONMENT

Map 2-2: Seismic Hazards Areas



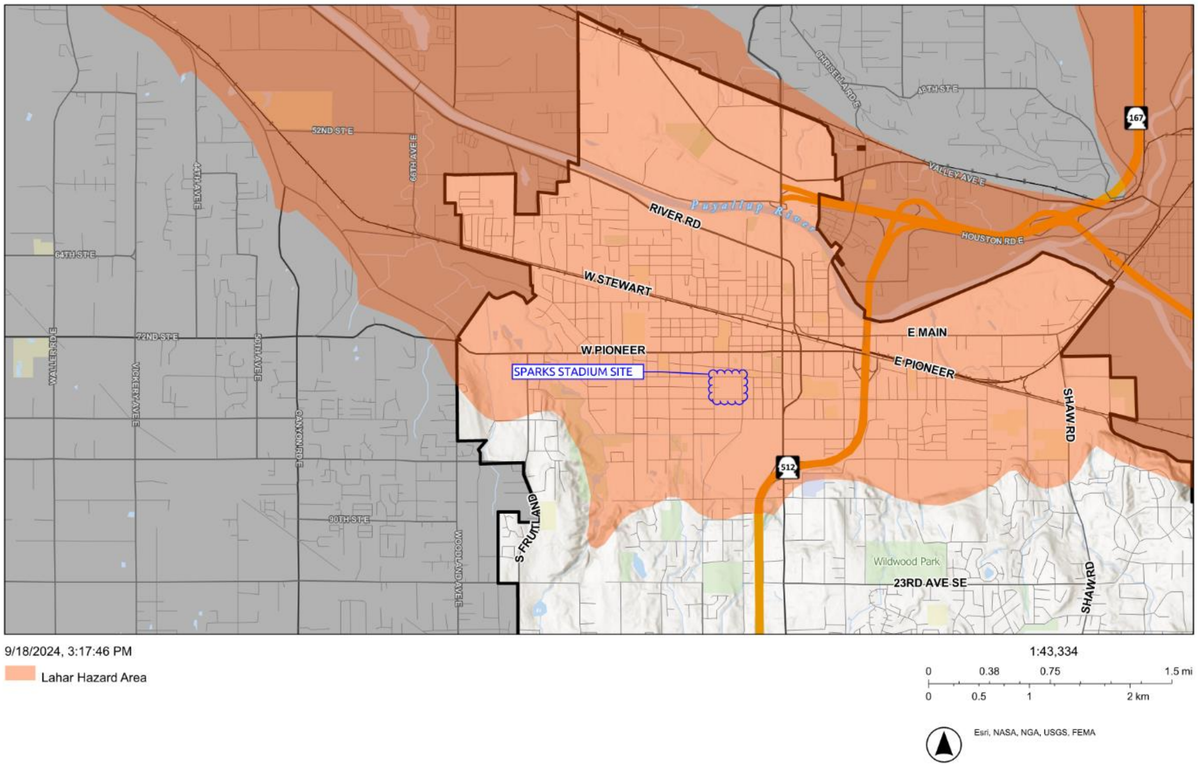
File Name: jray\comp_plan\environmental\seismic_hazard_areas.mxd; Updated September 2014

Data Source: United Stated GeologicalSurvey, 1975, "A Study of Earthquake Losses in the Puget Sound", Open File Report 75-375.

PUYALLUP COMPREHENSIVE PLAN PAGE 2.8

7. Volcanic Hazard Areas

ArcGIS Web Map



9/18/2024, 3:17:46 PM

🟧 Lahar Hazard Area

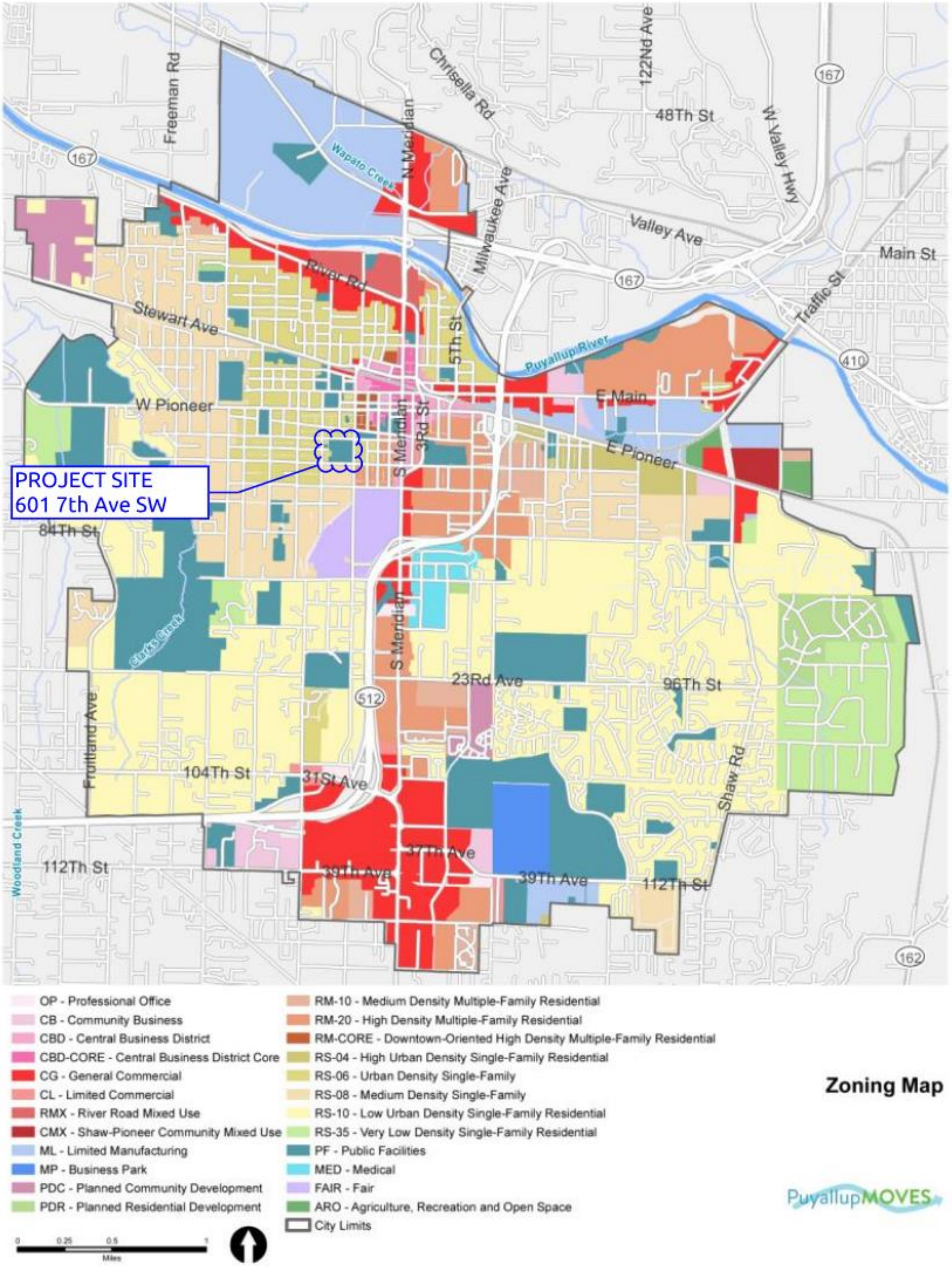
1:43,334

Esri, NASA, NGA, USGS, FEMA

8. Zoning Map

TRANSPORTATION ELEMENT

Map 7-1: Zoning Map

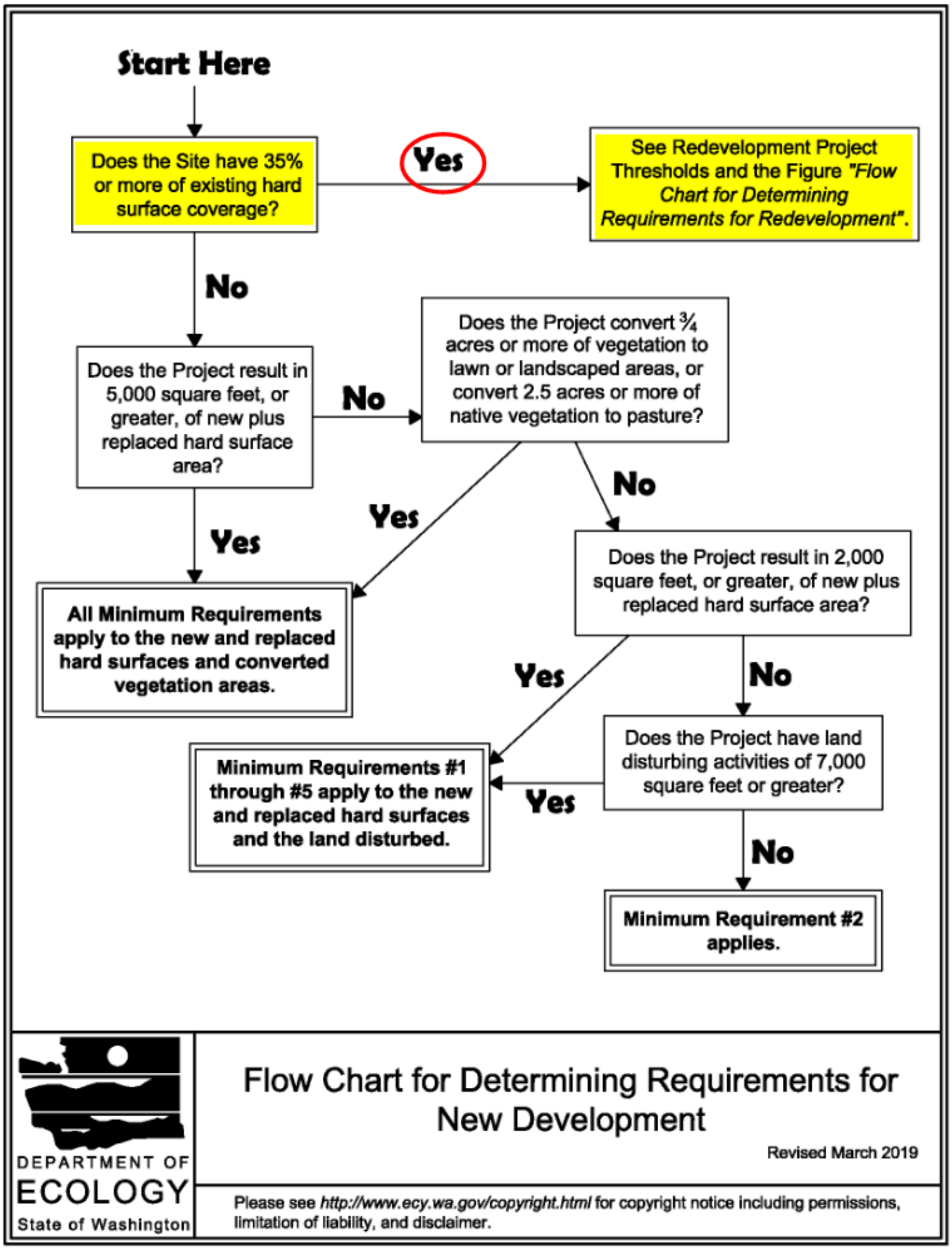


PUYALLUP COMPREHENSIVE PLAN

PAGE 7.10

Appendix F Flow Charts for Determining Minimum Requirements

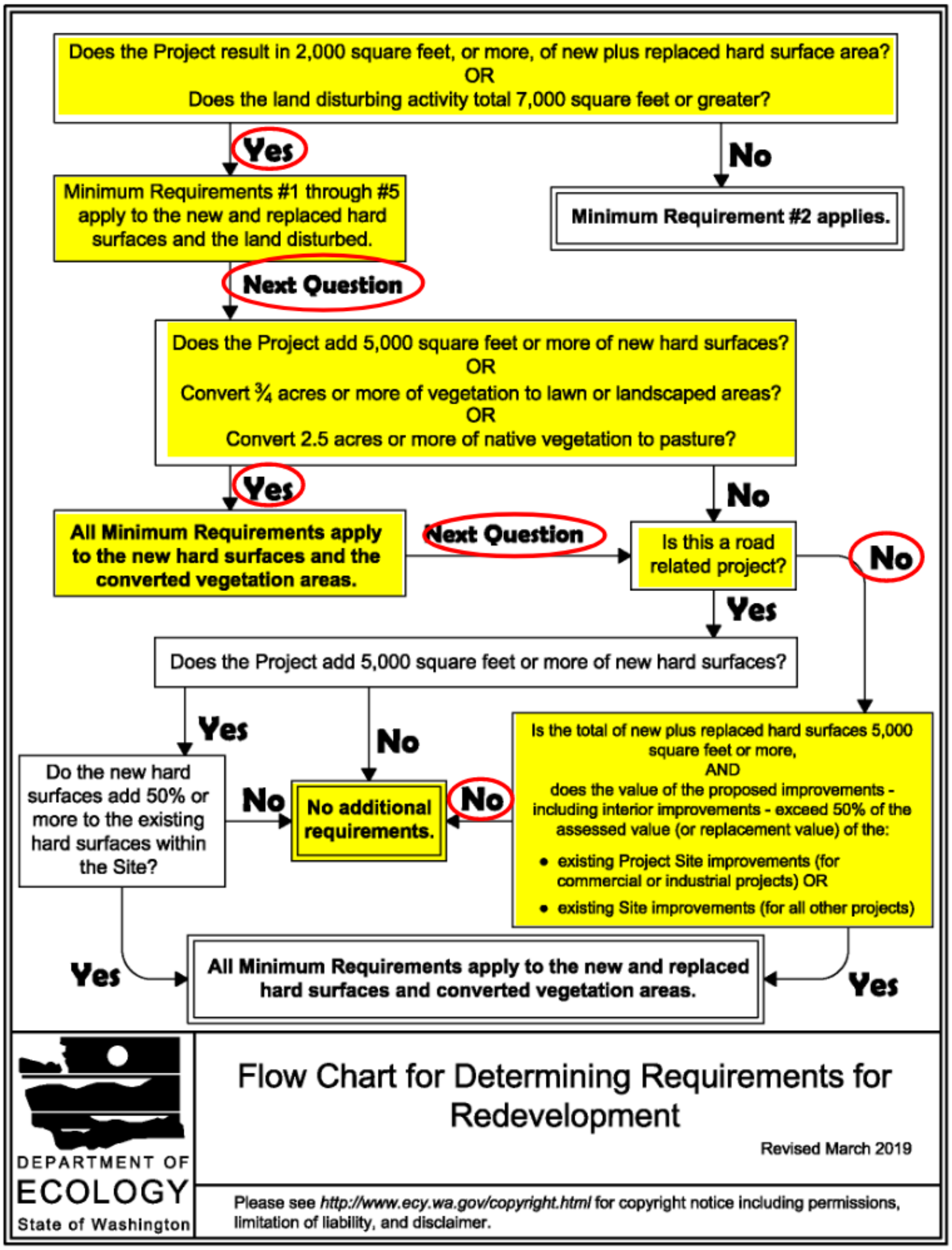
Figure I-3.1: Flow Chart for Determining Requirements for New Development



2019 Stormwater Management Manual for Western Washington

Volume I - Chapter 3 - Page 89

Figure I-3.2: Flow Chart for Determining Requirements for Redevelopment



2019 Stormwater Management Manual for Western Washington

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Appendix G MR#5 Flow Charts

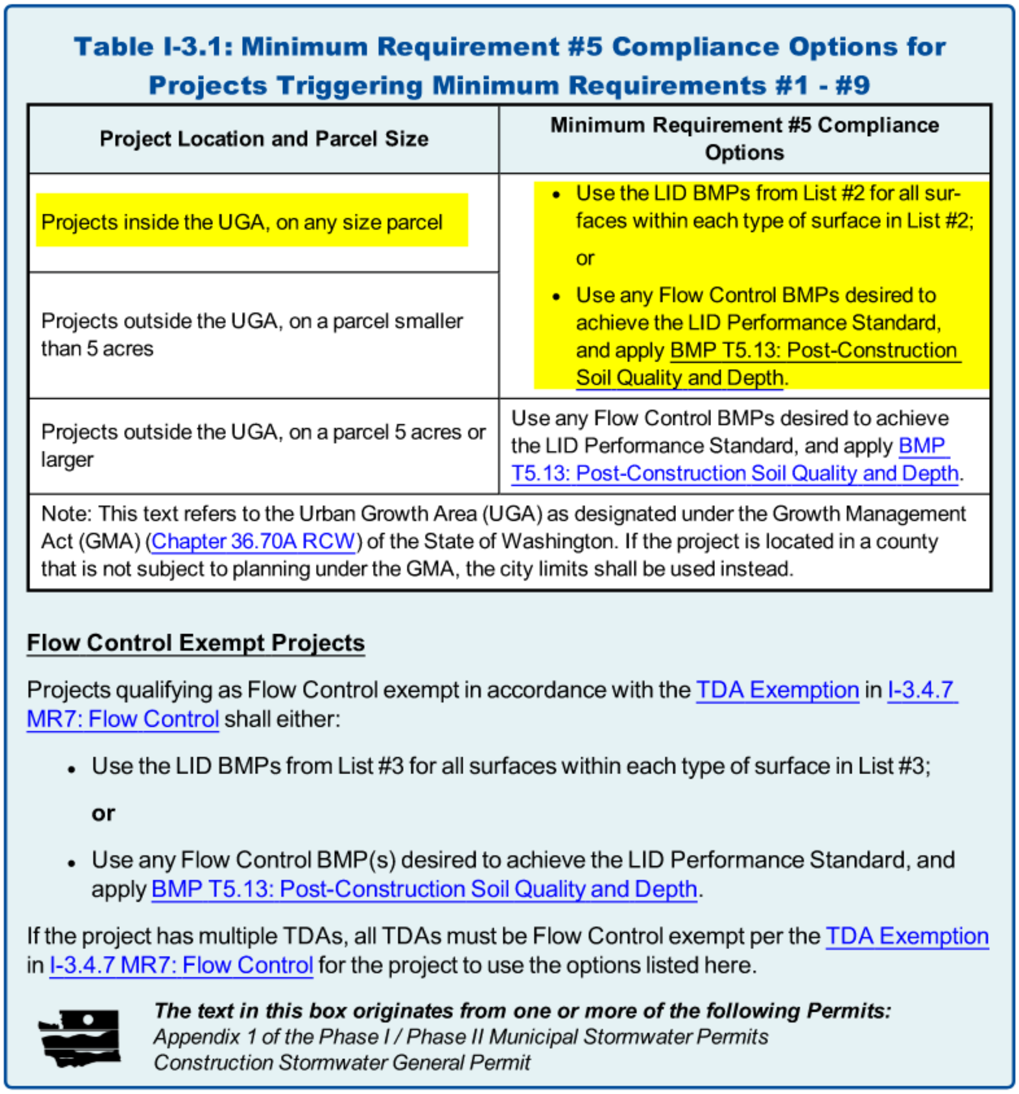


Table I-3.1: Minimum Requirement #5 Compliance Options for Projects Triggering Minimum Requirements #1 - #9

Project Location and Parcel Size	Minimum Requirement #5 Compliance Options
Projects inside the UGA, on any size parcel	• Use the LID BMPs from List #2 for all surfaces within each type of surface in List #2; or • Use any Flow Control BMPs desired to achieve the LID Performance Standard, and apply BMP T5.13: Post-Construction Soil Quality and Depth.
Projects outside the UGA, on a parcel smaller than 5 acres	
Projects outside the UGA, on a parcel 5 acres or larger	Use any Flow Control BMPs desired to achieve the LID Performance Standard, and apply BMP T5.13: Post-Construction Soil Quality and Depth.
Note: This text refers to the Urban Growth Area (UGA) as designated under the Growth Management Act (GMA) (Chapter 36.70A RCW) of the State of Washington. If the project is located in a county that is not subject to planning under the GMA, the city limits shall be used instead.	

Flow Control Exempt Projects

Projects qualifying as Flow Control exempt in accordance with the TDA Exemption in I-3.4.7 MR7: Flow Control shall either:

- Use the LID BMPs from List #3 for all surfaces within each type of surface in List #3;

  or

- Use any Flow Control BMP(s) desired to achieve the LID Performance Standard, and apply BMP T5.13: Post-Construction Soil Quality and Depth.

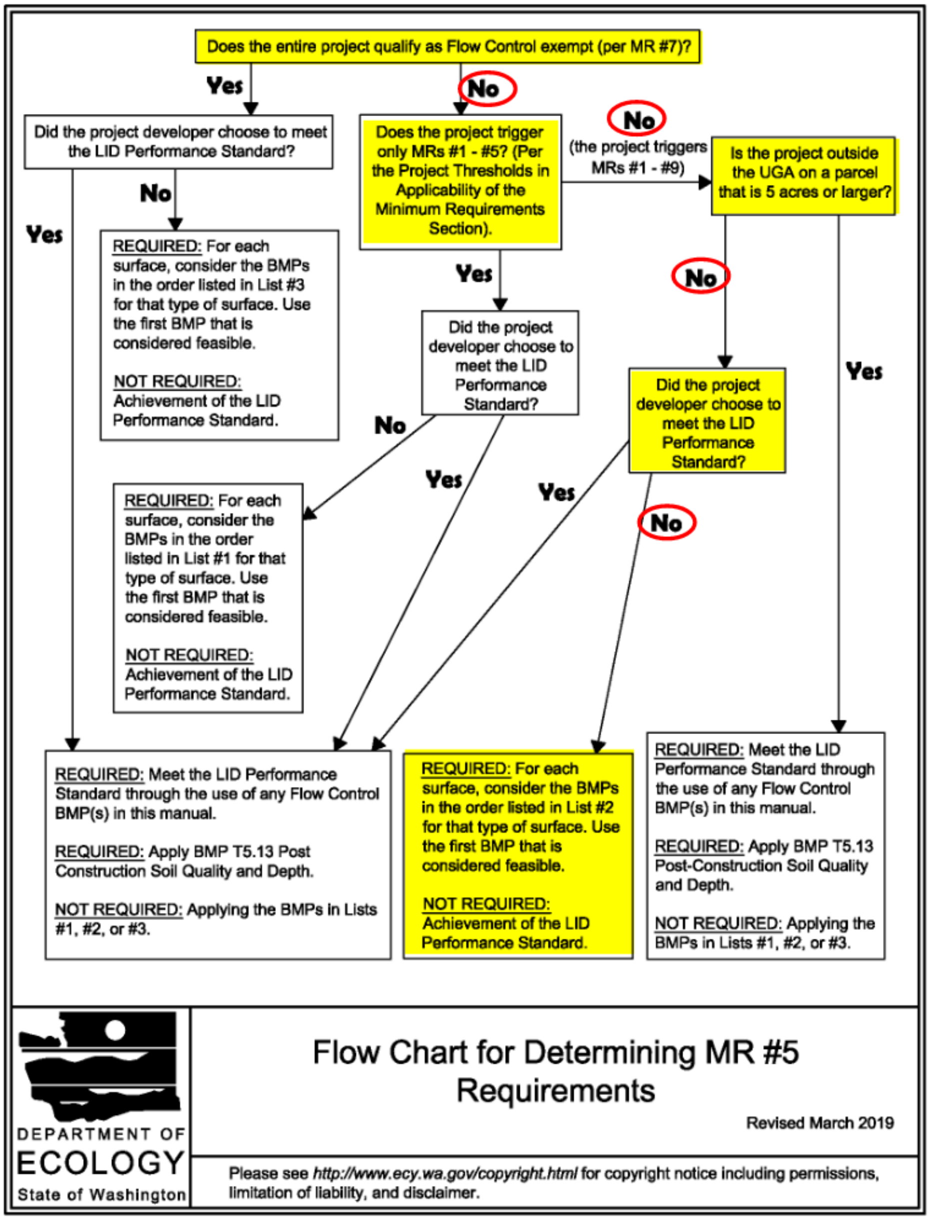
If the project has multiple TDAs, all TDAs must be Flow Control exempt per the TDA Exemption in I-3.4.7 MR7: Flow Control for the project to use the options listed here.

The text in this box originates from one or more of the following Permits:
Appendix 1 of the Phase I / Phase II Municipal Stormwater Permits
Construction Stormwater General Permit

2019 Stormwater Management Manual for Western Washington

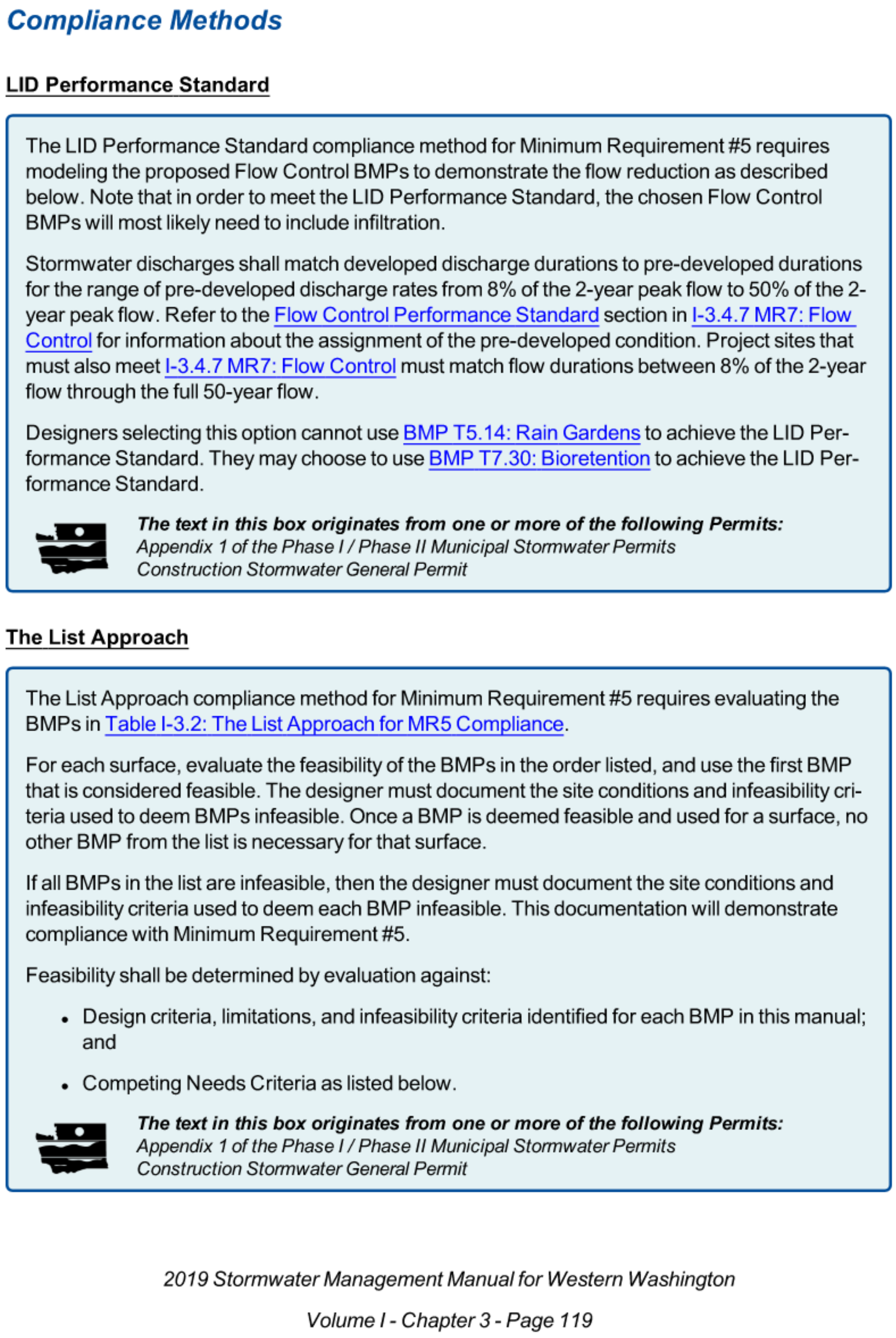
Volume I - Chapter 3 - Page 117

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



2019 Stormwater Management Manual for Western Washington

Volume I - Chapter 3 - Page 118



Compliance Methods

LID Performance Standard

The LID Performance Standard compliance method for Minimum Requirement #5 requires modeling the proposed Flow Control BMPs to demonstrate the flow reduction as described below. Note that in order to meet the LID Performance Standard, the chosen Flow Control BMPs will most likely need to include infiltration.

Stormwater discharges shall match developed discharge durations to pre-developed durations for the range of pre-developed discharge rates from 8% of the 2-year peak flow to 50% of the 2-year peak flow. Refer to the Flow Control Performance Standard section in I-3.4.7 MR7: Flow Control for information about the assignment of the pre-developed condition. Project sites that must also meet I-3.4.7 MR7: Flow Control must match flow durations between 8% of the 2-year flow through the full 50-year flow.

Designers selecting this option cannot use BMP T5.14: Rain Gardens to achieve the LID Performance Standard. They may choose to use BMP T7.30: Bioretention to achieve the LID Performance Standard.

The text in this box originates from one or more of the following Permits:
Appendix 1 of the Phase I / Phase II Municipal Stormwater Permits
Construction Stormwater General Permit

The List Approach

The List Approach compliance method for Minimum Requirement #5 requires evaluating the BMPs in Table I-3.2: The List Approach for MR5 Compliance.

For each surface, evaluate the feasibility of the BMPs in the order listed, and use the first BMP that is considered feasible. The designer must document the site conditions and infeasibility criteria used to deem BMPs infeasible. Once a BMP is deemed feasible and used for a surface, no other BMP from the list is necessary for that surface.

If all BMPs in the list are infeasible, then the designer must document the site conditions and infeasibility criteria used to deem each BMP infeasible. This documentation will demonstrate compliance with Minimum Requirement #5.

Feasibility shall be determined by evaluation against:

- Design criteria, limitations, and infeasibility criteria identified for each BMP in this manual; and
- Competing Needs Criteria as listed below.

The text in this box originates from one or more of the following Permits:
Appendix 1 of the Phase I / Phase II Municipal Stormwater Permits
Construction Stormwater General Permit

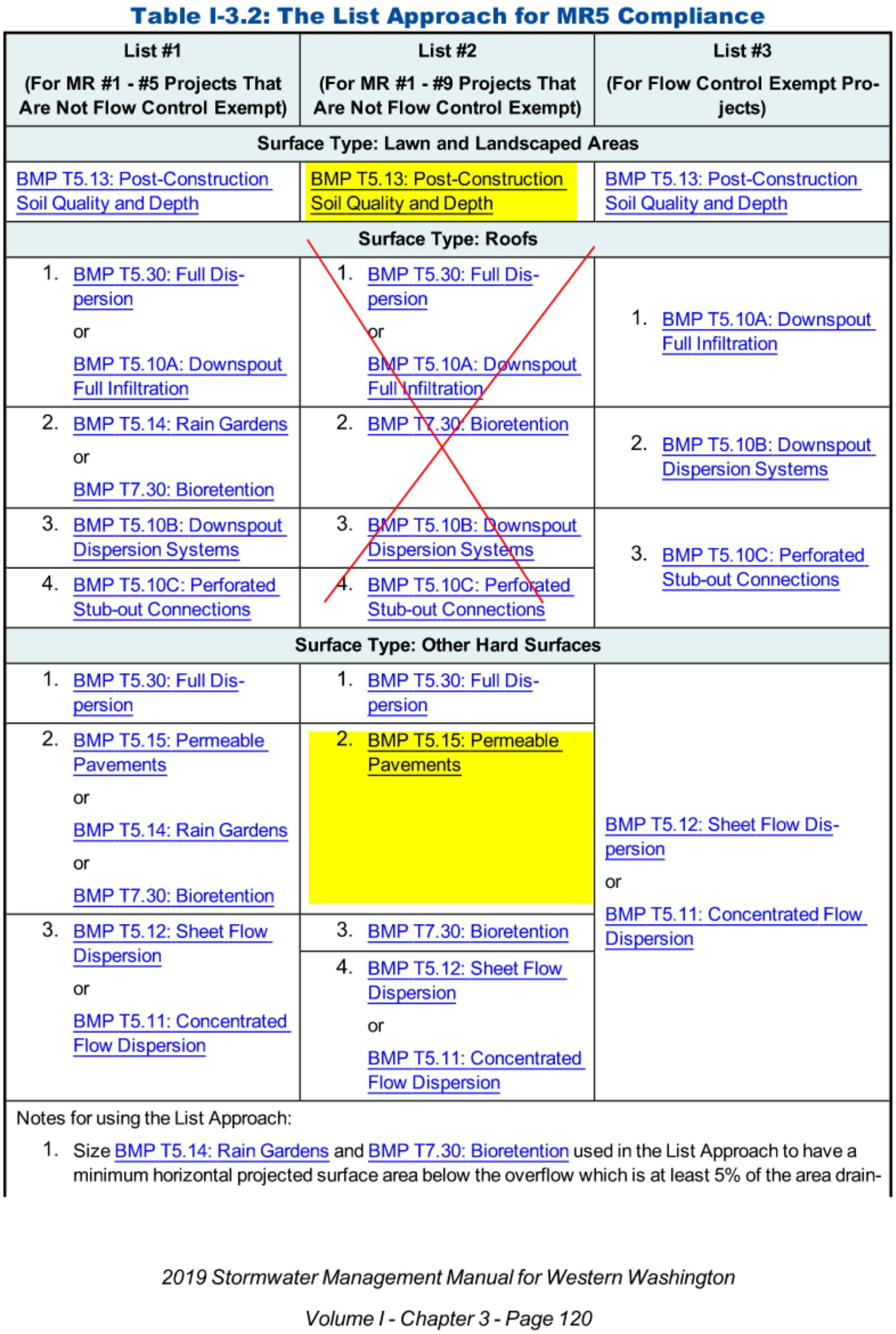


Table I-3.2: The List Approach for MR5 Compliance

List #1 (For MR #1 - #5 Projects That Are Not Flow Control Exempt)	List #2 (For MR #1 - #9 Projects That Are Not Flow Control Exempt)	List #3 (For Flow Control Exempt Projects)
Surface Type: Lawn and Landscaped Areas		
BMP T5.13: Post-Construction Soil Quality and Depth	BMP T5.13: Post-Construction Soil Quality and Depth	BMP T5.13: Post-Construction Soil Quality and Depth
Surface Type: Roofs		
1. BMP T5.30: Full Dispersion or BMP T5.10A: Downspout Full Infiltration	~~1. BMP T5.30: Full Dispersion~~ ~~or~~ ~~BMP T5.10A: Downspout Full Infiltration~~	1. BMP T5.10A: Downspout Full Infiltration
2. BMP T5.14: Rain Gardens or BMP T7.30: Bioretention	~~2. BMP T7.30: Bioretention~~	2. BMP T5.10B: Downspout Dispersion Systems
3. BMP T5.10B: Downspout Dispersion Systems	~~3. BMP T5.10B: Downspout Dispersion Systems~~	3. BMP T5.10C: Perforated Stub-out Connections
4. BMP T5.10C: Perforated Stub-out Connections	~~4. BMP T5.10C: Perforated Stub-out Connections~~	
Surface Type: Other Hard Surfaces		
1. BMP T5.30: Full Dispersion	1. BMP T5.30: Full Dispersion	BMP T5.12: Sheet Flow Dispersion or BMP T5.11: Concentrated Flow Dispersion
2. BMP T5.15: Permeable Pavements or BMP T5.14: Rain Gardens or BMP T7.30: Bioretention	2. BMP T5.15: Permeable Pavements	
3. BMP T5.12: Sheet Flow Dispersion or BMP T5.11: Concentrated Flow Dispersion	3. BMP T7.30: Bioretention	
	4. BMP T5.12: Sheet Flow Dispersion or BMP T5.11: Concentrated Flow Dispersion	

Notes for using the List Approach:

1. Size BMP T5.14: Rain Gardens and BMP T7.30: Bioretention used in the List Approach to have a minimum horizontal projected surface area below the overflow which is at least 5% of the area drain-

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Table I-3.2: The List Approach for MR5 Compliance (continued)

List #1 **(For MR #1 - #5 Projects That Are Not Flow Control Exempt)**	**List #2** **(For MR #1 - #9 Projects That Are Not Flow Control Exempt)**	**List #3** **(For Flow Control Exempt Projects)**
ing to it. 2. When the designer encounters BMP T5.15: Permeable Pavements in the List Approach, it is not a requirement to pave these surfaces. Where pavement is proposed, it must be permeable to the extent feasible unless BMP T5.30: Full Dispersion is employed.		

Objective

The objective of On-Site Stormwater Management is to use practices distributed across a development that reduce the amount of disruption of the natural hydrologic characteristics of the site.

Competing Needs Criteria

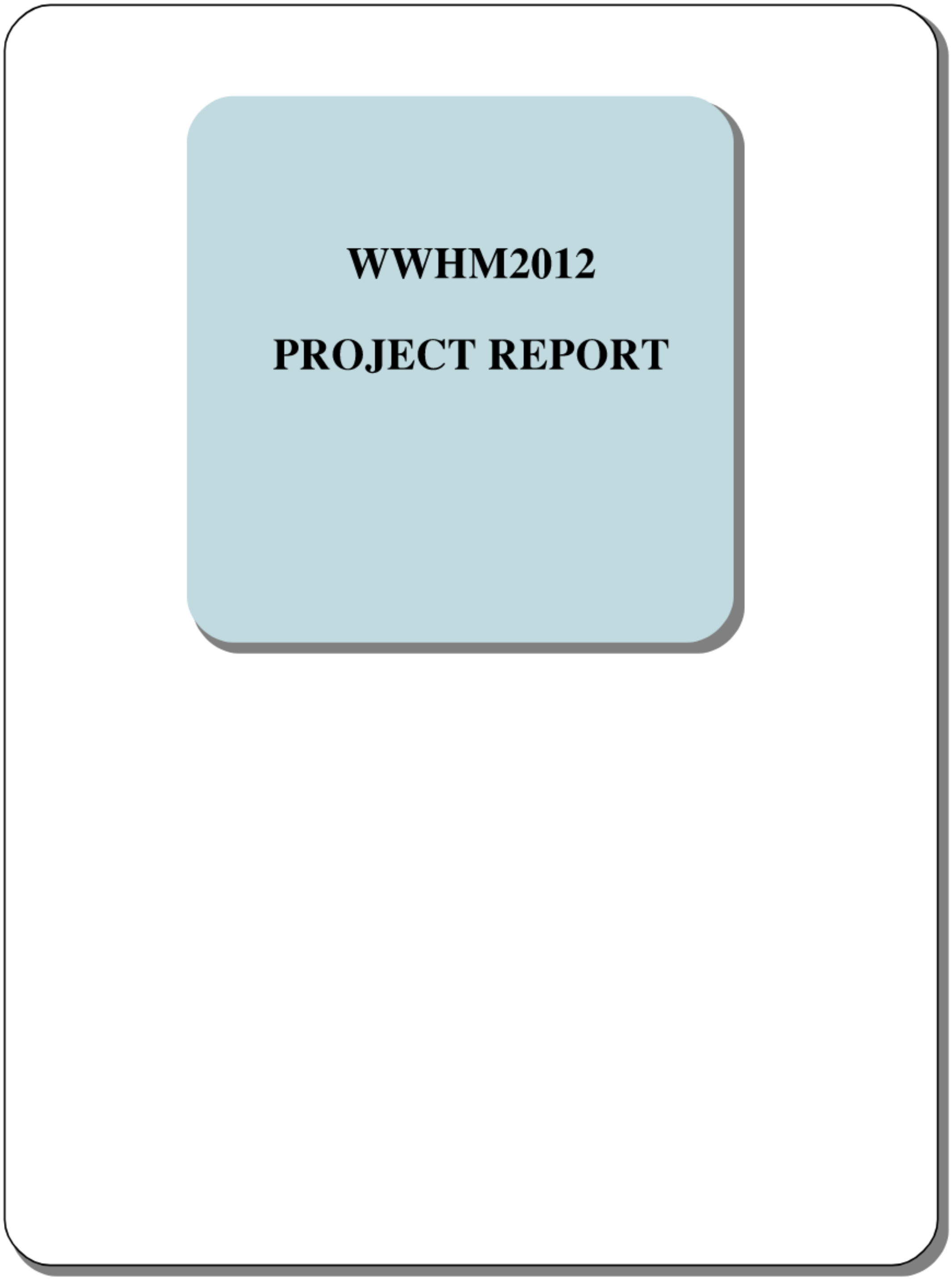
LID BMPs can be superseded or restricted where they are in conflict with:

- Requirements of the following federal or state laws, rules, and standards:
    - Historic Preservation Laws and Archaeology Laws as listed at https://dahp.wa.gov/project-review/preservation-laws,
    - Federal Superfund or Washington State Model Toxics Control Act,
    - Federal Aviation Administration requirements for airports,
    - Americans with Disabilities Act.
- When an LID requirement has been found to be in conflict with special zoning district design criteria adopted and being implemented pursuant to a community planning process. The existing local codes may supersede or reduce the LID requirement.
- Public health and safety standards (e.g. active zone of a skate park, bike park, or sport court where permeable pavement violates safety standards).
- Transportation regulations to maintain the option for future expansion or multi-modal use of public rights-of-way.
- A local Critical Area Ordinance that provides protection of tree species.
- A local code or rule adopted as part of a Wellhead Protection Program established under the Federal Safe Drinking Water Act; or adopted to protect a Critical Aquifer Recharge Area established under the State Growth Management Act.

Supplemental Guidelines

In order to meet the LID Performance Standard, designers may use any Flow Control BMP in the SWMMWW. There are no specific Flow Control BMPs that must be used to meet the LID Performance Standard.

Appendix H Permanent Stormwater Control Calculations



WWHM2012

PROJECT REPORT

General Model Information

WWHM2012 Project Name: prelim calcs

Site Name: Sparks Stadium
Site Address: 601 7th ave sw
City: Puyallup
Report Date: 10/2/2024
Gage: 42 IN EAST
Data Start: 10/01/1901
Data End: 09/30/2059
Timestep: 15 Minute
Precip Scale: 1.000
Version Date: 2024/06/28
Version: 4.3.1

POC Thresholds

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

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Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Lawn, Flat	0.65
Pervious Total	0.65
Impervious Land Use	acre
ROADS FLAT	0.08
ROOF TOPS FLAT	0.08
Impervious Total	0.16
Basin Total	0.81

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

POC 1	POC 1

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Mitigated Land Use

Basin 1 Landscape

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Lawn, Flat	0.27
Pervious Total	0.27
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.27

Element Flow Componants:

Surface	Interflow	Groundwater
Componant Flows To:		
Gravel Trench Bed 1	Gravel Trench Bed 1	

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Impervious walk

Bypass:	No
Impervious Land Use	acre
SIDEWALKS FLAT	0.03

Element Flow Componant:
Surface
Componant Flows To:
Permeable Pavement 2

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Remove & New AC

Bypass:	No
Impervious Land Use	acre
ROADS FLAT	0.07

Element Flow Componant:
Surface
Componant Flows To:
Permeable Pavement 2
POC 1

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Pervious Pavemnent

Bypass: No

GroundWater: No

Pervious Land Use	acre
C, Pasture, Flat	.45

Element Flow Componants:

Surface	Interflow	Groundwater

Componant Flows To:

Surface	Interflow	Groundwater
Permeable Pavement 2	Permeable Pavement 2	

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Routing Elements

Predeveloped Routing

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Mitigated Routing

Permeable Pavement 2

Pavement Area:0.4435 acre.Pavement Length:139.00 ft.
Pavement Width: 139.00 ft.
Pavement slope 1:0.02 To 1
Pavement thickness: 0.67
Pour Space of Pavement: 0.4
Material thickness of second layer: 0.33
Pour Space of material for second layer: 0.4
Material thickness of third layer: 0.5
Pour Space of material for third layer: 0.4
Infiltration On
Infiltration rate: 0.5
Infiltration safety factor: 1
Total Volume Infiltrated (ac-ft.): 281.58
Total Volume Through Riser (ac-ft.): 0
Total Volume Through Facility (ac-ft.): 281.58
Percent Infiltrated: 100
Total Precip Applied to Facility: 0
Total Evap From Facility: 22.904
Discharge Structure
Riser Height: 2.5 ft.
Riser Diameter: 1668 in.
Notch Type: Rectangular
Notch Width: 13.900 ft.
Notch Height: 1.000 ft.
Element Outlets:
Outlet 1 Outlet 2
Outlet Flows To:

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Permeable Pavement Hydraulic Table

Stage(feet)	**Area(ac.)**	**Volume(ac-ft.)**	**Discharge(cfs)**	**Infilt(cfs)**
0.0000	0.443	0.000	0.000	0.000
0.0278	0.443	0.004	0.000	0.223
0.0556	0.443	0.009	0.000	0.223
0.0833	0.443	0.014	0.000	0.223
0.1111	0.443	0.019	0.000	0.223
0.1389	0.443	0.024	0.000	0.223
0.1667	0.443	0.029	0.000	0.223
0.1944	0.443	0.034	0.000	0.223
0.2222	0.443	0.039	0.000	0.223
0.2500	0.443	0.044	0.000	0.223
0.2778	0.443	0.049	0.000	0.223
0.3056	0.443	0.054	0.000	0.223
0.3333	0.443	0.059	0.000	0.223
0.3611	0.443	0.064	0.000	0.223
0.3889	0.443	0.069	0.000	0.223
0.4167	0.443	0.073	0.000	0.223
0.4444	0.443	0.078	0.000	0.223
0.4722	0.443	0.083	0.000	0.223
0.5000	0.443	0.088	0.000	0.223
0.5278	0.443	0.093	0.000	0.223
0.5556	0.443	0.098	0.000	0.223
0.5833	0.443	0.103	0.000	0.223

0.6111	0.443	0.108	0.000	0.223
0.6389	0.443	0.113	0.000	0.223
0.6667	0.443	0.118	0.000	0.223
0.6944	0.443	0.123	0.000	0.223
0.7222	0.443	0.128	0.000	0.223
0.7500	0.443	0.133	0.000	0.223
0.7778	0.443	0.138	0.000	0.223
0.8056	0.443	0.142	0.000	0.223
0.8333	0.443	0.147	0.000	0.223
0.8611	0.443	0.152	0.000	0.223
0.8889	0.443	0.157	0.000	0.223
0.9167	0.443	0.162	0.000	0.223
0.9444	0.443	0.167	0.000	0.223
0.9722	0.443	0.172	0.000	0.223
1.0000	0.443	0.177	0.000	0.223
1.0278	0.443	0.182	0.000	0.223
1.0556	0.443	0.187	0.000	0.223
1.0833	0.443	0.192	0.000	0.223
1.1111	0.443	0.197	0.000	0.223
1.1389	0.443	0.202	0.000	0.223
1.1667	0.443	0.207	0.000	0.223
1.1944	0.443	0.212	0.000	0.223
1.2222	0.443	0.216	0.000	0.223
1.2500	0.443	0.221	0.000	0.223
1.2778	0.443	0.226	0.000	0.223
1.3056	0.443	0.231	0.000	0.223
1.3333	0.443	0.236	0.000	0.223
1.3611	0.443	0.241	0.000	0.223
1.3889	0.443	0.246	0.000	0.223
1.4167	0.443	0.251	0.000	0.223
1.4444	0.443	0.256	0.000	0.223
1.4722	0.443	0.261	0.000	0.223
1.5000	0.443	0.266	0.000	0.223
1.5278	0.443	0.278	0.214	0.223
1.5556	0.443	0.290	0.606	0.223
1.5833	0.443	0.303	1.113	0.223
1.6111	0.443	0.315	1.714	0.223
1.6389	0.443	0.327	2.395	0.223
1.6667	0.443	0.340	3.149	0.223
1.6944	0.443	0.352	3.968	0.223
1.7222	0.443	0.364	4.848	0.223
1.7500	0.443	0.377	5.785	0.223
1.7778	0.443	0.389	6.776	0.223
1.8056	0.443	0.401	7.818	0.223
1.8333	0.443	0.414	8.907	0.223
1.8611	0.443	0.426	10.04	0.223
1.8889	0.443	0.438	11.22	0.223
1.9167	0.443	0.451	12.44	0.223
1.9444	0.443	0.463	13.71	0.223
1.9722	0.443	0.475	15.02	0.223
2.0000	0.443	0.488	16.36	0.223
2.0278	0.443	0.500	17.74	0.223
2.0556	0.443	0.512	19.16	0.223
2.0833	0.443	0.525	20.62	0.223
2.1111	0.443	0.537	22.11	0.223
2.1389	0.443	0.549	23.63	0.223
2.1667	0.443	0.562	25.19	0.223
2.1944	0.443	0.574	26.78	0.223

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2.2222	0.443	0.586	28.41	0.223
2.2500	0.443	0.599	30.06	0.223
2.2778	0.443	0.611	31.75	0.223
2.3056	0.443	0.623	33.46	0.223
2.3333	0.443	0.636	35.21	0.223
2.3611	0.443	0.648	36.98	0.223
2.3889	0.443	0.660	38.79	0.223
2.4167	0.443	0.673	40.62	0.223
2.4444	0.443	0.685	42.48	0.223
2.4722	0.443	0.697	44.37	0.223
2.5000	0.443	0.710	46.28	0.223

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Gravel Trench Bed 1

Bottom Length: 108.00 ft.
Bottom Width: 108.00 ft.
Trench bottom slope 1: 0.001 To 1
Trench Left side slope 0: 0.001 To 1
Trench right side slope 2: 0.001 To 1
Material thickness of first layer: 0.67
Pour Space of material for first layer: 0.4
Material thickness of second layer: 0
Pour Space of material for second layer: 0
Material thickness of third layer: 0
Pour Space of material for third layer: 0
Infiltration On
Infiltration rate: 0.5
Infiltration safety factor: 1
Total Volume Infiltrated (ac-ft.): 198.415
Total Volume Through Riser (ac-ft.): 0
Total Volume Through Facility (ac-ft.): 198.415
Percent Infiltrated: 100
Total Precip Applied to Facility: 142.722
Total Evap From Facility: 0
Discharge Structure
Riser Height: 0 ft.
Riser Diameter: 0 in.
Element Outlets:
Outlet 1 Outlet 2
Outlet Flows To:

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Gravel Trench Bed Hydraulic Table

Stage(feet)	**Area(ac.)**	**Volume(ac-ft.)**	**Discharge(cfs)**	**Infilt(cfs)**
0.0000	0.267	0.000	0.000	0.000
0.0186	0.267	0.002	0.000	0.135
0.0371	0.267	0.004	0.000	0.135
0.0557	0.267	0.006	0.000	0.135
0.0742	0.267	0.007	0.000	0.135
0.0928	0.267	0.009	0.000	0.135
0.1113	0.267	0.011	0.000	0.135
0.1299	0.267	0.013	0.000	0.135
0.1484	0.267	0.015	0.000	0.135
0.1670	0.267	0.017	0.000	0.135
0.1856	0.267	0.019	0.000	0.135
0.2041	0.267	0.021	0.000	0.135
0.2227	0.267	0.023	0.000	0.135
0.2412	0.267	0.025	0.000	0.135
0.2598	0.267	0.027	0.000	0.135
0.2783	0.267	0.029	0.000	0.135
0.2969	0.267	0.031	0.000	0.135
0.3154	0.267	0.033	0.000	0.135
0.3340	0.267	0.035	0.000	0.135
0.3526	0.267	0.037	0.000	0.135
0.3711	0.267	0.039	0.000	0.135
0.3897	0.267	0.041	0.000	0.135
0.4082	0.267	0.043	0.000	0.135
0.4268	0.267	0.045	0.000	0.135
0.4453	0.267	0.047	0.000	0.135

0.4639	0.267	0.049	0.000	0.135
0.4824	0.267	0.051	0.000	0.135
0.5010	0.267	0.053	0.000	0.135
0.5196	0.267	0.055	0.000	0.135
0.5381	0.267	0.057	0.000	0.135
0.5567	0.267	0.059	0.000	0.135
0.5752	0.267	0.061	0.000	0.135
0.5938	0.267	0.063	0.000	0.135
0.6123	0.267	0.065	0.000	0.135
0.6309	0.267	0.067	0.000	0.135
0.6494	0.267	0.069	0.000	0.135
0.6680	0.267	0.071	0.000	0.135
0.6866	0.267	0.076	0.000	0.135
0.7051	0.267	0.081	0.000	0.135
0.7237	0.267	0.086	0.000	0.135
0.7422	0.267	0.091	0.000	0.135
0.7608	0.267	0.096	0.000	0.135
0.7793	0.267	0.101	0.000	0.135
0.7979	0.267	0.106	0.000	0.135
0.8164	0.267	0.111	0.000	0.135
0.8350	0.267	0.116	0.000	0.135
0.8536	0.267	0.121	0.000	0.135
0.8721	0.267	0.126	0.000	0.135
0.8907	0.267	0.131	0.000	0.135
0.9092	0.267	0.136	0.000	0.135
0.9278	0.267	0.141	0.000	0.135
0.9463	0.267	0.146	0.000	0.135
0.9649	0.267	0.151	0.000	0.135
0.9834	0.267	0.156	0.000	0.135
1.0020	0.267	0.161	0.000	0.135
1.0206	0.267	0.166	0.000	0.135
1.0391	0.267	0.170	0.000	0.135
1.0577	0.267	0.175	0.000	0.135
1.0762	0.267	0.180	0.000	0.135
1.0948	0.267	0.185	0.000	0.135
1.1133	0.267	0.190	0.000	0.135
1.1319	0.267	0.195	0.000	0.135
1.1504	0.267	0.200	0.000	0.135
1.1690	0.267	0.205	0.000	0.135
1.1876	0.267	0.210	0.000	0.135
1.2061	0.267	0.215	0.000	0.135
1.2247	0.267	0.220	0.000	0.135
1.2432	0.267	0.225	0.000	0.135
1.2618	0.267	0.230	0.000	0.135
1.2803	0.267	0.235	0.000	0.135
1.2989	0.267	0.240	0.000	0.135
1.3174	0.267	0.245	0.000	0.135
1.3360	0.267	0.250	0.000	0.135
1.3546	0.267	0.255	0.000	0.135
1.3731	0.267	0.260	0.000	0.135
1.3917	0.267	0.265	0.000	0.135
1.4102	0.267	0.270	0.000	0.135
1.4288	0.267	0.275	0.000	0.135
1.4473	0.267	0.280	0.000	0.135
1.4659	0.267	0.285	0.000	0.135
1.4844	0.267	0.290	0.000	0.135
1.5030	0.267	0.295	0.000	0.135
1.5216	0.267	0.300	0.000	0.135

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1.5401	0.267	0.305	0.000	0.135
1.5587	0.267	0.310	0.000	0.135
1.5772	0.267	0.315	0.000	0.135
1.5958	0.267	0.320	0.000	0.135
1.6143	0.267	0.325	0.000	0.135
1.6329	0.267	0.329	0.000	0.135
1.6514	0.267	0.334	0.000	0.135

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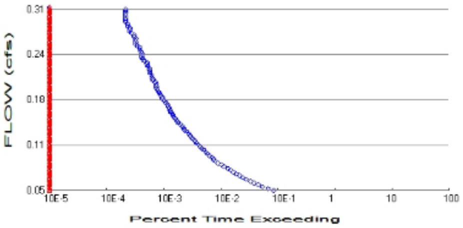
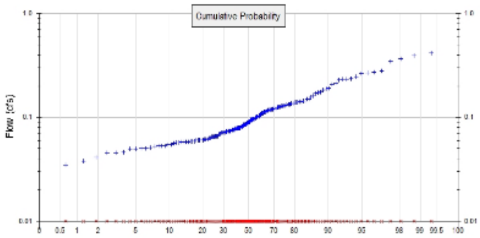
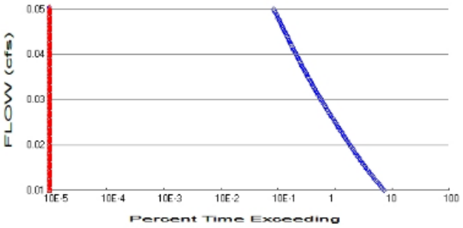
Analysis Results

POC 1







+ Predeveloped x Mitigated

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Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.65
Total Impervious Area: 0.16

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.72
Total Impervious Area: 0.543549

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.091555
5 year	0.143554
10 year	0.186139
25 year	0.250327
50 year	0.306412
100 year	0.370222

Flow Frequency Return Periods for Mitigated. POC #1

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

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1902	0.072	0.000
1903	0.083	0.000
1904	0.213	0.000
1905	0.055	0.000
1906	0.046	0.000
1907	0.125	0.000
1908	0.075	0.000
1909	0.084	0.000
1910	0.131	0.000
1911	0.115	0.000
1912	0.365	0.000
1913	0.057	0.000
1914	0.414	0.000
1915	0.058	0.000
1916	0.096	0.000
1917	0.035	0.000
1918	0.061	0.000
1919	0.058	0.000
1920	0.096	0.000
1921	0.076	0.000
1922	0.149	0.000
1923	0.086	0.000
1924	0.089	0.000
1925	0.053	0.000
1926	0.071	0.000
1927	0.061	0.000
1928	0.066	0.000
1929	0.156	0.000
1930	0.102	0.000
1931	0.065	0.000
1932	0.071	0.000
1933	0.075	0.000
1934	0.182	0.000
1935	0.051	0.000
1936	0.088	0.000
1937	0.143	0.000
1938	0.061	0.000
1939	0.054	0.000
1940	0.109	0.000
1941	0.095	0.000
1942	0.143	0.000
1943	0.100	0.000
1944	0.188	0.000
1945	0.096	0.000
1946	0.109	0.000
1947	0.053	0.000
1948	0.103	0.000
1949	0.107	0.000
1950	0.053	0.000
1951	0.079	0.000
1952	0.280	0.000
1953	0.233	0.000
1954	0.074	0.000
1955	0.049	0.000
1956	0.041	0.000
1957	0.065	0.000

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1958	0.150	0.000
1959	0.141	0.000
1960	0.059	0.000
1961	0.270	0.000
1962	0.079	0.000
1963	0.046	0.000
1964	0.266	0.000
1965	0.120	0.000
1966	0.065	0.000
1967	0.140	0.000
1968	0.079	0.000
1969	0.078	0.000
1970	0.113	0.000
1971	0.126	0.000
1972	0.393	0.000
1973	0.121	0.000
1974	0.127	0.000
1975	0.237	0.000
1976	0.190	0.000
1977	0.045	0.000
1978	0.161	0.000
1979	0.113	0.000
1980	0.140	0.000
1981	0.090	0.000
1982	0.066	0.000
1983	0.128	0.000
1984	0.120	0.000
1985	0.171	0.000
1986	0.063	0.000
1987	0.136	0.000
1988	0.063	0.000
1989	0.061	0.000
1990	0.084	0.000
1991	0.120	0.000
1992	0.102	0.000
1993	0.079	0.000
1994	0.114	0.000
1995	0.058	0.000
1996	0.117	0.000
1997	0.074	0.000
1998	0.117	0.000
1999	0.069	0.000
2000	0.089	0.000
2001	0.057	0.000
2002	0.231	0.000
2003	0.079	0.000
2004	0.110	0.000
2005	0.245	0.000
2006	0.074	0.000
2007	0.118	0.000
2008	0.097	0.000
2009	0.059	0.000
2010	0.078	0.000
2011	0.056	0.000
2012	0.085	0.000
2013	0.101	0.000
2014	0.075	0.000
2015	0.230	0.000

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2016	0.060	0.000
2017	0.113	0.000
2018	0.141	0.000
2019	0.207	0.000
2020	0.127	0.000
2021	0.096	0.000
2022	0.130	0.000
2023	0.122	0.000
2024	0.346	0.000
2025	0.058	0.000
2026	0.125	0.000
2027	0.081	0.000
2028	0.034	0.000
2029	0.081	0.000
2030	0.131	0.000
2031	0.038	0.000
2032	0.050	0.000
2033	0.060	0.000
2034	0.053	0.000
2035	0.136	0.000
2036	0.072	0.000
2037	0.065	0.000
2038	0.141	0.000
2039	0.134	0.000
2040	0.073	0.000
2041	0.093	0.000
2042	0.134	0.000
2043	0.102	0.000
2044	0.097	0.000
2045	0.068	0.000
2046	0.073	0.000
2047	0.060	0.000
2048	0.050	0.000
2049	0.086	0.000
2050	0.091	0.000
2051	0.176	0.000
2052	0.059	0.000
2053	0.061	0.000
2054	0.270	0.000
2055	0.078	0.000
2056	0.085	0.000
2057	0.051	0.000
2058	0.073	0.000
2059	0.173	0.000

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Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.4139	0.0000
2	0.3926	0.0000
3	0.3648	0.0000
4	0.3457	0.0000
5	0.2805	0.0000
6	0.2702	0.0000
7	0.2697	0.0000
8	0.2658	0.0000
9	0.2452	0.0000
10	0.2368	0.0000

11	0.2331	0.0000
12	0.2311	0.0000
13	0.2304	0.0000
14	0.2128	0.0000
15	0.2075	0.0000
16	0.1905	0.0000
17	0.1880	0.0000
18	0.1822	0.0000
19	0.1757	0.0000
20	0.1728	0.0000
21	0.1712	0.0000
22	0.1610	0.0000
23	0.1562	0.0000
24	0.1501	0.0000
25	0.1492	0.0000
26	0.1435	0.0000
27	0.1432	0.0000
28	0.1411	0.0000
29	0.1410	0.0000
30	0.1405	0.0000
31	0.1403	0.0000
32	0.1398	0.0000
33	0.1364	0.0000
34	0.1355	0.0000
35	0.1336	0.0000
36	0.1336	0.0000
37	0.1311	0.0000
38	0.1306	0.0000
39	0.1299	0.0000
40	0.1279	0.0000
41	0.1274	0.0000
42	0.1271	0.0000
43	0.1259	0.0000
44	0.1251	0.0000
45	0.1251	0.0000
46	0.1218	0.0000
47	0.1208	0.0000
48	0.1205	0.0000
49	0.1200	0.0000
50	0.1196	0.0000
51	0.1175	0.0000
52	0.1174	0.0000
53	0.1173	0.0000
54	0.1153	0.0000
55	0.1139	0.0000
56	0.1134	0.0000
57	0.1132	0.0000
58	0.1130	0.0000
59	0.1097	0.0000
60	0.1090	0.0000
61	0.1087	0.0000
62	0.1071	0.0000
63	0.1031	0.0000
64	0.1022	0.0000
65	0.1022	0.0000
66	0.1019	0.0000
67	0.1006	0.0000
68	0.1004	0.0000

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69	0.0974	0.0000
70	0.0965	0.0000
71	0.0962	0.0000
72	0.0960	0.0000
73	0.0959	0.0000
74	0.0956	0.0000
75	0.0951	0.0000
76	0.0935	0.0000
77	0.0906	0.0000
78	0.0901	0.0000
79	0.0894	0.0000
80	0.0886	0.0000
81	0.0882	0.0000
82	0.0863	0.0000
83	0.0857	0.0000
84	0.0853	0.0000
85	0.0850	0.0000
86	0.0845	0.0000
87	0.0839	0.0000
88	0.0828	0.0000
89	0.0812	0.0000
90	0.0805	0.0000
91	0.0795	0.0000
92	0.0789	0.0000
93	0.0788	0.0000
94	0.0787	0.0000
95	0.0786	0.0000
96	0.0783	0.0000
97	0.0778	0.0000
98	0.0775	0.0000
99	0.0761	0.0000
100	0.0754	0.0000
101	0.0753	0.0000
102	0.0752	0.0000
103	0.0741	0.0000
104	0.0740	0.0000
105	0.0736	0.0000
106	0.0733	0.0000
107	0.0730	0.0000
108	0.0727	0.0000
109	0.0722	0.0000
110	0.0719	0.0000
111	0.0713	0.0000
112	0.0712	0.0000
113	0.0694	0.0000
114	0.0684	0.0000
115	0.0660	0.0000
116	0.0658	0.0000
117	0.0654	0.0000
118	0.0647	0.0000
119	0.0646	0.0000
120	0.0645	0.0000
121	0.0629	0.0000
122	0.0627	0.0000
123	0.0614	0.0000
124	0.0613	0.0000
125	0.0611	0.0000
126	0.0608	0.0000

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127	0.0605	0.0000
128	0.0604	0.0000
129	0.0603	0.0000
130	0.0601	0.0000
131	0.0591	0.0000
132	0.0586	0.0000
133	0.0586	0.0000
134	0.0583	0.0000
135	0.0580	0.0000
136	0.0579	0.0000
137	0.0578	0.0000
138	0.0574	0.0000
139	0.0574	0.0000
140	0.0564	0.0000
141	0.0546	0.0000
142	0.0544	0.0000
143	0.0532	0.0000
144	0.0531	0.0000
145	0.0529	0.0000
146	0.0526	0.0000
147	0.0510	0.0000
148	0.0506	0.0000
149	0.0505	0.0000
150	0.0495	0.0000
151	0.0494	0.0000
152	0.0464	0.0000
153	0.0455	0.0000
154	0.0453	0.0000
155	0.0415	0.0000
156	0.0380	0.0000
157	0.0349	0.0000
158	0.0335	0.0000

DRAFT

LID Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0073	404037	0	0	Pass
0.0077	379051	0	0	Pass
0.0081	355728	0	0	Pass
0.0085	334066	0	0	Pass
0.0089	314232	0	0	Pass
0.0093	295729	0	0	Pass
0.0097	278610	0	0	Pass
0.0100	262654	0	0	Pass
0.0104	247752	0	0	Pass
0.0108	233957	0	0	Pass
0.0112	221326	0	0	Pass
0.0116	209027	0	0	Pass
0.0120	197669	0	0	Pass
0.0124	187088	0	0	Pass
0.0128	177171	0	0	Pass
0.0132	167698	0	0	Pass
0.0135	159055	0	0	Pass
0.0139	150856	0	0	Pass
0.0143	143155	0	0	Pass
0.0147	135953	0	0	Pass
0.0151	129139	0	0	Pass
0.0155	122823	0	0	Pass
0.0159	116840	0	0	Pass
0.0163	111189	0	0	Pass
0.0166	105871	0	0	Pass
0.0170	100774	0	0	Pass
0.0174	95843	0	0	Pass
0.0178	91356	0	0	Pass
0.0182	87090	0	0	Pass
0.0186	82990	0	0	Pass
0.0190	79112	0	0	Pass
0.0194	75400	0	0	Pass
0.0198	71799	0	0	Pass
0.0201	68531	0	0	Pass
0.0205	65262	0	0	Pass
0.0209	62270	0	0	Pass
0.0213	59445	0	0	Pass
0.0217	56675	0	0	Pass
0.0221	53999	0	0	Pass
0.0225	51451	0	0	Pass
0.0229	49074	0	0	Pass
0.0232	46830	0	0	Pass
0.0236	44592	0	0	Pass
0.0240	42553	0	0	Pass
0.0244	40692	0	0	Pass
0.0248	38902	0	0	Pass
0.0252	37196	0	0	Pass
0.0256	35600	0	0	Pass
0.0260	34016	0	0	Pass
0.0264	32481	0	0	Pass
0.0267	31063	0	0	Pass
0.0271	29700	0	0	Pass
0.0275	28493	0	0	Pass

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0.0279	27296	0	0	Pass
0.0283	26155	0	0	Pass
0.0287	25080	0	0	Pass
0.0291	24022	0	0	Pass
0.0295	23063	0	0	Pass
0.0299	22105	0	0	Pass
0.0302	21202	0	0	Pass
0.0306	20360	0	0	Pass
0.0310	19495	0	0	Pass
0.0314	18703	0	0	Pass
0.0318	17950	0	0	Pass
0.0322	17241	0	0	Pass
0.0326	16554	0	0	Pass
0.0330	15917	0	0	Pass
0.0333	15318	0	0	Pass
0.0337	14748	0	0	Pass
0.0341	14183	0	0	Pass
0.0345	13662	0	0	Pass
0.0349	13147	0	0	Pass
0.0353	12654	0	0	Pass
0.0357	12216	0	0	Pass
0.0361	11756	0	0	Pass
0.0365	11302	0	0	Pass
0.0368	10886	0	0	Pass
0.0372	10482	0	0	Pass
0.0376	10100	0	0	Pass
0.0380	9717	0	0	Pass
0.0384	9379	0	0	Pass
0.0388	9052	0	0	Pass
0.0392	8720	0	0	Pass
0.0396	8399	0	0	Pass
0.0400	8100	0	0	Pass
0.0403	7806	0	0	Pass
0.0407	7540	0	0	Pass
0.0411	7269	0	0	Pass
0.0415	7014	0	0	Pass
0.0419	6770	0	0	Pass
0.0423	6510	0	0	Pass
0.0427	6260	0	0	Pass
0.0431	6050	0	0	Pass
0.0434	5850	0	0	Pass
0.0438	5629	0	0	Pass
0.0442	5459	0	0	Pass
0.0446	5262	0	0	Pass
0.0450	5063	0	0	Pass
0.0454	4905	0	0	Pass
0.0458	4737	0	0	Pass

DRAFT

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0458	4737	0	0	Pass
0.0484	3753	0	0	Pass
0.0510	3021	0	0	Pass
0.0537	2522	0	0	Pass
0.0563	2125	0	0	Pass
0.0589	1825	0	0	Pass
0.0616	1563	0	0	Pass
0.0642	1363	0	0	Pass
0.0668	1191	0	0	Pass
0.0695	1040	0	0	Pass
0.0721	922	0	0	Pass
0.0747	828	0	0	Pass
0.0774	737	0	0	Pass
0.0800	630	0	0	Pass
0.0826	565	0	0	Pass
0.0853	500	0	0	Pass
0.0879	450	0	0	Pass
0.0905	409	0	0	Pass
0.0932	388	0	0	Pass
0.0958	355	0	0	Pass
0.0984	325	0	0	Pass
0.1011	303	0	0	Pass
0.1037	280	0	0	Pass
0.1063	255	0	0	Pass
0.1090	241	0	0	Pass
0.1116	223	0	0	Pass
0.1142	209	0	0	Pass
0.1169	196	0	0	Pass
0.1195	184	0	0	Pass
0.1221	172	0	0	Pass
0.1248	162	0	0	Pass
0.1274	150	0	0	Pass
0.1300	140	0	0	Pass
0.1327	129	0	0	Pass
0.1353	124	0	0	Pass
0.1379	118	0	0	Pass
0.1406	109	0	0	Pass
0.1432	100	0	0	Pass
0.1458	94	0	0	Pass
0.1485	90	0	0	Pass
0.1511	84	0	0	Pass
0.1537	81	0	0	Pass
0.1563	78	0	0	Pass
0.1590	73	0	0	Pass
0.1616	72	0	0	Pass
0.1642	69	0	0	Pass
0.1669	66	0	0	Pass
0.1695	64	0	0	Pass
0.1721	61	0	0	Pass
0.1748	58	0	0	Pass
0.1774	53	0	0	Pass
0.1800	53	0	0	Pass
0.1827	49	0	0	Pass

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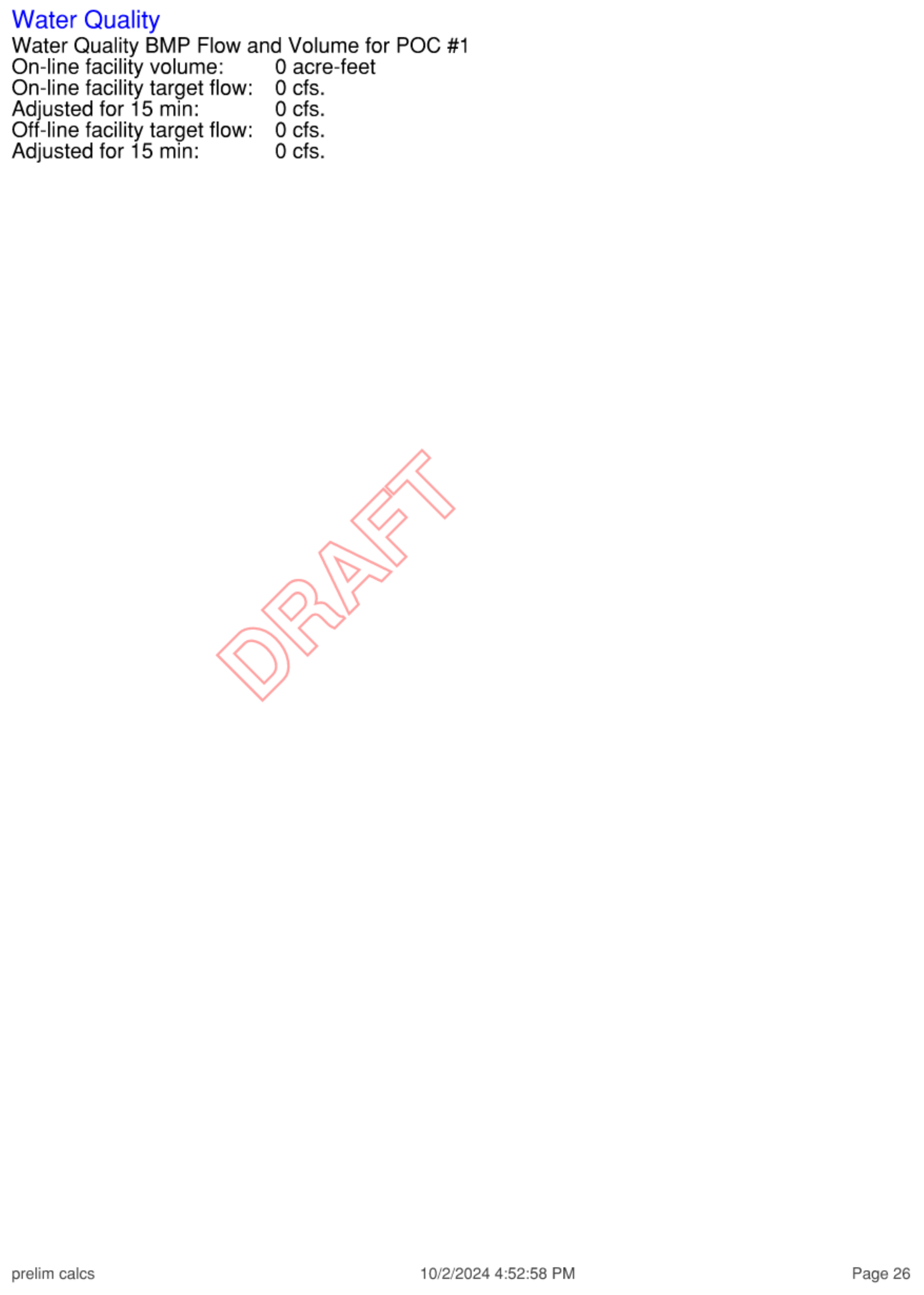
0.1853	47	0	0	Pass
0.1879	46	0	0	Pass
0.1906	43	0	0	Pass
0.1932	41	0	0	Pass
0.1958	41	0	0	Pass
0.1985	41	0	0	Pass
0.2011	40	0	0	Pass
0.2037	36	0	0	Pass
0.2064	36	0	0	Pass
0.2090	34	0	0	Pass
0.2116	34	0	0	Pass
0.2143	32	0	0	Pass
0.2169	32	0	0	Pass
0.2195	31	0	0	Pass
0.2222	31	0	0	Pass
0.2248	29	0	0	Pass
0.2274	28	0	0	Pass
0.2301	28	0	0	Pass
0.2327	25	0	0	Pass
0.2353	24	0	0	Pass
0.2380	23	0	0	Pass
0.2406	23	0	0	Pass
0.2432	23	0	0	Pass
0.2459	22	0	0	Pass
0.2485	21	0	0	Pass
0.2511	21	0	0	Pass
0.2538	19	0	0	Pass
0.2564	18	0	0	Pass
0.2590	18	0	0	Pass
0.2617	18	0	0	Pass
0.2643	18	0	0	Pass
0.2669	17	0	0	Pass
0.2696	17	0	0	Pass
0.2722	15	0	0	Pass
0.2748	14	0	0	Pass
0.2775	14	0	0	Pass
0.2801	14	0	0	Pass
0.2827	13	0	0	Pass
0.2854	13	0	0	Pass
0.2880	12	0	0	Pass
0.2906	12	0	0	Pass
0.2932	12	0	0	Pass
0.2959	12	0	0	Pass
0.2985	12	0	0	Pass
0.3011	12	0	0	Pass
0.3038	12	0	0	Pass
0.3064	12	0	0	Pass

DRAFT

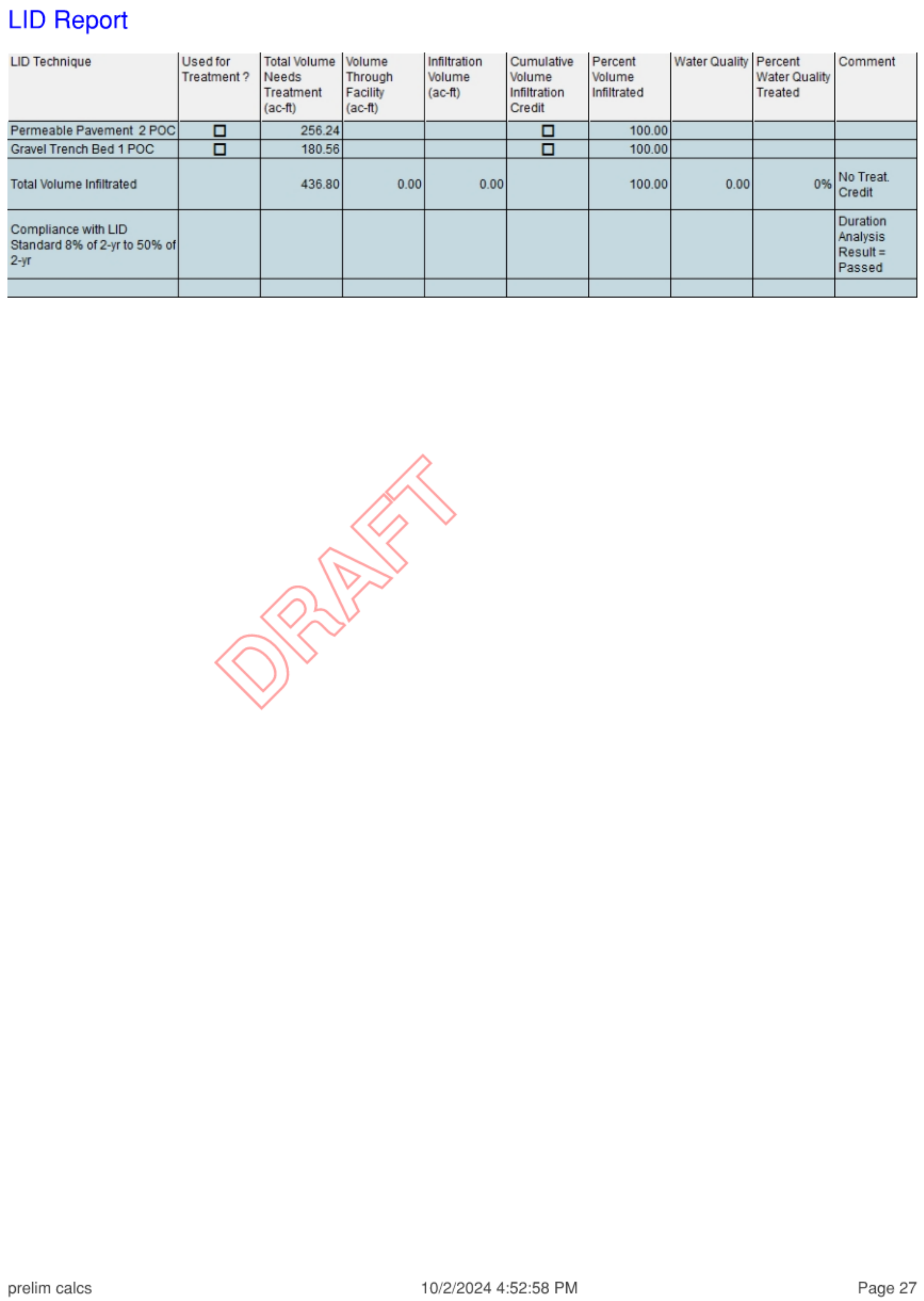


Water Quality

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.

DRAFT



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 2 POC	☐	256.24			☐	100.00			
Gravel Trench Bed 1 POC	☐	180.56			☐	100.00			
Total Volume Infiltrated		436.80	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 = Passed

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POC 2

POC #2 was not reported because POC must exist in both scenarios and both scenarios must have been run.

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Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

No PERLND changes have been made.

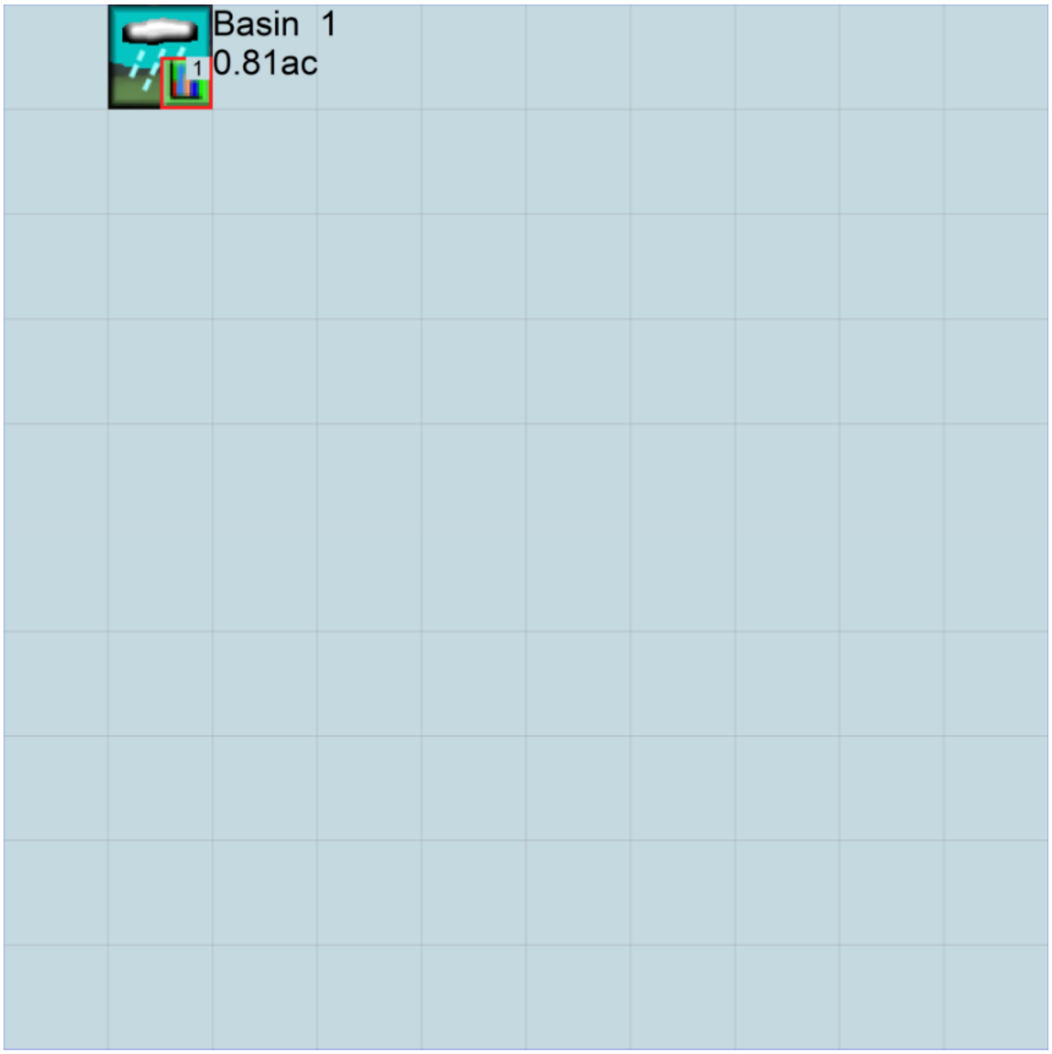
IMPLND Changes

No IMPLND changes have been made.

DRAFT

Appendix

Predeveloped Schematic



Mitigated Schematic

Predeveloped UCI File

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Mitigated UCI File

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```
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   prelim calcs.wdm
MESSU      25   Mitprelim calcs.MES
           27   Mitprelim calcs.L61
           28   Mitprelim calcs.L62
           30   POCprelim calcs1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      16
      IMPLND      20
      IMPLND      21
      PERLND      40
      RCHRES       1
      IMPLND      19
      RCHRES       2
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Gravel Trench Bed 1          MAX                      1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
   16     C, Lawn, Flat           1    1    1    1   27    0
   40     C, Pasture, Flat        1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   16         0    0    1    0    0    0    0    0    0    0    0    0
```

```
   40         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   16         0    0    4    0    0    0    0    0    0    0    0    0    1    9
   40         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   16         0    0    0    0    0    0    0    0    0    0    0
   40         0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   16              0       4.5      0.03       400      0.05       0.5     0.996
   40              0       4.5      0.06       400      0.05       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   16              0         0         2         2         0         0         0
   40              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                               ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   16            0.1      0.25      0.25         6       0.5      0.25
   40           0.15       0.4       0.3         6       0.5       0.4
  END PWAT-PARM4

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
              ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***      CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   16              0         0         0         0       2.5         1         0
   40              0         0         0         0       2.5         1         0
  END PWAT-STATE1

END PERLND

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

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
   20         0    0    1    0    0    0
   21         0    0    1    0    0    0
   19         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
   20         0    0    4    0    0    0    1    9
```

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```
   21         0    0    4    0    0    0    1    9
   19         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     ***
   20         0    0    0    0    0
   21         0    0    0    0    0
   19         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
   20            400      0.01        0.1        0.1
   21            400      0.01        0.1        0.1
   19            400      0.01        0.1        0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
   20              0         0
   21              0         0
   19              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
   20              0         0
   21              0         0
   19              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1 Landscape***
PERLND  16                        0.27     RCHRES   1      2
PERLND  16                        0.27     RCHRES   1      3
Impervious walk***
IMPLND  20                      0.0676     IMPLND  19     53
Pervious Pavemnent***
PERLND  40                      1.0145     IMPLND  19     54
PERLND  40                      1.0145     IMPLND  19     55
Remove & New AC***
IMPLND  21                      0.1578     IMPLND  19     53
IMPLND  19                      0.4435     RCHRES   2      5

******Routing******
PERLND  16                        0.27     COPY     1     12
PERLND  16                        0.27     COPY     1     13
IMPLND  20                        0.03     COPY     1     15
IMPLND  21                        0.07     COPY     1     15
PERLND  40                        0.45     COPY     1     12
PERLND  40                        0.45     COPY     1     13
RCHRES   2                           1     COPY   501     17
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
```

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

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                 ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG            ***
                                           in  out                           ***
    1     Gravel Trench Be-012    2    1    1    1   28    0    1
    2     Permeable Paveme-010    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
    2         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
    2         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
    2        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
    2             2      0.03       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
    2            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       2
   91    5
     Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
      (ft)   (acres) (acre-ft)     (cfs)     (cfs)  (ft/sec)    (Minutes)***
  0.000000  0.443549  0.000000  0.000000  0.000000
  0.027778  0.443549  0.004928  0.000000  0.223623
  0.055556  0.443549  0.009857  0.000000  0.223623
  0.083333  0.443549  0.014785  0.000000  0.223623
  0.111111  0.443549  0.019713  0.000000  0.223623
  0.138889  0.443549  0.024642  0.000000  0.223623
  0.166667  0.443549  0.029570  0.000000  0.223623
  0.194444  0.443549  0.034498  0.000000  0.223623
  0.222222  0.443549  0.039427  0.000000  0.223623
```

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```
0.250000  0.443549  0.044355  0.000000  0.223623
0.277778  0.443549  0.049283  0.000000  0.223623
0.305556  0.443549  0.054212  0.000000  0.223623
0.333333  0.443549  0.059140  0.000000  0.223623
0.361111  0.443549  0.064068  0.000000  0.223623
0.388889  0.443549  0.068997  0.000000  0.223623
0.416667  0.443549  0.073925  0.000000  0.223623
0.444444  0.443549  0.078853  0.000000  0.223623
0.472222  0.443549  0.083782  0.000000  0.223623
0.500000  0.443549  0.088710  0.000000  0.223623
0.527778  0.443549  0.093638  0.000000  0.223623
0.555556  0.443549  0.098566  0.000000  0.223623
0.583333  0.443549  0.103495  0.000000  0.223623
0.611111  0.443549  0.108423  0.000000  0.223623
0.638889  0.443549  0.113351  0.000000  0.223623
0.666667  0.443549  0.118280  0.000000  0.223623
0.694444  0.443549  0.123208  0.000000  0.223623
0.722222  0.443549  0.128136  0.000000  0.223623
0.750000  0.443549  0.133065  0.000000  0.223623
0.777778  0.443549  0.137993  0.000000  0.223623
0.805556  0.443549  0.142921  0.000000  0.223623
0.833333  0.443549  0.147850  0.000000  0.223623
0.861111  0.443549  0.152778  0.000000  0.223623
0.888889  0.443549  0.157706  0.000000  0.223623
0.916667  0.443549  0.162635  0.000000  0.223623
0.944444  0.443549  0.167563  0.000000  0.223623
0.972222  0.443549  0.172491  0.000000  0.223623
1.000000  0.443549  0.177420  0.000000  0.223623
1.027778  0.443549  0.182348  0.000000  0.223623
1.055556  0.443549  0.187276  0.000000  0.223623
1.083333  0.443549  0.192205  0.000000  0.223623
1.111111  0.443549  0.197133  0.000000  0.223623
1.138889  0.443549  0.202061  0.000000  0.223623
1.166667  0.443549  0.206990  0.000000  0.223623
1.194444  0.443549  0.211918  0.000000  0.223623
1.222222  0.443549  0.216846  0.000000  0.223623
1.250000  0.443549  0.221775  0.000000  0.223623
1.277778  0.443549  0.226703  0.000000  0.223623
1.305556  0.443549  0.231631  0.000000  0.223623
1.333333  0.443549  0.236560  0.000000  0.223623
1.361111  0.443549  0.241488  0.000000  0.223623
1.388889  0.443549  0.246416  0.000000  0.223623
1.416667  0.443549  0.251345  0.000000  0.223623
1.444444  0.443549  0.256273  0.000000  0.223623
1.472222  0.443549  0.261201  0.000000  0.223623
1.500000  0.443549  0.266129  0.000000  0.223623
1.527778  0.443549  0.278450  0.214292  0.223623
1.555556  0.443549  0.290771  0.606108  0.223623
1.583333  0.443549  0.303092  1.113492  0.223623
1.611111  0.443549  0.315413  1.714333  0.223623
1.638889  0.443549  0.327734  2.395854  0.223623
1.666667  0.443549  0.340054  3.149431  0.223623
1.694444  0.443549  0.352375  3.968737  0.223623
1.722222  0.443549  0.364696  4.848867  0.223623
1.750000  0.443549  0.377017  5.785875  0.223623
1.777778  0.443549  0.389338  6.776498  0.223623
1.805556  0.443549  0.401658  7.817976  0.223623
1.833333  0.443549  0.413979  8.907937  0.223623
1.861111  0.443549  0.426300  10.04431  0.223623
1.888889  0.443549  0.438621  11.22528  0.223623
1.916667  0.443549  0.450942  12.44922  0.223623
1.944444  0.443549  0.463262  13.71467  0.223623
1.972222  0.443549  0.475583  15.02030  0.223623
2.000000  0.443549  0.487904  16.36493  0.223623
2.027778  0.443549  0.500225  17.74744  0.223623
2.055556  0.443549  0.512546  19.16683  0.223623
2.083333  0.443549  0.524866  20.62216  0.223623
2.111111  0.443549  0.537187  22.11257  0.223623
2.138889  0.443549  0.549508  23.63725  0.223623
2.166667  0.443549  0.561829  25.19545  0.223623
```

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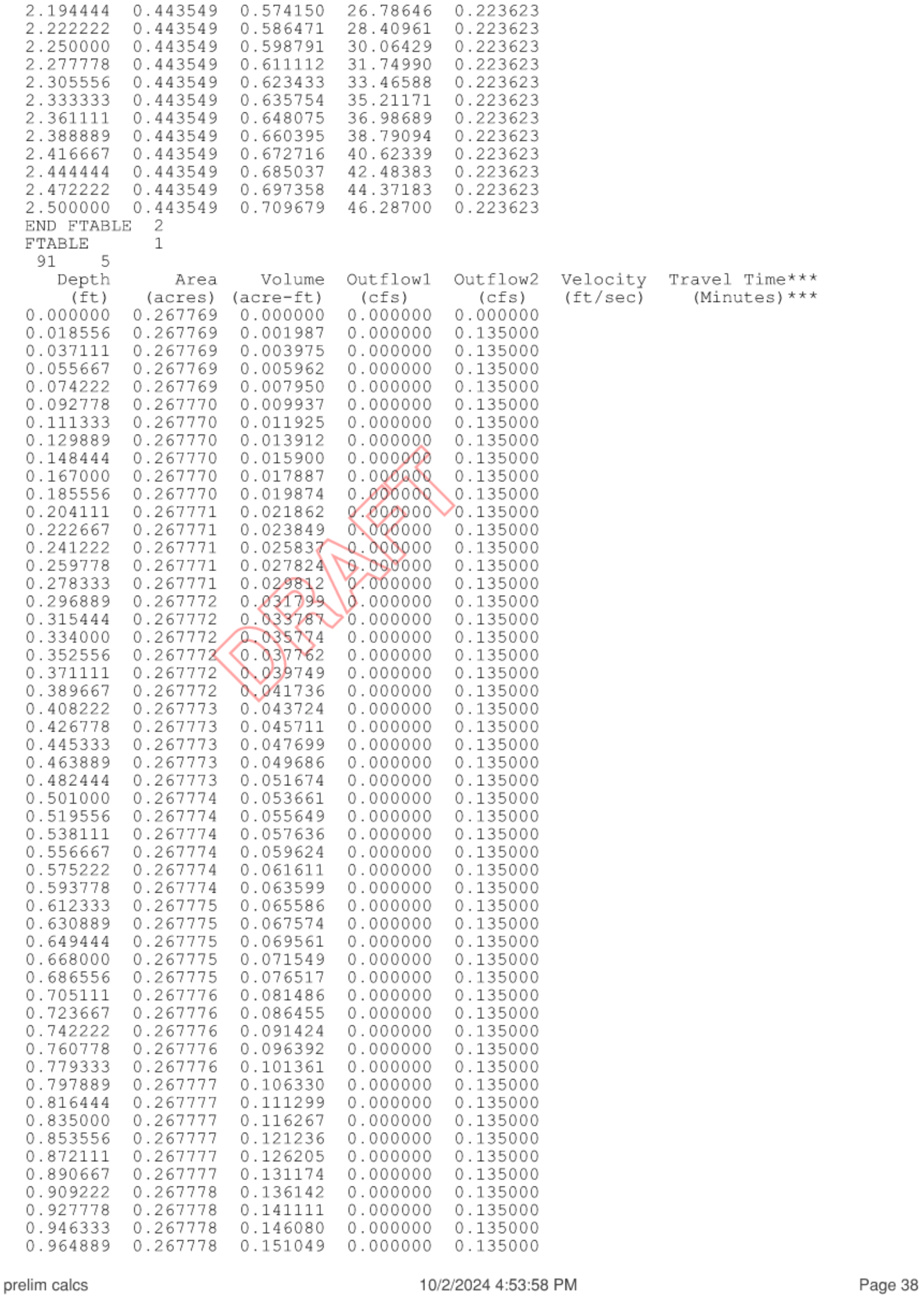

```
2.194444  0.443549  0.574150  26.78646  0.223623
2.222222  0.443549  0.586471  28.40961  0.223623
2.250000  0.443549  0.598791  30.06429  0.223623
2.277778  0.443549  0.611112  31.74990  0.223623
2.305556  0.443549  0.623433  33.46588  0.223623
2.333333  0.443549  0.635754  35.21171  0.223623
2.361111  0.443549  0.648075  36.98689  0.223623
2.388889  0.443549  0.660395  38.79094  0.223623
2.416667  0.443549  0.672716  40.62339  0.223623
2.444444  0.443549  0.685037  42.48383  0.223623
2.472222  0.443549  0.697358  44.37183  0.223623
2.500000  0.443549  0.709679  46.28700  0.223623
END FTABLE  2
FTABLE      1
 91    5
   Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
    (ft)   (acres) (acre-ft)    (cfs)     (cfs)   (ft/sec)     (Minutes)***
0.000000  0.267769  0.000000  0.000000  0.000000
0.018556  0.267769  0.001987  0.000000  0.135000
0.037111  0.267769  0.003975  0.000000  0.135000
0.055667  0.267769  0.005962  0.000000  0.135000
0.074222  0.267769  0.007950  0.000000  0.135000
0.092778  0.267770  0.009937  0.000000  0.135000
0.111333  0.267770  0.011925  0.000000  0.135000
0.129889  0.267770  0.013912  0.000000  0.135000
0.148444  0.267770  0.015900  0.000000  0.135000
0.167000  0.267770  0.017887  0.000000  0.135000
0.185556  0.267770  0.019874  0.000000  0.135000
0.204111  0.267771  0.021862  0.000000  0.135000
0.222667  0.267771  0.023849  0.000000  0.135000
0.241222  0.267771  0.025837  0.000000  0.135000
0.259778  0.267771  0.027824  0.000000  0.135000
0.278333  0.267771  0.029812  0.000000  0.135000
0.296889  0.267772  0.031799  0.000000  0.135000
0.315444  0.267772  0.033787  0.000000  0.135000
0.334000  0.267772  0.035774  0.000000  0.135000
0.352556  0.267772  0.037762  0.000000  0.135000
0.371111  0.267772  0.039749  0.000000  0.135000
0.389667  0.267772  0.041736  0.000000  0.135000
0.408222  0.267773  0.043724  0.000000  0.135000
0.426778  0.267773  0.045711  0.000000  0.135000
0.445333  0.267773  0.047699  0.000000  0.135000
0.463889  0.267773  0.049686  0.000000  0.135000
0.482444  0.267773  0.051674  0.000000  0.135000
0.501000  0.267774  0.053661  0.000000  0.135000
0.519556  0.267774  0.055649  0.000000  0.135000
0.538111  0.267774  0.057636  0.000000  0.135000
0.556667  0.267774  0.059624  0.000000  0.135000
0.575222  0.267774  0.061611  0.000000  0.135000
0.593778  0.267774  0.063599  0.000000  0.135000
0.612333  0.267775  0.065586  0.000000  0.135000
0.630889  0.267775  0.067574  0.000000  0.135000
0.649444  0.267775  0.069561  0.000000  0.135000
0.668000  0.267775  0.071549  0.000000  0.135000
0.686556  0.267775  0.076517  0.000000  0.135000
0.705111  0.267776  0.081486  0.000000  0.135000
0.723667  0.267776  0.086455  0.000000  0.135000
0.742222  0.267776  0.091424  0.000000  0.135000
0.760778  0.267776  0.096392  0.000000  0.135000
0.779333  0.267776  0.101361  0.000000  0.135000
0.797889  0.267777  0.106330  0.000000  0.135000
0.816444  0.267777  0.111299  0.000000  0.135000
0.835000  0.267777  0.116267  0.000000  0.135000
0.853556  0.267777  0.121236  0.000000  0.135000
0.872111  0.267777  0.126205  0.000000  0.135000
0.890667  0.267777  0.131174  0.000000  0.135000
0.909222  0.267778  0.136142  0.000000  0.135000
0.927778  0.267778  0.141111  0.000000  0.135000
0.946333  0.267778  0.146080  0.000000  0.135000
0.964889  0.267778  0.151049  0.000000  0.135000
```

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```
  0.983444  0.267778  0.156017  0.000000  0.135000
  1.002000  0.267779  0.160986  0.000000  0.135000
  1.020556  0.267779  0.165955  0.000000  0.135000
  1.039111  0.267779  0.170924  0.000000  0.135000
  1.057667  0.267779  0.175892  0.000000  0.135000
  1.076222  0.267779  0.180861  0.000000  0.135000
  1.094778  0.267779  0.185830  0.000000  0.135000
  1.113333  0.267780  0.190799  0.000000  0.135000
  1.131889  0.267780  0.195768  0.000000  0.135000
  1.150444  0.267780  0.200736  0.000000  0.135000
  1.169000  0.267780  0.205705  0.000000  0.135000
  1.187556  0.267780  0.210674  0.000000  0.135000
  1.206111  0.267781  0.215643  0.000000  0.135000
  1.224667  0.267781  0.220612  0.000000  0.135000
  1.243222  0.267781  0.225581  0.000000  0.135000
  1.261778  0.267781  0.230549  0.000000  0.135000
  1.280333  0.267781  0.235518  0.000000  0.135000
  1.298889  0.267781  0.240487  0.000000  0.135000
  1.317444  0.267782  0.245456  0.000000  0.135000
  1.336000  0.267782  0.250425  0.000000  0.135000
  1.354556  0.267782  0.255394  0.000000  0.135000
  1.373111  0.267782  0.260362  0.000000  0.135000
  1.391667  0.267782  0.265331  0.000000  0.135000
  1.410222  0.267783  0.270300  0.000000  0.135000
  1.428778  0.267783  0.275269  0.000000  0.135000
  1.447333  0.267783  0.280238  0.000000  0.135000
  1.465889  0.267783  0.285207  0.000000  0.135000
  1.484444  0.267783  0.290176  0.000000  0.135000
  1.503000  0.267784  0.295144  0.000000  0.135000
  1.521556  0.267784  0.300113  0.000000  0.135000
  1.540111  0.267784  0.305082  0.000000  0.135000
  1.558667  0.267784  0.310051  0.000000  0.135000
  1.577222  0.267784  0.315020  0.000000  0.135000
  1.595778  0.267784  0.319989  0.000000  0.135000
  1.614333  0.267785  0.324958  0.000000  0.135000
  1.632889  0.267785  0.329927  0.000000  0.135000
  1.651444  0.267785  0.334896  0.000000  0.135000
  1.670000  0.267785  0.339864  0.000000  0.135000
  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      2 PREC     ENGL     1             RCHRES   1     EXTNL  PREC
WDM      1 EVAP     ENGL     1             RCHRES   2     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***
RCHRES   2 HYDR   RO     1 1        1      WDM   1004 FLOW     ENGL      REPL
RCHRES   2 HYDR   O      1 1        1      WDM   1005 FLOW     ENGL      REPL
RCHRES   2 HYDR   O      2 1        1      WDM   1006 FLOW     ENGL      REPL
RCHRES   2 HYDR   STAGE  1 1        1      WDM   1007 STAG     ENGL      REPL
COPY     1 OUTPUT MEAN   1 1     48.4      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    801 FLOW     ENGL      REPL
RCHRES   1 HYDR   RO     1 1        1      WDM   1000 FLOW     ENGL      REPL
RCHRES   1 HYDR   O      1 1        1      WDM   1001 FLOW     ENGL      REPL
RCHRES   1 HYDR   O      2 1        1      WDM   1002 FLOW     ENGL      REPL
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1003 STAG     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>      <-Grp> <-Member->***
```

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```
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK         2
PERLND     PWATER SURO       0.083333     RCHRES         INFLOW IVOL
  END MASS-LINK     2

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

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

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

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

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

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

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

  MASS-LINK        54
PERLND     PWATER SURO                    IMPLND         EXTNL  SURLI
  END MASS-LINK    54

  MASS-LINK        55
PERLND     PWATER IFWO                    IMPLND         EXTNL  SURLI
  END MASS-LINK    55

END MASS-LINK

END RUN
```

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Predeveloped HSPF Message File

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Mitigated HSPF Message File

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