

**Puyallup School District
Sparks Stadium
Parking Lot Addition**

**Construction Stormwater
Pollution Prevention Plan**

Prepared for:

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

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April 2025

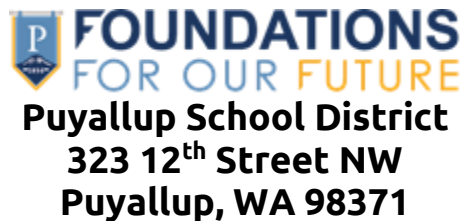
Job Number 19,474



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EXECUTIVE SUMMARY

"I hereby state that this Construction Stormwater Pollution Prevention Plan for Sparks Stadium Parking Lot Addition 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 Construction Stormwater Pollution Prevention Plan prepared by me."



16 APRIL 2025

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1 Project Overview and Conditions Summary

1.1 Project Description

The Puyallup School District (herein after referred to as PSD) proposes to add 50± stalls to an existing parking lot at Sparks Stadium. Sparks Stadium is located at 601 7th Ave SW, Puyallup, WA 98371, see Appendix A Vicinity Map. The project will convert an existing vegetative area into an additional parking lot. The parking lot addition project proposes pervious pavement, landscaping and electrical lighting improvements. The project also proposes to seal coat the existing impervious pavement parking lot and then restripe the lot to match existing parking lot stall counts. No improvements are proposed to the existing stadium building facilities.

1.2 Existing Conditions

The existing Sparks Stadium site I located on parcel 0420284126. The majority of the proposed improvements will occur in the Southwest corner of the parcel. The Sparks Stadium site contains the existing Sparks Stadium, two (2) concession stands, two (2) ticket booths and two (2) portable buildings. The site is developed with impervious surfaces and vegetative areas on the west side of the site. The site is mostly flat with the eastern side being slightly high in elevation than the west side.

1.3 Adjacent Areas

The site is surrounded by Urban Density Single Family residential areas to the north, east, and west and Medium Density Single Family residential areas to the south. The project is not proposing any frontage improvements but will improve the driveway entry way on 7th Ave SW. The project is required to perform adjacent westerly offsite alley improvements. There are no lakes, streams, or wetlands near the site.

1.4 Critical Areas

The site is in the City of Puyallup Aquifer Recharge Areas and Wellhead Protection Areas. The project will not impact the Aquifer Recharge area.

The project site is located in the following Critical Area Zones per City of Puyallup and FEMA Flood Zone mapping (included in Figures 3-10): Aquifer Recharge Area, Wellhead Protection Area, Volcanic Hazard Area/Zone, and Seismic Liquefaction Zone.

The project site is located within an area of minimal flood hazard (0.2% annual change flood hazard), Zone X according to the FEMA flood map. The project site does not lie within Landslide or Wetland critical areas

1.5 Soil

The project site soils are SCS soils group B, a silty sand with occasional sandy silt layer. The design infiltration rate is 0.5 inches per hour. The site also has a high seasonal groundwater table to within 2.7' from the surface and over 4' during the fall and spring time.

1.6 Potential Erosion Problem Areas

There are no additional potential erosion problem areas on the site.

2 Construction Stormwater Pollution Prevention Elements

2.1 Element 1 – Preserve Vegetation/ Mark Clearing Limits

The boundaries of the clearing limits, sensitive buffer areas and tree protection are shown on the plans shall be clearly flagged in the field prior to construction. Clearing outside of the clearing limits is prohibited. The flagging shall be maintained until the completion of the project.

2.2 Element 2 – Establish Construction Access

Construction vehicles will enter the site from existing paved entrances located off of 7th Ave SW in the southeasterly portion of the site. All paved areas shall be swept clean to prevent the tracking of debris from construction activities.

2.3 Element 3 – Control Flow Rates

The project proposes no runoff from the site. In addition, the project will be constructed during the summer months or season.

2.4 Element 4 – Install Sediment Controls

No construction activities shall occur outside the clearing limits. Catch basin inserts shall be used to prevent any sediment from entering the existing storm drainage system. The catch basin inserts shall be inspected daily. If the catch basin inserts become one-third full with sediment or debris, they must be cleaned in a way to prevent material from entering the stormwater drainage systems.

2.5 Element 5 – Stabilize Soils

All exposed soils shall be located away from any storm drain inlets, waterways, and drainage channels. Any exposed soils requiring stabilization due to poor weather conditions or left unworked for more than 7 days from May 1st to September 30th (2 days from October 1st to April 30th), shall be covered at the end of each work shift. Covering material shall remain in place until soil stabilization can be achieved by the installation of permanent surfacing. Although not anticipated, dust control shall be used to keep the site in an adequately moisten condition.

2.6 Element 6 – Protect Slopes

The project area contains no significant slopes over 2%-3%, except at localized ADA ramp construction. Therefore, no additional TESC (Temporary Erosion Sedimentation & Control) measures are proposed

2.7 Element 7 – Protect Drain Inlets

The project proposes NO new drain inlets. However, the plans do require inlet protection on adjacent street and onsite stormwater systems.

2.8 Element 8 – Stabilize Channels and Outlets

The project site has no channels, ditches or outlets that require stabilization.

2.9 Element 9 – Control Pollutants

The project will control dust migration by applying water over dry surfaces. Oil and fuel pollutants will be mopped up in accordance with spill prevention and countermeasure procedures.

2.10 Element 10 – Control Dewatering

The project anticipates no dewatering. However, if dewatering is required, the dewatering discharge will be routed to nearby onsite landscape or brush areas for dispersion prior to runoff.

2.11 Element 11 – Maintain BMPs

The contractor is required to provide TESC BMP maintenance throughout the project duration.

2.12 Element 12 – Manage the Project

The project construction is scheduled for the summer 2025, during the typical dry season.

2.13 Element 13 – Protect Low Impact Development BMPs

The project proposes permeable pavement low impact development BMP's. There is a detailed sequence of construction events outlined in the document for the contractor to follow. These requirements are aimed at protecting the native soil subgrade from being over-compacted.

3 Construction Schedule and Phasing

Construction sequencing is detailed by contract documents. The contractor will coordinate all scheduling needed for the proposed construction. It is anticipated that work will begin in June 2025 with completion by September 2025.

The following construction sequence will be used:

- Hold a pre-construction meeting with the City and obtain required permits.
- Provide submittals and obtain approvals from school district and engineer.
- Establish clearing and grading limits.
- Construct erosion control devices as shown on the approved erosion control plans. No uncontrolled stormwater runoff shall be discharged offsite during grading operations.
- Construct protection fencing for significant trees proposed for retention.
- Schedule for erosion control inspection with the City.
- Execute required limited clearing, grubbing, and demolition work.
- Maintain erosion control BMPs. No uncontrolled stormwater runoff shall be discharged offsite during grading operations.
- Execute required electrical, landscaping and irrigation
- Execute required limited grading.
- Execute required concrete work.
- Execute required limited impervious paving.
- Complete remaining pervious pavement area required clearing and demolition work.
- Complete pervious pavement earthwork work.
- Complete pervious pavement installation.
- Provide required pervious pavement testing.
- Provide asphalt seal coating on existing parking lot.
- Provide required pavement striping, markings and signage.
- Following final stabilization of the entire project site, and upon approval by school district, engineer, and City Inspector, remove all TESC measures.

4 Financial/Ownership Responsibilities

The contractor shall be responsible for all erosion and maintenance liabilities during construction. The project owner is the Puyallup School District. Any bonds or other financial securities required will be provided by the district.

5 Engineering Calculations

No TESC facilities requiring calculations are proposed.

6 Certified Erosion and Sediment Control Lead (CESCL)

The plans and contract documents require that the Contractor provide a CESCL.

7 Figures

Figure 1 - Vicinity Map

Figure 2 - City of Puyallup Aquifer Recharge Area Mapping

Figure 3 - City of Puyallup Wellhead Protection Mapping

Figure 4 - City of Puyallup Lakes, Streams and Wetlands Mapping

Figure 5 - City of Puyallup Landslide Hazard Mapping

Figure 6 - City of Puyallup Seismic Hazards Areas Mapping

Figure 7 - City of Puyallup Lahar Hazard Areas Mapping

Figure 3 - Vicinity Map



Puyallup School District
 Sparks Stadium Parking Lot Addition
 Construction Stormwater Pollution Prevention Plan

Figure 3 - City of Puyallup Wellhead Protection Mapping

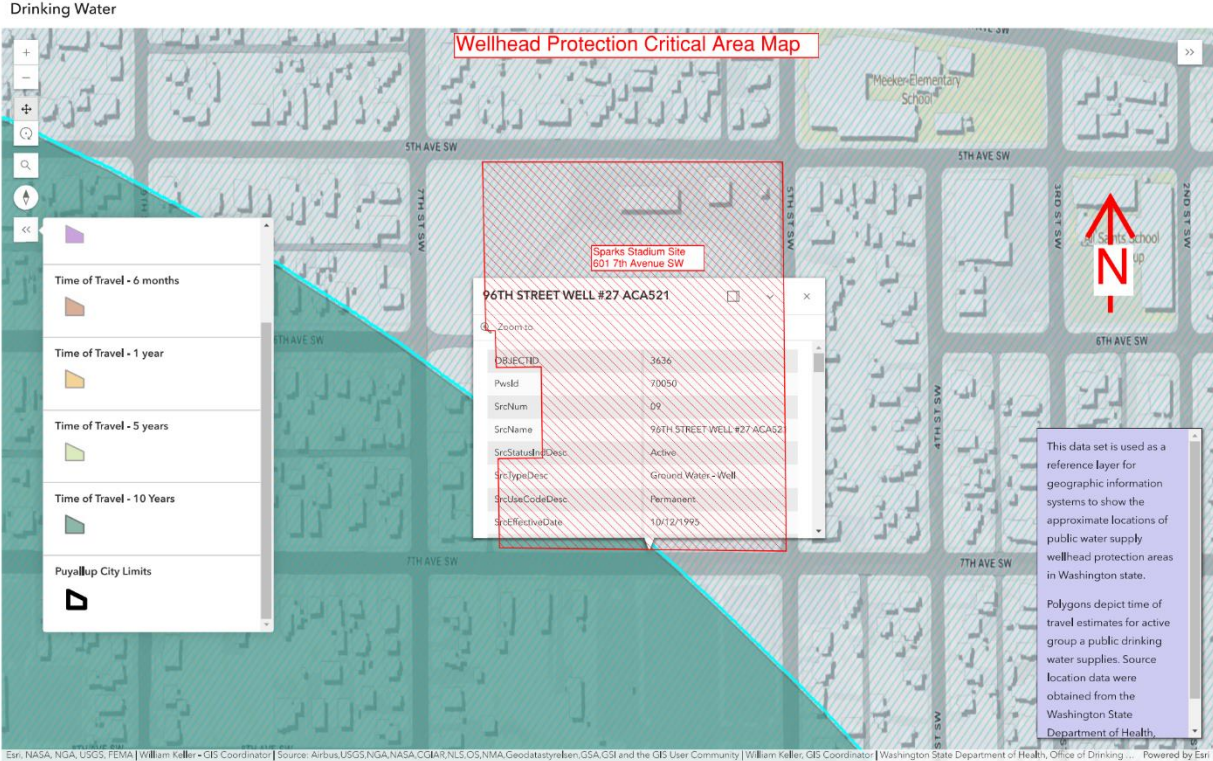
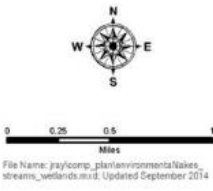
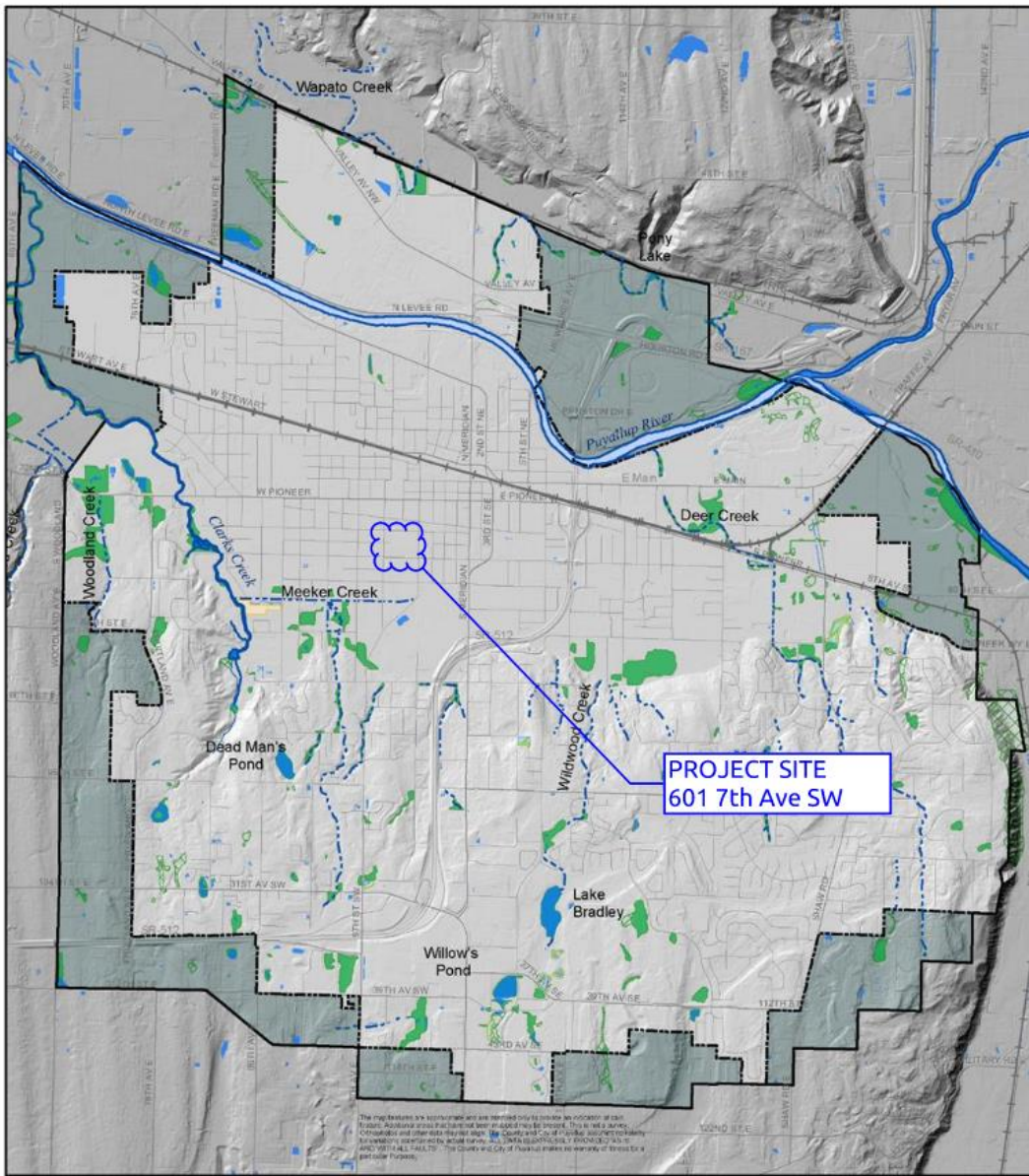


Figure 4 - City of Puyallup Lakes, Streams and Wetlands mapping

NATURAL ENVIRONMENT



Map 2-7: Lakes, Streams and Wetlands



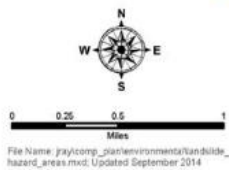
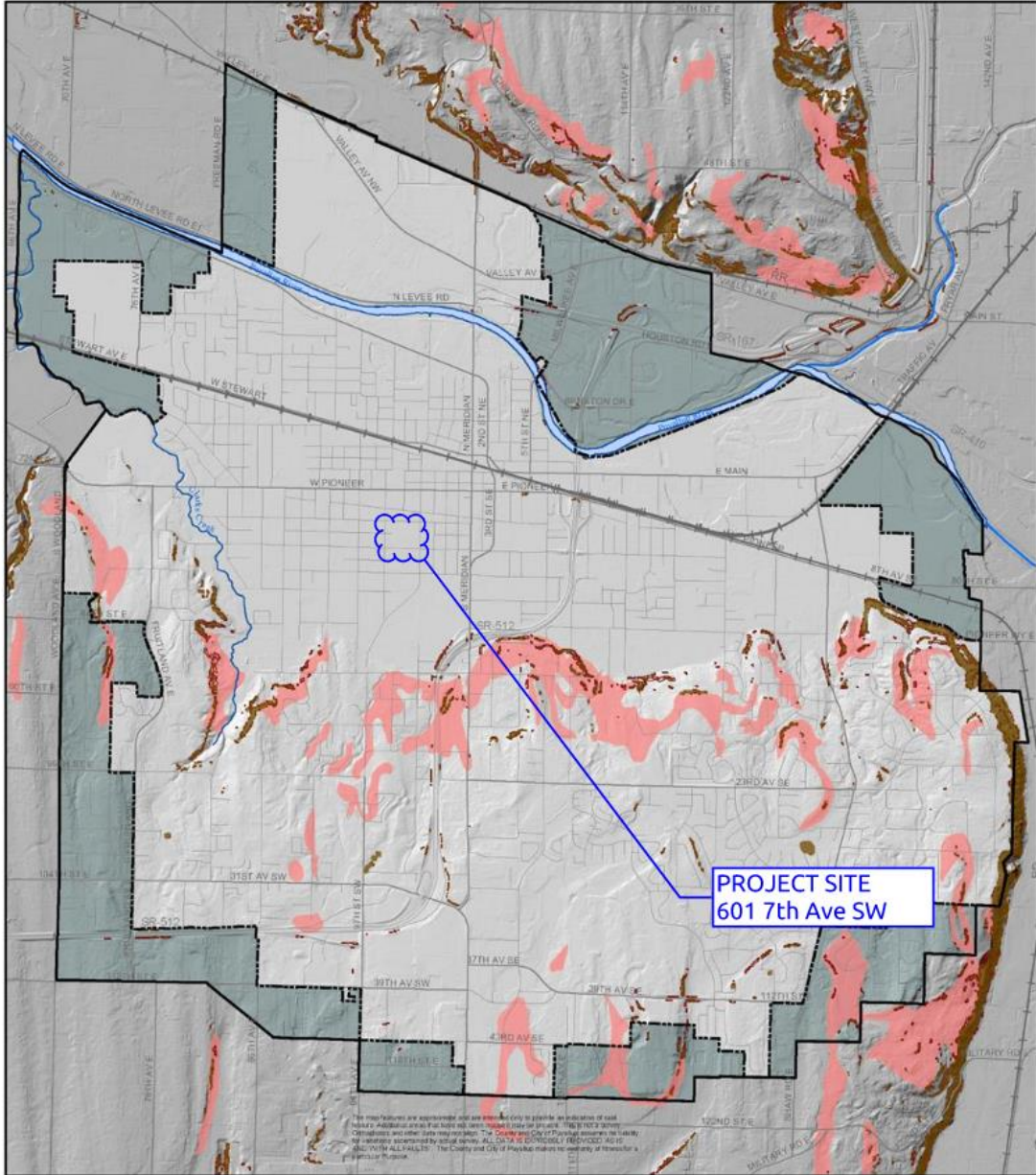
- Shorelines of the State
 - - - Streams
 - Water body
 - City Limits
 - Urban Growth Area
 - +— Railroads
- Wetlands
 - Field-verified Delineated
 - Field-verified
 - Unverified
 - Buffer
 - Mitigation Site

Lakes,
Streams
and Wetlands

Figure 5 - City of Puyallup Landslide Hazard Mapping

NATURAL ENVIRONMENT

Map 2-3: Landslide Hazard Areas



Landslide Hazard Areas

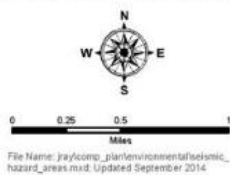
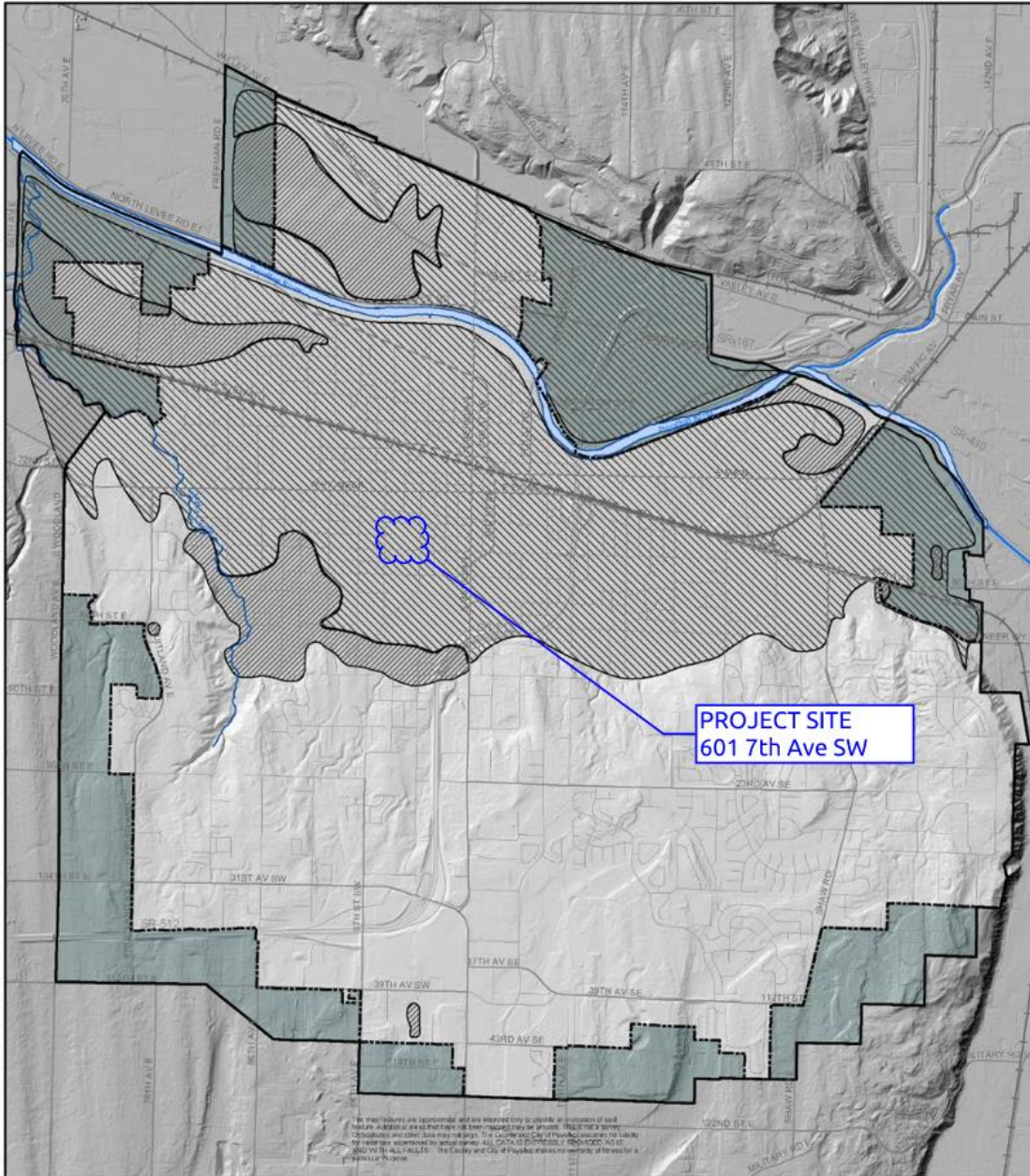
Data Source: Soil Conservation Study, Washington State Department of Natural Resources (30% - 40% and >40% data), Coastal Zone Atlas of Washington, Volume VII (15% - 30% data), and Pierce County GIS (all data).

Figure 6 - City of Puyallup Seismic Hazards Areas Mapping

NATURAL ENVIRONMENT



Map 2-2: Seismic Hazards Areas



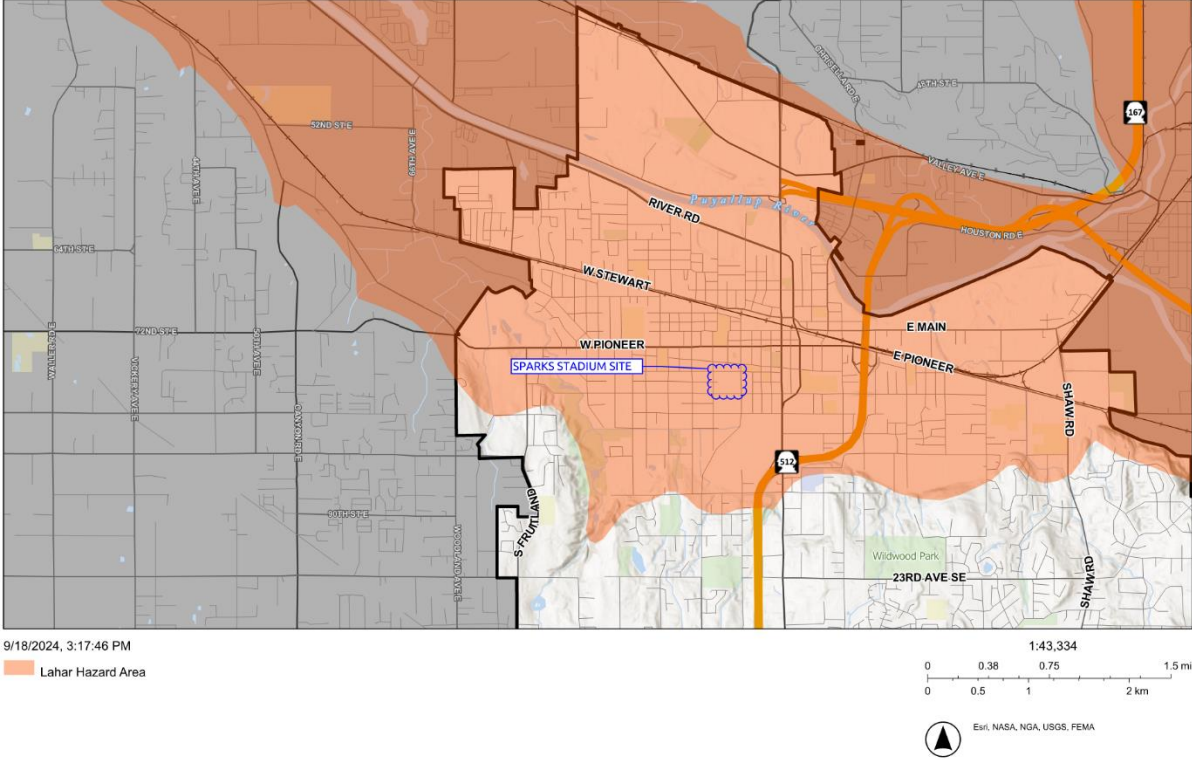
- City Limits
- Urban Growth Area
- Railroads
- Severe
- Moderate to Severe

Seismic Hazard Areas

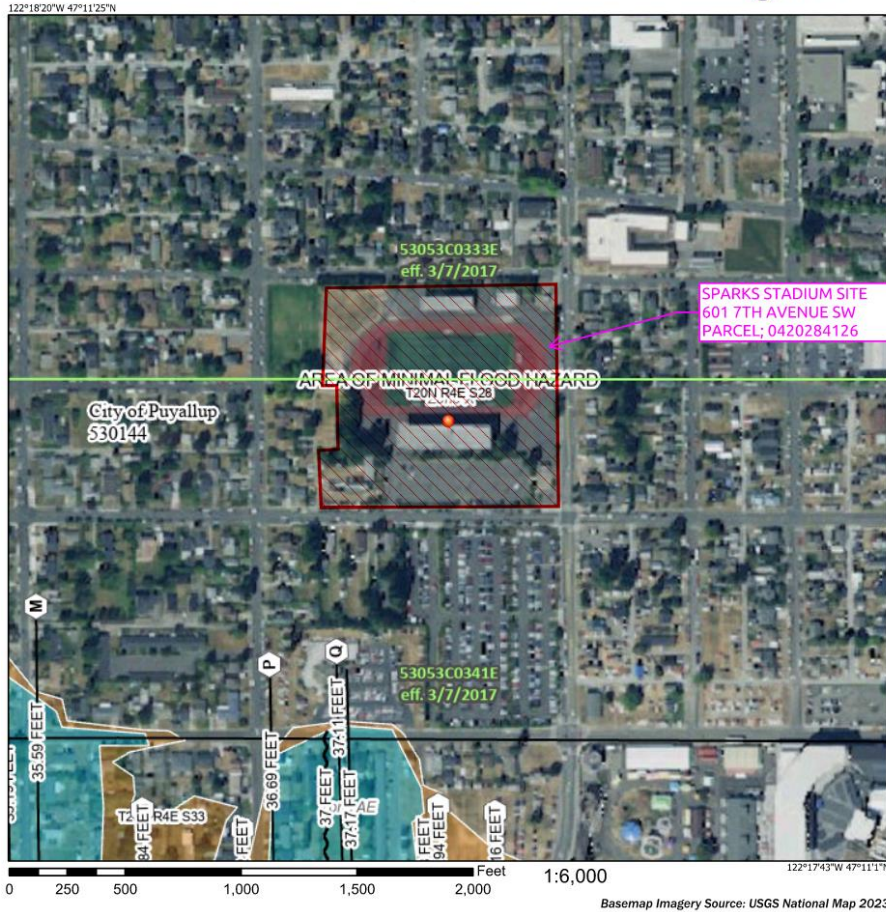
File Name: jay\comp_plan\environmental\seismic_hazard_areas.mxd; Updated September 2014.

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

Figure 7 - City of Puyallup Lahar Hazard Areas Mapping
ArcGIS Web Map



**Figure 8 - FEMA Flood Hazard Mapping
 National Flood Hazard Layer FIRMeTte**



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) <i>Zone A, X, AE</i>
		With BFE or Depth <i>Zone AE, AD, AH, VE, AR</i>
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile <i>Zone X</i>
		Future Conditions 1% Annual Chance Flood Hazard <i>Zone X</i>
		Area with Reduced Flood Risk due to Levee. See Notes. <i>Zone X</i>
		Area with Flood Risk due to Levee <i>Zone D</i>
OTHER AREAS		Area of Minimal Flood Hazard <i>Zone X</i>
		Effective LOMRs
GENERAL STRUCTURES		Area of Undetermined Flood Hazard <i>Zone D</i>
		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		Cross Sections with 1% Annual Chance
		Water Surface Elevation
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
MAP PANELS		Jurisdiction Boundary
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
		Digital Data Available
		No Digital Data Available
		Unmapped

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.

8 Appendices

Appendix A: Project Improvements Exhibit Map

Appendix B: NCRS Soil Survey

Appendix C: Project Geotechnical report from Migizi Group.

APPENDIX B: NCRS SOILS REPORT



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.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

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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

Custom Soil Resource Report

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

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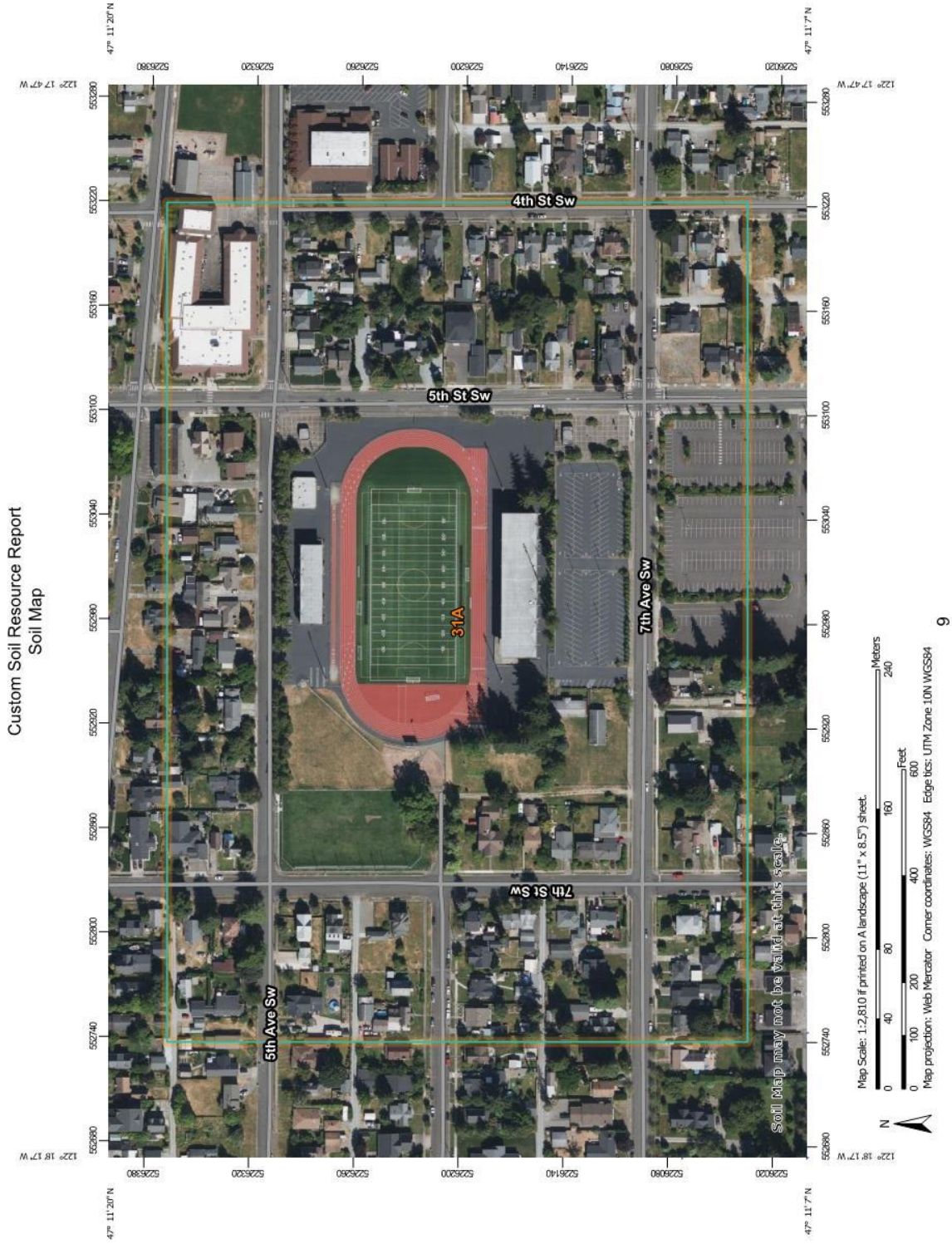
Custom Soil Resource Report

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.

Puyallup School District
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MAP LEGEND

	Area of Interest (AOI)		Spoil Area
	Soils		Stony Spot
	Soil Map Unit Polygons		Very Stony Spot
	Soil Map Unit Lines		Wet Spot
	Soil Map Unit Points		Other
	Special Point Features		Special Line Features
	Blowout		Streams and Canals
	Borrow Pit		Transportation
	Clay Spot		Rails
	Closed Depression		Interstate Highways
	Gravel Pit		US Routes
	Gravelly Spot		Major Roads
	Landfill		Local Roads
	Lava Flow		Background
	Marsh or swamp		Aerial Photography
	Mine or Quarry		
	Miscellaneous Water		
	Perennial Water		
	Rock Outcrop		
	Saline Spot		
	Sandy Spot		
	Severely Eroded Spot		
	Sinkhole		
	Slide or Slip		
	Sodic Spot		

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.

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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.

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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.

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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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Sparks Stadium Parking Lot Addition
Construction Stormwater Pollution Prevention Plan*

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References

- American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.
- American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.
- Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.
- Federal Register. July 13, 1994. Changes in hydric soils of the United States.
- Federal Register. September 18, 2002. Hydric soils of the United States.
- Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.
- National Research Council. 1995. Wetlands: Characteristics and boundaries.
- Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262
- Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577
- Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580
- Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.
- United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.
- United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374
- United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084>

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Sparks Stadium Parking Lot Addition
Construction Stormwater Pollution Prevention Plan*

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United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

APPENDIX C: PROJECT GEOTECHNICAL REPORT

Geotechnical Engineering Report

Sparks Stadium Parking Lot Expansion

615 7th Ave SW

Puyallup, Washington 98371

Parcel No. 5000550290

February 15, 2022



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

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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

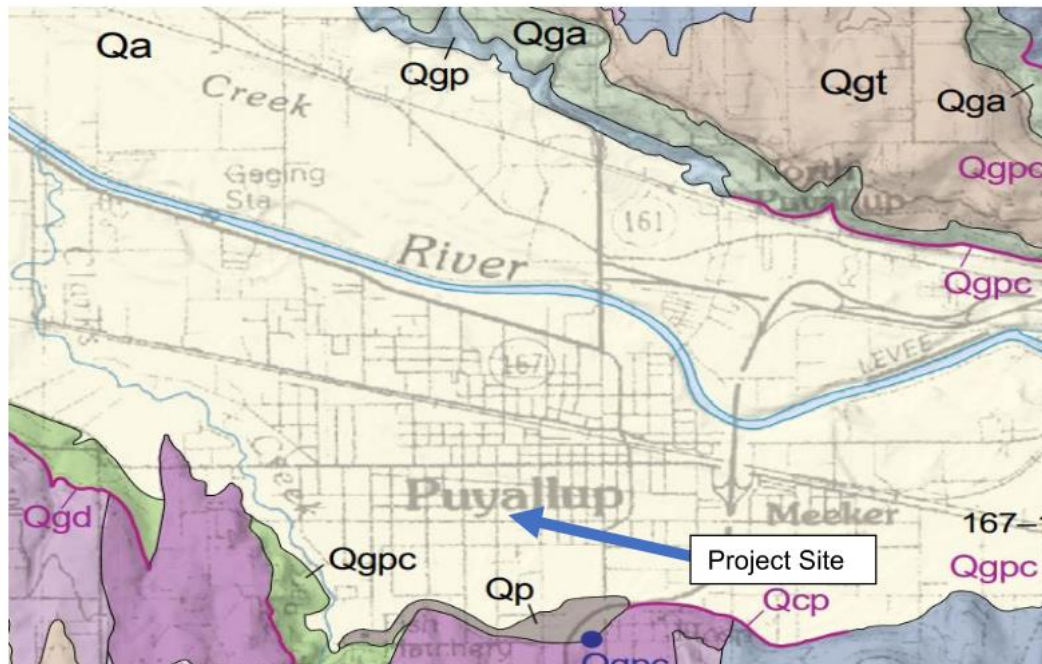
We observed subsurface conditions through the advancement of two test pit explorations and one auger boring exploration adjacent to proposed improvements. Soil conditions were relatively consistent, generally comprised of a surface mantle of sod and topsoil, underlain by fine-grained alluvial soils associated with the flood plains of the Puyallup River. Alluvial soils, as encountered

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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	$= \frac{2}{3} S_{MS}$, 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:

<u>Pavement Course</u>	<u>Minimum Thickness</u>		
	<u>Automobile Parking Areas</u>	<u>Areas Subject to Truck Loads</u>	<u>High Traffic Driveways</u>
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 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.

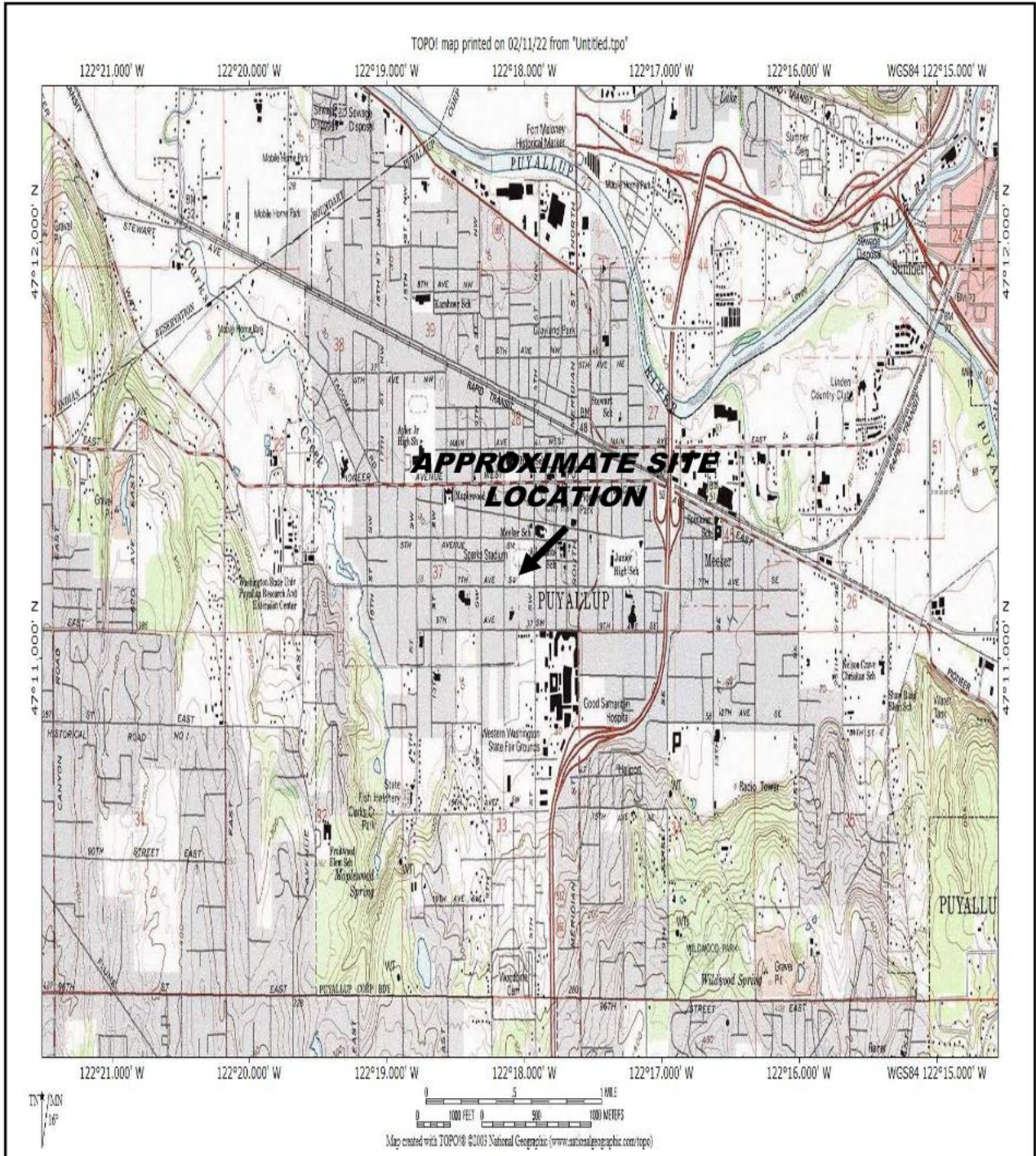



Zachary L. Logan
Zach L. Logan, L.G.
Project Geologist



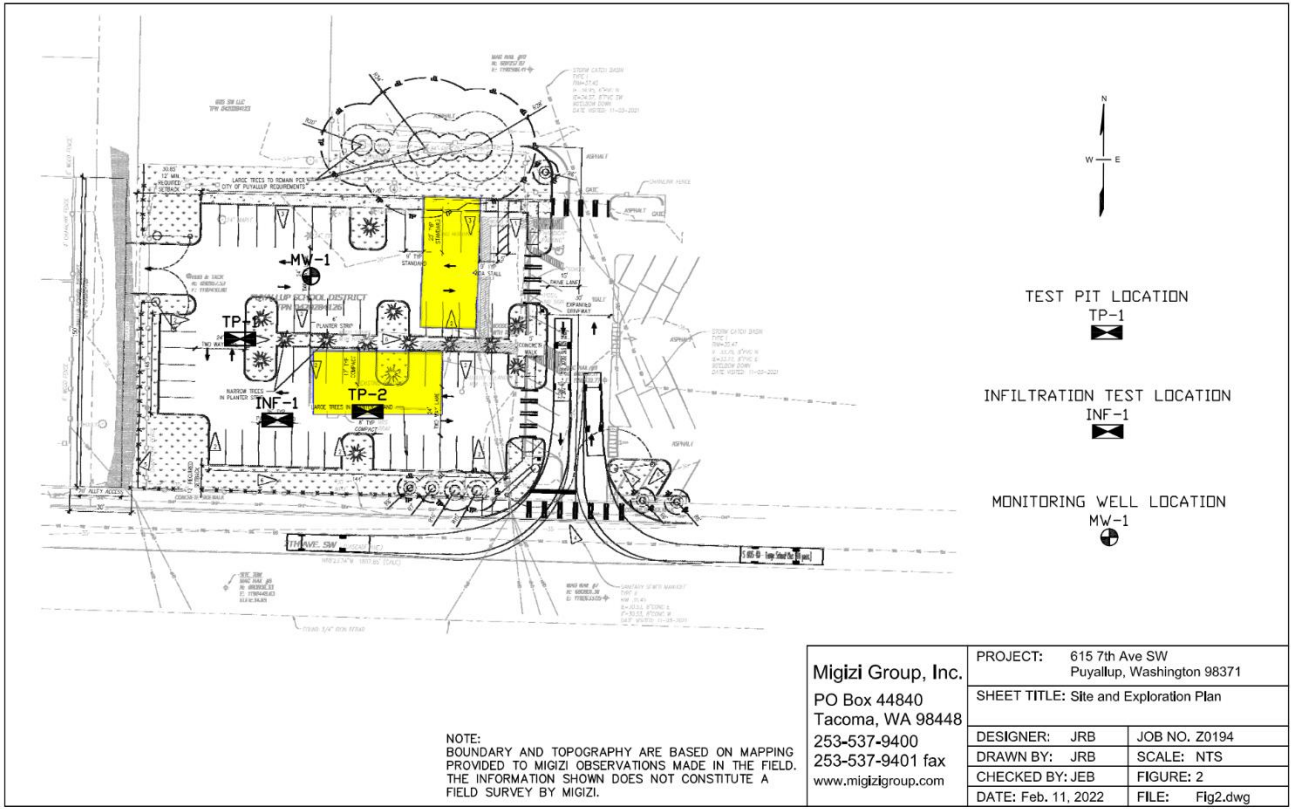
02/15/22
James E. Brigham, P.E.
Senior Principal Engineer

Puyallup School District
 Sparks Stadium Parking Lot Addition
 Construction Stormwater Pollution Prevention Plan



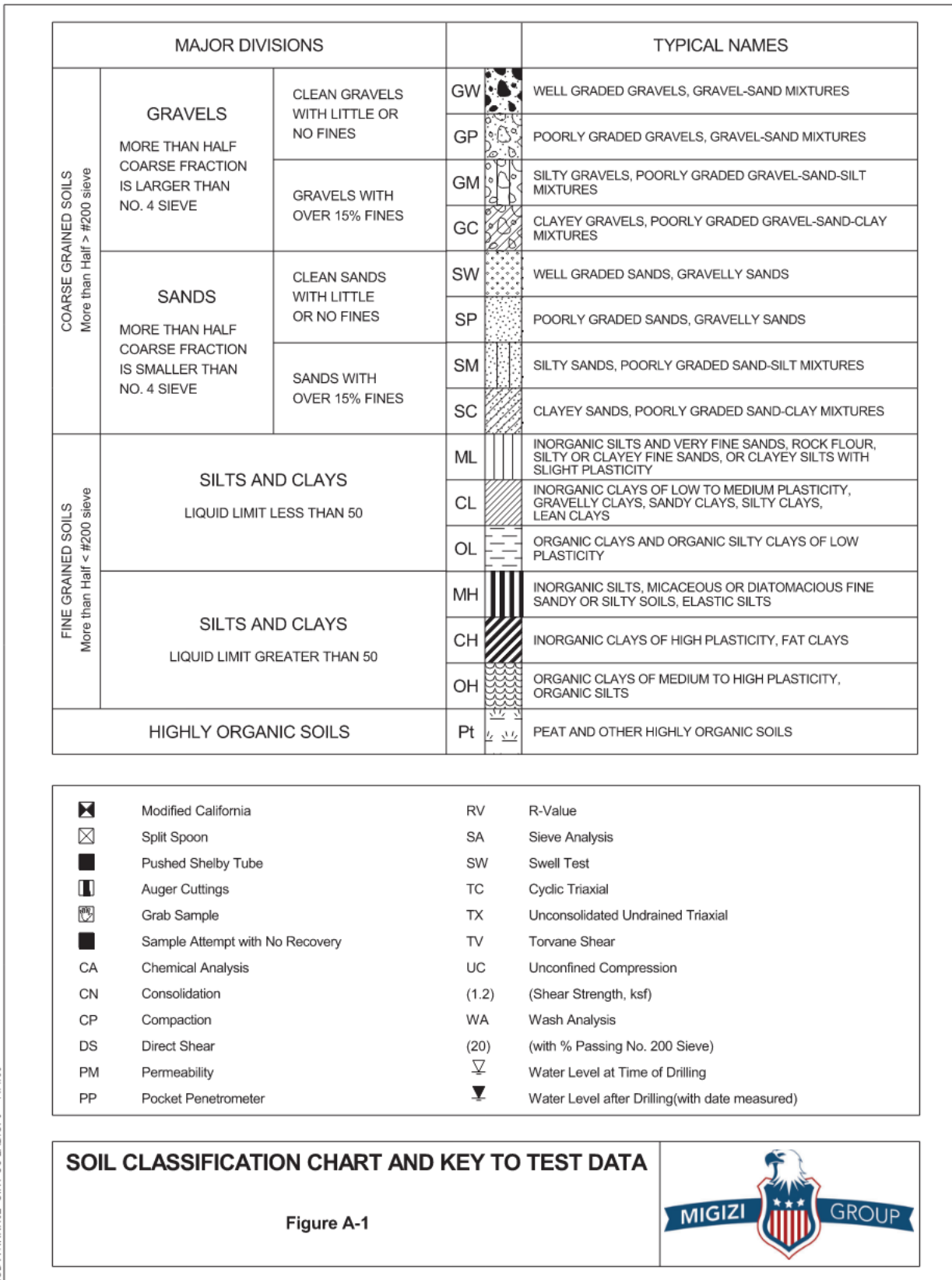
	Location 615 7th Ave SW Puyallup, WA 98371	Job Number Z0194	Figure 1
P.O. Box 44840 Tacoma, WA 98448	Title Topographic and Location Map	Date 02/11/22	

Puyallup School District
 Sparks Stadium Parking Lot Addition
 Construction Stormwater Pollution Prevention Plan



**APPENDIX A
SOIL CLASSIFICATION CHART AND
KEY TO TEST DATA**

**LOG OF TEST PITS
AND AUGER BORINGS**



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Puyallup School District
 Sparks Stadium Parking Lot Addition
 Construction Stormwater Pollution Prevention Plan



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

BORING NUMBER MW-1


PAGE 1 OF 1
 Figure A-4

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

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)
3.0	SS S-1	12	7-4-3 (7)	SP-SM		(SP-SM) Gray/brown fine sand with silt (loose, wet)
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) Gray fine silty sand (loose, wet)
10	SS S-4	12	3-3-4 (7)			
15	SS S-5	12	4-4-6 (10)	SM		Grades to medium dense
21.0						
21.5	SS S-6	12	3-5-8 (13)	SP-SM		(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\JESSICA\BIZAK\DESKTOP\TEST PITS AND BORINGS - GINT\Z0194\Z0194 BORING LOG.GPJ

Puyallup School District
 Sparks Stadium Parking Lot Addition
 Construction Stormwater Pollution Prevention Plan

	Migizi Group, Inc. PO Box 44840 Tacoma, WA 98448 Telephone: 253-537-9400	<h2 style="margin: 0;">TEST PIT NUMBER TP-1</h2> PAGE 1 OF 1 Figure A-2
CLIENT <u>Sitts & Hill Engineers, Inc.</u>		PROJECT NAME <u>Sparks Stadium Parking Lot Expansion</u>
PROJECT NUMBER <u>Z0194</u>		PROJECT LOCATION <u>615 7th Ave SW, Puyallup, WA 98371</u>
DATE STARTED <u>1/5/22</u> COMPLETED <u>1/5/22</u>		GROUND ELEVATION _____ TEST PIT SIZE _____
EXCAVATION CONTRACTOR <u>Paulman</u>		GROUND WATER LEVELS:
EXCAVATION METHOD <u>Rubber Tracked Mini Excavator</u>		∇ AT TIME OF EXCAVATION <u>6.50 ft Rapid seepage</u>
LOGGED BY <u>ZLL</u> CHECKED BY <u>JEB</u>		AT END OF EXCAVATION <u>---</u>
NOTES _____		AFTER EXCAVATION <u>---</u>

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)
	SP-SM		2.5	(SP-SM) Gray fine sand with silt (loose, wet) (Alluvium)
2.5		ML	3.5	(ML) Gray/brown mottled sandy silt (soft, wet) (Alluvium)
			5.0	(SM) Gray fine silty sand (loose, wet) (Alluvium)
5.0		SM	7.5	
7.5			10.0	
10.0				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\JESSICA\BIZAK\DESKTOP\TEST PITS AND BORINGS - GINT\Z0194\Z0194 TEST PITS.GPJ

