
Technical Memo

To Fran Love – City of Olympia

From: Tyrell Bradley, PE – LDC, Inc.
Anthony Taing, EIT – LDC, Inc.

Date: July 10, 2026

LDC Project Reference: C26-156 – Evergreen Christian Center Portables

Subject Project Report for Engineered Abbreviated Drainage Plan

1 Project Report

This project report was prepared for the proposed portables that will be located at Evergreen Christian School; 1010 Black Lake Blvd SW, Olympia, WA 98502. This project report was prepared to comply with the minimum technical standards and requirements that are set forth in the *2022 City of Olympia Drainage Design and Erosion Control Manual (DDECM)*.

2 Project Overview

The proposed project consists of the installation of two portable classroom buildings at the existing school campus located at 1010 Black Lake Blvd SW, Olympia, Washington. The proposed portables will be placed on existing gravel surface. The project includes limited site preparation, placement of portables, installation of deck in between, splashblocks. No clearing or grading is proposed, and the existing site drainage patterns will generally remain unchanged. The primary stormwater impact associated with the project is the runoff generated from the proposed roof area, while the elevated wood deck will allow stormwater runoff to pass through to the existing gravel surface below.

- ◆ Limited site preparation and temporary erosion and sediment control measures
- ◆ Installation of proposed portable classroom buildings
- ◆ Installation of wood deck
- ◆ Installation of splash blocks to convey runoff from the proposed portable classrooms

See Figure 1 and **Appendix 1** for the site vicinity map and Table 1 for the breakdown of pervious and impervious areas before and after the proposed project. See **Appendix 3** for the proposed and existing basin maps.



Figure 1. Site Vicinity Map

Table 1: Land Type Designations Summary Section

LAND TYPE DESIGNATION	AREA (SF)	AREA (ACRES)	% OF TOTAL AREA
Total Parcel Area	1,032,372	23.7	100
Project Area	4,818	0.11	100
Existing Surfaces	4,818	0.11	100
Pervious Surface	0	0	0
Impervious Surface	4,818	0.14	100
Proposed Surfaces	4,818	0.11	100
Roof	3,640	0.08	75.5
Wood Deck	1,178	0.03	24.5

3 Existing Site Conditions

The proposed project is located within the R-24 (Residential 24) zoning district. The existing site is developed with a church, four (4) school building, a grassed playfield, associated parking areas, sidewalks, and existing stormwater infrastructure. Because the site contains greater than 35 percent hard surface coverage, the proposed project is classified as redevelopment under the City of Olympia's stormwater requirements. The proposed redevelopment will create less than 5,000 square feet of new and replaced hard surfaces; therefore, only Core Requirements #1 through #5 apply to the new and replaced hard surfaces and any converted vegetation. It is important to note that less than 1% of the total project site will be disturbed.

A field investigation was conducted by LDC on October 27, 2025, to evaluate the existing downstream drainage system and conveyance path. Existing downspouts, catch basins, trench drains, and storm

drainage pipes were observed on-site, all of which convey runoff to the City of Olympia stormwater system. Based on field observations and available mapping, stormwater runoff is assumed to be conveyed to the City of Olympia system ultimately discharging to Black Lake Ditch. The downstream drainage exhibit is provided in **Appendix 6**.

It is important to note that no new pollution generating hard surfaces are proposed. No adverse impacts to the downstream are anticipated.

The site is relatively flat. The project is located within a Critical Aquifer Recharge Area Category 1, 2, and 3. See figures below.

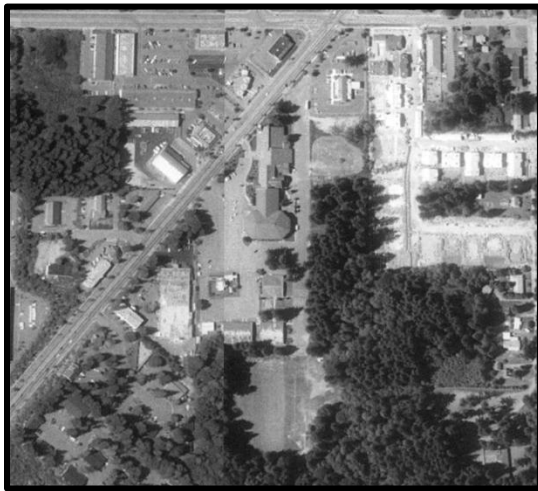


Figure 2: Existing Conditions (1990)



Figure 3: Existing Conditions (2024)

4 Conditions and Requirements Summary

According to Figure 1-3.1 and Figure 1-3.12 of the *DDECM*, the project is considered a redevelopment that triggers Core Requirements #1-5 for the new and replaced hard surfaces and the land disturbed. See **Appendix 2** for Figure 1-3.2. The project will be replacing more than 2,000 SF of impervious surfaces; however, it will not be adding 5,000 SF of new impervious surfaces. The table below summarizes how each requirement will be met.

Table 2. Compliance with Core Requirements

CORE REQUIREMENT	COMPLIANCE WITH CORE REQUIREMENT
#1 – Stormwater Site Planning	The contents of this report and the enclosed construction plans are intended to satisfy this requirement.

#2 – Construction SWPPP	The project will disturb less than 7000 SF of land. A Short Form SWPPP has been prepared for this project as a separate document that describes the thirteen required elements. Examples of construction stormwater BMPs that will be utilized include but are not limited to the following: • BMP C235 Straw Wattles • BMP C105 Stabilized Construction Entrance/Exit • BMP C220 Storm Drain Inlet Protection • See the Short Form SWPPP for more details and Volume III, Chapters 3 and 4 for additional BMPs The anticipated impacts throughout construction are small due to the location of the site, and the size of the disturbed area. Additionally, the project will minimize the amount of time that the soils are exposed, to prevent potential impacts from storms. Approx. Start Date: 08/01/2026 Approx. End Date: 9/30/2026
#3 – Source Control of Pollution	All known, available and reasonable source control BMPs will be applied to this project. These include but are not limited to: Sediment & Erosion Control BMPs • BMP C235 Straw Wattles • BMP C220 Storm Drain Inlet Protection • See Volume II, Chapter 3 and 4 for additional BMPs Operational Source Control BMPs • S411 BMPs for Landscaping and Lawn/Vegetation Management • S417 BMPs for Maintenance of Stormwater Drainage and Treatment Systems • S117 BMPs for Storage of Solid Wastes and Food Wastes
#4 – Preservation of Natural Drainage Systems and Outfalls	Currently, Stormwater runoff from the site is captured by on-site catch basins and conveyed to the City of Olympia's stormwater system. After construction, the proposed improvements will continue to discharge to. No adverse impacts to the downstream are anticipated.
#5 – On-Site Stormwater Management	Stormwater LID BMPS will be implemented/constructed to mitigate stormwater runoff per List #3. Refer to Section 6 of this report for more information.

5 Soils Report

According to the Natural Resources Conservation Service (NRCS) Web Soil Survey, the soils on the site were classified to be Alderwood gravelly sandy loam with a low infiltration rate between 0 and 0.06 in/hr.

Per Table 2.3.1 of Volume III of the 2022 *DDECM*, Alderwood gravelly sandy loam are classified as hydrologic soil group B.

See **Appendix 5** of the Drainage Control Plan for the NRCS Web Soil Survey report.

6 On-Site Stormwater Management

The proposed project is not flow control exempt and only triggers Core Requirements #1-5, therefore the project can employ On-Site Stormwater Management BMPs to meet the Low Impact Development Standard or utilize List #1. This project will utilize List #1, see below.

- **Lawn and Landscaped areas:**
 - **Post-Construction Soil Quality and Depth (BMP T5.13):**
The proposed will use BMP T.513 to the maximum extent practicable.
- **Roofs:**
 - **Downspout Full Infiltration Systems (BMP T5.10A):** are not feasible for this project because the NRCS soil mapping indicates soils with inadequate infiltration capacity to support full infiltration.
Downspout Dispersion Systems (BMP T5.10B): Downspout Dispersion Systems are feasible for the proposed project and will be used to the maximum extent practicable. Roof runoff will discharge through splash blocks and disperse as sheet flow across the existing gravel surface. Runoff may enter the existing catch basin located to the northeast, where it will be conveyed through the existing stormwater conveyance system and ultimately discharged to the existing playfield. The proposed improvements are not anticipated to adversely affect the existing drainage patterns.
- **Other Hard Surfaces:**
 - Wood Deck: The proposed 1,178-square-foot wood deck will allow stormwater runoff to pass through the deck surface and sheet flow onto the underlying pervious area, where it will follow existing drainage patterns.

APPENDIX 1

SITE VICINITY MAP



APPENDIX 2

DETERMINATION OF CORE REQUIREMENTS WORKSHEET

Figure 1-3.1: Flow Chart for Determining Core Requirements for New Development

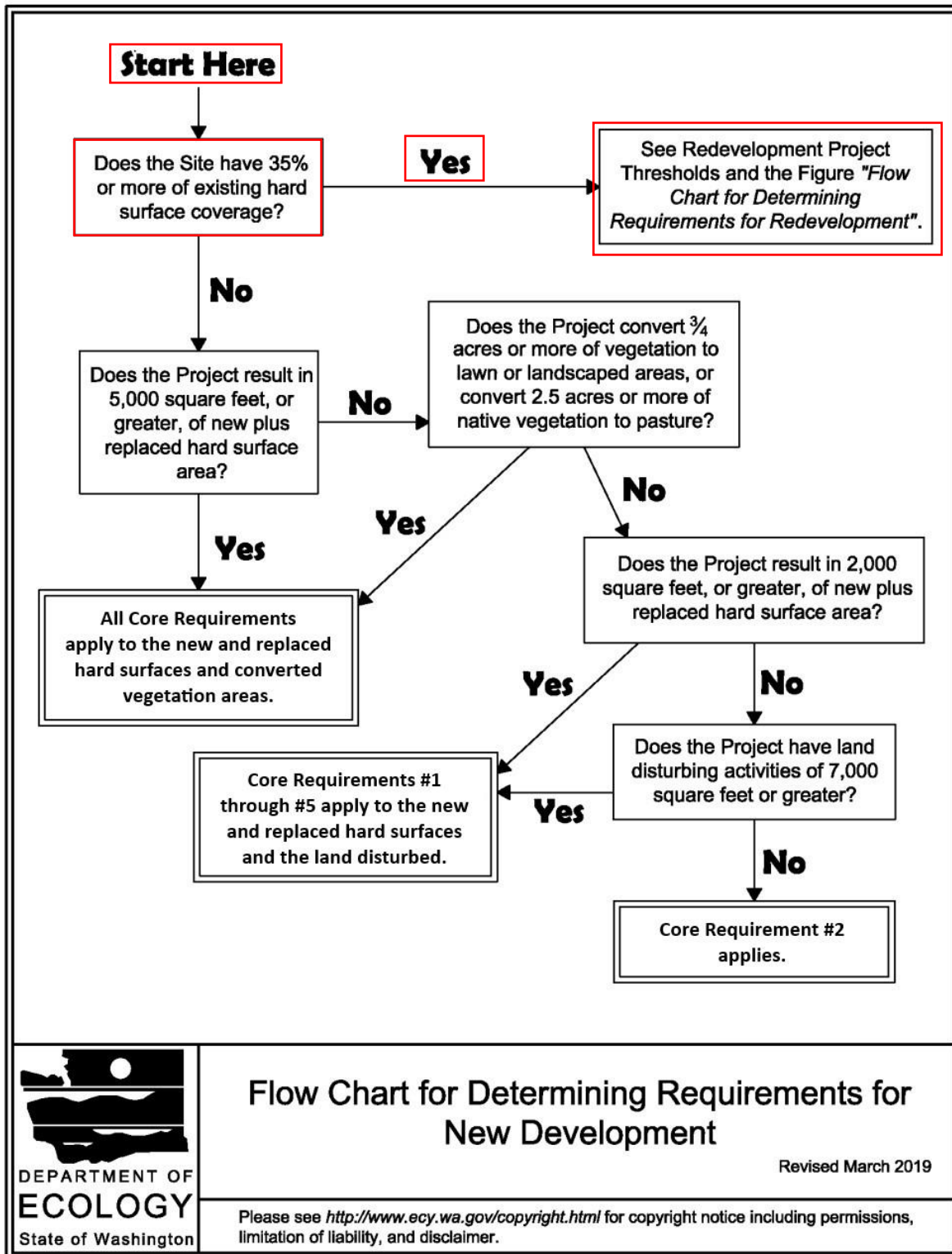


Figure I-3.2: Flow Chart for Determining Requirements for Redevelopment

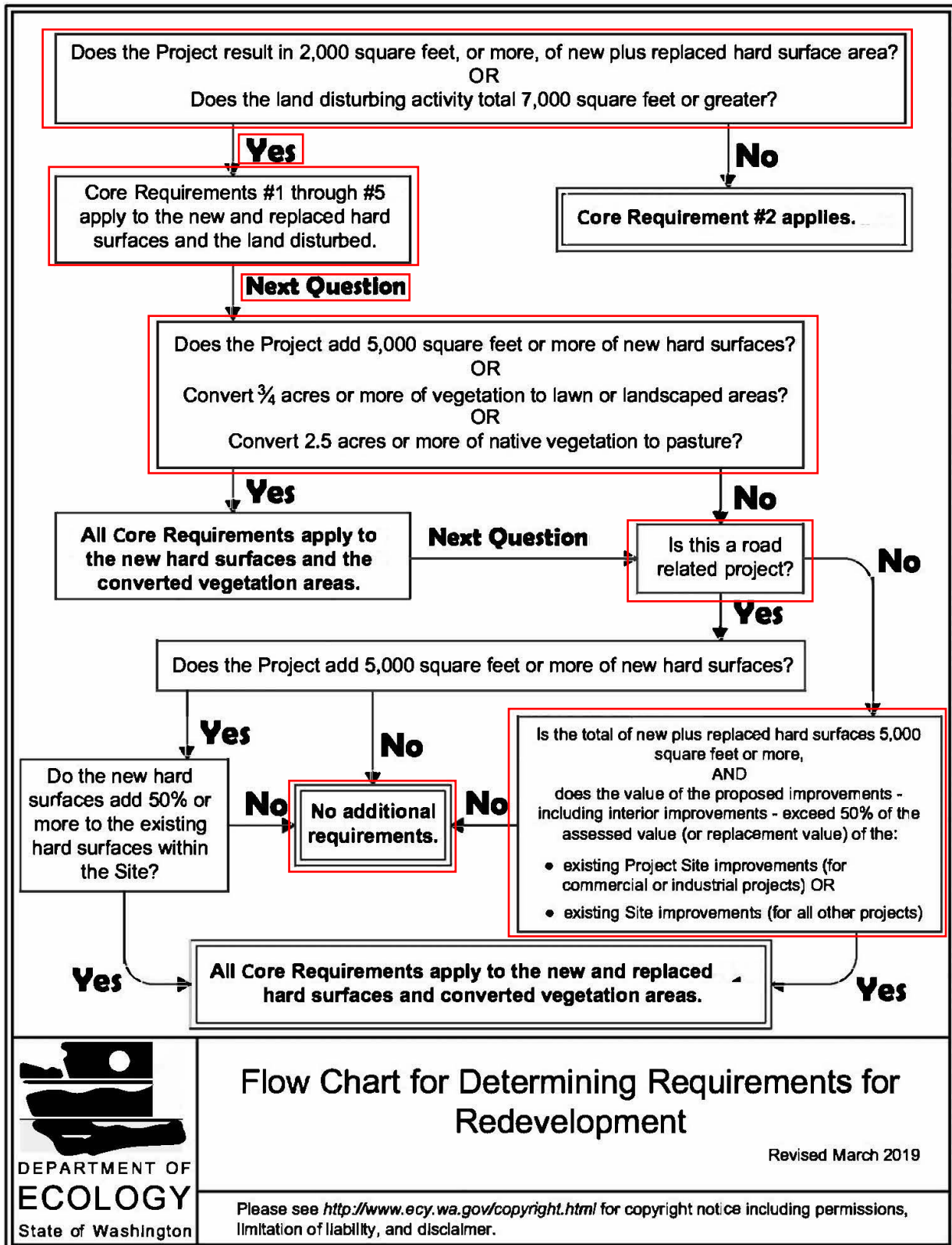
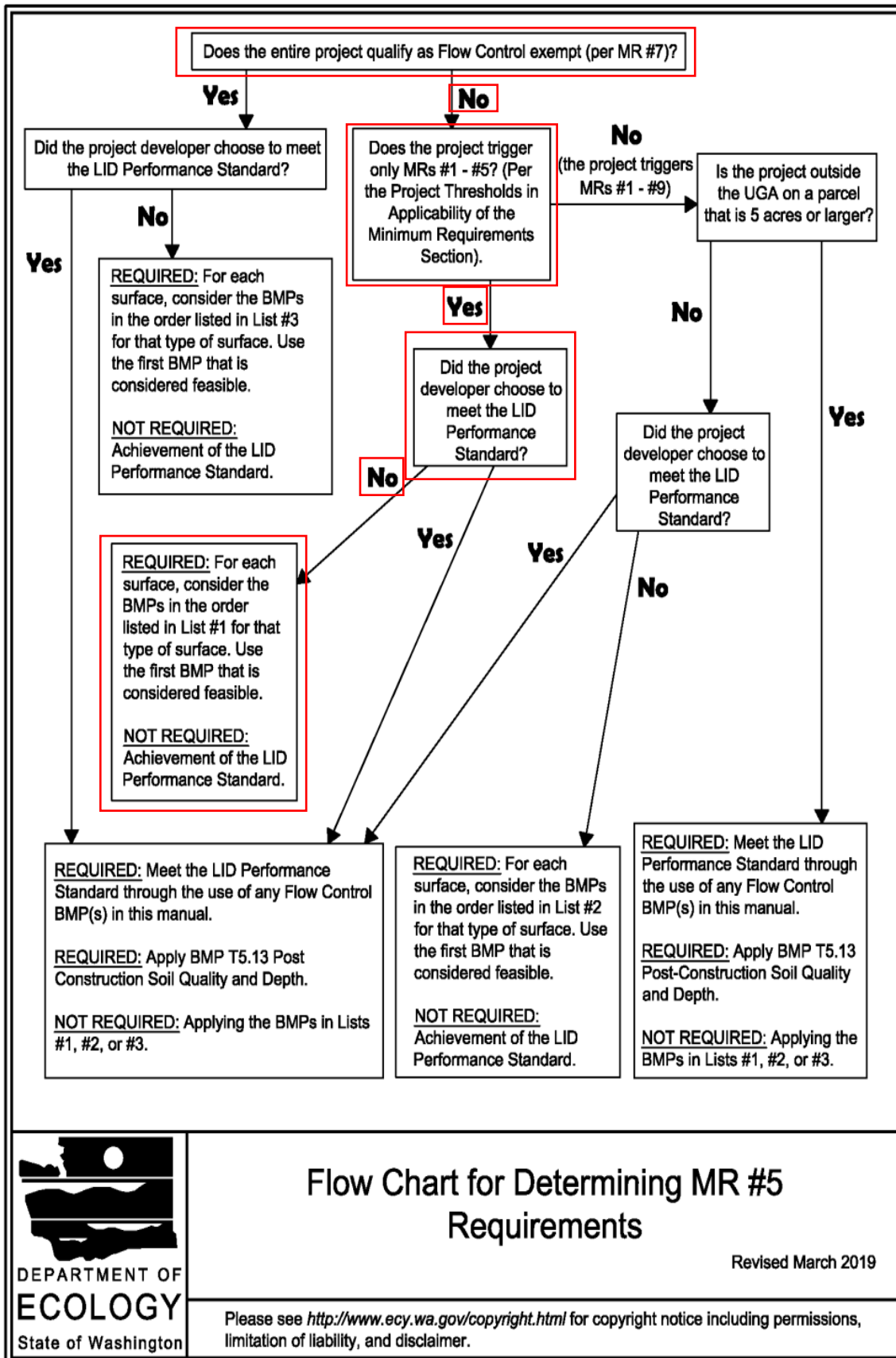


Figure I-3.3: Flow Chart for Determining CR #5 Requirements



APPENDIX 3

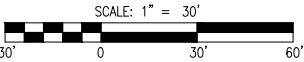
BASIN MAP EXHIBITS



PROJECT AREAS:

EXISTING GRAVEL SURFACE 0.11 ACRES (4,818 SF)

TOTAL: 0.11 ACRES (4,818 SF)



**EVERGREEN CHRISTIAN CENTER
ECC PORTABLES
EXISTING CONDITIONS MAP**

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Planning

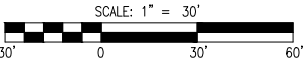
Woodinville Tumwater Kent
321 Cleveland Ave SE, #209
Tumwater, WA 98501
T 425.806.1869 www.LDCcorp.com F 425.482.2893

ISSUE DATE: 07-10-2026



PROJECT AREAS:

	WOOD DECK:	0.03 ACRES (1,178 SF)
	ROOF	0.08 ACRES (3,640 SF)
TOTAL:		0.11 ACRES (4,818 SF)



**EVERGREEN CHRISTIAN CENTER
ECC PORTABLES
PROPOSED CONDITIONS MAP**

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Planning

Woodinville Tumwater Kent
321 Cleveland Ave SE, #209
Tumwater, WA 98501
T 425.806.1869 www.LDCcorp.com F 425.482.2893

ISSUE DATE: 07-10-2026

APPENDIX 4

CONSTRUCTION PLANS

EVERGREEN CHRISTIAN SCHOOL - PORTABLES

ABBREVIATED DRAINAGE PLAN



LEGEND

- PARCEL LINE
- STRAW WATTLES PER DETAIL SHOWN ON SHEET DT-01

DEMOLITION AND TESC NOTES

1. INSTALL STRAW WATTLES PER DETAIL SHOWN ON SHEET DT-01
2. PROTECT IN-PLACE EXISTING CEMENT CONCRETE SIDEWALK

PROJECT INFORMATION

OWNER: EVERGREEN CHRISTIAN CENTER
TPN: 78400100200, 78400100201, 78400100000
78400300500, 78400200100
SITE ADDRESS: 1000 BLACK LAKE BLVD
PARCEL SIZE: 1,032,372 SF (23.7 AC)
SANITARY SEWER: CITY OF OLYMPIA
WATER: CITY OF OLYMPIA
POWER/GAS: PUGET SOUND ENERGY
TELEPHONE/FIBER: XFINITY / CENTURYLINK
CABLE/TV: XFINITY
FIRE DISTRICT: CITY OF OLYMPIA
SCHOOL DISTRICT: OLYMPIA SCHOOL DISTRICT
FEMA PANEL NO.: 0166
EXISTING WELLS: NONE
ZONING DESIGNATION: RM-24

CONTACT LIST

APPLICANT: RJ DEVELOPMENT
401 CENTRAL ST SE
OLYMPIA, WA 98501
CONTACT: RONNIE HASTIE
EMAIL: ronnie@rjdevelopment.com

CIVIL ENGINEER: LDC, INC.
321 CLEVELAND AVE SE SUITE 209
TUMWATER, WA 98501
CONTACT: TYRELL BRADLEY, P.E.
PHONE: (360) 634-2066
FAX: (425) 482-2893
EMAIL: tbradley@ldccorp.com

OWNER: EVERGREEN CHRISTIAN CENTER
1000 BLACK LAKE BLVD SW
OLYMPIA, WA 98502
PHONE: (360) 352-3410

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UTILITY NOTE

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



REVISIONS		NO.	DATE	DESCRIPTION	BY

LDC

Surveying
Engineering
Planning

Woodinville

Olympia

321 Cleveland Ave SE, #209

Tumwater, WA 98501

www.LDCcorp.com

T 425.806.1869

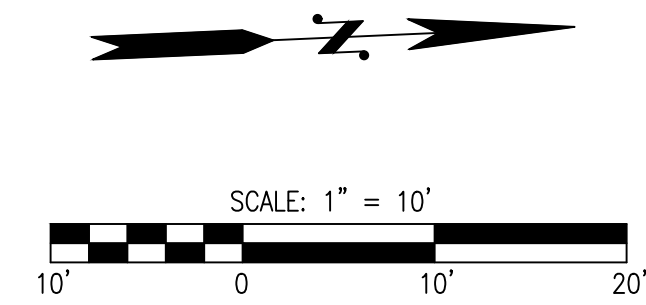
F 425.482.2893

EVERGREEN CHRISTIAN SCHOOL PORTABLE PROJECT

DEMOLITION AND TESC PLAN



JOB NUMBER: C26-156
DRAWING NAME: C26-156 EC-01
DESIGNER: AT
DRAFTING BY: AW
DATE: JULY, 2026
SCALE: AS SHOWN
JURISDICTION: OLYMPIA, WA





1. PROPOSED PORTABLE BUILDING

2. INSTALL SPLASH BLOCK PER DETAIL SHOWN ON SHEET DT-01

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



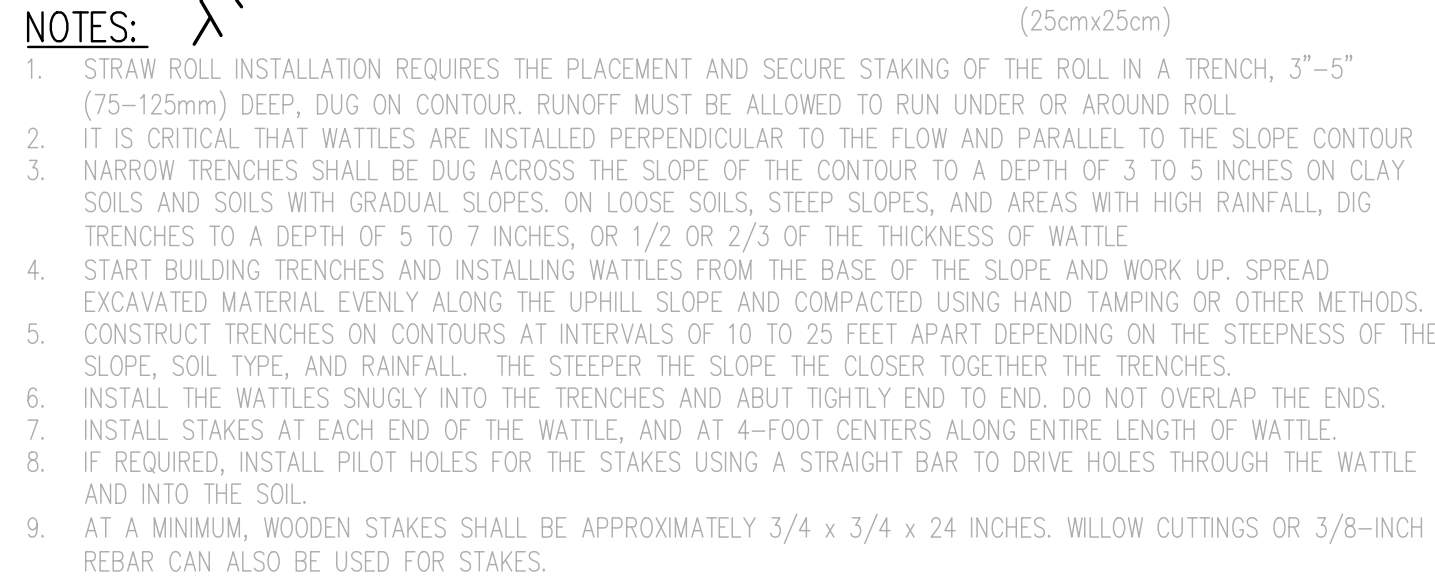
DR-01

SHEET **2** OF **3**

RJ DEVELOPMENT

EVERGREEN CHRISTIAN SCHOOL
PORTABLE PROJECT

DRAINAGE PLAN



The image displays four views of a tapered rectangular block:

- Top View:** A rectangle with a width of 4" and a length of 3'-0". The right side is tapered from a full width of 4" to a narrower section.
- Front View:** A trapezoid with a top width of 2"-8" and a bottom width of 2'-0". The height is 2" on both the left and right sides. The label "SIDE ELEVATION" is placed to its right.
- Right Side View:** A trapezoid with a top width of 2" and a bottom width of 17". The height is 4". The label "FRONT ELEVATION" is placed below it.
- Isometric View:** A 3D perspective of the block, showing the 3'-0" length, 2'-0" width, and 2'-0" height.

SPLASH BLOCK DETAIL
NOT TO SCALE

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



DT-01

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Engineering
Planning

Woodinville	Olympia	Kent
321 Cleveland Ave SE, #209	321 Cleveland Ave SE, #209	
Tumwater, WA 98501	Tumwater, WA 98501	
T 25-806 1869	www.LDCcorp.com	F 425.482.2983

[illegible]

APPENDIX 5

NRCS REPORT



United States
Department of
Agriculture

NRCS

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 **Thurston County Area, Washington**

Evergreen Christian Center



July 10, 2026

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

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.

Custom Soil Resource Report Soil Map



Custom Soil Resource Report

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit

 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop

 Saline Spot

 Sandy Spot

 Severely Eroded Spot

 Sinkhole

 Slide or Slip

 Sodic Spot

 Spoil Area

 Stony Spot

 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Water Features

 Streams and Canals

Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Thurston County Area, Washington
Survey Area Data: Version 19, Aug 28, 2025

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

Date(s) aerial images were photographed: Jul 31, 2022—Aug 8, 2022

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1	Alderwood gravelly sandy loam, 0 to 8 percent slopes	0.1	0.3%
2	Alderwood gravelly sandy loam, 8 to 15 percent slopes	26.2	79.4%
38	Giles silt loam, 0 to 3 percent slopes	6.7	20.2%
Totals for Area of Interest		32.9	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.

Thurston County Area, Washington

1—Alderwood gravelly sandy loam, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2t625
Landscape: Glacial drift plains
Elevation: 50 to 800 feet
Mean annual precipitation: 25 to 60 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 160 to 240 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Alderwood and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Alderwood

Setting

Landscape: Glacial drift plains
Landform: Hills, Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest, talf
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Glacial drift and/or glacial outwash over dense glaciomarine deposits

Typical profile

A - 0 to 7 inches: gravelly sandy loam
Bw1 - 7 to 21 inches: very gravelly sandy loam
Bw2 - 21 to 30 inches: very gravelly sandy loam
Bg - 30 to 35 inches: very gravelly sandy loam
2Cd1 - 35 to 43 inches: very gravelly sandy loam
2Cd2 - 43 to 59 inches: very gravelly sandy loam

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 20 to 39 inches to densic material
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: B
Ecological site: F002XA004WA - Puget Lowlands Forest

Custom Soil Resource Report

Forage suitability group: Limited Depth Soils (G002XS301WA), Limited Depth Soils (G002XF303WA), Limited Depth Soils (G002XN302WA)
Other vegetative classification: Limited Depth Soils (G002XS301WA), Limited Depth Soils (G002XF303WA), Limited Depth Soils (G002XN302WA)
Hydric soil rating: No

Minor Components

Everett

Percent of map unit: 5 percent
Landscape: Glacial drift and outwash plains
Landform: Moraines, Eskers, Kames
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve, crest
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Mckenna

Percent of map unit: 5 percent
Landscape: Drift plains
Landform: Drainageways, Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Linear, concave
Across-slope shape: Concave
Hydric soil rating: Yes

Shalcar

Percent of map unit: 3 percent
Landscape: Till plains
Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Norma

Percent of map unit: 2 percent
Landscape: Glacial drift plains
Landform: Drainageways, Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Linear, concave
Across-slope shape: Concave
Hydric soil rating: Yes

2—Alderwood gravelly sandy loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2t626
Landscape: Glacial drift plains
Elevation: 50 to 800 feet

Custom Soil Resource Report

Mean annual precipitation: 20 to 60 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 160 to 240 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Alderwood and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Alderwood

Setting

Landscape: Glacial drift plains
Landform: Hills, Ridges
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Nose slope, talf
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Glacial drift and/or glacial outwash over dense glaciomarine deposits

Typical profile

A - 0 to 7 inches: gravelly sandy loam
Bw1 - 7 to 21 inches: very gravelly sandy loam
Bw2 - 21 to 30 inches: very gravelly sandy loam
Bg - 30 to 35 inches: very gravelly sandy loam
2Cd1 - 35 to 43 inches: very gravelly sandy loam
2Cd2 - 43 to 59 inches: very gravelly sandy loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 20 to 39 inches to densic material
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: B
Ecological site: F002XA004WA - Puget Lowlands Forest
Forage suitability group: Limited Depth Soils (G002XS301WA), Limited Depth Soils (G002XF303WA), Limited Depth Soils (G002XN302WA)
Other vegetative classification: Limited Depth Soils (G002XS301WA), Limited Depth Soils (G002XF303WA), Limited Depth Soils (G002XN302WA)
Hydric soil rating: No

Minor Components

Everett

Percent of map unit: 5 percent
Landscape: Glacial drift and outwash plains

Custom Soil Resource Report

Landform: Moraines, Eskers, Kames
Landform position (two-dimensional): Shoulder, footslope
Landform position (three-dimensional): Base slope, crest
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Indianola

Percent of map unit: 5 percent
Landscape: Glacial drift and outwash plains
Landform: Terraces, Kames, Eskers
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Shalcar

Percent of map unit: 3 percent
Landscape: Till plains
Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Norma

Percent of map unit: 2 percent
Landscape: Glacial drift plains
Landform: Drainageways, Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Linear, concave
Across-slope shape: Concave
Hydric soil rating: Yes

38—Giles silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2ndbv
Elevation: 160 to 1,640 feet
Mean annual precipitation: 35 to 60 inches
Mean annual air temperature: 50 degrees F
Frost-free period: 170 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Giles and similar soils: 85 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Giles

Setting

Landform: Terraces

Parent material: Volcanic ash and glacial outwash

Typical profile

H1 - 0 to 10 inches: silt loam

H2 - 10 to 48 inches: silt loam

H3 - 48 to 60 inches: silt loam

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

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Very high (about 14.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 1

Hydrologic Soil Group: B

Ecological site: F002XA004WA - Puget Lowlands Forest

Forage suitability group: Soils with Few Limitations (G002XS501WA)

Other vegetative classification: Soils with Few Limitations (G002XS501WA)

Hydric soil rating: No

Minor Components

Yelm

Percent of map unit: 3 percent

Landform: Terraces

Hydric soil rating: No

Norma

Percent of map unit: 2 percent

Landform: Depressions

Other vegetative classification: Wet Soils (G002XS101WA)

Hydric soil rating: Yes

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APPENDIX 6

DOWNSTREAM EXHIBIT
