Preliminary Stormwater Site Plan

DaVita Clinic
Woodland, WA

Prepared For:
Genesis KC Development, LLC
300 Deschutes Way SW Suite 208
Tumwater, WA 98501

Prepared By:
LDC, Inc.
1411 State Ave NE, Ste 200
Olympia, WA 98506
425.806.1869

LDC | Surveying Engineering Planning

November 2022

Stormwater Site Plan

Project Information

Project:	**DaVita Clinic**
Prepared for:	**Genesis KC Development, LLC** 300 Deschutes Way SW Suite 208 Tumwater, WA 98501 Contact Name: Mark Kinney Contact Phone: 918.271.8240

Reviewing Agency

Jurisdiction:	City of Woodland, WA

Project Representative

Prepared by:	**LDC, Inc.** 1411 State Ave. NE, Ste 200 Olympia, WA 98506 425.806.1869 ldccorp.com
Contact:	Ross Jarvis, PE RJarvis@ldccorp.com
Project Reference:	C22-259

PROJECT ENGINEER'S CERTIFICATION

I hereby certify that this Stormwater Site Plan for the DaVita Clinic project has been prepared by me or under my supervision and meets the minimum standards of the City of Woodland and normal standards of engineering practice. I hereby acknowledge and agree that the jurisdiction does not and will not assume liability for the sufficiency, suitability, or performance of drainage facilities designed by me.

Preliminary
11/10/2022 3:44:29 PM

Prepared by: Kyle Herrera, EIT Date
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Approved by: Ross Jarvis, PE Date
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1. PROJECT OVERVIEW

The following report was prepared for the DaVita Clinic project in Woodland, WA. This report was prepared to comply with the minimum technical standards and requirements that are set forth in the *2019 Department of Ecology Stormwater Management Manual for Western Washington (SWMMWW).*

Project Proponent:	Genesis KC Development, LLC
Parcel Numbers:	50451
Total Parcel Area:	1.03 Acres
Current Zoning:	C2 – Highway Commercial
Required Permits:	Grading, Utility, Paving, Building, etc.
Site Address:	467 Beechwood Street
Section, Township, Range:	Section 24, Township 5 N, Range 1 W

The proposed DaVita Clinic project is located on a 1.03-acre parcel. The proposed construction includes the construction of a 1-story clinic building, a 39-stall parking lot, frontage improvements, landscaping, and stormwater improvements disturbing approximately 1.03 acres of the parcel. Specifically, the proposed site improvements/construction activities for this project include the following:

- Site preparation, grading, and erosion control activities
- Construction of 1-story clinic building
- Construction of new parking stalls
- Construction of sidewalks
- Frontage improvements along Beechwood Street
- Construction/installation of on-site stormwater management BMPs

A site vicinity map of the proposed project location is enclosed herein as **Appendix 1**. A worksheet for determining the number of Minimum Requirements for this project per the *2019 SWMMWW* has been prepared and enclosed herein as **Appendix 2**. The proposed project is considered a new development and will create over 5,000 s.f. of new hard surface areas. Therefore, the project will trigger minimum requirements #1-9 for the new impervious surfaces.

1.1 SUMMARY OF COMPLIANCE ON-SITE

The stormwater design complies with the 9 minimum requirements as follows:

Minimum Requirement #1 – Preparation of Stormwater Site Plans – The Stormwater Site Plan is prepared per the *2019 SWMMWW*.

Minimum Requirement #2 – Construction Stormwater Pollution Prevention – A pollution prevention plan will be completed and included herein as **Appendix 6** at the time of civil permit submittal which will

describe the 13 required elements. Further, an erosion control plan has been prepared and included as part of the preliminary construction plan set in **Appendix 4**.

Minimum Requirement #3 – Source Control of Pollution – BMPs listed below are the minimum required for the site, additional BMPs not listed here may need to be implemented the meet the minimum requirements discussed in the *2019 SWMMWW*.

- S411 BMPs for Landscaping and Lawn/Vegetation Management
- S417 BMPs for Maintenance of Stormwater Drainage and Treatment Systems
- S421 BMPs for Parking and Storage of Vehicles and Equipment

Minimum Requirement #4 – Preservation of Natural Drainage Systems and Outfalls – Currently, stormwater runoff within the project area appears to sheet flow to the east and west. There is no evidence of channelized flow or runoff from the project areas and therefore it is believed the stormwater runoff on the parcel infiltrates within the native soils. After construction, the stormwater runoff from the proposed roof, parking lot, and sidewalk areas will be collected and conveyed into the bioretention pond. The remaining areas will continue to have the same drainage patterns as today.

Minimum Requirement #5 – On-Site Stormwater Management – In accordance with Minimum Requirement #7, this project is not flow control exempt, triggers Minimum Requirements #1-9, and is located on a parcel inside the UGA. Therefore, the project shall employ the On-Site Stormwater Management BMPs in accordance with List #2 or the LID Performance Standard. The proposed project will utilize BMPs per List #2, see below.

Lawn and Landscaped Areas:

- Per the *2019 SWMMWW* manual, BMP T5.13: Post Construction Soil Quality and Depth will be utilized to the maximum extent practicable. See landscape plans for details.

Roofs:

- Full Dispersion (BMP T5.30) or Downspout Full Infiltration Systems (BMP T5.10A): Full dispersion is infeasible for this project site. Full dispersion requires that the site protects at least 65% of the site in a forest or native condition. For this reason alone, this BMP is not feasible.
- Downspout Full Infiltration Systems (BMP T5.10A): Downspout infiltration system is infeasible for this site due to the required setback from the water table and desire to provide a singular LID enhanced treatment facility.
- Bioretention (BMP T7.30): Bioretention is feasible for this project. Due to the site soils supporting infiltration, bioretention can be used to provide treatment and flow control for on-site stormwater runoff. Bioretention will be utilized with a single bioretention pond system. See Section 4 of this report for more information.

Other Hard Surfaces:

- Full Dispersion (BMP T5.30): Full dispersion is infeasible for this project site based on the reason above.
- Permeable Pavements (BMP T5.15): Based on the use of the site and the location of the parcel, permeable pavement may be feasible however is not practical nor is it the desired design option.
- Bioretention (BMP T7.30): Bioretention is feasible for this project and will be utilized through the use of a single bioretention pond system. See Section 4 of this report for more information.

Minimum Requirement #6: Runoff Treatment: The proposed project will construct over 5,000 S.F. of pollution generating impervious surface; therefore, a stormwater treatment facility is required. Even though the proposed project is a commercial project, the site does not trigger the requirements for enhanced treatment as it is not within a quarter mile of a fresh water designated for aquatic life use or

that has an existing aquatic life use per Volume III, Section 1.2, Step 5. However, enhanced treatment will be provided for this project through the use of a bioretention soil mix in the bioretention pond.

Minimum Requirement #7: Flow Control: The proposed project will construct over 10,000 SF of impervious surface and does not discharge to a flow control exempt water body, therefore flow control is required. Flow control for the project will be provided through the use of a bioretention pond.

Minimum Requirement #8: Wetlands Protection: Per Cowlitz County GIS data, no wetlands were identified on or near the site.

Minimum Requirement #9: Operation and Maintenance: An operations and maintenance manual will be completed and provided herein as **Appendix 8** at the time of civil permit submittal.

2. EXISTING CONDITIONS SUMMARY

2.1 EXISTING ON-SITE CONDITIONS

The project parcel is +/- 1.03 acres in size. Topography within the site varies from slopes of 0% to 3%. The site slopes to a trench on the west side of the parcel with the low point being on the southwest corner. The site appears to have been a residential home until cleared in 2019 and has remained undeveloped since. The parcel is predominantly covered in grass with no evidence of concentrated discharge or runoff from the parcel. An existing access for the adjacent parcel runs along the eastern parcel boundary and will remain throughout the construction of this project. The stormwater runoff from this access appears to flow away from the project parcel and is assumed to utilize existing stormwater facilities on that parcel. There are no known flooding problems downstream of the project site. There are no flow control facilities on the project site. See Figures 1, and 2, Existing Conditions Maps below.

Figure 1: Existing Conditions (1990)

Figure 2: Existing Conditions (2022)

2.1.1 Flood Hazard Zone

The project parcel is located within the Federal Emergency Management Agency (FEMA) Flood Insurance Rate map (FIRM) Panel No. 53015C0886G. According to the FIRM Map the project parcel is located within

Zone X, which is determined to be an area of reduced flood hazard due to levee. See **Appendix 7** for the FIRM Map.

2.1.2 On-Site Soils Information

According to the Natural Resources Conservation Service (NRCS) Web Soil Survey, the soils on the site were classified to be Newberg fine sandy loam, 0 to 3 percent slopes. The soils belong to hydrologic soil group A with a high infiltration rate between 1.98 and 5.95 in/hr. At this stage in design, a preliminary design infiltration rate of 2 in/hr was used to size the bioretention facility. See **Appendix 5** of the Drainage Control Plan for the NRCS Web Soil Survey report. A full geotechnical report will be provided at the time of civil permit submittal.

3. OFFSITE ANALYSIS REPORT

3.1 QUALITATIVE UPSTREAM ANALYSIS

Currently, it appears that there is no on-site run on from adjacent project areas. The adjacent street is developed with curb and gutter. The parcel to the east is currently developed and has its own stormwater system. The parcels to the west and south are residential properties.

3.2 QUALITATIVE DOWNSTREAM ANALYSIS

The proposed project will infiltrate all of the stormwater runoff on-site therefore reducing the volume of runoff entering the downstream system. No adverse effects to the downstream systems are anticipated.

4. PERMANENT STORMWATER CONTROL PLAN

4.1 SUMMARY SECTION

The proposed project follows the development requirements stated in the *2019 SWMMWW*. Following Figure 2.4.1 (See **Appendix 2**), this project classifies as a new development that triggers minimum requirements #1-9. The site does not have 35% or more of existing impervious coverage, and the project will add more than 5,000 s.f. of new impervious surfaces. See **Appendix 4** for the proposed stormwater conveyance locations and details. Table 1 and 2 below illustrate the existing and proposed impervious and pervious areas of the disturbed areas (See **Appendix 3** for the basin maps).

Table 1: On-Site Land Type Designations Existing vs. Proposed

LAND TYPE DESIGNATIONS	AREA (ACRES)	% OF TOTAL AREA
Existing Areas	**1.03**	**100**
Impervious	0.00	0
Pervious	1.03	100
Proposed Areas	**1.03**	**100**
Impervious	0.67	65.0
Pervious	0.36	35.0
Undisturbed	0.00	0

4.1.1 Performance Standards and Goals

Following Figure 2.4.1 – Flow Chart for Determining Requirements for New Development, the project is considered a new development that triggers the use of Minimum Requirements #1-9.

4.1.2 Water Quality System

The proposed project will construct over 5,000 S.F. of pollution generating impervious surface; therefore, a stormwater treatment facility is required. Even though the proposed project is a commercial project, the site does not trigger the requirements for enhanced treatment as it is not within a quarter mile of a fresh water designated for aquatic life use or that has an existing aquatic life use per Volume III, Section 1.2, Step 5. However, enhanced treatment will be provided for this project through the use of a bioretention soil mix in the bioretention pond.

4.1.3 Flow Control System

Flow control is required for the proposed project and will be provided through the use of a bioretention pond. The bioretention pond was sized using MGS FLOOD. At this time of design, a long-term design infiltration rate of 2 in/hr, which was provided in the NRCS Soils Report, was used. According to MGS FLOOD, the proposed roof area, asphalt parking lot, and concrete sidewalks require a bioretention pond with a minimum bottom area of 550 SF and total depth of 3 ft, including 1 ft of freeboard. A bioretention pond with bottom area 550 SF and depth of 3 ft has been provided. The stormwater conveyed to this pond is fully infiltrated. See **Appendix 9** for MGS FLOOD report.

4.1.4 Conveyance System Analysis and Design

All stormwater conveyance systems will be sized to convey the 24-hour 25-year storm within the pipe.

5. CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN (C-SWPPP)

A SWPPP will be completed and provided herein as **Appendix 6** at the time of civil permit submittal.

6. SPECIAL REPORTS AND STUDIES

A full geotechnical report will be completed and provided herein as **Appendix 5** at the time of the civil permit submittal.

7. OTHER PERMITS

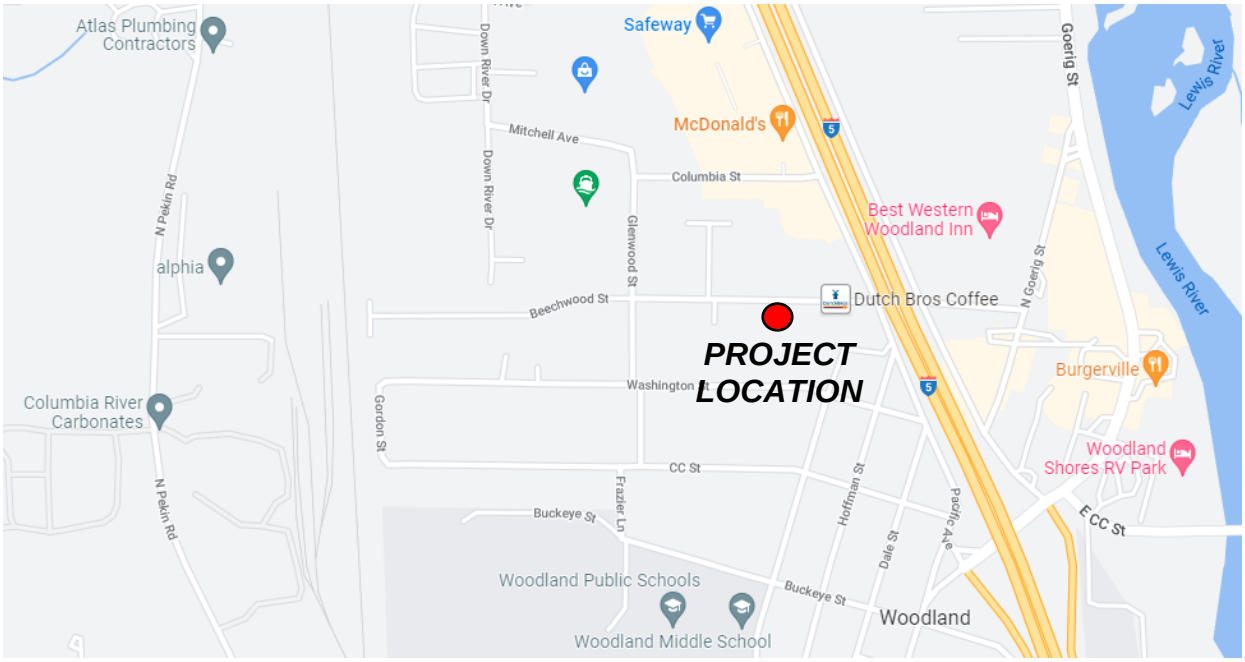
Utility, paving, building, and grading permits may need to be secured prior to beginning construction activities.

8. OPERATION AND MAINTENANCE MANUAL

Genesis KC Development, LLC will be responsible in maintaining all stormwater facilities on-site. An operation and maintenance manual will be completed and provided herein as **Appendix 8** at the time of civil permit submittal.

END OF STORMWATER SITE PLAN

APPENDIX 1
SITE VICINITY MAP



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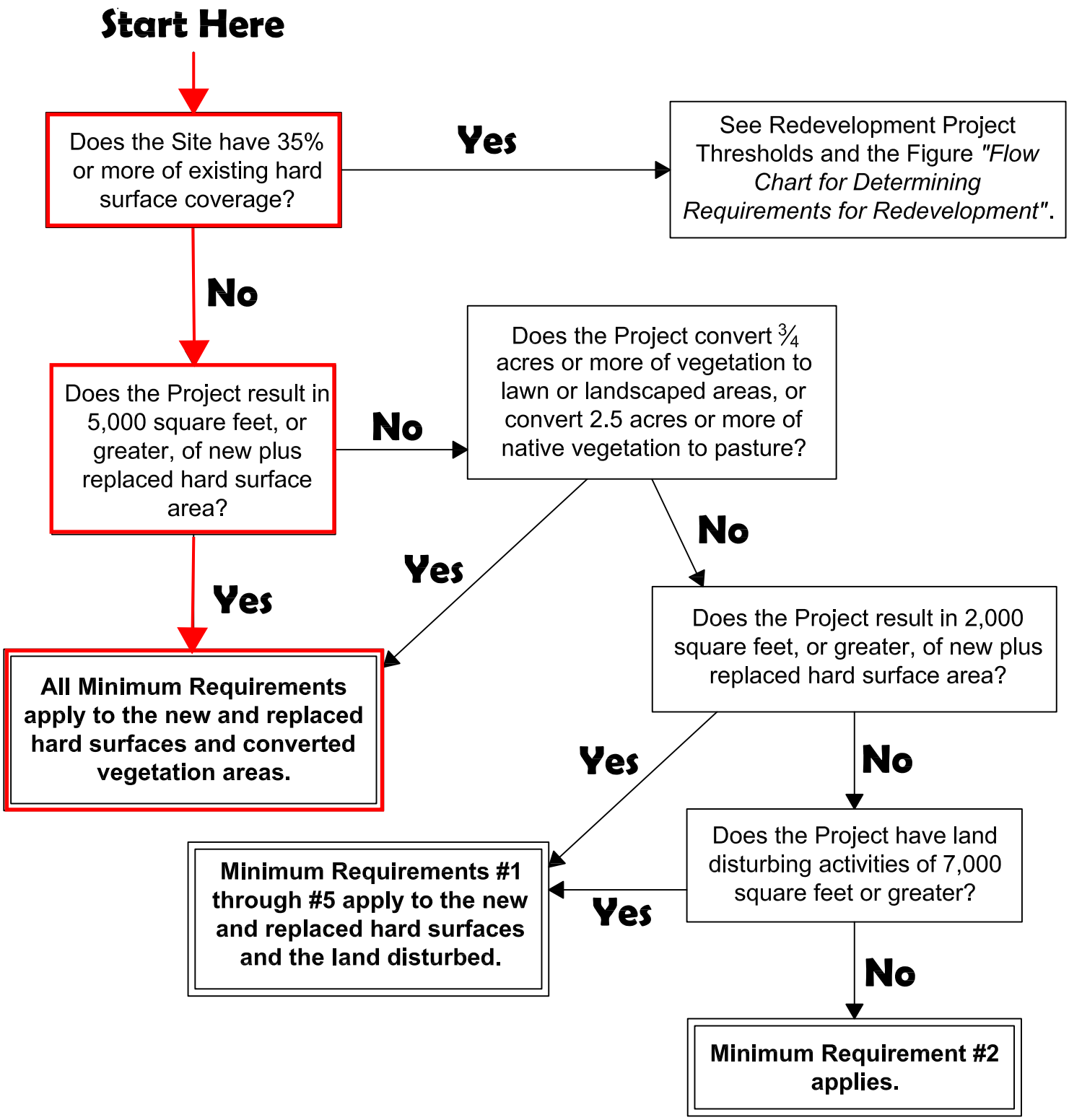
APPENDIX 2
DETERMINATION OF MINIMUM REQUIREMENTS WORKSHEET



DEPARTMENT OF ECOLOGY
State of Washington

Flow Chart for Determining Requirements for New Development

Revised March 2019

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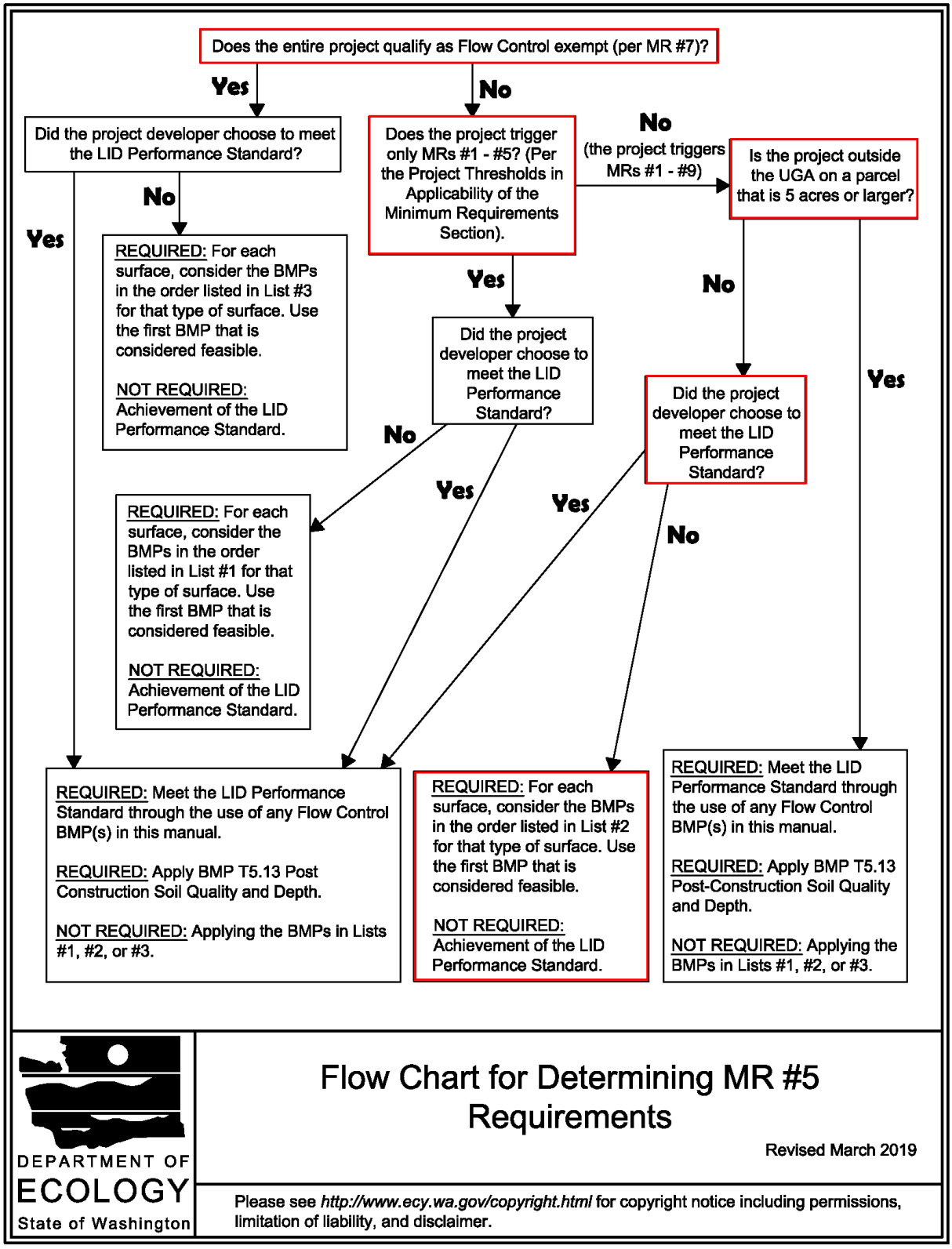
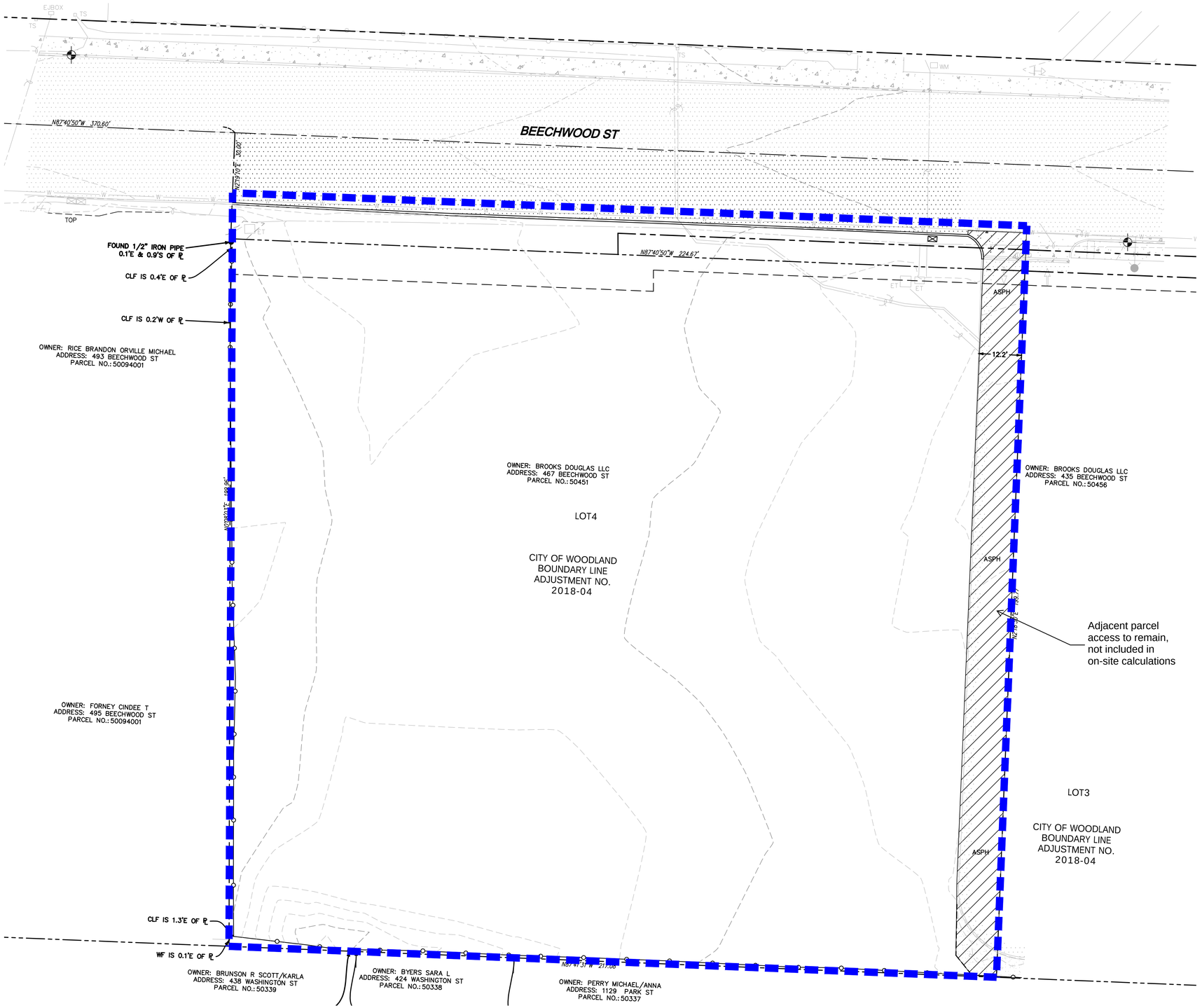
Figure I-3.3: Flow Chart for Determining MR #5 Requirements



APPENDIX 3
BASIN MAP EXHIBITS



N

SCALE: 1" = 15'

15' 0 15' 30'

EXISTING AREAS

BASIN 1:

PERVIOUS:	1.03 AC
TOTAL AREA:	1.03 AC

GENESIS KC DEVELOPMENT, LLC

MIXED USE BUILDING
PROPOSED CONDITIONS MAP

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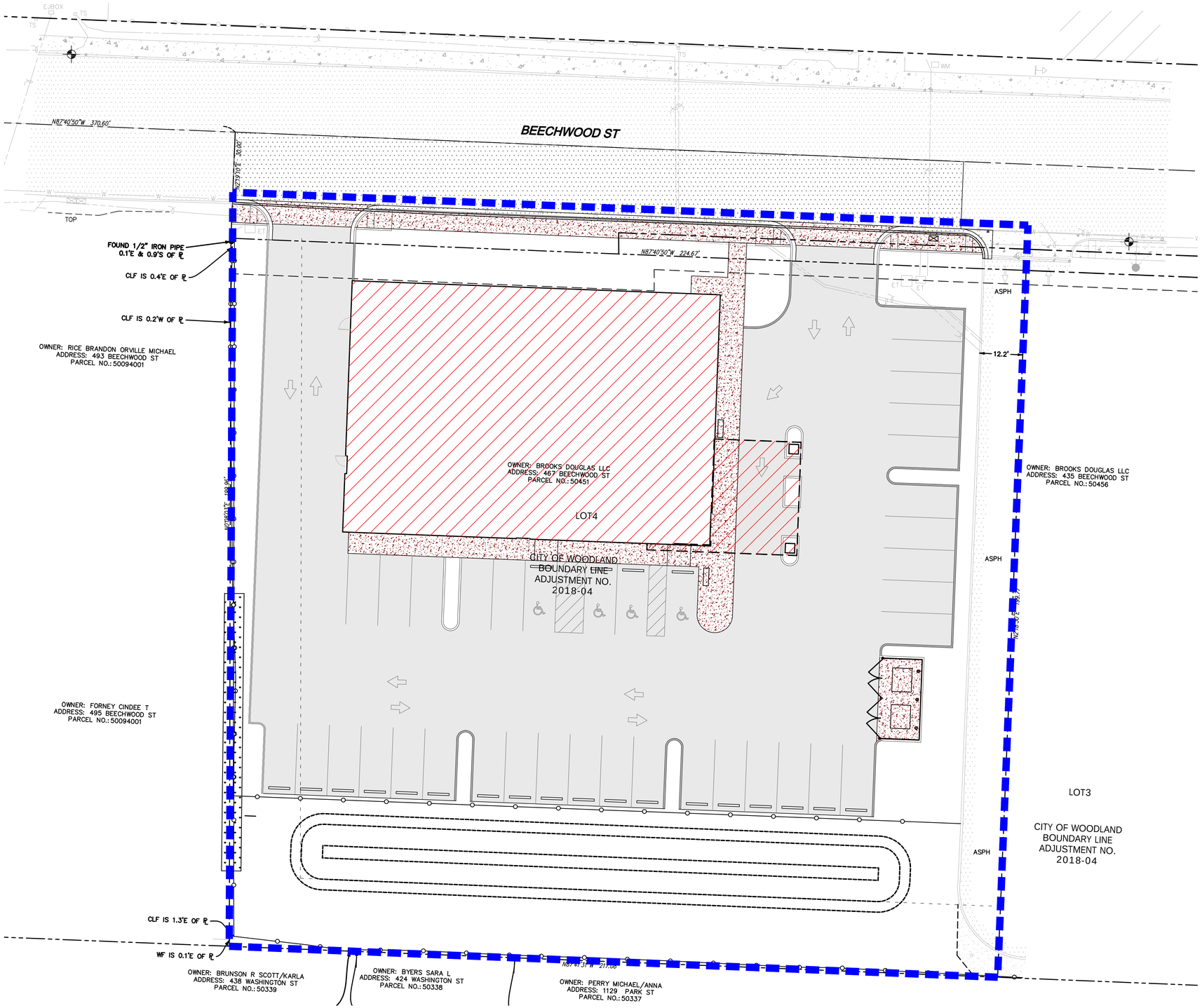
ISSUE DATE: 10-11-22



PROPOSED BASIN 1 AREAS:

ROOF AREA:	***0.19 ACRES***
CONCRETE AREA:	***0.06 ACRES***
ASPHALT AREA:	***0.42 ACRES***
PERVIOUS AREA:	***0.36 ACRES***
TOTAL:	***1.03 ACRES***

GENESIS KC DEVELOPMENT, LLC

MIXED USE BUILDING
PROPOSED CONDITIONS MAP

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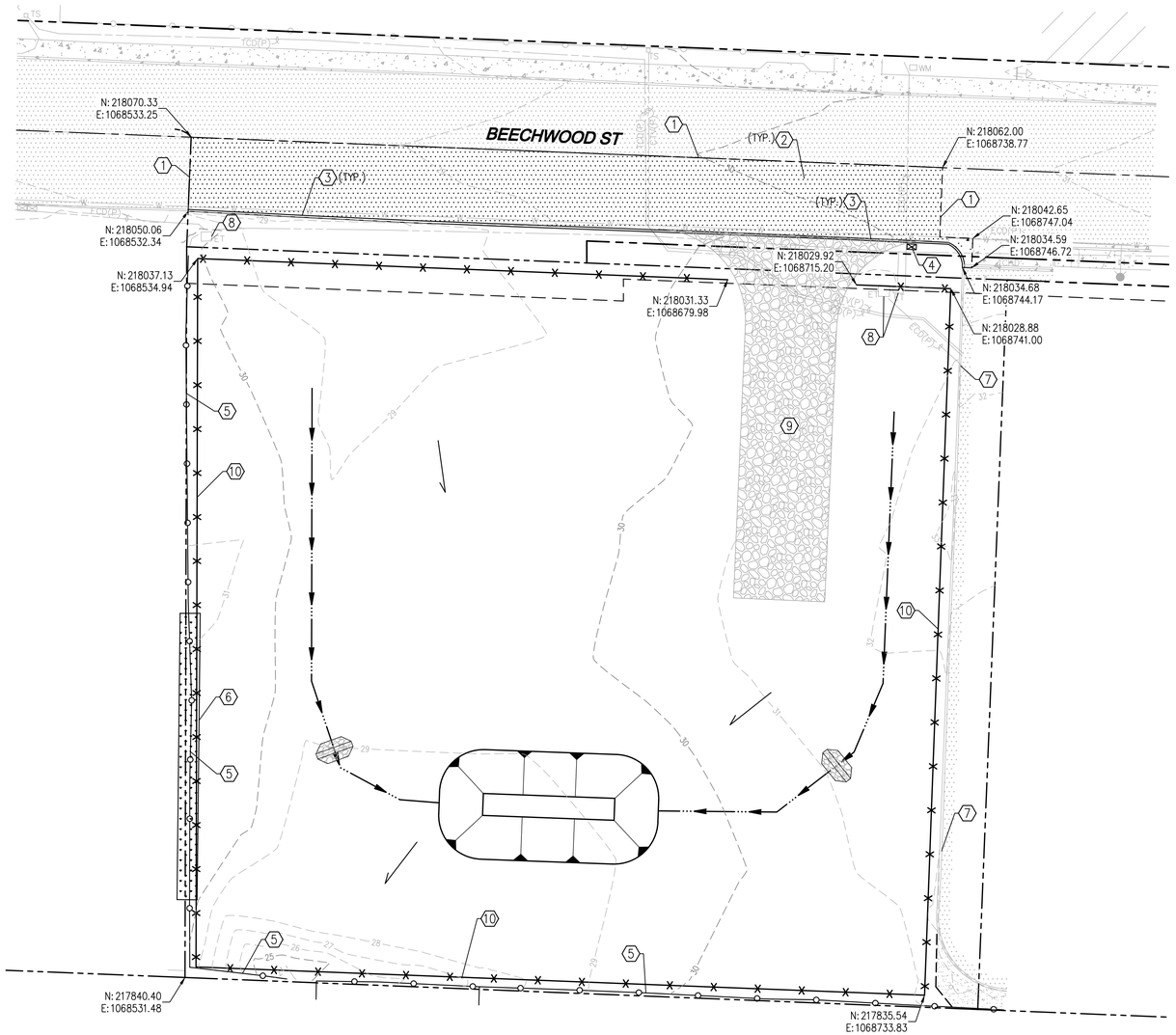
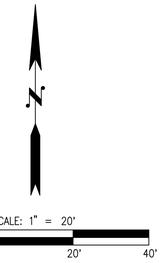
ISSUE DATE: 10-11-22

APPENDIX 4
PRELIMINARY CONSTRUCTION PLANS

IN THE N.E. 1/4 OF THE N.E. 1/4 SECTION 24, TOWNSHIP 5 N., RANGE 01 W., W.M.





LEGEND

- SAWCUT LIMITS
- SILT FENCE
- CONVEYANCE SWALE
- (11) ROCK CONSTRUCTION ENTRANCE
- CATCH BASIN PROTECTION
- TESC POND
- PRE DEVELOPMENT DRAINAGE PATTERN
- INSTALL CHECK DAM EVERY 100' OR 2' OF ELEVATION CHANGE
- ASPHALT REMOVAL

(X) DEMO & TESC NOTES

1. SAWCUT LIMITS
2. REMOVE & DISPOSE OF EXISTING ASPHALT PAVEMENT & STRUCTURAL BASE MATERIAL
3. REMOVE & DISPOSE OF EXISTING CONCRETE CURB
4. COORDINATE MAILBOX REMOVAL & REPLACEMENT W/OWNER
5. REMOVE & DISPOSE OF EXISTING WIRE FENCE
6. REMOVE & DISPOSE OF EXISTING VEGETATION & ASSOCIATED ROOTS
7. PROTECT IN-PLACE EXISTING CURB
8. PROTECT IN-PLACE EXISTING ELECTRIC TRANSFORMER & CONCRETE PAD
9. CONSTRUCTION ENTRANCE
10. INSTALL SILT FENCE

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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.

Call 2 Business Days Before You Dig
811 or 1-800-424-5555
Utilities Underground Location Center

REVISIONS

NO.	DATE	DESCRIPTION	BY

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GENESIS KC DEVELOPMENT

DAVITA CLINIC

DEMO & TESC PLAN

ROSS D. JARVIS — STATE OF WASHINGTON — 43868 — REGISTERED PROFESSIONAL ENGINEER — 11-22-22

JOB NUMBER:	C22-259
DRAWING NAME:	C22-259-EC-01
DESIGNER:	RW
DRAFTING BY:	AW
DATE:	NOVEMBER 2022
SCALE:	AS NOTED
JURISDICTION:	WOODLAND, WA

EC-01

SHEET 3 OF 6

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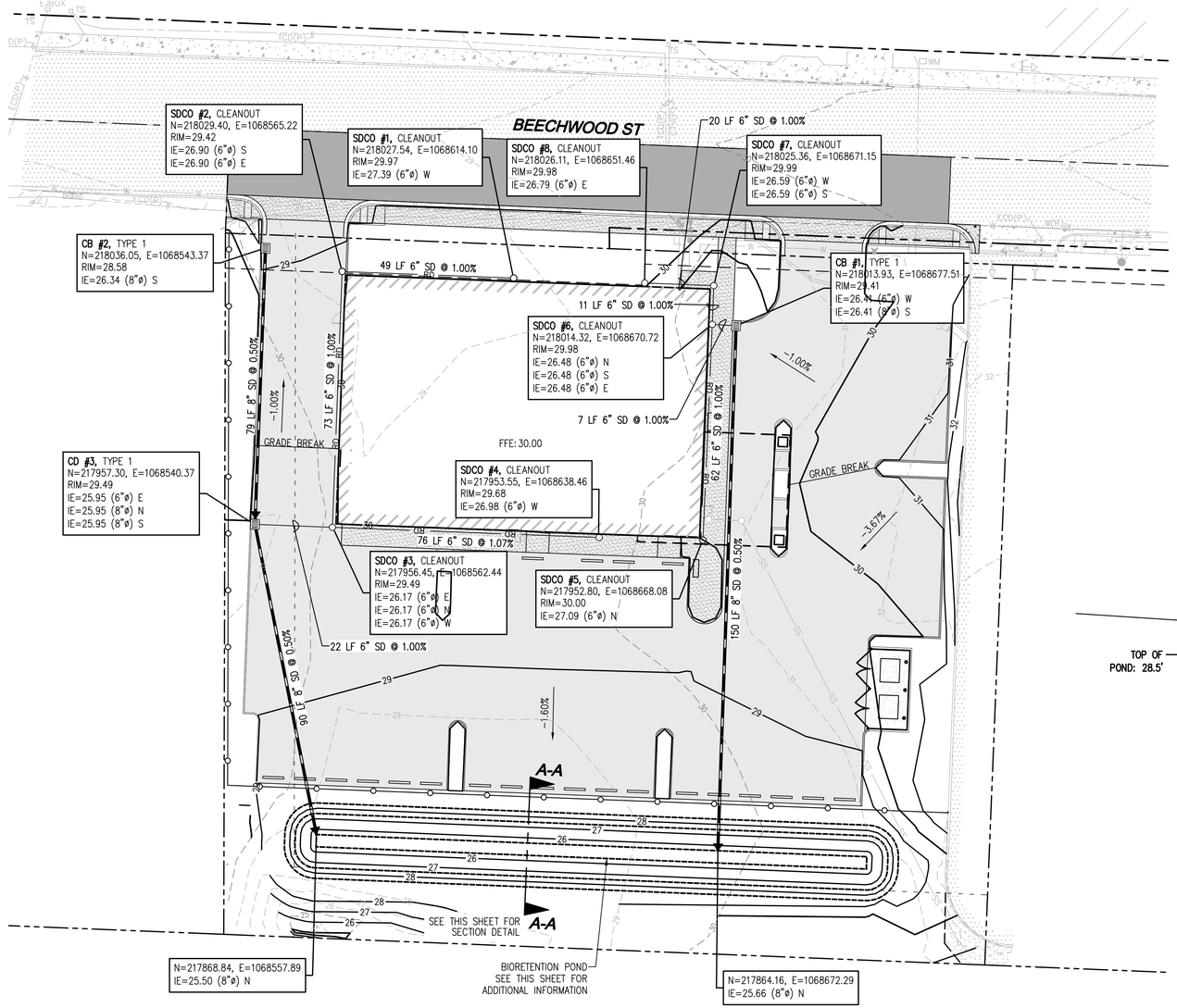
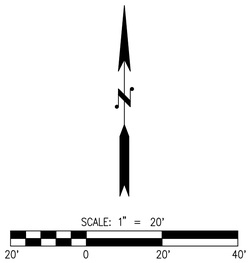


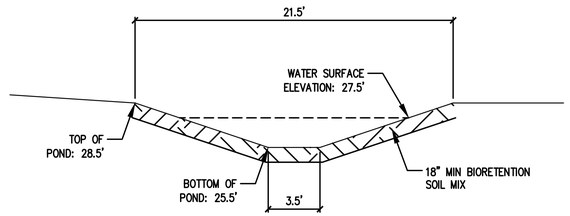


LEGEND

- RIGHT OF WAY ROW
- CENTERLINE
- PROPERTY LINE
- UTILITY EASEMENT LINE
- STORM POND LINE
- BUILDING SETBACK LINE
- PROPOSED STORM PIPE
- RD — PROPOSED ROOF DRAIN LINE
- CATCH BASIN
- CLEANOUT

GENERAL NOTES

STORM POND DIMENSIONS
BOTTOM: 166' X 3.5' (581 SQ FT)
SIDE SLOPE: 3:1
WATER DEPTH 2'
TOTAL DEPTH: 3' (WATER DEPTH + 1' FREEBOARD)



BIORETENTION POND SECTION A-A

NTS

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GENESIS KC DEVELOPMENT

DAVITA CLINIC

GRADING & DRAINAGE PLAN

ROSS D. JARLS — STATE OF WASHINGTON — 43868 — REGISTERED PROFESSIONAL ENGINEER — 11-28-22

JOB NUMBER:	C22-259
DRAWING NAME:	C22-259-DR-01
DESIGNER:	RW
DRAFTING BY:	AW
DATE:	NOVEMBER 2022
SCALE:	AS NOTED
JURISDICTION:	WOODLAND, WA

DR-01

SHEET 5 OF 6

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APPENDIX 5
GEOTECHNICAL 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 Cowlitz County, Washington

October 28, 2022

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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Contents

How Soil Surveys Are Made

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

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

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

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

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

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

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

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

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

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

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

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

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

Custom Soil Resource Report
Soil Map

Map Scale: 1:458 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 5 10 20 30

Feet
0 20 40 80 120

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

MAP LEGEND

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

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- 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: Cowlitz County, Washington
Survey Area Data: Version 23, Aug 31, 2022

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

Date(s) aerial images were photographed: Apr 26, 2019—Jun 11, 2019

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
141	Newberg fine sandy loam, 0 to 3 percent slopes	0.9	100.0%
Totals for Area of Interest		**0.9**	**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.

Cowlitz County, Washington

141—Newberg fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2f3d
Elevation: 10 to 1,500 feet
Mean annual precipitation: 18 to 60 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 165 to 210 days
Farmland classification: All areas are prime farmland

Map Unit Composition

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

Description of Newberg

Setting

Landform: Flood plains
Parent material: Alluvium

Typical profile

H1 - 0 to 10 inches: fine sandy loam
H2 - 10 to 28 inches: very fine sandy loam
H3 - 28 to 60 inches: fine sandy 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): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: OccasionalNone
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: A
Ecological site: F002XA008WA - Puget Lowlands Riparian Forest
Forage suitability group: Soils with Few Limitations (G002XV502WA)
Other vegetative classification: Soils with Few Limitations (G002XV502WA)
Hydric soil rating: No

Minor Components

Chehalis

Percent of map unit: 5 percent
Hydric soil rating: No

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APPENDIX 6
CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN

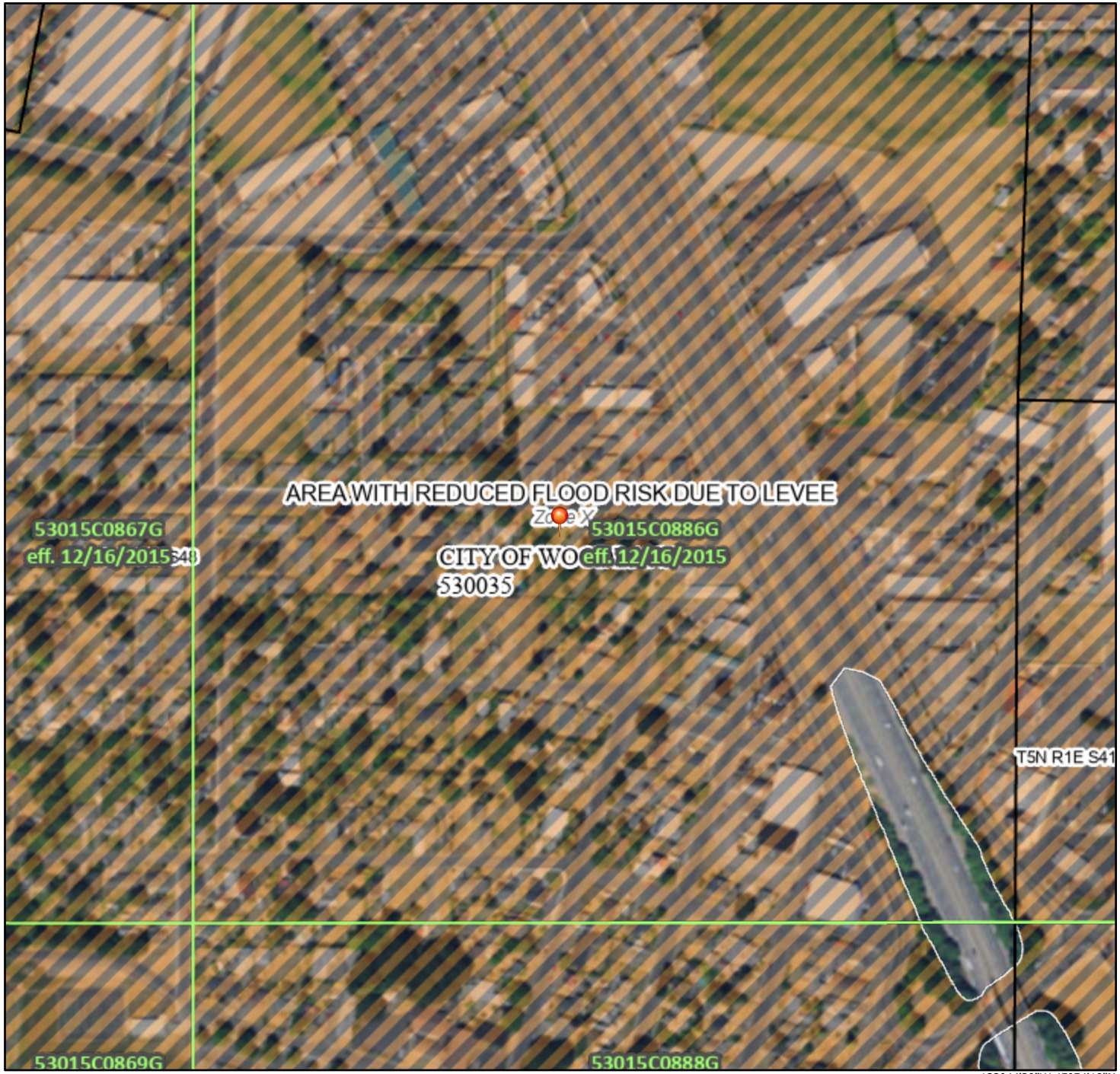
(NOT INCLUDED AT THIS TIME)

APPENDIX 7
FEMA FLOOD INSURANCE MAP

National Flood Hazard Layer FIRMette

FEMA

122°45'6"W 45°54'44"N



122°44'29"W 45°54'19"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

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

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- 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 *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

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 10/28/2022 at 5:36 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.

APPENDIX 8
OPERATIONS AND MAINTENANCE MANUAL

(NOT INCLUDED AT THIS TIME)

APPENDIX 9
DESIGN CALCULATIONS AND COMPUTATIONS

MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.57
Program License Number: 201510005
Project Simulation Performed on: 11/10/2022 10:44 AM
Report Generation Date: 11/10/2022 10:44 AM

Input File Name: C22-259 DaVita Clinic Bioretention.fld
Project Name: DaVita Clinic Bioretention Pond
Analysis Title:
Comments:

PRECIPITATION INPUT

Computational Time Step (Minutes): 15

Extended Precipitation Time Series Selected
Climatic Region Number: 6

Full Period of Record Available used for Routing
Precipitation Station : 95005205 Puget West 52 in_5min 10/01/1939-10/01/2097
Evaporation Station : 951052 Puget West 52 in MAP
Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : Ecology Default

********** Default HSPF Parameters Used (Not Modified by User) **********

********** WATERSHED DEFINITION **********

Predevelopment/Post Development Tributary Area Summary

	Predeveloped	Post Developed
Total Subbasin Area (acres)	1.030	1.018
Area of Links that Include Precip/Evap (acres)	0.000	0.012
Total (acres)	1.030	1.030

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 1

---------- Subbasin : Subbasin 1 ----------

	-------Area (Acres) --------
A/B, Forest, Flat	1.030
Subbasin Total	1.030

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 1

---------- Subbasin : Subbasin 1 ----------

	-------Area (Acres) --------
A/B, Lawn, Flat	0.348
ROADS/FLAT	0.670
Subbasin Total	1.018

********** **LINK DATA** **********

----------SCENARIO: PREDEVELOPED
Number of Links: 0

********** **LINK DATA** **********

----------SCENARIO: POSTDEVELOPED
Number of Links: 1

Link Name: New Ecy Bio Lnk1
Link Type: Ecology Bioretention Facility
Downstream Link: None

Floor Elevation (ft)	:	100.00
Riser Crest Elevation (ft)	:	102.00
Storage Depth (ft)	:	2.00
Bottom Length (ft)	:	155.0
Bottom Width (ft)	:	3.5
Bottom Slope (ft/ft)	:	0.000
Side Slopes (ft/ft)	:	Z1= 3.00 Z2= 3.00 Z3= 3.00 Z4= 3.00
Bottom Area (sq-ft)	:	543.
Area at Riser Crest El (sq-ft)	:	2,589.
(acres)	:	0.059
Volume at Riser Crest (cu-ft)	:	4,763.
(ac-ft)	:	0.109

Infiltration on Bottom and Sideslopes Selected

Soil Properties

Layer No	Soil Name	Thickness (ft)
1	SMMWW 12 in/hr (Ecol	1.500
2	SMMWW 12 in/hr (Ecol	0.000
3	GRAVEL	0.000

KSat Safety Factor: None
Native Soil Infiltration Rate (in/hr) : 2.00

Underdrain Not Present

Riser Geometry
Riser Structure Type : Circular
Riser Diameter (in) : 6.00

Common Length (ft) : 0.000
Riser Crest Elevation : 102.00 ft

Hydraulic Structure Geometry

Number of Devices: 0

**************************FLOOD FREQUENCY AND DURATION STATISTICS********************

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 1
Number of Links: 0

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 1
Number of Links: 1

********** Link: New Ecy Bio Lnk1 ********** Link WSEL Stats
WSEL Frequency Data(ft)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	WSEL Peak (ft)
1.05-Year	100.145
1.11-Year	100.207
1.25-Year	100.270
2.00-Year	100.500
3.33-Year	100.693
5-Year	100.860
10-Year	101.195
25-Year	101.452
50-Year	101.692
100-Year	101.766

*************Groundwater Recharge Summary ***************
Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Total Predeveloped Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: Subbasin 1	428.961
Total:	428.961

Total Post Developed Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: Subbasin 1	168.664
Link: New Ecy Bio Lnk1	413.351
Total:	582.014

Total Predevelopment Recharge is Less than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 2.715 ac-ft/year, Post Developed: 3.684 ac-ft/year

*************Water Quality Facility Data **************

----------SCENARIO: PREDEVELOPED

Number of Links: 0

----------SCENARIO: POSTDEVELOPED

Number of Links: 1

********** Link: New Ecy Bio Lnk1 **********

2-Year Discharge Rate : 0.000 cfs

15-Minute Timestep, Water Quality Treatment Design Discharge
On-line Design Discharge Rate (91% Exceedance): 0.13 cfs
Off-line Design Discharge Rate (91% Exceedance): 0.08 cfs

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 410.52
Inflow Volume Including PPT-Evap (ac-ft): 413.35
Total Runoff Infiltrated (ac-ft): 413.35, 100.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 0.00
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 100.00%

*************Compliance Point Results **************

Scenario Predeveloped Compliance Subbasin: Subbasin 1

Scenario Postdeveloped Compliance Link: New Ecy Bio Lnk1

***** Point of Compliance Flow Frequency Data *****
Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	8.283E-04	2-Year	0.000
5-Year	4.784E-03	5-Year	0.000
10-Year	8.477E-03	10-Year	0.000
25-Year	2.130E-02	25-Year	0.000
50-Year	3.757E-02	50-Year	0.000
100-Year	5.149E-02	100-Year	0.000
200-Year	5.632E-02	200-Year	3.917E-02
500-Year	6.268E-02	500-Year	9.195E-02

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

****** Flow Duration Performance ******

Excursion at Predeveloped 50%Q2 (Must be Less Than or Equal to 0%):	-99.9%	PASS
Maximum Excursion from 50%Q2 to Q2 (Must be Less Than or Equal to 0%):	-99.6%	PASS
Maximum Excursion from Q2 to Q50 (Must be less than 10%):	-63.2%	PASS
Percent Excursion from Q2 to Q50 (Must be less than 50%):	0.0%	PASS

MEETS ALL FLOW DURATION DESIGN CRITERIA: PASS

****** LID Duration Performance ******

Excursion at Predeveloped 8%Q2 (Must be Less Than 0%):	-100.0%	PASS
Maximum Excursion from 8%Q2 to 50%Q2 (Must be Less Than 0%):	-99.9%	PASS

MEETS ALL LID DURATION DESIGN CRITERIA: PASS
