# Stormwater Site Plan

*PREPARED FOR:*

Tuan Nguyen
8937 SE 56th Street
Mercer Island, WA 98040

*PROJECT:*

Ngyuen Residence
8937 SE 56th Street
Mercer Island, WA 98040
SitePro #2023014

*PREPARED BY:*

Nicholas A. Rheaume, PE
Principal

*DATE:*

May, 2023

SITEPRO ENGINEERING

# Stormwater Site Plan

*PREPARED FOR:*

Tuan Ngyuen
8937 SE 56th Street
Mercer Island, WA 98040

*PROJECT:*

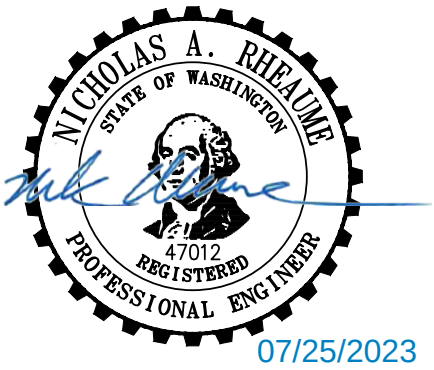
Ngyuen Residence
8937 SE 56th Street
Mercer Island, WA 98040
SitePro #2023014

*PREPARED BY:*

Nicholas A. Rheaume, PE
Principal

*DATE:*

May, 2023




I hereby state that this Stormwater Site Plan for the Ngyuen Residence project has been prepared by me or under my supervision, and meets the standard of care and expertise that is usual and customary in this community for professional engineers. I understand that Mercer Island does not and will not assume liability for the sufficiency, suitability, or performance of drainage facilities prepared by me.

# Table of Contents

# Appendices

## Appendix A

### Exhibits



## Appendix B

### Basin Maps



## Appendix C

### Calculations

# 1.0 Proposed Project Description

The project site is located at 8937 SE 56th Street in Mercer Island, Washington. The site is situated on Parcel No. 6672900440, and encompasses approximately 0.27 acres. The project is to create a new single family residence and associated walkways and hardscapes. Stormwater will be collected and infiltrated onsite in order to comply with the Department of Ecology Stormwater Management Manual adopted by the City of Mercer Island. Refer to Appendix A1 for a Vicinity Map.

Table 2 below summarizes the land use in the affected portion of the site before and after development. A pre and post developed basin map can be found in Appendix B

**Table 2. Basin Land Use**

| Basin | Impervious (acres) | Pervious (acres) | Total Area (acres) |
|---|---|---|---|
| Existing Conditions | 0.09 | 0.08 | 0.17 |
| Developed Conditions | 0.11 | 0.06 | 0.17 |

The project triggers minimum requirements #1 - #5. See Appendix A2 for flow chart for determining minimum requirements and A3 for flow chart for determining minimum requirement #5.

# 2.0 Existing Conditions

The project site is bounded by 56th Street SE on the north side. Single family residences are located to the south, east, and west sides of the project site. An existing residence, driveway, and walkways are located in the center of the site. The remaining site area is landscaped. The site is relatively flat with slopes from 1% - 2% and generally slopes from south to north.

The site is not located within a 100 year floodplain. It is mapped as Zone X, area of minimal flood hazard. See Appendix A4 for FEMA map.

# 3.0 Infiltration Rate / Soils Reports

Soils in the Project Area are Mapped as Arents, Alderwood Material per USDA Web Soil Survey. See Appendix A5. Soil Logs and Infiltration testing were performed by SitePro Engineering. Two excavations were made revealing sandy loam soils to roughly 4' below grade underlain by cemented clayey loam soils. Soil type was visually classified on site. A falling head percolation test was performed on site. Drawdown time was measured at 15 min intervals and correction factors applied. The sandy loam soils were well drained resulting in an infiltration rate of 8 in / hr. after correction factors. See Appendix C for soil logs and infiltration rate calculations. It should be noted that the site has been utilizing infiltration for the existing home and an existing infiltration trench with perforated pipe and drain rock was discovered during excavation.

## 4.0 Wells and Septic Systems

There are no wells or septic systems located on the site.

## 5.0 Fuel Tanks

There are no known fuel tanks located on the project site.

## 6.0 Subbasin Description

The project site is tributary to the municipal stormwater system at the intersection of SE 56th Street and 91st Ave SE. The system runs north to SE 54th Street and NE from there where it is discharged to a ravine. An unnamed waterway drains SE to the east shore of the Island and drains to Lake Washington roughly 2,200 SE of the site.

## 7.0 Floodplain Analysis

The project does not lie within a 100-year flood plain.

## 8.0 Aesthetic Considerations for Facilities

Stormwater facilities for the project are all below grade. Site grading has been designed to blend into the existing contours of the land. Areas around the home will be restored and landscaped in an aesthetic manner.

## 9.0 Facility Sizing and Downstream Analysis

The project is subject to minimum requirements #1 - #5 as set forth in the Department of Ecology Stormwater Management Manual Adopted by the City of Mercer Island.

### 9.1 MR 1 – Preparation of Stormwater Site Plan

This Stormwater Site Plan meets this requirement.

### 9.2 MR 2 – Construction Stormwater Pollution Prevention Plan

The Construction Stormwater Pollution Prevention Plan (SWPPP) (provided under separate cover) addresses the specific elements of the SWPPP.

### 9.3 MR 3 – Source Control of Pollution

The Construction SWPPP will provide Best Management Practices (BMPs) to manage pollution-generating activities during construction. The BMPs will address preventing erosion and sediment transport. The Construction SWPPP will also contain BMP measures regarding spill prevention.

Post-construction site soils will be amended in conformance with BMP T5.13.

### 9.4 MR 4 – Preservation of Natural Drainage Systems and Outfalls

Drainage patterns will not be altered by the project. Stormwater from roof and driveway areas will be infiltrated on site. Stormwater from disturbed areas will continue to drain toward the north, which is similar to the predeveloped condition.

### 9.5 MR 5 – Onsite Stormwater Management

The project has elected to provide list #1 BMP's and apply soil preservation and amendment to satisfy MR#5. A downspout infiltration system has been selected from list #1 and designed for proposed roof areas. Pervious pavement has been has been selected from list #1 for the proposed sidewalks. The driveway will be overlayed for maintenance and is not considered new or replaced. See Appendix A3 for List #1 selections. See Appendix B1 and B2 for Pre and Post Developed areas. WWHM calculations for sizing of the downspout infiltration system can be found in Appendix C2. BMP T5.13 will be applied to all disturbed pervious areas.

### 9.6 MR 6 – Runoff Treatment

The project is not subject to MR#6

### 9.7 MR 7 – Flow Control

The project is not subject to MR#7

### 9.8 MR 8 – Wetlands Protection

The project is not subject to MR#8.

### 9.9 MR 9 – Basin/Watershed Planning

The project is not subject to MR#9

### 9.10 MR 10 – Operation and Maintenance

The project is not subject to MR#10

### 9.11 Downstream Analysis

The project site is tributary to the municipal stormwater system at the intersection of SE 56$^{th}$ Street and 91$^{st}$ Ave SE. The system runs north to SE 54$^{th}$ Street and NE from there where it is discharged to a ravine. An unnamed waterway drains SE to the east shore of the Island and drains to Lake Washington roughly 2,200 SE of the site. No flooding or erosion damage was observed. Stormwater from the project site will be infiltrated on-site and will not contribute any flows, flooding, or erosion to the downstream. It is our opinion that there will be no negative impacts with the proposed design.

## 10.0 Utilities

Stormwater facilities have been designed away from existing and proposed utilities with proper clearances and setbacks.

## 11.0 Covenants, Dedication, Easements

There are no known covenants, dedications, or easements on the site. None are needed for the proposed stormwater facilities.

## 12.0 Property Owners' Association Articles of Incorporation

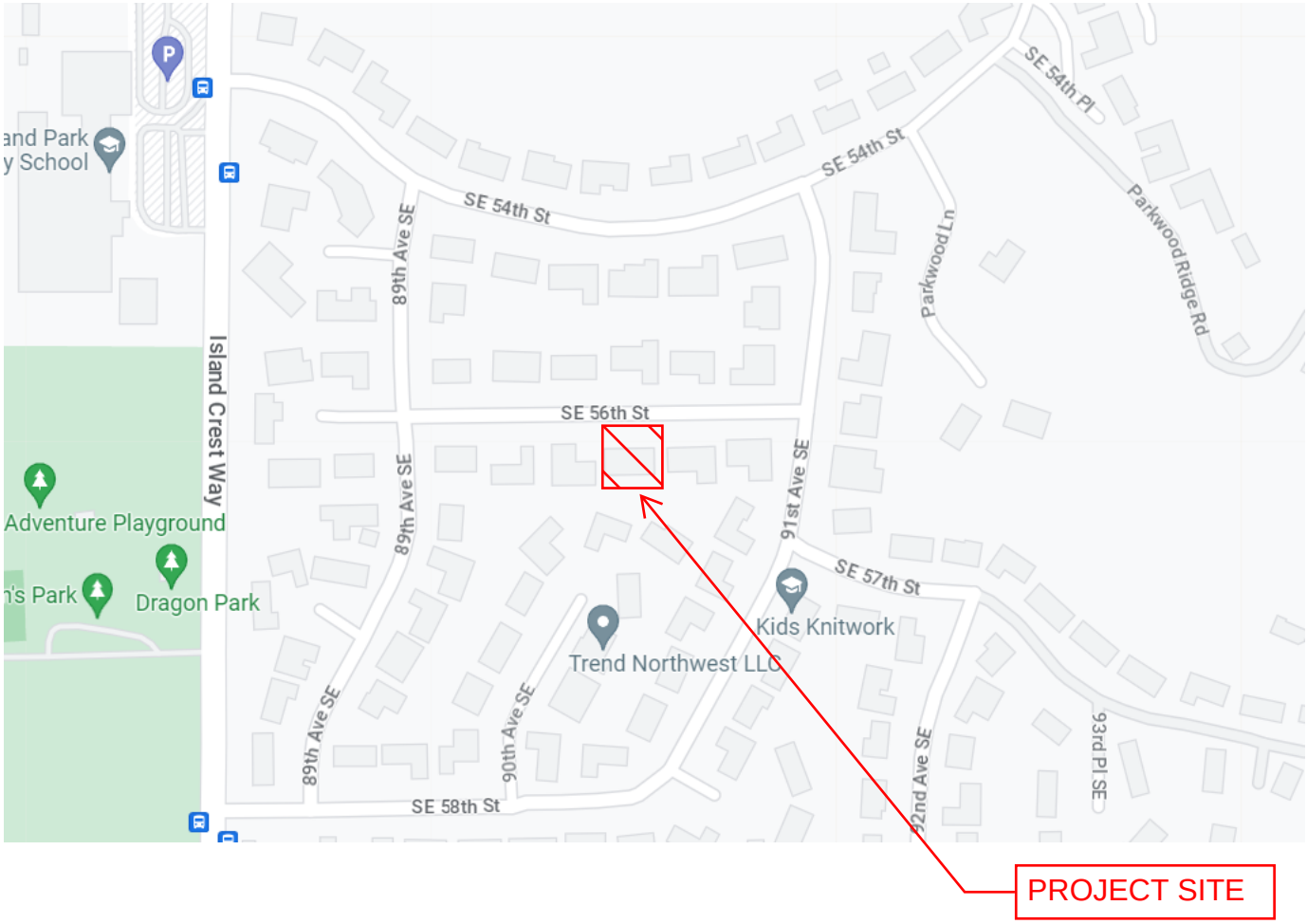
Not Applicable.

## 13.0 Other Permits or Conditions Placed on the Project

A building permit is required for construction of the single family residence. No other permits are anticipated for the development.

# Appendix A

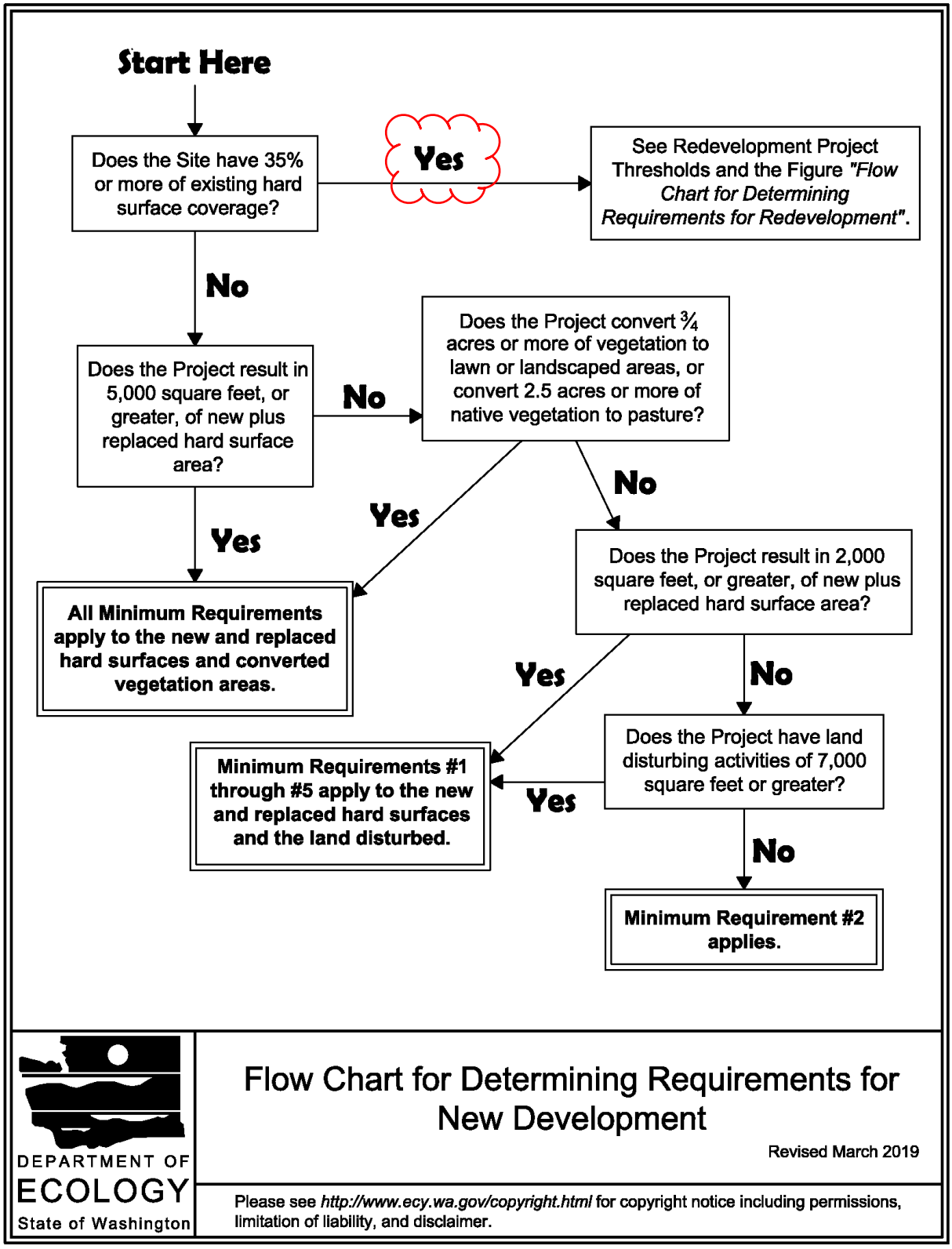
## Exhibits



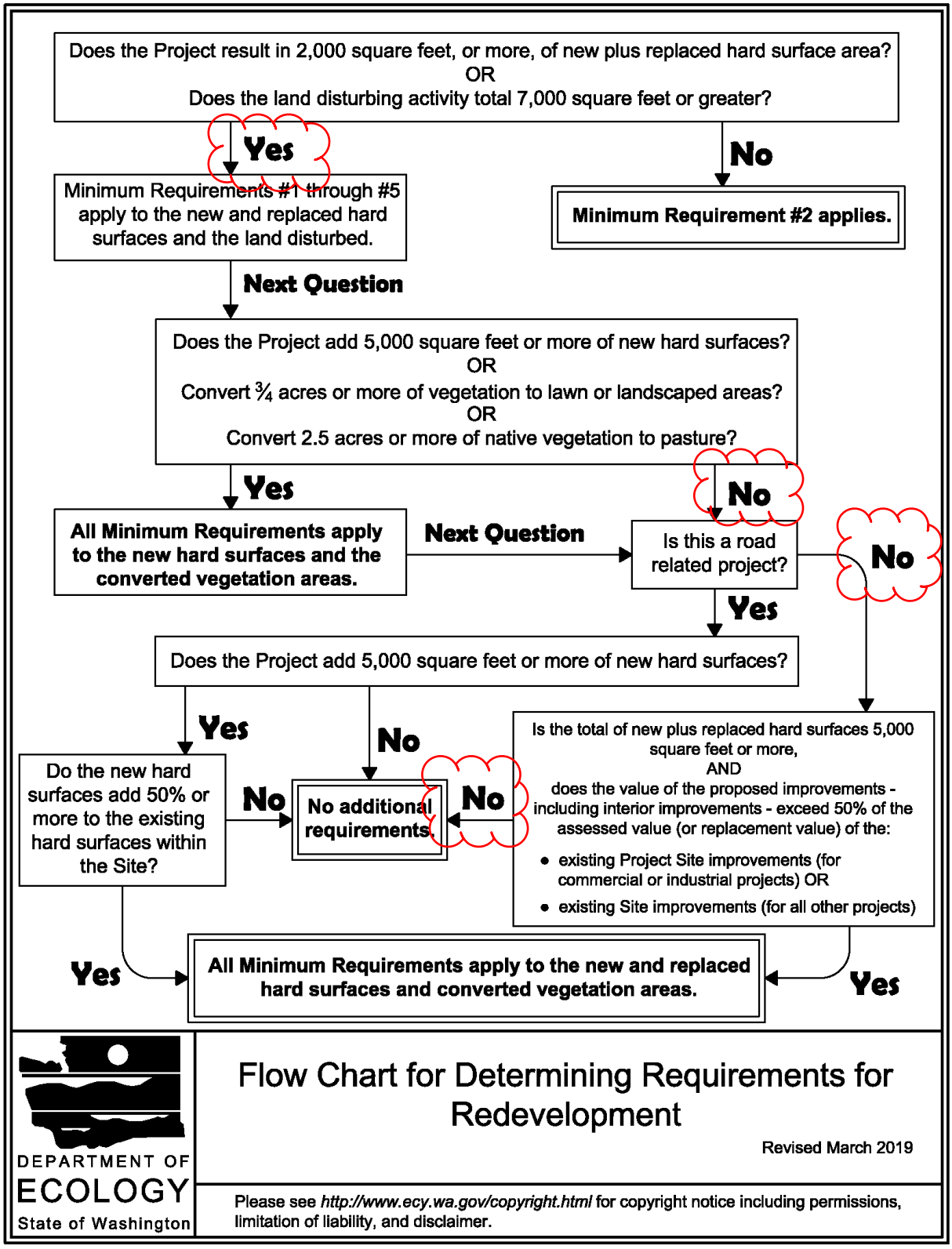

SITEPRO ENGINEERING

| SHEET NAME: | SHEET NUMBER: |
| --- | --- |
| VICINITY MAP | A1 |

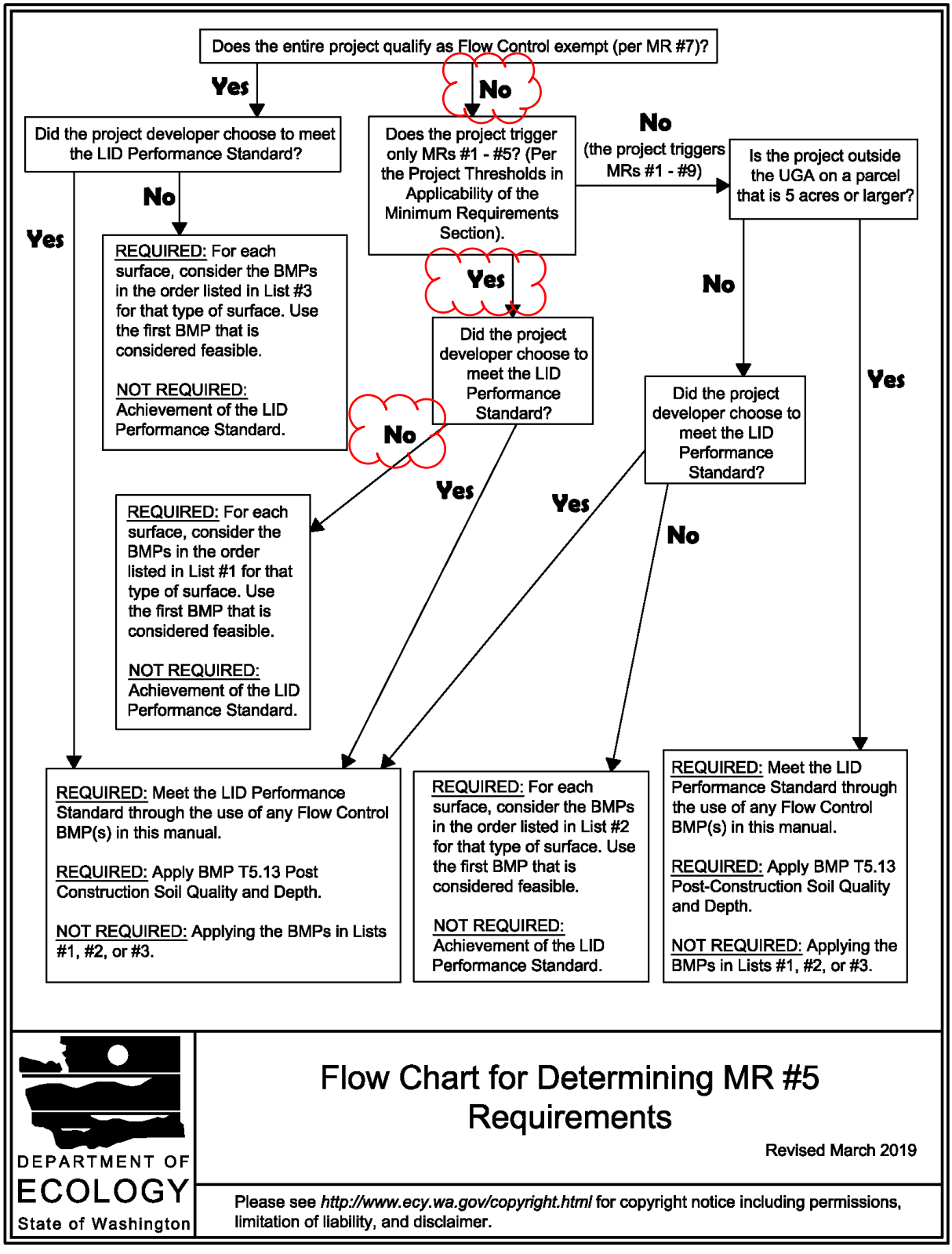
## Figure I-3.1: Flow Chart for Determining Requirements for New Development



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



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



### Table I-2.5.1 On-Site Stormwater Management Requirements for Projects Triggering Minimum Requirements #1 - #9

| Project Type and Location | Requirement |
|---|---|
| New development on any parcel inside the UGA, or new development outside the UGA on a parcel less than 5 acres | Low Impact Development Performance Standard and BMP T5.13: Post-Construction Soil Quality and Depth (p.911); or List #2 (applicant option). |
| New development outside the UGA on a parcel of 5 acres or larger | Low Impact Development Performance Standard and BMP T5.13: Post-Construction Soil Quality and Depth (p.911). |
| Redevelopment on any parcel inside the UGA, or redevelopment outside the UGA on a parcel less than 5 acres | Low Impact Development Performance Standard and BMP T5.13: Post-Construction Soil Quality and Depth (p.911); or List #2 (applicant option). |
| Redevelopment outside the UGA on a parcel of 5 acres or larger | Low Impact Development Performance Standard and BMP T5.13: Post-Construction Soil Quality and Depth (p.911). |
| Note: This table refers to the Urban Growth Area (UGA) as designated under the Growth Management Act (GMA) (Chapter 36.70A RCW) of the State of Washington. If the Permittee is located in a county that is not subject to planning under the GMA, the city limits shall be used. | |

### *Low Impact Development Performance Standard*

**Stormwater discharges shall match developed discharge durations to pre-developed durations for the range of pre-developed discharge rates from 8% of the 2-year peak flow to 50% of the 2-year peak flow. Refer to the Standard Flow Control Requirement section in Minimum Requirement #7 for information about the assignment of the pre-developed condition. Project sites that must also meet minimum requirement #7 – flow control - must match flow durations between 8% of the 2-year flow through the full 50-year flow.**

### *List #1: On-site Stormwater Management BMPs for Projects Triggering Minimum Requirements #1 through #5*

**For each surface, consider the BMP's in the order listed for that type of surface. Use the first BMP that is considered feasible. No other On-site Stormwater Management BMP is necessary for that surface. Feasibility shall be determined by evaluation against:**

1. **Design criteria, limitations, and infeasibility criteria identified for each BMP in this manual; and**

2. **Competing Needs Criteria listed in Chapter V-5 - On-Site Stormwater Management (p.903).**

**Lawn and landscaped areas:**

- **Post-Construction Soil Quality and Depth in accordance with BMP T5.13: Post-Construction Soil Quality and Depth (p.911).**

**Roofs:**

1. **Full Dispersion in accordance with BMP T5.30: Full Dispersion (p.939), or Downspout Full Infiltration Systems in accordance with BMP T5.10A: Downspout Full Infiltration (p.905)**
2. **Rain Gardens in accordance with BMP T5.14A: Rain Gardens (p.915), or Bioretention in accordance with BMP T7.30: Bioretention Cells, Swales, and Planter Boxes (p.959). The rain garden or bioretention facility must have a minimum horizontal projected surface area below the overflow which is at least 5% of the area draining to it.**
3. **Downspout Dispersion Systems in accordance with BMP T5.10B: Downspout Dispersion Systems (p.905)**
4. **Perforated Stub-out Connections in accordance with BMP T5.10C: Perforated Stub-out Connections (p.905)**

**Other Hard Surfaces:**

1. **Full Dispersion in accordance with BMP T5.30: Full Dispersion (p.939)**
2. **Permeable pavement[1] in accordance with BMP T5.15: Permeable Pavements (p.917), or Rain Gardens in accordance with BMP T5.14A: Rain Gardens (p.915), or Bioretention in accordance with BMP T7.30: Bioretention Cells, Swales, and Planter Boxes (p.959). The rain garden or bioretention facility must have a minimum horizontal projected surface area below the overflow which is at least 5% of the area draining to it.**
3. **Sheet Flow Dispersion in accordance with BMP T5.12: Sheet Flow Dispersion (p.908), or Concentrated Flow Dispersion in accordance with BMP T5.11: Concentrated Flow Dispersion (p.905).**

### *List #2: On-site Stormwater Management BMPs for Projects Triggering Minimum Requirements #1 through #9*

**For each surface, consider the BMPs in the order listed for that type of surface. Use the first BMP that is considered feasible. No other On-site Stormwater**

---

[1]This is not a requirement to pave these surfaces. Where pavement is proposed, it must be permeable to the extent feasible unless full dispersion is employed.

**Management BMP is necessary for that surface. Feasibility shall be determined by evaluation against:**

1. **Design criteria, limitations, and infeasibility criteria identified for each BMP in this manual; and**
2. **Competing Needs Criteria listed in Chapter V-5 - On-Site Stormwater Management (p.903).**

**Lawn and landscaped areas:**

- **Post-Construction Soil Quality and Depth in accordance with BMP T5.13: Post-Construction Soil Quality and Depth (p.911).**

**Roofs:**

1. **Full Dispersion in accordance with BMP T5.30: Full Dispersion (p.939), or Downspout Full Infiltration Systems in accordance with BMP T5.10A: Downspout Full Infiltration (p.905).**
2. **Bioretention (See BMP T7.30: Bioretention Cells, Swales, and Planter Boxes (p.959)) facilities that have a minimum horizontally projected surface area below the overflow which is at least 5% of the total surface area draining to it.**
3. **Downspout Dispersion Systems in accordance with BMP T5.10B: Downspout Dispersion Systems (p.905)**
4. **Perforated Stub-out Connections in accordance with BMP T5.10C: Perforated Stub-out Connections (p.905)**

**Other Hard Surfaces:**

1. **Full Dispersion in accordance with BMP T5.30: Full Dispersion (p.939)**
2. **Permeable pavement[1] in accordance with BMP T5.15: Permeable Pavements (p.917)**
3. **Bioretention BMP's (BMP T7.30: Bioretention Cells, Swales, and Planter Boxes (p.959)) that have a minimum horizontally projected surface area below the overflow which is at least 5% of the total surface area draining to it.**
4. **Sheet Flow Dispersion in accordance with BMP T5.12: Sheet Flow Dispersion (p.908), or Concentrated Flow Dispersion in accordance with BMP T5.11: Concentrated Flow Dispersion (p.905)**

[1] This is not a requirement to pave these surfaces. Where pavement is proposed, it must be permeable to the extent feasible unless full dispersion is employed.

# National Flood Hazard Layer FIRMette

APPENDIX A4

122°13'26"W 47°33'21"N


122°12'49"W 47°32'56"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 Cross Sections with 1% Annual Chance |
| | 17.5 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 5/24/2023 at 2:33 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 A5

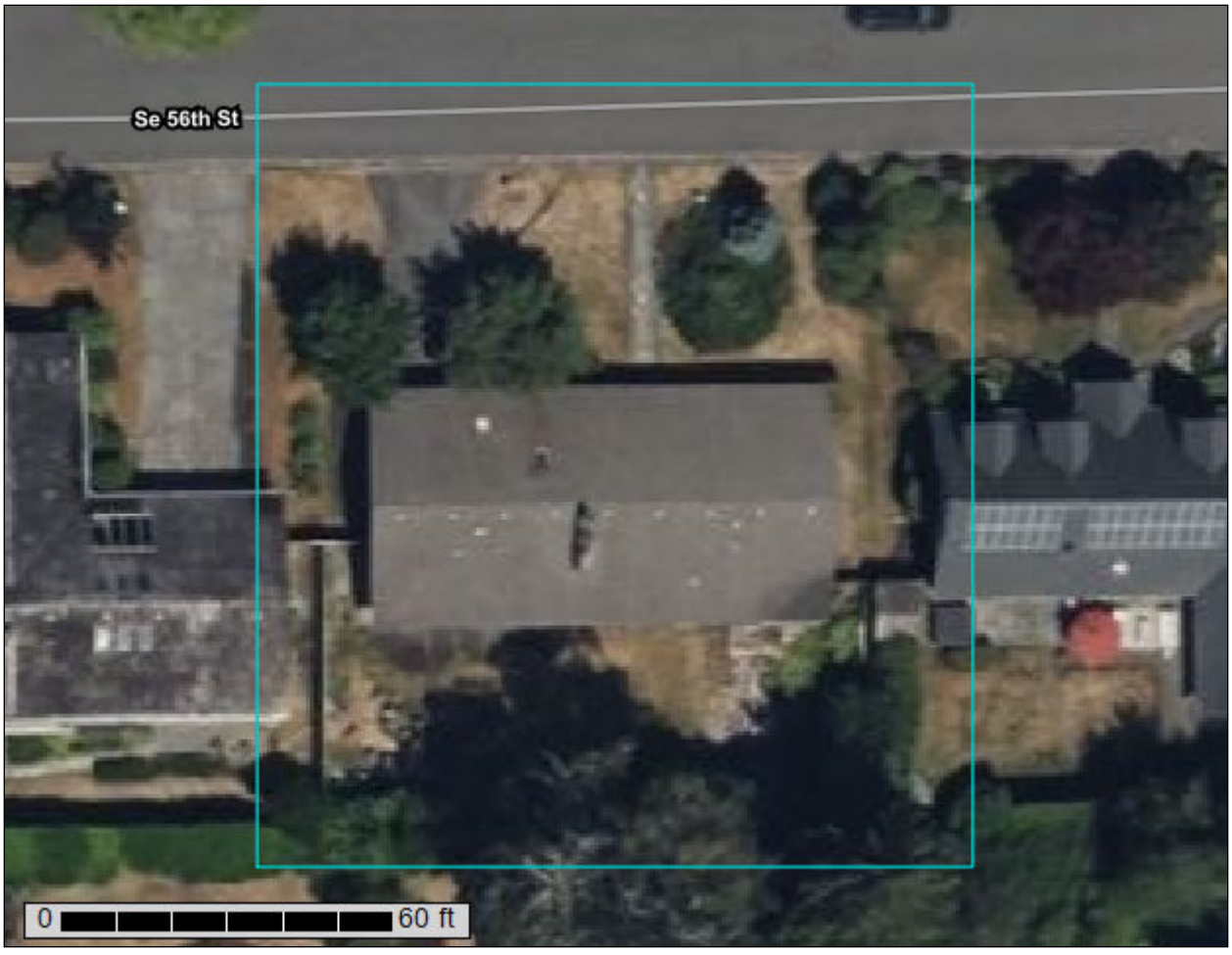
United States Department of Agriculture

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 King County Area, Washington




May 24, 2023

# 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

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

# 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: 1:306 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 4 9 18 27

Feet
0 10 20 40 60

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: King County Area, Washington
Survey Area Data: Version 18, Sep 8, 2022

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 |
|---|---|---|---|
| AmB | Arents, Alderwood material, 0 to 6 percent slopes | 0.4 | 100.0% |
| **Totals for Area of Interest** | | **0.4** | **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.

# King County Area, Washington

## AmB—Arents, Alderwood material, 0 to 6 percent slopes

### Map Unit Setting

*National map unit symbol:* 1hmsp
*Elevation:* 160 to 590 feet
*Mean annual precipitation:* 35 to 60 inches
*Mean annual air temperature:* 50 degrees F
*Frost-free period:* 150 to 200 days
*Farmland classification:* Prime farmland if irrigated

### Map Unit Composition

*Arents, alderwood material, and similar soils:* 100 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Arents, Alderwood Material

#### Setting

*Landform:* Till plains
*Parent material:* Basal till

#### Typical profile

*H1 - 0 to 26 inches:* gravelly sandy loam
*H2 - 26 to 60 inches:* very gravelly sandy loam

#### Properties and qualities

*Slope:* 0 to 6 percent
*Depth to restrictive feature:* 20 to 40 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 16 to 36 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water supply, 0 to 60 inches:* Very low (about 2.3 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 4s
*Hydrologic Soil Group:* B/D
*Hydric soil rating:* No

# 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

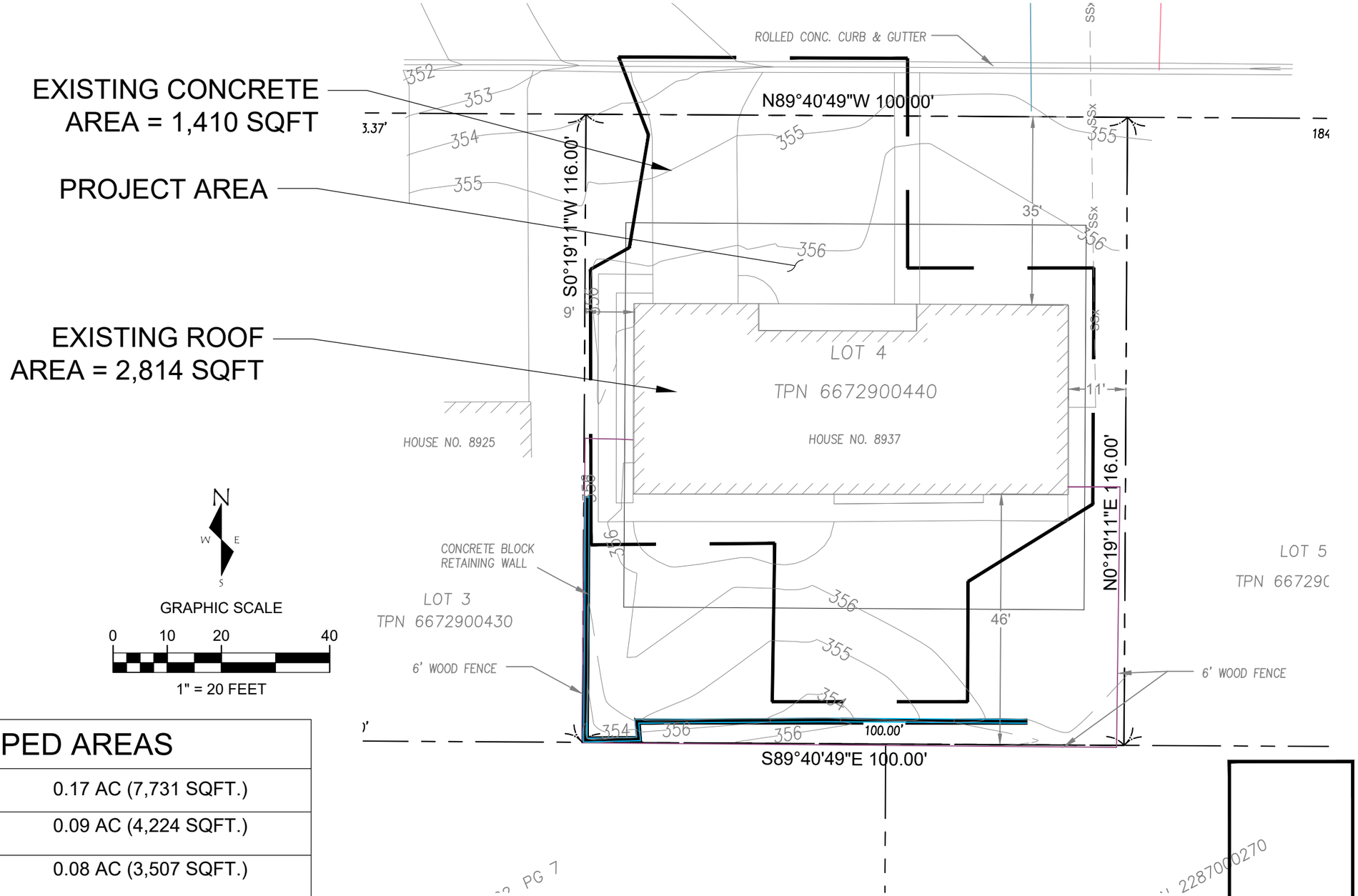
United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

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 B

## Basin Maps




N
W E
S

GRAPHIC SCALE

0 10 20 40

1" = 20 FEET

| PRE-DEVELOPED AREAS | |
|---|---|
| TOTAL PROJECT AREA | 0.17 AC (7,731 SQFT.) |
| IMPERVIOUS AREA | 0.09 AC (4,224 SQFT.) |
| PERVIOUS AREA | 0.08 AC (3,507 SQFT.) |

SITEPRO ENGINEERING

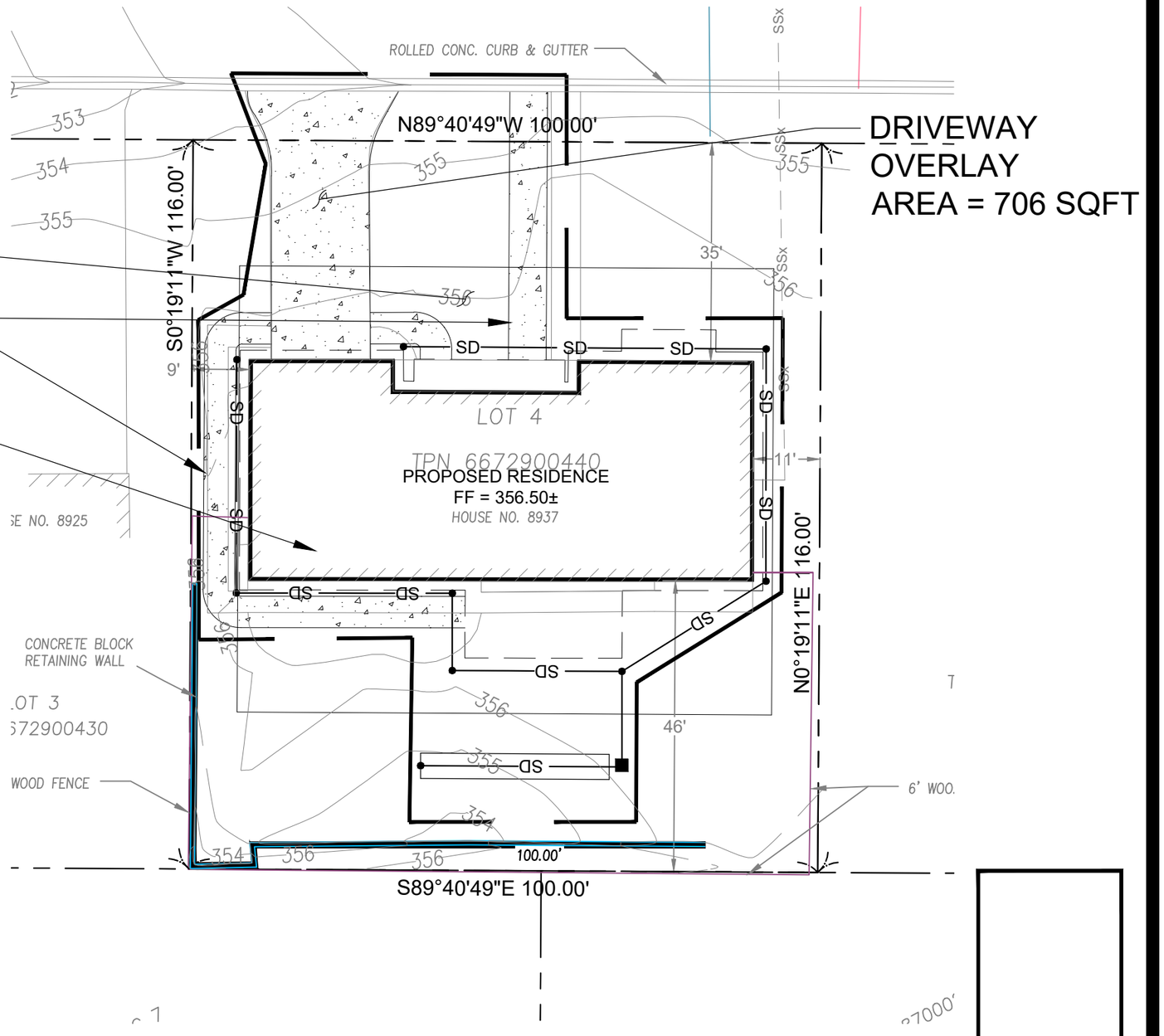
| SHEET NAME: | PROJECT NAME: | SHEET NUMBER: |
|---|---|---|
| EXISTING CONDITIONS | NGYUEN RESIDENCE | B1 |

| POST-DEVELOPED AREAS | |
|---|---|
| TOTAL PROJECT AREA | 0.17 AC (7,731 SQFT.) |
| IMPERVIOUS AREA | 0.11 AC (4,925 SQFT.) |
| PERVIOUS AREA | 0.06 AC (2,806 SQFT.) |

PROJECT AREA

PROPOSED PERVIOUS SIDEWALKS = 772 SQFT

PROPOSED ROOF AREA = 3,447 SQFT





GRAPHIC SCALE

0 10 20 40

1" = 20 FEET

| NEW AND REPLACED AREAS | |
|---|---|
| NEW IMPERVIOUS AREA | 0.11 AC (4,925 SQFT.) |
| REPLACED IMPERVIOUS AREA | 0.00 AC (0 SQFT.) |
| NEW PLUS REPLACED AREA | 0.11 AC (4,925 SQFT.) |

SITEPRO ENGINEERING

| SHEET NAME: | PROJECT NAME: | SHEET NUMBER: |
|---|---|---|
| DEVELOPED CONDITIONS | NGYUEN RESIDENCE | B2 |

# Appendix C

## Calculations

APPENDIX C1

SITEPRO ENGINEERING

# INFILTRATION RATE CALCULATION - TP2

| | |
|---|---|
| TEST METHOD | US EPA FALLING HEAD |
| PRE-SOAK | 6 hours |
| SOIL TYPE | Sandy Loam |
| INTERVAL (MIN.) | 15 |
| DROP (IN.) | 8 |
| INFILTRATION RATE (MIN. / IN.) | 1.875 |
| INFILTRATION RATE (IN. / HR.) | 32 |

| **EXCAVATION DIMENSIONS (FT)** | |
|---|---|
| LENGTH (L) | 2 |
| WIDTH (W) | 3 |
| DEPTH (D) | 4 |
| BOTTOM AREA (A) | 6 |
| VOLUME (V) | 24 |
| PIPE DIAMETER (IN) | 4 |
| Depth to Groundwater / Restictive Layer | N/A |
| Separation from Groundwater / Restictive Layer (D) | 1 |

| $I_{measured}$ (IN./HR.) | |
|---|---|
| | 32 |

| $F_{testing}$ | |
|---|---|
| US EPA FALLING HEAD = 0.40 | 0.4 |

| $F_{geometry}$ = 4D/W+0.05 (0.25 - 1.0) | |
|---|---|
| 1.383333333 | 1 |

| $F_{plugging}$ | |
|---|---|
| 0.7 FOR LOAMS AND SANDY LOAMS | 0.7 |

| $I_{design} = I_{measured} \times F_{testing} \times F_{geometry} \times F_{plugging}$ | |
|---|---|
| | 8.96 |
| | **Use 8.00 in / hr** |


SITEPRO VISITED THE SITE ON 5/4/2023 TO PERFORM A FALLING HEAD PERCOLATION TEST. TWO TEST HOLES WERE DUG TO 4' DEPTH. THE FOLLING HEAD PERCOLATION TEST WAS PERFORMED IN TP2 AT A DEPTH OF 3'. INFILTRATION RATE CALCULATIONS ARE PROVIDED ON THE FOLLOWING PAGE.

TP1
0-6" - TOPSOIL / ORGANICS
6"-3' - SANDY LOAM SOILS
3'-4' - CEMENTED CLAYEY LOAM SOILS
TERMINATED @ 4' NO GROUNDWATER / MOTTLING

TP2
0-6" - TOPSOIL / ORGANICS
6"-4' - SANDY LOAM SOILS
TERMINATED @ 4' NO GROUNDWATER / MOTTLING

SITEPRO ENGINEERING

SHEET NAME:
SOIL LOGS

SHEET NUMBER:
C-1

APPENDIX C2

# WWHM2012

# PROJECT REPORT

# General Model Information

| | |
|---|---|
| Project Name: | Ngyuen Residence |
| Site Name: | Ngyuen Residence |
| Site Address: | 8937 SE 56th ST |
| City: | Mercer Island |
| Report Date: | 5/25/2023 |
| Gage: | Seatac |
| Data Start: | 1948/10/01 |
| Data End: | 2009/09/30 |
| Timestep: | 15 Minute |
| Precip Scale: | 1.000 |
| Version Date: | 2019/09/13 |
| Version: | 4.2.17 |

## POC Thresholds

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

# Landuse Basin Data
## Predeveloped Land Use

## *Mitigated Land Use*

### Basin 1

| | |
|---|---|
| Bypass: | No |
| GroundWater: | No |
| Pervious Land Use | acre |
| Pervious Total | 0 |
| Impervious Land Use | acre |
| ROOF TOPS FLAT | 0.11 |
| Impervious Total | 0.11 |
| Basin Total | 0.11 |

Element Flows To:

| Surface | Interflow | Groundwater |
|---|---|---|
| Gravel Trench Bed 1 | Gravel Trench Bed 1 | |

# Routing Elements
## Predeveloped Routing

## *Mitigated Routing*

### Gravel Trench Bed 1

| | |
|---|---|
| Bottom Length: | 30.00 ft. |
| Bottom Width: | 4.00 ft. |
| Trench bottom slope 1: | 0 To 1 |
| Trench Left side slope 0: | 0 To 1 |
| Trench right side slope 2: | 0 To 1 |
| Material thickness of first layer: | 2.5 |
| Pour Space of material for first layer: | 0.4 |
| Material thickness of second layer: | 0 |
| Pour Space of material for second layer: | 0 |
| Material thickness of third layer: | 0 |
| Pour Space of material for third layer: | 0 |
| Infiltration On | |
| Infiltration rate: | 8 |
| Infiltration safety factor: | 1 |
| Wetted surface area On | |
| Total Volume Infiltrated (ac-ft.): | 16.913 |
| Total Volume Through Riser (ac-ft.): | 0.039 |
| Total Volume Through Facility (ac-ft.): | 16.952 |
| Percent Infiltrated: | 99.77 |
| Total Precip Applied to Facility: | 0 |
| Total Evap From Facility: | 0 |
| Discharge Structure | |
| Riser Height: | 2.5 ft. |
| Riser Diameter: | 10 in. |
| Element Flows To: | |
| Outlet 1 | Outlet 2 |

Gravel Trench Bed Hydraulic Table

| Stage(feet) | Area(ac.) | Volume(ac-ft.) | Discharge(cfs) | Infilt(cfs) |
|---|---|---|---|---|
| 0.0000 | 0.002 | 0.000 | 0.000 | 0.000 |
| 0.0278 | 0.002 | 0.000 | 0.000 | 0.022 |
| 0.0556 | 0.002 | 0.000 | 0.000 | 0.022 |
| 0.0833 | 0.002 | 0.000 | 0.000 | 0.022 |
| 0.1111 | 0.002 | 0.000 | 0.000 | 0.022 |
| 0.1389 | 0.002 | 0.000 | 0.000 | 0.022 |
| 0.1667 | 0.002 | 0.000 | 0.000 | 0.022 |
| 0.1944 | 0.002 | 0.000 | 0.000 | 0.022 |
| 0.2222 | 0.002 | 0.000 | 0.000 | 0.022 |
| 0.2500 | 0.002 | 0.000 | 0.000 | 0.022 |
| 0.2778 | 0.002 | 0.000 | 0.000 | 0.022 |
| 0.3056 | 0.002 | 0.000 | 0.000 | 0.022 |
| 0.3333 | 0.002 | 0.000 | 0.000 | 0.022 |
| 0.3611 | 0.002 | 0.000 | 0.000 | 0.022 |
| 0.3889 | 0.002 | 0.000 | 0.000 | 0.022 |
| 0.4167 | 0.002 | 0.000 | 0.000 | 0.022 |
| 0.4444 | 0.002 | 0.000 | 0.000 | 0.022 |
| 0.4722 | 0.002 | 0.000 | 0.000 | 0.022 |
| 0.5000 | 0.002 | 0.000 | 0.000 | 0.022 |
| 0.5278 | 0.002 | 0.000 | 0.000 | 0.022 |
| 0.5556 | 0.002 | 0.000 | 0.000 | 0.022 |
| 0.5833 | 0.002 | 0.000 | 0.000 | 0.022 |
| 0.6111 | 0.002 | 0.000 | 0.000 | 0.022 |

| | | | | |
|---|---|---|---|---|
| 0.6389 | 0.002 | 0.000 | 0.000 | 0.022 |
| 0.6667 | 0.002 | 0.000 | 0.000 | 0.022 |
| 0.6944 | 0.002 | 0.000 | 0.000 | 0.022 |
| 0.7222 | 0.002 | 0.000 | 0.000 | 0.022 |
| 0.7500 | 0.002 | 0.000 | 0.000 | 0.022 |
| 0.7778 | 0.002 | 0.000 | 0.000 | 0.022 |
| 0.8056 | 0.002 | 0.000 | 0.000 | 0.022 |
| 0.8333 | 0.002 | 0.000 | 0.000 | 0.022 |
| 0.8611 | 0.002 | 0.000 | 0.000 | 0.022 |
| 0.8889 | 0.002 | 0.001 | 0.000 | 0.022 |
| 0.9167 | 0.002 | 0.001 | 0.000 | 0.022 |
| 0.9444 | 0.002 | 0.001 | 0.000 | 0.022 |
| 0.9722 | 0.002 | 0.001 | 0.000 | 0.022 |
| 1.0000 | 0.002 | 0.001 | 0.000 | 0.022 |
| 1.0278 | 0.002 | 0.001 | 0.000 | 0.022 |
| 1.0556 | 0.002 | 0.001 | 0.000 | 0.022 |
| 1.0833 | 0.002 | 0.001 | 0.000 | 0.022 |
| 1.1111 | 0.002 | 0.001 | 0.000 | 0.022 |
| 1.1389 | 0.002 | 0.001 | 0.000 | 0.022 |
| 1.1667 | 0.002 | 0.001 | 0.000 | 0.022 |
| 1.1944 | 0.002 | 0.001 | 0.000 | 0.022 |
| 1.2222 | 0.002 | 0.001 | 0.000 | 0.022 |
| 1.2500 | 0.002 | 0.001 | 0.000 | 0.022 |
| 1.2778 | 0.002 | 0.001 | 0.000 | 0.022 |
| 1.3056 | 0.002 | 0.001 | 0.000 | 0.022 |
| 1.3333 | 0.002 | 0.001 | 0.000 | 0.022 |
| 1.3611 | 0.002 | 0.001 | 0.000 | 0.022 |
| 1.3889 | 0.002 | 0.001 | 0.000 | 0.022 |
| 1.4167 | 0.002 | 0.001 | 0.000 | 0.022 |
| 1.4444 | 0.002 | 0.001 | 0.000 | 0.022 |
| 1.4722 | 0.002 | 0.001 | 0.000 | 0.022 |
| 1.5000 | 0.002 | 0.001 | 0.000 | 0.022 |
| 1.5278 | 0.002 | 0.001 | 0.000 | 0.022 |
| 1.5556 | 0.002 | 0.001 | 0.000 | 0.022 |
| 1.5833 | 0.002 | 0.001 | 0.000 | 0.022 |
| 1.6111 | 0.002 | 0.001 | 0.000 | 0.022 |
| 1.6389 | 0.002 | 0.001 | 0.000 | 0.022 |
| 1.6667 | 0.002 | 0.001 | 0.000 | 0.022 |
| 1.6944 | 0.002 | 0.001 | 0.000 | 0.022 |
| 1.7222 | 0.002 | 0.001 | 0.000 | 0.022 |
| 1.7500 | 0.002 | 0.001 | 0.000 | 0.022 |
| 1.7778 | 0.002 | 0.002 | 0.000 | 0.022 |
| 1.8056 | 0.002 | 0.002 | 0.000 | 0.022 |
| 1.8333 | 0.002 | 0.002 | 0.000 | 0.022 |
| 1.8611 | 0.002 | 0.002 | 0.000 | 0.022 |
| 1.8889 | 0.002 | 0.002 | 0.000 | 0.022 |
| 1.9167 | 0.002 | 0.002 | 0.000 | 0.022 |
| 1.9444 | 0.002 | 0.002 | 0.000 | 0.022 |
| 1.9722 | 0.002 | 0.002 | 0.000 | 0.022 |
| 2.0000 | 0.002 | 0.002 | 0.000 | 0.022 |
| 2.0278 | 0.002 | 0.002 | 0.000 | 0.022 |
| 2.0556 | 0.002 | 0.002 | 0.000 | 0.022 |
| 2.0833 | 0.002 | 0.002 | 0.000 | 0.022 |
| 2.1111 | 0.002 | 0.002 | 0.000 | 0.022 |
| 2.1389 | 0.002 | 0.002 | 0.000 | 0.022 |
| 2.1667 | 0.002 | 0.002 | 0.000 | 0.022 |
| 2.1944 | 0.002 | 0.002 | 0.000 | 0.022 |
| 2.2222 | 0.002 | 0.002 | 0.000 | 0.022 |

| | | | | |
|---|---|---|---|---|
| 2.2500 | 0.002 | 0.002 | 0.000 | 0.022 |
| 2.2778 | 0.002 | 0.002 | 0.000 | 0.022 |
| 2.3056 | 0.002 | 0.002 | 0.000 | 0.022 |
| 2.3333 | 0.002 | 0.002 | 0.000 | 0.022 |
| 2.3611 | 0.002 | 0.002 | 0.000 | 0.022 |
| 2.3889 | 0.002 | 0.002 | 0.000 | 0.022 |
| 2.4167 | 0.002 | 0.002 | 0.000 | 0.022 |
| 2.4444 | 0.002 | 0.002 | 0.000 | 0.022 |
| 2.4722 | 0.002 | 0.002 | 0.000 | 0.022 |
| 2.5000 | 0.002 | 0.002 | 0.000 | 0.022 |

# Analysis Results

## POC 1

POC #1 was not reported because POC must exist in both scenarios and both scenarios must have been run.

# Model Default Modifications

Total of 0 changes have been made.

## PERLND Changes

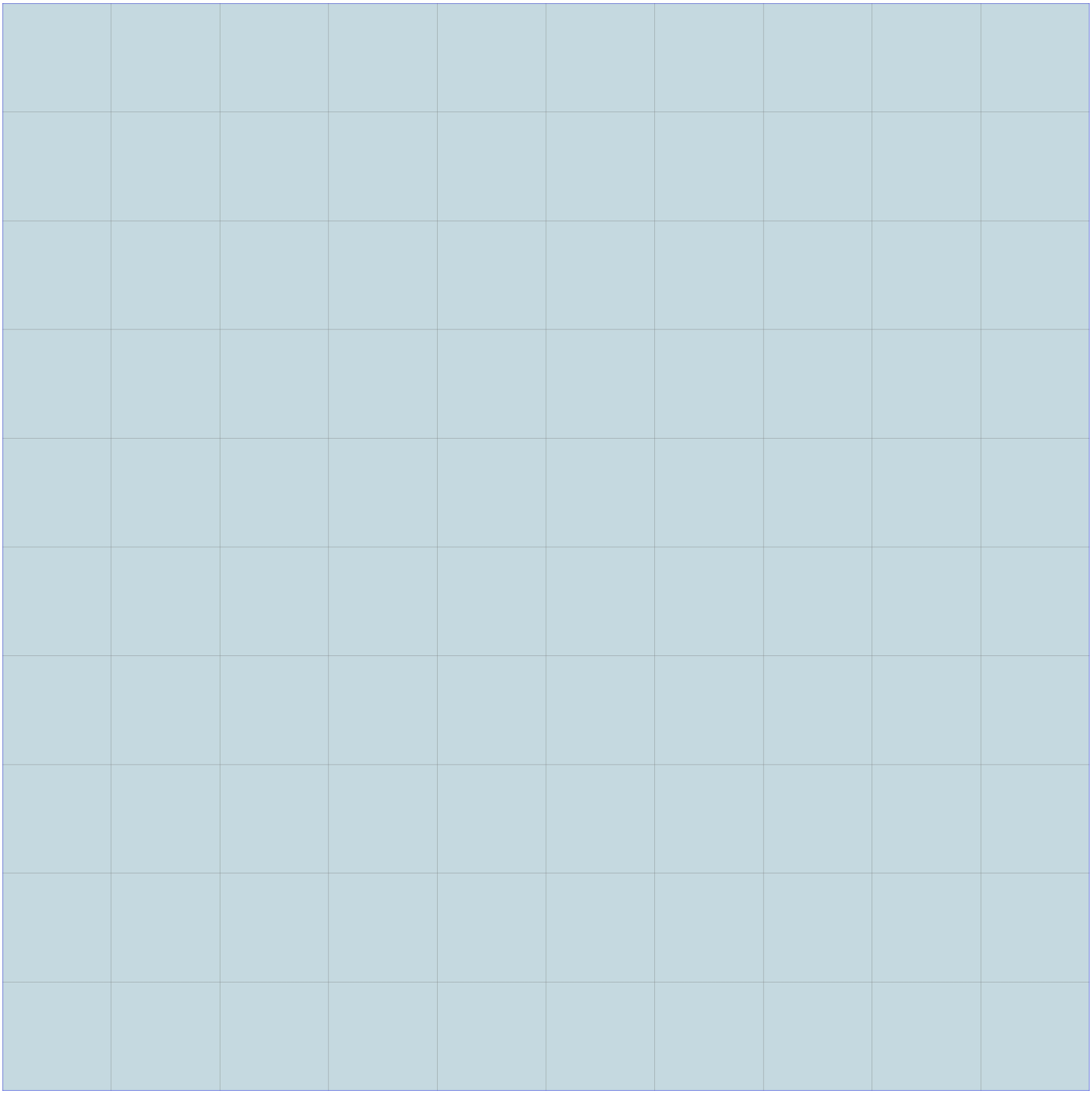
No PERLND changes have been made.

## IMPLND Changes

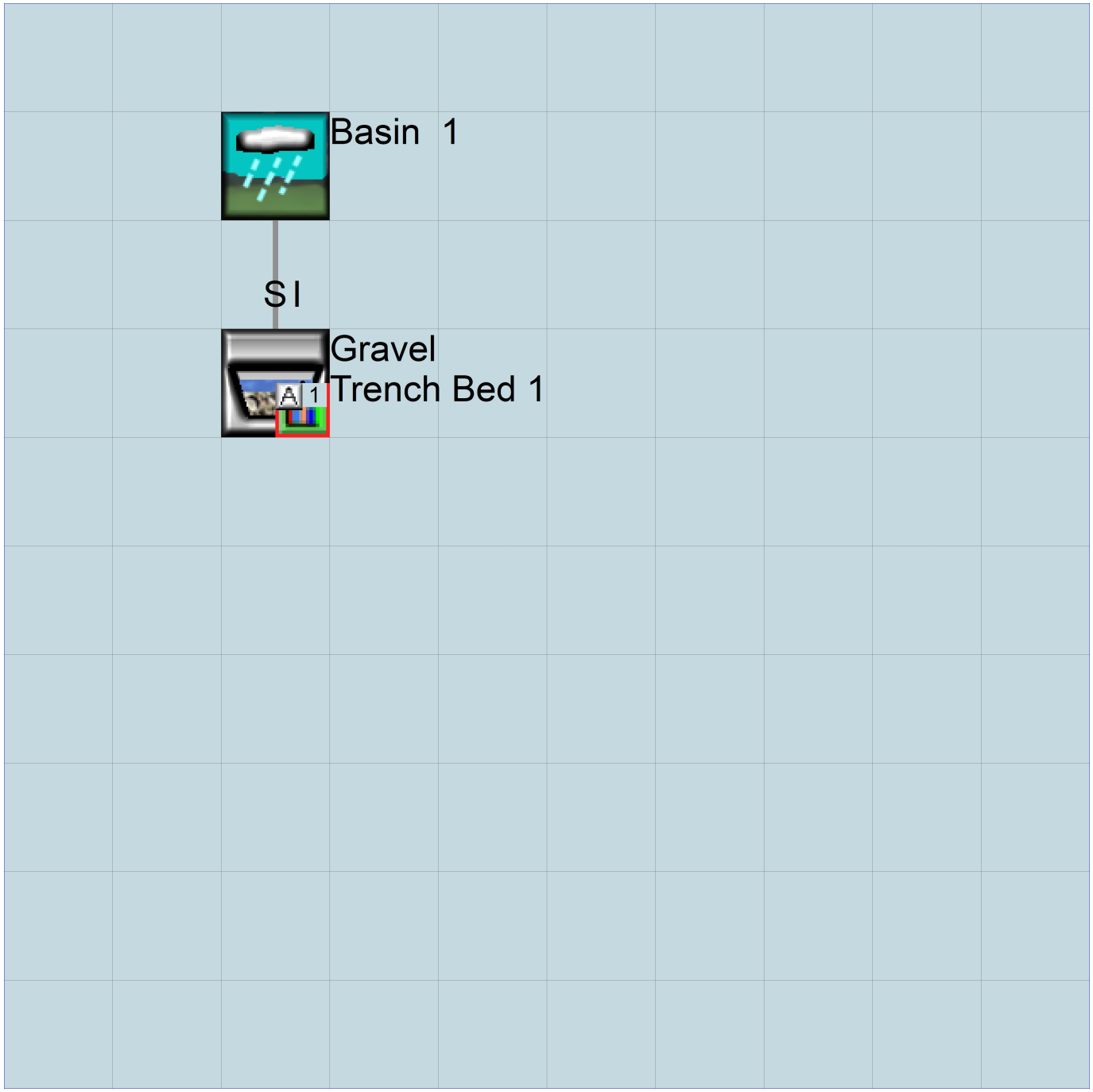
No IMPLND changes have been made.

# *Appendix*

## *Predeveloped Schematic*



## *Mitigated Schematic*



## *Predeveloped UCI File*

## *Mitigated UCI File*

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1948 10 01        END    2009 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   Ngyuen Residence.wdm
MESSU       25   MitNgyuen Residence.MES
            27   MitNgyuen Residence.L61
            28   MitNgyuen Residence.L62
            30   POCNgyuen Residence1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      IMPLND       4
      RCHRES       1
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title---------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Gravel Trench Bed 1         MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
  END GEN-INFO
  *** Section PWATER***

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

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

  PWAT-PARM1
```

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

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
  END PWAT-PARM4

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

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
    4      ROOF TOPS/FLAT         1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    4         0    0    1    0    0    0
  END ACTIVITY

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

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    4         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    4            400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    4              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    4              0         0
  END IWAT-STATE1
```

```
END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
IMPLND   4                        0.11     RCHRES   1      5

******Routing******
IMPLND   4                        0.11     COPY     1     15
RCHRES   1                           1     COPY   501     17
END SCHEMATIC

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



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

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<----------------><---> User T-series  Engl Metr LKFG             ***
                                      in  out                               ***
    1     Gravel Trench Be-008    2    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ******************* PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                    ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *        ***
    1        0  1  0  0    4  5  0  0  0       0  0  0  0  0       2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
    1             1      0.01       0.0       0.0       0.5       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                       ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
    1            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
```

FTABLES
FTABLE 1
92 5

| Depth (ft) | Area (acres) | Volume (acre-ft) | Outflow1 (cfs) | Outflow2 (cfs) | Velocity (ft/sec) | Travel Time*** (Minutes)*** |
|---|---|---|---|---|---|---|
| 0.000000 | 0.002755 | 0.000000 | 0.000000 | 0.000000 | | |
| 0.027778 | 0.002755 | 0.000031 | 0.000000 | 0.022222 | | |
| 0.055556 | 0.002755 | 0.000061 | 0.000000 | 0.022222 | | |
| 0.083333 | 0.002755 | 0.000092 | 0.000000 | 0.022222 | | |
| 0.111111 | 0.002755 | 0.000122 | 0.000000 | 0.022222 | | |
| 0.138889 | 0.002755 | 0.000153 | 0.000000 | 0.022222 | | |
| 0.166667 | 0.002755 | 0.000184 | 0.000000 | 0.022222 | | |
| 0.194444 | 0.002755 | 0.000214 | 0.000000 | 0.022222 | | |
| 0.222222 | 0.002755 | 0.000245 | 0.000000 | 0.022222 | | |
| 0.250000 | 0.002755 | 0.000275 | 0.000000 | 0.022222 | | |
| 0.277778 | 0.002755 | 0.000306 | 0.000000 | 0.022222 | | |
| 0.305556 | 0.002755 | 0.000337 | 0.000000 | 0.022222 | | |
| 0.333333 | 0.002755 | 0.000367 | 0.000000 | 0.022222 | | |
| 0.361111 | 0.002755 | 0.000398 | 0.000000 | 0.022222 | | |
| 0.388889 | 0.002755 | 0.000429 | 0.000000 | 0.022222 | | |
| 0.416667 | 0.002755 | 0.000459 | 0.000000 | 0.022222 | | |
| 0.444444 | 0.002755 | 0.000490 | 0.000000 | 0.022222 | | |
| 0.472222 | 0.002755 | 0.000520 | 0.000000 | 0.022222 | | |
| 0.500000 | 0.002755 | 0.000551 | 0.000000 | 0.022222 | | |
| 0.527778 | 0.002755 | 0.000582 | 0.000000 | 0.022222 | | |
| 0.555556 | 0.002755 | 0.000612 | 0.000000 | 0.022222 | | |
| 0.583333 | 0.002755 | 0.000643 | 0.000000 | 0.022222 | | |
| 0.611111 | 0.002755 | 0.000673 | 0.000000 | 0.022222 | | |
| 0.638889 | 0.002755 | 0.000704 | 0.000000 | 0.022222 | | |
| 0.666667 | 0.002755 | 0.000735 | 0.000000 | 0.022222 | | |
| 0.694444 | 0.002755 | 0.000765 | 0.000000 | 0.022222 | | |
| 0.722222 | 0.002755 | 0.000796 | 0.000000 | 0.022222 | | |
| 0.750000 | 0.002755 | 0.000826 | 0.000000 | 0.022222 | | |
| 0.777778 | 0.002755 | 0.000857 | 0.000000 | 0.022222 | | |
| 0.805556 | 0.002755 | 0.000888 | 0.000000 | 0.022222 | | |
| 0.833333 | 0.002755 | 0.000918 | 0.000000 | 0.022222 | | |
| 0.861111 | 0.002755 | 0.000949 | 0.000000 | 0.022222 | | |
| 0.888889 | 0.002755 | 0.000979 | 0.000000 | 0.022222 | | |
| 0.916667 | 0.002755 | 0.001010 | 0.000000 | 0.022222 | | |
| 0.944444 | 0.002755 | 0.001041 | 0.000000 | 0.022222 | | |
| 0.972222 | 0.002755 | 0.001071 | 0.000000 | 0.022222 | | |
| 1.000000 | 0.002755 | 0.001102 | 0.000000 | 0.022222 | | |
| 1.027778 | 0.002755 | 0.001133 | 0.000000 | 0.022222 | | |
| 1.055556 | 0.002755 | 0.001163 | 0.000000 | 0.022222 | | |
| 1.083333 | 0.002755 | 0.001194 | 0.000000 | 0.022222 | | |
| 1.111111 | 0.002755 | 0.001224 | 0.000000 | 0.022222 | | |
| 1.138889 | 0.002755 | 0.001255 | 0.000000 | 0.022222 | | |
| 1.166667 | 0.002755 | 0.001286 | 0.000000 | 0.022222 | | |
| 1.194444 | 0.002755 | 0.001316 | 0.000000 | 0.022222 | | |
| 1.222222 | 0.002755 | 0.001347 | 0.000000 | 0.022222 | | |
| 1.250000 | 0.002755 | 0.001377 | 0.000000 | 0.022222 | | |
| 1.277778 | 0.002755 | 0.001408 | 0.000000 | 0.022222 | | |
| 1.305556 | 0.002755 | 0.001439 | 0.000000 | 0.022222 | | |
| 1.333333 | 0.002755 | 0.001469 | 0.000000 | 0.022222 | | |
| 1.361111 | 0.002755 | 0.001500 | 0.000000 | 0.022222 | | |
| 1.388889 | 0.002755 | 0.001530 | 0.000000 | 0.022222 | | |
| 1.416667 | 0.002755 | 0.001561 | 0.000000 | 0.022222 | | |
| 1.444444 | 0.002755 | 0.001592 | 0.000000 | 0.022222 | | |
| 1.472222 | 0.002755 | 0.001622 | 0.000000 | 0.022222 | | |
| 1.500000 | 0.002755 | 0.001653 | 0.000000 | 0.022222 | | |
| 1.527778 | 0.002755 | 0.001684 | 0.000000 | 0.022222 | | |
| 1.555556 | 0.002755 | 0.001714 | 0.000000 | 0.022222 | | |
| 1.583333 | 0.002755 | 0.001745 | 0.000000 | 0.022222 | | |
| 1.611111 | 0.002755 | 0.001775 | 0.000000 | 0.022222 | | |
| 1.638889 | 0.002755 | 0.001806 | 0.000000 | 0.022222 | | |
| 1.666667 | 0.002755 | 0.001837 | 0.000000 | 0.022222 | | |
| 1.694444 | 0.002755 | 0.001867 | 0.000000 | 0.022222 | | |
| 1.722222 | 0.002755 | 0.001898 | 0.000000 | 0.022222 | | |
| 1.750000 | 0.002755 | 0.001928 | 0.000000 | 0.022222 | | |
| 1.777778 | 0.002755 | 0.001959 | 0.000000 | 0.022222 | | |

```
  1.805556  0.002755  0.001990  0.000000  0.022222
  1.833333  0.002755  0.002020  0.000000  0.022222
  1.861111  0.002755  0.002051  0.000000  0.022222
  1.888889  0.002755  0.002081  0.000000  0.022222
  1.916667  0.002755  0.002112  0.000000  0.022222
  1.944444  0.002755  0.002143  0.000000  0.022222
  1.972222  0.002755  0.002173  0.000000  0.022222
  2.000000  0.002755  0.002204  0.000000  0.022222
  2.027778  0.002755  0.002234  0.000000  0.022222
  2.055556  0.002755  0.002265  0.000000  0.022222
  2.083333  0.002755  0.002296  0.000000  0.022222
  2.111111  0.002755  0.002326  0.000000  0.022222
  2.138889  0.002755  0.002357  0.000000  0.022222
  2.166667  0.002755  0.002388  0.000000  0.022222
  2.194444  0.002755  0.002418  0.000000  0.022222
  2.222222  0.002755  0.002449  0.000000  0.022222
  2.250000  0.002755  0.002479  0.000000  0.022222
  2.277778  0.002755  0.002510  0.000000  0.022222
  2.305556  0.002755  0.002541  0.000000  0.022222
  2.333333  0.002755  0.002571  0.000000  0.022222
  2.361111  0.002755  0.002602  0.000000  0.022222
  2.388889  0.002755  0.002632  0.000000  0.022222
  2.416667  0.002755  0.002663  0.000000  0.022222
  2.444444  0.002755  0.002694  0.000000  0.022222
  2.472222  0.002755  0.002724  0.000000  0.022222
  2.500000  0.002755  0.002755  0.000000  0.022222
  2.527778  0.002755  0.002831  0.040914  0.022222
  END FTABLE  1
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    0.76           PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.76           IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   1 HYDR   RO     1 1        1      WDM   1000 FLOW     ENGL      REPL
RCHRES   1 HYDR   O      1 1        1      WDM   1001 FLOW     ENGL      REPL
RCHRES   1 HYDR   O      2 1        1      WDM   1002 FLOW     ENGL      REPL
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1003 STAG     ENGL      REPL
COPY     1 OUTPUT MEAN   1 1     48.4      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    801 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>             <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    5

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

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


END MASS-LINK

END RUN
```

## *Predeveloped HSPF Message File*

```
ERROR/WARNING ID:   341   6

DATE/TIME: 1981/10/ 6  0:45

RCHRES:     1

The volume of water in this reach/mixed reservoir is greater than the value
in the "volume" column of the last row of RCHTAB().  To continue the
simulation the table has been extrapolated, based on information contained
in the last two rows.  This will usually result in some loss of accuracy.
If depth is being calculated it will also cause an error condition.
Relevant data are:

NROWS         V1         V2        VOL
92  120.01     123.32     123.95
```

---

```
ERROR/WARNING ID:   341   5

DATE/TIME: 1981/10/ 6  0:45

RCHRES:     1

Calculation of relative depth, using Newton's method of successive
approximations, converged to an invalid value (not in range 0.0 to 1.0).
Probably ftable was extrapolated.  If extrapolation was small, no problem.
Remedy; extend ftable.  Relevant data are:

A          B          C      RDEP1      RDEP2  COUNT
0.0000E+00  240.02    -285.79       1.1907     1.1907       2
```

---

```
ERROR/WARNING ID:   341   6

DATE/TIME: 1990/ 1/ 9  7:15

RCHRES:     1

The volume of water in this reach/mixed reservoir is greater than the value
in the "volume" column of the last row of RCHTAB().  To continue the
simulation the table has been extrapolated, based on information contained
in the last two rows.  This will usually result in some loss of accuracy.
If depth is being calculated it will also cause an error condition.
Relevant data are:

NROWS         V1         V2        VOL
92  120.01     123.32    1.2465E+02
```

---

```
ERROR/WARNING ID:   341   5

DATE/TIME: 1990/ 1/ 9  7:15

RCHRES:     1

Calculation of relative depth, using Newton's method of successive
approximations, converged to an invalid value (not in range 0.0 to 1.0).
Probably ftable was extrapolated.  If extrapolation was small, no problem.
Remedy; extend ftable.  Relevant data are:

A          B          C      RDEP1      RDEP2  COUNT
0.0000E+00  240.02    -336.60       1.4024  1.4024E+00      2
```

---

```
ERROR/WARNING ID:   341   6

DATE/TIME: 2003/10/20 12:15

RCHRES:     1
```

The volume of water in this reach/mixed reservoir is greater than the value
in the "volume" column of the last row of RCHTAB(). To continue the
simulation the table has been extrapolated, based on information contained
in the last two rows. This will usually result in some loss of accuracy.
If depth is being calculated it will also cause an error condition.
Relevant data are:

| NROWS | V1 | V2 | VOL |
|---|---|---|---|
| 92 | 1.2001E+02 | 123.32 | 1.2347E+02 |

---

ERROR/WARNING ID: 341 5

DATE/TIME: 2003/10/20 12:15

RCHRES: 1

Calculation of relative depth, using Newton's method of successive
approximations, converged to an invalid value (not in range 0.0 to 1.0).
Probably ftable was extrapolated. If extrapolation was small, no problem.
Remedy; extend ftable. Relevant data are:

| A | B | C | RDEP1 | RDEP2 | COUNT |
|---|---|---|---|---|---|
| 0.0000E+00 | 240.02 | -251.03 | 1.0459 | 1.0459 | 2 |

---

ERROR/WARNING ID: 341 6

DATE/TIME: 2003/10/20 12:30

RCHRES: 1

The volume of water in this reach/mixed reservoir is greater than the value
in the "volume" column of the last row of RCHTAB(). To continue the
simulation the table has been extrapolated, based on information contained
in the last two rows. This will usually result in some loss of accuracy.
If depth is being calculated it will also cause an error condition.
Relevant data are:

| NROWS | V1 | V2 | VOL |
|---|---|---|---|
| 92 | 120.01 | 123.32 | 124.72 |

---

ERROR/WARNING ID: 341 5

DATE/TIME: 2003/10/20 12:30

RCHRES: 1

Calculation of relative depth, using Newton's method of successive
approximations, converged to an invalid value (not in range 0.0 to 1.0).
Probably ftable was extrapolated. If extrapolation was small, no problem.
Remedy; extend ftable. Relevant data are:

| A | B | C | RDEP1 | RDEP2 | COUNT |
|---|---|---|---|---|---|
| 0.0000E+00 | 240.02 | -341.70 | 1.4236 | 1.4236 | 2 |

---

ERROR/WARNING ID: 341 6

DATE/TIME: 2003/10/20 15:30

RCHRES: 1

The volume of water in this reach/mixed reservoir is greater than the value
in the "volume" column of the last row of RCHTAB(). To continue the
simulation the table has been extrapolated, based on information contained
in the last two rows. This will usually result in some loss of accuracy.
If depth is being calculated it will also cause an error condition.
Relevant data are:

| NROWS | V1 | V2 | VOL |
|---|---|---|---|
| 92 | 120.01 | 123.32 | 126.33 |

ERROR/WARNING ID:   341   5

DATE/TIME: 2003/10/20 15:30

RCHRES:     1

Calculation of relative depth, using Newton's method of successive
approximations, converged to an invalid value (not in range 0.0 to 1.0).
Probably ftable was extrapolated.  If extrapolation was small, no problem.
Remedy; extend ftable.  Relevant data are:

| A | B | C | RDEP1 | RDEP2 | COUNT |
|---|---|---|---|---|---|
| 0.0000E+00 | 240.02 | -458.03 | 1.9084 | 1.9083E+00 | 2 |

---

ERROR/WARNING ID:   341   6

DATE/TIME: 2003/10/20 16:45

RCHRES:     1

The volume of water in this reach/mixed reservoir is greater than the value
in the "volume" column of the last row of RCHTAB().  To continue the
simulation the table has been extrapolated, based on information contained
in the last two rows.  This will usually result in some loss of accuracy.
If depth is being calculated it will also cause an error condition.
Relevant data are:

| NROWS | V1 | V2 | VOL |
|---|---|---|---|
| 92 | 1.2001E+02 | 123.32 | 1.2434E+02 |

---

ERROR/WARNING ID:   341   5

DATE/TIME: 2003/10/20 16:45

RCHRES:     1

Calculation of relative depth, using Newton's method of successive
approximations, converged to an invalid value (not in range 0.0 to 1.0).
Probably ftable was extrapolated.  If extrapolation was small, no problem.
Remedy; extend ftable.  Relevant data are:

| A | B | C | RDEP1 | RDEP2 | COUNT |
|---|---|---|---|---|---|
| 0.0000E+00 | 240.02 | -314.18 | 1.3090 | 1.3090 | 2 |

---

ERROR/WARNING ID:   341   6

DATE/TIME: 2003/10/20 17:15

RCHRES:     1

The volume of water in this reach/mixed reservoir is greater than the value
in the "volume" column of the last row of RCHTAB().  To continue the
simulation the table has been extrapolated, based on information contained
in the last two rows.  This will usually result in some loss of accuracy.
If depth is being calculated it will also cause an error condition.
Relevant data are:

| NROWS | V1 | V2 | VOL |
|---|---|---|---|
| 92 | 120.01 | 123.32 | 123.33 |

---

ERROR/WARNING ID:   341   5

DATE/TIME: 2003/10/20 17:15

RCHRES:     1

Calculation of relative depth, using Newton's method of successive
approximations, converged to an invalid value (not in range 0.0 to 1.0).

Probably ftable was extrapolated.  If extrapolation was small, no problem.
Remedy; extend ftable.  Relevant data are:

| A | B | C | RDEP1 | RDEP2 | COUNT |
|---|---|---|---|---|---|
| 0.0000E+00 | 240.02 | -240.58 | 1.0023 | 1.0023E+00 | 2 |

---

ERROR/WARNING ID:   341   6

DATE/TIME: 2003/11/18 12: 0

RCHRES:     1

The volume of water in this reach/mixed reservoir is greater than the value
in the "volume" column of the last row of RCHTAB().  To continue the
simulation the table has been extrapolated, based on information contained
in the last two rows.  This will usually result in some loss of accuracy.
If depth is being calculated it will also cause an error condition.
Relevant data are:

| NROWS | V1 | V2 | VOL |
|---|---|---|---|
| 92 | 1.2001E+02 | 123.32 | 123.60 |

---

ERROR/WARNING ID:   341   5

DATE/TIME: 2003/11/18 12: 0

RCHRES:     1

Calculation of relative depth, using Newton's method of successive
approximations, converged to an invalid value (not in range 0.0 to 1.0).
Probably ftable was extrapolated.  If extrapolation was small, no problem.
Remedy; extend ftable.  Relevant data are:

| A | B | C | RDEP1 | RDEP2 | COUNT |
|---|---|---|---|---|---|
| 0.0000E+00 | 240.02 | -260.77 | 1.0865 | 1.0865E+00 | 2 |

---

ERROR/WARNING ID:   341   6

DATE/TIME: 2006/11/ 4 19:30

RCHRES:     1

The volume of water in this reach/mixed reservoir is greater than the value
in the "volume" column of the last row of RCHTAB().  To continue the
simulation the table has been extrapolated, based on information contained
in the last two rows.  This will usually result in some loss of accuracy.
If depth is being calculated it will also cause an error condition.
Relevant data are:

| NROWS | V1 | V2 | VOL |
|---|---|---|---|
| 92 | 1.2001E+02 | 123.32 | 126.45 |

---

ERROR/WARNING ID:   341   5

DATE/TIME: 2006/11/ 4 19:30

RCHRES:     1

Calculation of relative depth, using Newton's method of successive
approximations, converged to an invalid value (not in range 0.0 to 1.0).
Probably ftable was extrapolated.  If extrapolation was small, no problem.
Remedy; extend ftable.  Relevant data are:

| A | B | C | RDEP1 | RDEP2 | COUNT |
|---|---|---|---|---|---|
| 0.0000E+00 | 240.02 | -466.89 | 1.9452 | 1.9452E+00 | 2 |

---

ERROR/WARNING ID:   341   6

DATE/TIME: 2007/12/ 3  5:30

RCHRES:  1

The volume of water in this reach/mixed reservoir is greater than the value
in the "volume" column of the last row of RCHTAB().  To continue the
simulation the table has been extrapolated, based on information contained
in the last two rows.  This will usually result in some loss of accuracy.
If depth is being calculated it will also cause an error condition.
Relevant data are:

| NROWS | V1 | V2 | VOL |
|---|---|---|---|
| 92 | 1.2001E+02 | 123.32 | 123.73 |

---

ERROR/WARNING ID:  341  5

DATE/TIME: 2007/12/ 3  5:30

RCHRES:  1

Calculation of relative depth, using Newton's method of successive
approximations, converged to an invalid value (not in range 0.0 to 1.0).
Probably ftable was extrapolated.  If extrapolation was small, no problem.
Remedy; extend ftable.  Relevant data are:

| A | B | C | RDEP1 | RDEP2 | COUNT |
|---|---|---|---|---|---|
| 0.0000E+00 | 240.02 | -269.99 | 1.1249 | 1.1249 | 2 |

---

ERROR/WARNING ID:  341  6

DATE/TIME: 2007/12/ 3  8:15

RCHRES:  1

The volume of water in this reach/mixed reservoir is greater than the value
in the "volume" column of the last row of RCHTAB().  To continue the
simulation the table has been extrapolated, based on information contained
in the last two rows.  This will usually result in some loss of accuracy.
If depth is being calculated it will also cause an error condition.
Relevant data are:

| NROWS | V1 | V2 | VOL |
|---|---|---|---|
| 92 | 120.01 | 123.32 | 123.76 |

---

ERROR/WARNING ID:  341  5

DATE/TIME: 2007/12/ 3  8:15

RCHRES:  1

Calculation of relative depth, using Newton's method of successive
approximations, converged to an invalid value (not in range 0.0 to 1.0).
Probably ftable was extrapolated.  If extrapolation was small, no problem.
Remedy; extend ftable.  Relevant data are:

| A | B | C | RDEP1 | RDEP2 | COUNT |
|---|---|---|---|---|---|
| 0.0000E+00 | 240.02 | -272.29 | 1.1345 | 1.1345E+00 | 2 |

---

# Disclaimer

## Legal Notice

This program and accompanying documentation is provided 'as-is' without warranty of any kind. The entire risk regarding the performance and results of this program is assumed by the user. Clear Creek Solutions, Inc. disclaims all warranties, either expressed or implied, including but not limited to implied warranties of program and accompanying documentation. In no event shall Clear Creek Solutions, Inc. be liable for any damages whatsoever (including without limitation to damages for loss of business profits, loss of business information, business interruption, and the like) arising out of the use of, or inability to use this program even if Clear Creek Solutions, Inc. has been advised of the possibility of such damages.

Clear Creek Solutions, Inc.
6200 Capitol Blvd.  Ste F
Olympia, WA.  98501
Toll Free 1(866)943-0304
Local (360)943-0304

www.clearcreeksolutions.com