



MEMORANDUM

DATE: September 5, 2018

TO: Rick Tomkins
DEA Project Manager

FROM: Karen Comings, P.E.
Water Resources Engineer

SUBJECT: Floodplain Analysis and Delineation

PROJECT: Lakeside Industries – Maple Valley Asphalt Plant

CC:

1. Introduction

Lakeside Industries, Inc. is planning to construct a new asphalt plant on a site east of the City of Renton in King County, Washington. The site is along Renton – Maple Valley Highway in Section 19 of Township 23 North, Range 6 East. Figure 1 shows the site location relative to the City of Renton and the Cedar River.

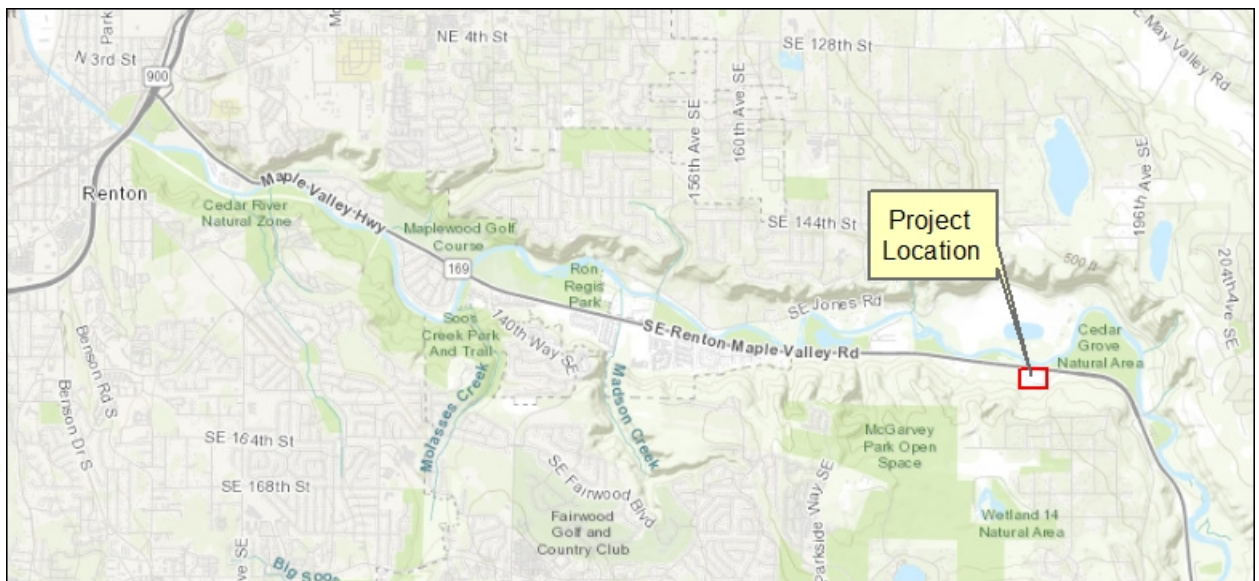


FIGURE 1. PROJECT LOCATION

The project property is at the bottom of a hillslope that is south of the site. Runoff from this hillslope forms a narrow linear wetland at the property edge that flows westward along the property boundary. This linear wetland is designated Stream B. Near the southwest corner of the property a more well defined stream channel (Stream A) flows down the hillslope and merges with flow from the linear wetland. With combined flow from Stream A, Stream B continues north along the western boundary of the property. Under existing conditions, runoff from the project area is collected at field inlets across the property and conveyed to



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Stream B via pipes to a discharge point along the west edge of the site. The proposed project will infiltrate on-site stormwater eliminating this direct discharge point. At the northwest corner of the property, the flow enters a wetland and then discharges west into the Renton-Maple Valley Highway roadside ditch before crossing the highway in an off-site culvert and discharging to the Cedar River. These channels are illustrated on the map included as Attachment 1.

Stream C is a third channel associated with the property. Stream C is sourced from a groundwater seep in the hillside on the north side of the property. Stream C flows out from bottom of the hillslope and directly into the roadside ditch along the south side of Renton-Maple Valley Highway. The roadside ditch is considerably lower than the buildable area of the property. Because this channel is from a hillside seep, drains directly to a roadside ditch, and will not be affected by the project, a floodplain was not delineated for Stream C as part of this analysis.

Floodplains for the streams associated with this property are not mapped on Department of Homeland Security – Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs). The Cedar River floodplain is shown on the FIRMs but the Cedar River floodplain does not cross Renton – Maple Valley Highway. A firmette of this section on the FIRM is provided as Attachment 2.

Hydrologic and Hydraulic analyses were conducted for Stream B to delineate the 100-year floodplain for this channel. Stream A is not directly adjacent to the property and so a floodplain was not delineated for this channel. Flow from Stream A was included in the hydraulic modeling for Stream B.

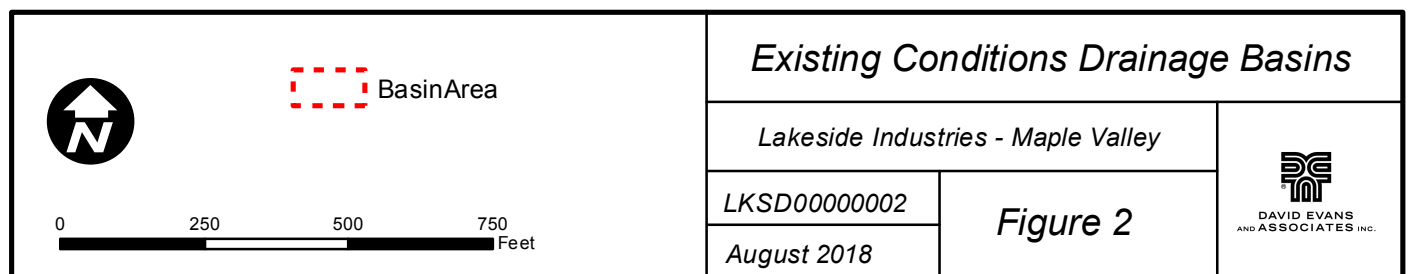
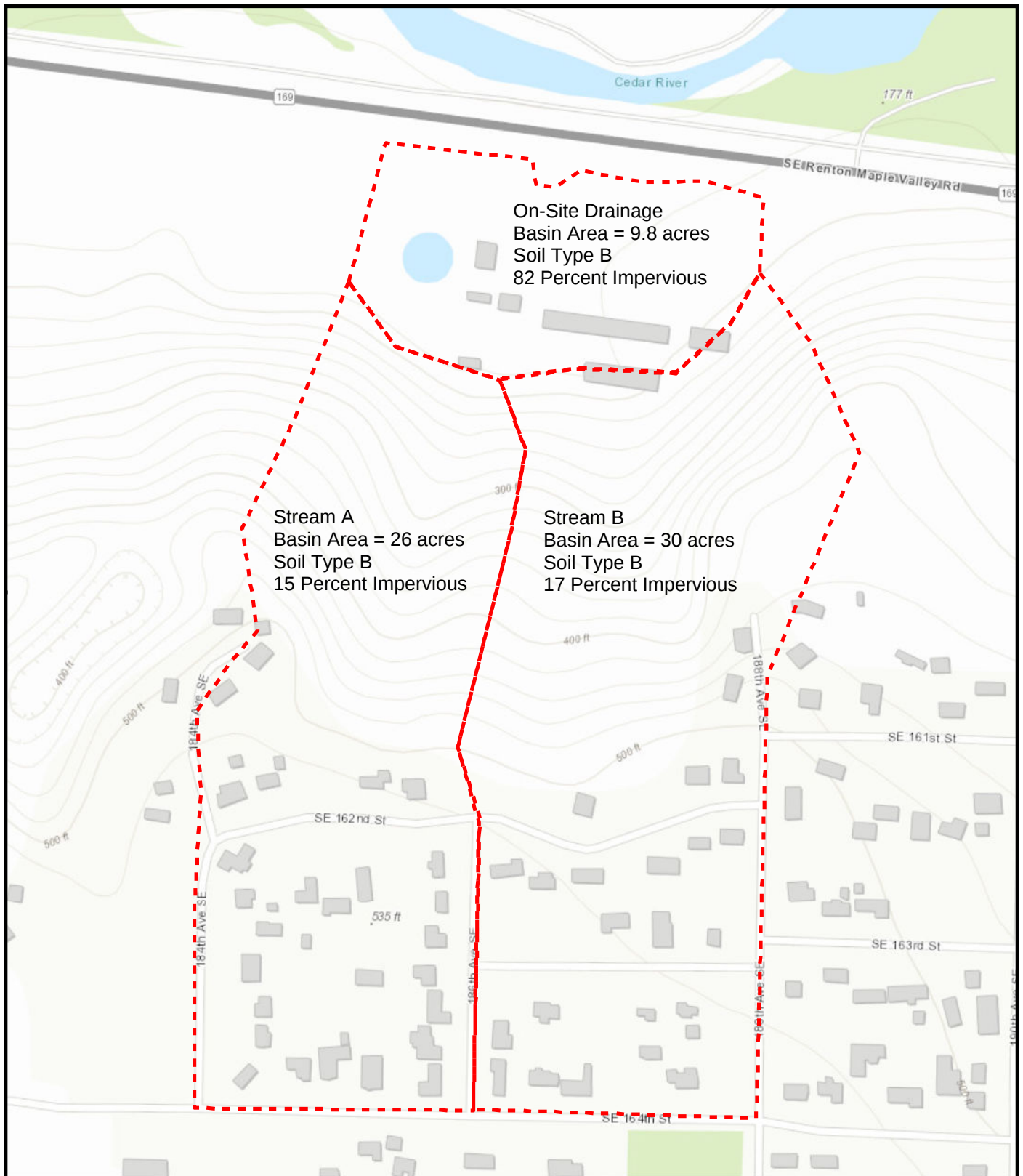
2. Hydrologic Analysis

Return period flows were determined using the hydrologic software MGSFlood. Three basins were delineated, one for Stream A flow, one for Stream B flow, and one for the on-site runoff. Figure 2 shows the drainage basin areas and relevant characteristics for the hydrologic modeling. Hydrologic Soil Groups were obtained from the Natural Resources Conservation Service Web Soil Survey. The Soil Resources Report is provided in Attachment 3. Table 1 shows the stream flow results that were used as input to the hydraulic model. Output reports from MGSFlood are included as Attachment 4.

TABLE 1. FLOW VALUES USED FOR HYDRAULIC ANALYSIS

	Cross Section¹	2-Year (cfs)	10-Year (cfs)	50-Year (cfs)	100-Year (cfs)	200-Year (cfs)
<i>Stream B</i>	1155	1.77	2.87	4.31	6.45	6.87
<i>Stream A and B combined</i>	443	3.14	5.02	7.84	11.87	12.56
<i>Stream A, B and On-Site</i>	308	5.79	8.79	12.34	16.89	18.48

1. The HEC-RAS cross section where flows were applied.



Source: DEA, Inc. GIS

This map was created by David Evans and Associates, Inc. (DEA) for Lakeside Industries. Accuracy and currency depend upon the source data at the time it is acquired. DEA makes no representation or warranty as to the correctness of the information depicted on this map. It is intended for limited planning purposes as agreed to between DEA and its client and is not suitable for design, survey, construction, or other uses or for other projects. It is strictly forbidden to modify, sell, distribute or reproduce this map for any reason without the written consent of DEA.



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3. Hydraulic Analysis

A hydraulic model of Stream B was developed using the U.S. Army Corps of Engineers' Hydraulic Engineering Centers River Analysis System (HEC-RAS) software version 5.0.4. The existing conditions model geometry was determined from survey data taken of the site topography including the bordering channels. The geometry of Stream B along the south side of the project site consists of a steep left bank from the southern hillslope. The right bank is formed by a berm that was likely created during past grading of the site. Along the south side of the site, the right overbank area is generally lower than the channel bottom under existing conditions. Within the hydraulic model, a levee marker was placed along the top of the berm to prevent the model from using the right overbank as the low point of the channel. The hydraulic model shows that the 100-year floodplain is contained within the channel by the berm. However, because the overbank area is lower than the channel, it is possible that, during high flow conditions, water could seep through the berm and onto the site. If this were to happen, the water on-site would be collected by inlet drains across the site and discharged back to the channel at a point along the west edge of the site.

Under proposed conditions, the overbank area will be raised and graded so that the overbank within the stream buffer slopes toward the channel. This will restore the overbank morphology to natural conditions and eliminate the issue of leakage through the berm.

Stream B passes through a culvert just upstream of the confluence with Stream A. This culvert is included in the hydraulic model, though the project will not modify the culvert.

Downstream of the confluence with Stream A, along the west side of the site, Stream B becomes entrenched with a depth from thalweg to bank of about five feet.

4. No-Rise Analysis

The Proposed plan for the site will improve the right channel bank within the stream buffer by providing an overbank that slopes toward the channel within the stream buffer area. This will improve the channel and floodplain morphology. Buffer restoration activities will not occur within the active channel, and no buildings will be constructed within the floodplain. A comparison of the existing 100-year water surface elevations and energy grade lines to the proposed project shows that the proposed project will not cause a rise of the 100-year floodplain. This comparison is shown in Table 2. Output data tables from the HEC-RAS model are provided as Attachment 5.



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TABLE 2. COMPARISON OF EXISTING TO PROPOSED 100-YEAR WATER SURFACE ELEVATIONS

Cross Section No.	Existing WSEL (ft)	Proposed WSEL (ft)	Change in WSEL (ft)	Existing EGL (ft)	Proposed EGL (ft)	Change in EGL (ft)
1155	172.36	172.36	0	172.39	172.39	0
1076	171.63	171.62	-0.01	171.90	171.90	0
1002	171.73	171.72	-0.01	171.73	171.73	0
917	171.59	171.59	0	171.65	171.65	0
834	171.42	171.42	0	171.43	171.43	0
756	171.35	171.35	0	171.36	171.36	0
678	170.84	170.83	-0.01	171.16	171.16	0
<i>Culvert</i>						
598	170.67	170.46	-0.21	170.68	170.47	-0.21
549	170.67	170.46	-0.21	170.67	170.46	-0.21
486	170.56	170.41	-0.15	170.63	170.42	-0.21
443	169.56	169.56	0	169.74	169.74	0
375	166.83	166.83	0	167.16	167.16	0
308	166.35	166.35	0	166.39	166.39	0
237	165.72	165.72	0	165.97	165.97	0
161	164.75	164.75	0	164.82	164.82	0
109	163.67	163.67	0	163.98	163.98	0
19	160.51	160.51	0	160.54	160.54	0

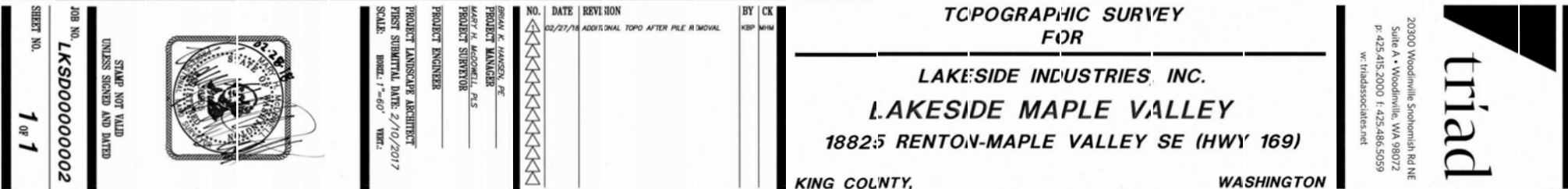
5. Floodplain Delineation

Once the water surface elevations were determined for the 100-year flow, the floodplain was mapped onto the site plan layout. This map is provided as Attachment 6. The 100-year floodplain is contained within the channel due to the very small flows that Stream B receives and due to the previously placed berm along the south side of the project site. There is some overbank flow at the southwest corner of the property within the channel buffer.

Attachments/Enclosures:

- Attachment 1 – Flow Path Map
- Attachment 2 – Firmette
- Attachment 3 – Soil Report
- Attachment 4 – MGSFlood Output Reports
- Attachment 5 – HEC-RAS Output Data
- Attachment 6 – 100-year Floodplain Map

ATTACHMENT 1



ATTACHMENT 2



APPROXIMATE SCALE IN FEET

500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM FLOOD INSURANCE RATE MAP

KING COUNTY,
WASHINGTON AND
INCORPORATED AREAS

PANEL 1004 OF 1725
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:
COMMUNITY

COMMUNITY	NUMBER	PANEL	SUFFIX
KING COUNTY, UNINCORPORATED AREAS	530071	1004	F

MAP NUMBER
53033C1004 F

MAP REVISED:
MAY 16, 1995



Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

ATTACHMENT 3



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**

**Lakeside Industries - Maple
Valley**



August 13, 2018

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

Preface	2
Soil Map	5
Soil Map.....	6
Legend.....	7
Map Unit Legend.....	8
Map Unit Descriptions.....	8
King County Area, Washington.....	10
AgC—Alderwood gravelly sandy loam, 8 to 15 percent slopes.....	10
AkF—Alderwood and Kitsap soils, very steep.....	11
BeC—Beausite gravelly sandy loam, 6 to 15 percent slopes.....	13
Or—Orcas peat.....	14
Pc—Pilchuck loamy fine sand.....	15
Py—Puyallup fine sandy loam.....	16
Rh—Riverwash.....	17
Ur—Urban land.....	18
W—Water.....	18
References	19

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.

Soil Map

Map Scale: 1:10,900 if printed on A landscape (11" x 8.5") sheet.

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

Custom Soil Resource Report

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit

 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop

 Saline Spot

 Sandy Spot

 Severely Eroded Spot

 Sinkhole

 Slide or Slip

 Sodic Spot

 Spoil Area

 Stony Spot

 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Water Features

 Streams and Canals

Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: King County Area, Washington
Survey Area Data: Version 13, Sep 7, 2017

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

Date(s) aerial images were photographed: Jul 8, 2014—Jul 15, 2014

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
AgC	Alderwood gravelly sandy loam, 8 to 15 percent slopes	216.2	51.1%
AkF	Alderwood and Kitsap soils, very steep	84.2	19.9%
BeC	Beausite gravelly sandy loam, 6 to 15 percent slopes	1.1	0.3%
Or	Orcas peat	2.4	0.6%
Pc	Pilchuck loamy fine sand	31.6	7.5%
Py	Puyallup fine sandy loam	4.5	1.1%
Rh	Riverwash	27.7	6.5%
Ur	Urban land	47.7	11.3%
W	Water	7.8	1.9%
Totals for Area of Interest		423.2	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

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

Map Unit Setting

National map unit symbol: 2t626
Elevation: 50 to 800 feet
Mean annual precipitation: 20 to 60 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 160 to 240 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Alderwood

Setting

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

Typical profile

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

Properties and qualities

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

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: B
Forage suitability group: Limited Depth Soils (G002XN302WA), Limited Depth Soils (G002XS301WA), Limited Depth Soils (G002XF303WA)
Hydric soil rating: No

Minor Components

Everett

Percent of map unit: 5 percent
Landform: Kames, eskers, moraines
Landform position (two-dimensional): Shoulder, footslope
Landform position (three-dimensional): Crest, base slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Indianola

Percent of map unit: 5 percent
Landform: Eskers, kames, terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Shalcar

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

Norma

Percent of map unit: 2 percent
Landform: Depressions, drainageways
Landform position (three-dimensional): Dip
Down-slope shape: Concave, linear
Across-slope shape: Concave
Hydric soil rating: Yes

AkF—Alderwood and Kitsap soils, very steep

Map Unit Setting

National map unit symbol: 1hmsn
Elevation: 50 to 800 feet
Mean annual precipitation: 25 to 60 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 160 to 220 days
Farmland classification: Not prime farmland

Map Unit Composition

Alderwood and similar soils: 50 percent
Kitsap and similar soils: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Alderwood

Setting

Landform: Moraines, till plains

Parent material: Basal till with some volcanic ash

Typical profile

H1 - 0 to 12 inches: gravelly ashy sandy loam

H2 - 12 to 27 inches: very gravelly sandy loam

H3 - 27 to 60 inches: very gravelly sandy loam

Properties and qualities

Slope: 25 to 70 percent

Depth to restrictive feature: 24 to 40 inches to densic material

Natural drainage class: Moderately well drained

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)

Depth to water table: About 18 to 37 inches

Frequency of flooding: None

Frequency of ponding: None

Available water storage in profile: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7e

Hydrologic Soil Group: B

Hydric soil rating: No

Description of Kitsap

Setting

Landform: Terraces

Parent material: Lacustrine deposits with a minor amount of volcanic ash

Typical profile

H1 - 0 to 5 inches: ashy silt loam

H2 - 5 to 24 inches: ashy silt loam

H3 - 24 to 60 inches: stratified silt to silty clay loam

Properties and qualities

Slope: 25 to 70 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Moderately well drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)

Depth to water table: About 18 to 36 inches

Frequency of flooding: None

Frequency of ponding: None

Available water storage in profile: High (about 11.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7e

Hydrologic Soil Group: C

Hydric soil rating: No

BeC—Beausite gravelly sandy loam, 6 to 15 percent slopes

Map Unit Setting

National map unit symbol: 1hmss
Elevation: 0 to 1,500 feet
Mean annual precipitation: 30 to 50 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 160 to 220 days
Farmland classification: Not prime farmland

Map Unit Composition

Beausite and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Beausite

Setting

Parent material: Till over residuum from sandstone

Typical profile

H1 - 0 to 6 inches: gravelly ashy sandy loam
H2 - 6 to 19 inches: gravelly ashy sandy loam
H3 - 19 to 38 inches: very gravelly sandy loam
H4 - 38 to 42 inches: bedrock

Properties and qualities

Slope: 6 to 15 percent
Depth to restrictive feature: 24 to 40 inches to lithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: C
Forage suitability group: Droughty Soils (G002XF403WA)
Hydric soil rating: No

Minor Components

Norma

Percent of map unit: 3 percent
Landform: Depressions
Hydric soil rating: Yes

Seattle

Percent of map unit: 2 percent

Landform: Depressions

Hydric soil rating: Yes

Or—Orcas peat

Map Unit Setting

National map unit symbol: 1hmtl

Elevation: 10 to 1,000 feet

Mean annual precipitation: 27 to 60 inches

Mean annual air temperature: 48 to 52 degrees F

Frost-free period: 160 to 180 days

Farmland classification: Prime farmland if drained

Map Unit Composition

Orcas and similar soils: 75 percent

Minor components: 25 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Orcas

Setting

Landform: Depressions

Parent material: Mossy organic material

Typical profile

H1 - 0 to 6 inches: peat

H2 - 6 to 60 inches: peat

Properties and qualities

Slope: 0 to 1 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Very poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Very high (19.98 to 99.90 in/hr)

Depth to water table: About 0 inches

Frequency of flooding: None

Frequency of ponding: Frequent

Available water storage in profile: Very high (about 26.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6w

Hydrologic Soil Group: A/D

Forage suitability group: Wet Soils (G002XN102WA)

Hydric soil rating: Yes

Minor Components

Seattle

Percent of map unit: 10 percent
Landform: Depressions
Hydric soil rating: Yes

Tukwila

Percent of map unit: 10 percent
Landform: Depressions
Hydric soil rating: Yes

Bellingham

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Pc—Pilchuck loamy fine sand

Map Unit Setting

National map unit symbol: 1hmtr
Elevation: 0 to 820 feet
Mean annual precipitation: 35 to 60 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 160 to 210 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Pilchuck and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pilchuck

Setting

Landform: Flood plains, terraces
Parent material: Gravelly and sandy alluvium

Typical profile

H1 - 0 to 20 inches: loamy fine sand
H2 - 20 to 38 inches: loamy fine sand
H3 - 38 to 60 inches: gravelly sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 24 to 48 inches
Frequency of flooding: Occasional

Custom Soil Resource Report

Frequency of ponding: None

Available water storage in profile: Low (about 3.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4s

Hydrologic Soil Group: A

Forage suitability group: Droughty Soils (G002XN402WA)

Hydric soil rating: No

Minor Components

Oridia

Percent of map unit: 5 percent

Landform: Depressions

Hydric soil rating: Yes

Briscot

Percent of map unit: 5 percent

Landform: Flood plains

Hydric soil rating: Yes

Py—Puyallup fine sandy loam

Map Unit Setting

National map unit symbol: 1hmtv

Elevation: 0 to 820 feet

Mean annual precipitation: 35 to 60 inches

Mean annual air temperature: 50 degrees F

Frost-free period: 170 to 200 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Puyallup and similar soils: 75 percent

Minor components: 25 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Puyallup

Setting

Landform: Terraces, flood plains

Parent material: Alluvium

Typical profile

H1 - 0 to 8 inches: ashy fine sandy loam

H2 - 8 to 34 inches: very fine sandy loam

H3 - 34 to 60 inches: sand

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: 20 to 40 inches to strongly contrasting textural stratification

Custom Soil Resource Report

Natural drainage class: Well drained

Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)

Depth to water table: About 48 to 60 inches

Frequency of flooding: Occasional

Frequency of ponding: None

Available water storage in profile: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): 3w

Land capability classification (nonirrigated): 3w

Hydrologic Soil Group: A

Forage suitability group: Droughty Soils (G002XN402WA)

Hydric soil rating: No

Minor Components

Briscot

Percent of map unit: 8 percent

Landform: Depressions

Hydric soil rating: Yes

Newberg

Percent of map unit: 6 percent

Landform: Depressions

Hydric soil rating: Yes

Woodinville

Percent of map unit: 5 percent

Landform: Depressions

Hydric soil rating: Yes

Nooksack

Percent of map unit: 3 percent

Hydric soil rating: No

Oridia

Percent of map unit: 3 percent

Landform: Depressions

Hydric soil rating: Yes

Rh—Riverwash

Map Unit Composition

Riverwash: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Riverwash

Setting

Landform: Drainageways

Parent material: Alluvium

Typical profile

H1 - 0 to 60 inches: Error

Properties and qualities

Slope: 0 to 3 percent

Depth to water table: About 0 to 24 inches

Frequency of flooding: Frequent

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydric soil rating: Yes

Ur—Urban land

Map Unit Composition

Urban land: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydric soil rating: No

W—Water

Map Unit Composition

Water: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

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ATTACHMENT 4

Subbasin B

MGS FLOOD PROJECT REPORT

Program Version: MGSFlood 4.46
Program License Number: 200410013
Project Simulation Performed on: 08/28/2018 7:35 AM
Report Generation Date: 08/28/2018 7:35 AM

Input File Name: LakesideInd.fld
Project Name: Lakeside Industries
Analysis Title: Flood Hazard Certification
Comments:

PRECIPITATION INPUT

Computational Time Step (Minutes): 60

Extended Precipitation Time Series Selected
Climatic Region Number: 5

Full Period of Record Available used for Routing
Precipitation Station : 95004805 Puget West 48 in_5min 10/01/1939-10/01/2097
Evaporation Station : 951048 Puget West 48 in MAP
Evaporation Scale Factor : 0.750

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

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

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

Predevelopment/Post Development Tributary Area Summary

	Predeveloped	Post Developed
Total Subbasin Area (acres)	65.900	65.900
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	65.900	65.900

-----SCENARIO: PREDEVELOPED

Number of Subbasins: 3

----- Subbasin : Subbasin A -----
-----Area (Acres) -----

Outwash Forest	13.000
Outwash Grass	9.000
Impervious	4.000

Subbasin Total 26.000

----- Subbasin : Subbasin B -----
-----Area (Acres) -----
Outwash Forest 15.100
Outwash Grass 10.000
Impervious 5.000

Subbasin Total 30.100

----- Subbasin : On-Site Area -----
-----Area (Acres) -----
Till Grass 1.800
Impervious 8.000

Subbasin Total 9.800

-----**SCENARIO: POSTDEVELOPED**
Number of Subbasins: 3

----- Subbasin : Subbasin A -----
-----Area (Acres) -----
Outwash Forest 13.000
Outwash Grass 9.000
Impervious 4.000

Subbasin Total 26.000

----- Subbasin : Subbasin B -----
-----Area (Acres) -----
Outwash Forest 15.100
Outwash Grass 10.000
Impervious 5.000

Subbasin Total 30.100

----- Subbasin : On-Site Area -----
-----Area (Acres) -----
Till Grass 1.800
Impervious 8.000

Subbasin Total 9.800

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

-----**SCENARIO: PREDEVELOPED**
Number of Links: 1

Link Name: New Channel Lnk1

Link Type: Open Channel

Downstream Link: None

-----Left Overbank

Upper Sideslope (z) : 0.500
Upper Width (ft) : 3.000
Middle Sideslope (z) : 10.000
Middle Width (ft) : 10.000
Mannings n : 0.040

-----Main Channel

Lower Sideslope Left (z) : 0.500
Lower Width Left (ft) : 3.000
Lower Sideslope Right (z) : 0.500
Lower Width Right (ft) : 3.000
Mannings n : 0.024
Base Width (ft) : 10.0
Elevation (ft) : 100.00
Channel Slope (ft/ft) : 0.020
Channel Length (ft) : 1000.0

-----Right Overbank

Upper Sideslope (z) : 0.500
Upper Width (ft) : 3.000
Middle Sideslope (z) : 10.000
Middle Width (ft) : 10.000
Mannings n : 0.040

Massmann Infiltration Option Used

Hydraulic Conductivity (in/hr) : 0.0

Depth to Water Table (ft) : 100.0

Bio-Fouling Potential : Low

Maintenance : Average or Better

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

-----SCENARIO: POSTDEVELOPED

Number of Links: 1

Link Name: New Channel Lnk1

Link Type: Open Channel

Downstream Link: None

-----Left Overbank

Upper Sideslope (z) : 0.500
Upper Width (ft) : 3.000
Middle Sideslope (z) : 10.000
Middle Width (ft) : 10.000
Mannings n : 0.040

-----Main Channel

Lower Sideslope Left (z) : 0.500
 Lower Width Left (ft) : 3.000
 Lower Sideslope Right (z) : 0.500
 Lower Width Right (ft) : 3.000
 Mannings n : 0.024
 Base Width (ft) : 10.0
 Elevation (ft) : 100.00
 Channel Slope (ft/ft) : 0.020
 Channel Length (ft) : 1000.0

-----Right Overbank
 Upper Sideslope (z) : 0.500
 Upper Width (ft) : 3.000
 Middle Sideslope (z) : 10.000
 Middle Width (ft) : 10.000
 Mannings n : 0.040

Massmann Infiltration Option Used
 Hydraulic Conductivity (in/hr) : 0.0
 Depth to Water Table (ft) : 100.0
 Bio-Fouling Potential : Low
 Maintenance : Average or Better

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

-----SCENARIO: PREDEVELOPED

Number of Subbasins: 3
 Number of Links: 1

-----SCENARIO: POSTDEVELOPED

Number of Subbasins: 3
 Number of Links: 1

*****Groundwater Recharge Summary*****

Recharge is computed as input to PerInd Groundwater Plus Infiltration in Structures

Total Predeveloped Recharge During Simulation	
Model Element	Recharge Amount (ac-ft)
Subbasin: Subbasin A	8713.084
Subbasin: Subbasin B	9922.893
Subbasin: On-Site Area	240.883
Link: New Channel Lnk1	Not Computed
Total:	18876.860

Total Post Developed Recharge During Simulation	
Model Element	Recharge Amount (ac-ft)
Subbasin: Subbasin A	8713.084
Subbasin: Subbasin B	9922.893
Subbasin: On-Site Area	240.883
Link: New Channel Lnk1	Not Computed

Total: 18876.860

Total Predevelopment Recharge Equals Post Developed

Average Recharge Per Year, (Number of Years= 158)

Predeveloped: 119.474 ac-ft/year, Post Developed: 119.474 ac-ft/year

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

-----SCENARIO: PREDEVELOPED

Number of Links: 1

-----SCENARIO: POSTDEVELOPED

Number of Links: 1

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

Scenario Predeveloped Compliance Subbasin: Subbasin B

Scenario Postdeveloped Compliance Subbasin: Subbasin B

***** 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	1.774	2-Year	1.774
5-Year	2.378	5-Year	2.378
10-Year	2.870	10-Year	2.870
25-Year	3.740	25-Year	3.740
50-Year	4.312	50-Year	4.312
100-Year	6.450	100-Year	6.450
200-Year	6.871	200-Year	6.871

** 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%):	0.0%	PASS
Maximum Excursion from 50%Q2 to Q2 (Must be Less Than or Equal to 0%):	0.1%	FAIL
Maximum Excursion from Q2 to Q50 (Must be less than 10%):	0.0%	PASS
Percent Excursion from Q2 to Q50 (Must be less than 50%):	2.7%	PASS

Subbasins A and B

MGS FLOOD PROJECT REPORT

Program Version: MGSFlood 4.46
Program License Number: 200410013
Project Simulation Performed on: 08/28/2018 7:43 AM
Report Generation Date: 08/28/2018 7:43 AM

Input File Name: LakesideInd.fld
Project Name: Lakeside Industries
Analysis Title: Flood Hazard Certification
Comments:

PRECIPITATION INPUT

Computational Time Step (Minutes): 60

Extended Precipitation Time Series Selected
Climatic Region Number: 5

Full Period of Record Available used for Routing
Precipitation Station : 95004805 Puget West 48 in_5min 10/01/1939-10/01/2097
Evaporation Station : 951048 Puget West 48 in MAP
Evaporation Scale Factor : 0.750

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

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

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

Predevelopment/Post Development Tributary Area Summary

	Predeveloped	Post Developed
Total Subbasin Area (acres)	65.900	65.900
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	65.900	65.900

-----SCENARIO: PREDEVELOPED

Number of Subbasins: 3

----- Subbasin : Subbasin A -----
-----Area (Acres) -----

Outwash Forest	13.000
Outwash Grass	9.000
Impervious	4.000

Subbasin Total 26.000

----- Subbasin : Subbasin B -----
-----Area (Acres) -----
Outwash Forest 15.100
Outwash Grass 10.000
Impervious 5.000

Subbasin Total 30.100

----- Subbasin : On-Site Area -----
-----Area (Acres) -----
Till Grass 1.800
Impervious 8.000

Subbasin Total 9.800

-----**SCENARIO: POSTDEVELOPED**
Number of Subbasins: 3

----- Subbasin : Subbasin A -----
-----Area (Acres) -----
Outwash Forest 13.000
Outwash Grass 9.000
Impervious 4.000

Subbasin Total 26.000

----- Subbasin : Subbasin B -----
-----Area (Acres) -----
Outwash Forest 15.100
Outwash Grass 10.000
Impervious 5.000

Subbasin Total 30.100

----- Subbasin : On-Site Area -----
-----Area (Acres) -----
Till Grass 1.800
Impervious 8.000

Subbasin Total 9.800

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

-----**SCENARIO: PREDEVELOPED**
Number of Links: 1

Link Name: New Channel Lnk1

Link Type: Open Channel

Downstream Link: None

-----Left Overbank

Upper Sideslope (z) : 0.500
Upper Width (ft) : 3.000
Middle Sideslope (z) : 10.000
Middle Width (ft) : 10.000
Mannings n : 0.040

-----Main Channel

Lower Sideslope Left (z) : 0.500
Lower Width Left (ft) : 3.000
Lower Sideslope Right (z) : 0.500
Lower Width Right (ft) : 3.000
Mannings n : 0.024
Base Width (ft) : 10.0
Elevation (ft) : 100.00
Channel Slope (ft/ft) : 0.020
Channel Length (ft) : 1000.0

-----Right Overbank

Upper Sideslope (z) : 0.500
Upper Width (ft) : 3.000
Middle Sideslope (z) : 10.000
Middle Width (ft) : 10.000
Mannings n : 0.040

Massmann Infiltration Option Used

Hydraulic Conductivity (in/hr) : 0.0

Depth to Water Table (ft) : 100.0

Bio-Fouling Potential : Low

Maintenance : Average or Better

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

-----SCENARIO: POSTDEVELOPED

Number of Links: 1

Link Name: New Channel Lnk1

Link Type: Open Channel

Downstream Link: None

-----Left Overbank

Upper Sideslope (z) : 0.500
Upper Width (ft) : 3.000
Middle Sideslope (z) : 10.000
Middle Width (ft) : 10.000
Mannings n : 0.040

-----Main Channel

Lower Sideslope Left (z) : 0.500
 Lower Width Left (ft) : 3.000
 Lower Sideslope Right (z) : 0.500
 Lower Width Right (ft) : 3.000
 Mannings n : 0.024
 Base Width (ft) : 10.0
 Elevation (ft) : 100.00
 Channel Slope (ft/ft) : 0.020
 Channel Length (ft) : 1000.0

-----Right Overbank
 Upper Sideslope (z) : 0.500
 Upper Width (ft) : 3.000
 Middle Sideslope (z) : 10.000
 Middle Width (ft) : 10.000
 Mannings n : 0.040

Massmann Infiltration Option Used
 Hydraulic Conductivity (in/hr) : 0.0
 Depth to Water Table (ft) : 100.0
 Bio-Fouling Potential : Low
 Maintenance : Average or Better

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

-----SCENARIO: PREDEVELOPED

Number of Subbasins: 3
 Number of Links: 1

-----SCENARIO: POSTDEVELOPED

Number of Subbasins: 3
 Number of Links: 1

*****Groundwater Recharge Summary*****

Recharge is computed as input to PerInd Groundwater Plus Infiltration in Structures

Total Predeveloped Recharge During Simulation	
Model Element	Recharge Amount (ac-ft)
Subbasin: Subbasin A	8713.084
Subbasin: Subbasin B	9922.893
Subbasin: On-Site Area	240.883
Link: New Channel Lnk1	0.000
Total:	18876.860

Total Post Developed Recharge During Simulation	
Model Element	Recharge Amount (ac-ft)
Subbasin: Subbasin A	8713.084
Subbasin: Subbasin B	9922.893
Subbasin: On-Site Area	240.883
Link: New Channel Lnk1	0.000

Total: 18876.860

Total Predevelopment Recharge Equals Post Developed

Average Recharge Per Year, (Number of Years= 158)

Predeveloped: 119.474 ac-ft/year, Post Developed: 119.474 ac-ft/year

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

-----SCENARIO: PREDEVELOPED

Number of Links: 1

***** Link: New Channel Lnk1 *****

Infiltration/Filtration Statistics-----

Inflow Volume (ac-ft): 5055.52

Inflow Volume Including PPT-Evap (ac-ft): 5055.52

Total Runoff Infiltrated (ac-ft): 0.00, 0.00%

Total Runoff Filtered (ac-ft): 0.00, 0.00%

Primary Outflow To Downstream System (ac-ft): 5060.93

Secondary Outflow To Downstream System (ac-ft): 0.00

Percent Treated (Infiltrated+Filtered)/Total Volume: 0.00%

-----SCENARIO: POSTDEVELOPED

Number of Links: 1

***** Link: New Channel Lnk1 *****

Infiltration/Filtration Statistics-----

Inflow Volume (ac-ft): 5055.52

Inflow Volume Including PPT-Evap (ac-ft): 5055.52

Total Runoff Infiltrated (ac-ft): 0.00, 0.00%

Total Runoff Filtered (ac-ft): 0.00, 0.00%

Primary Outflow To Downstream System (ac-ft): 5060.93

Secondary Outflow To Downstream System (ac-ft): 0.00

Percent Treated (Infiltrated+Filtered)/Total Volume: 0.00%

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	3.138	2-Year	3.138
5-Year	4.237	5-Year	4.237
10-Year	5.023	10-Year	5.023
25-Year	6.638	25-Year	6.638
50-Year	7.841	50-Year	7.841
100-Year	11.868	100-Year	11.868
200-Year	12.556	200-Year	12.556

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

Subbasins A and B, and On-Site Area

MGS FLOOD PROJECT REPORT

Program Version: MGSFlood 4.46
Program License Number: 200410013
Project Simulation Performed on: 08/28/2018 7:31 AM
Report Generation Date: 08/28/2018 7:31 AM

Input File Name: LakesideInd.fld
Project Name: Lakeside Industries
Analysis Title: Flood Hazard Certification
Comments:

PRECIPITATION INPUT

Computational Time Step (Minutes): 60

Extended Precipitation Time Series Selected
Climatic Region Number: 5

Full Period of Record Available used for Routing
Precipitation Station : 95004805 Puget West 48 in_5min 10/01/1939-10/01/2097
Evaporation Station : 951048 Puget West 48 in MAP
Evaporation Scale Factor : 0.750

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

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

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

Predevelopment/Post Development Tributary Area Summary

	Predeveloped	Post Developed
Total Subbasin Area (acres)	65.900	65.900
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	65.900	65.900

-----SCENARIO: PREDEVELOPED

Number of Subbasins: 3

----- Subbasin : Subbasin A -----
-----Area (Acres) -----
Outwash Forest 13.000
Outwash Grass 9.000
Impervious 4.000

Subbasin Total 26.000

----- Subbasin : Subbasin B -----
-----Area (Acres) -----
Outwash Forest 15.100
Outwash Grass 10.000
Impervious 5.000

Subbasin Total 30.100

----- Subbasin : On-Site Area -----
-----Area (Acres) -----
Till Grass 1.800
Impervious 8.000

Subbasin Total 9.800

-----**SCENARIO: POSTDEVELOPED**
Number of Subbasins: 3

----- Subbasin : Subbasin A -----
-----Area (Acres) -----
Outwash Forest 13.000
Outwash Grass 9.000
Impervious 4.000

Subbasin Total 26.000

----- Subbasin : Subbasin B -----
-----Area (Acres) -----
Outwash Forest 15.100
Outwash Grass 10.000
Impervious 5.000

Subbasin Total 30.100

----- Subbasin : On-Site Area -----
-----Area (Acres) -----
Till Grass 1.800
Impervious 8.000

Subbasin Total 9.800

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

-----**SCENARIO: PREDEVELOPED**
Number of Links: 1

Link Name: New Channel Lnk1

Link Type: Open Channel

Downstream Link: None

-----Left Overbank

Upper Sideslope (z) : 0.500
Upper Width (ft) : 3.000
Middle Sideslope (z) : 10.000
Middle Width (ft) : 10.000
Mannings n : 0.040

-----Main Channel

Lower Sideslope Left (z) : 0.500
Lower Width Left (ft) : 3.000
Lower Sideslope Right (z) : 0.500
Lower Width Right (ft) : 3.000
Mannings n : 0.024
Base Width (ft) : 10.0
Elevation (ft) : 100.00
Channel Slope (ft/ft) : 0.020
Channel Length (ft) : 1000.0

-----Right Overbank

Upper Sideslope (z) : 0.500
Upper Width (ft) : 3.000
Middle Sideslope (z) : 10.000
Middle Width (ft) : 10.000
Mannings n : 0.040

Massmann Infiltration Option Used

Hydraulic Conductivity (in/hr) : 0.0

Depth to Water Table (ft) : 100.0

Bio-Fouling Potential : Low

Maintenance : Average or Better

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

-----SCENARIO: POSTDEVELOPED

Number of Links: 1

Link Name: New Channel Lnk1

Link Type: Open Channel

Downstream Link: None

-----Left Overbank

Upper Sideslope (z) : 0.500
Upper Width (ft) : 3.000
Middle Sideslope (z) : 10.000
Middle Width (ft) : 10.000
Mannings n : 0.040

-----Main Channel

Lower Sideslope Left (z) : 0.500
 Lower Width Left (ft) : 3.000
 Lower Sideslope Right (z) : 0.500
 Lower Width Right (ft) : 3.000
 Mannings n : 0.024
 Base Width (ft) : 10.0
 Elevation (ft) : 100.00
 Channel Slope (ft/ft) : 0.020
 Channel Length (ft) : 1000.0

-----Right Overbank
 Upper Sideslope (z) : 0.500
 Upper Width (ft) : 3.000
 Middle Sideslope (z) : 10.000
 Middle Width (ft) : 10.000
 Mannings n : 0.040

Massmann Infiltration Option Used
 Hydraulic Conductivity (in/hr) : 0.0
 Depth to Water Table (ft) : 100.0
 Bio-Fouling Potential : Low
 Maintenance : Average or Better

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

-----SCENARIO: PREDEVELOPED

Number of Subbasins: 3
 Number of Links: 1

-----SCENARIO: POSTDEVELOPED

Number of Subbasins: 3
 Number of Links: 1

*****Groundwater Recharge Summary*****

Recharge is computed as input to PerInd Groundwater Plus Infiltration in Structures

Total Predeveloped Recharge During Simulation	
Model Element	Recharge Amount (ac-ft)
Subbasin: Subbasin A	8713.084
Subbasin: Subbasin B	9922.893
Subbasin: On-Site Area	240.883
Link: New Channel Lnk1	0.000
Total:	18876.860

Total Post Developed Recharge During Simulation	
Model Element	Recharge Amount (ac-ft)
Subbasin: Subbasin A	8713.084
Subbasin: Subbasin B	9922.893
Subbasin: On-Site Area	240.883
Link: New Channel Lnk1	0.000

Total: 18876.860

Total Predevelopment Recharge Equals Post Developed

Average Recharge Per Year, (Number of Years= 158)

Predeveloped: 119.474 ac-ft/year, Post Developed: 119.474 ac-ft/year

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

-----SCENARIO: PREDEVELOPED

Number of Links: 1

***** Link: New Channel Lnk1 *****

Infiltration/Filtration Statistics-----

Inflow Volume (ac-ft): 10009.50

Inflow Volume Including PPT-Evap (ac-ft): 10009.50

Total Runoff Infiltrated (ac-ft): 0.00, 0.00%

Total Runoff Filtered (ac-ft): 0.00, 0.00%

Primary Outflow To Downstream System (ac-ft): 10028.61

Secondary Outflow To Downstream System (ac-ft): 0.00

Percent Treated (Infiltrated+Filtered)/Total Volume: 0.00%

-----SCENARIO: POSTDEVELOPED

Number of Links: 1

***** Link: New Channel Lnk1 *****

Infiltration/Filtration Statistics-----

Inflow Volume (ac-ft): 10009.50

Inflow Volume Including PPT-Evap (ac-ft): 10009.50

Total Runoff Infiltrated (ac-ft): 0.00, 0.00%

Total Runoff Filtered (ac-ft): 0.00, 0.00%

Primary Outflow To Downstream System (ac-ft): 10028.61

Secondary Outflow To Downstream System (ac-ft): 0.00

Percent Treated (Infiltrated+Filtered)/Total Volume: 0.00%

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	5.787	2-Year	5.787
5-Year	7.538	5-Year	7.538
10-Year	8.787	10-Year	8.787
25-Year	10.810	25-Year	10.810
50-Year	12.337	50-Year	12.337
100-Year	16.888	100-Year	16.888
200-Year	18.477	200-Year	18.477

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

ATTACHMENT 5

Existing Conditions

HEC-RAS Plan: Existing River: Stream B Reach: Stream B

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Stream B	1155	2 Year	1.77	171.04	171.78	171.31	171.79	0.001599	0.78	2.30	3.96	0.17
Stream B	1155	10 Year	2.87	171.04	171.95	171.39	171.97	0.001801	0.97	3.02	4.33	0.19
Stream B	1155	50 Year	4.31	171.04	172.14	171.49	172.16	0.001973	1.17	3.85	4.64	0.21
Stream B	1155	100 Year	6.45	171.04	172.36	171.62	172.39	0.002204	1.42	4.89	4.97	0.23
Stream B	1155	200 Year	6.87	171.04	172.39	171.64	172.43	0.002244	1.46	5.08	5.03	0.23
Stream B	1076	2 Year	1.77	171.00	171.28	171.28	171.40	0.063611	2.83	0.63	2.52	0.99
Stream B	1076	10 Year	2.87	171.00	171.37	171.37	171.54	0.056515	3.31	0.88	2.72	0.99
Stream B	1076	50 Year	4.31	171.00	171.49	171.49	171.70	0.049995	3.74	1.19	2.94	0.97
Stream B	1076	100 Year	6.45	171.00	171.63	171.62	171.90	0.043301	4.19	1.65	3.25	0.95
Stream B	1076	200 Year	6.87	171.00	171.66	171.65	171.93	0.042052	4.25	1.74	3.30	0.94
Stream B	1002	2 Year	1.77	170.34	171.27	170.51	171.27	0.000123	0.27	6.68	9.67	0.05
Stream B	1002	10 Year	2.87	170.34	171.38	170.57	171.38	0.000205	0.38	7.75	10.10	0.07
Stream B	1002	50 Year	4.31	170.34	171.52	170.63	171.52	0.000276	0.49	9.22	10.66	0.09
Stream B	1002	100 Year	6.45	170.34	171.73	170.72	171.73	0.000325	0.60	11.49	11.47	0.10
Stream B	1002	200 Year	6.87	170.34	171.76	170.73	171.77	0.000332	0.62	11.92	11.61	0.10
Stream B	917	2 Year	1.77	171.00	171.16	171.16	171.23	0.067128	2.14	0.83	5.52	0.98
Stream B	917	10 Year	2.87	171.00	171.21	171.21	171.31	0.067646	2.57	1.11	5.66	1.02
Stream B	917	50 Year	4.31	171.00	171.38	171.28	171.44	0.018819	2.06	2.11	5.98	0.60
Stream B	917	100 Year	6.45	171.00	171.59	171.35	171.65	0.009135	1.94	3.42	6.38	0.45
Stream B	917	200 Year	6.87	171.00	171.63	171.37	171.69	0.008374	1.94	3.66	6.45	0.44
Stream B	834	2 Year	1.77	170.00	170.78	170.22	170.79	0.000890	0.61	2.92	4.49	0.13
Stream B	834	10 Year	2.87	170.00	170.98	170.29	170.99	0.001057	0.74	3.86	4.87	0.15
Stream B	834	50 Year	4.31	170.00	171.18	170.39	171.20	0.001078	0.87	5.27	7.30	0.15
Stream B	834	100 Year	6.45	170.00	171.42	170.50	171.43	0.001127	1.03	7.01	7.78	0.16
Stream B	834	200 Year	6.87	170.00	171.46	170.52	171.47	0.001135	1.05	7.33	7.86	0.16
Stream B	756	2 Year	1.77	170.00	170.72	170.18	170.73	0.000607	0.51	3.46	5.48	0.11
Stream B	756	10 Year	2.87	170.00	170.92	170.24	170.92	0.000664	0.64	4.56	5.90	0.12
Stream B	756	50 Year	4.31	170.00	171.12	170.32	171.13	0.000721	0.77	6.09	12.89	0.13
Stream B	756	100 Year	6.45	170.00	171.35	170.41	171.36	0.000701	0.87	9.24	13.85	0.14
Stream B	756	200 Year	6.87	170.00	171.39	170.42	171.40	0.000693	0.88	9.82	13.94	0.14
Stream B	678	2 Year	1.77	170.00	170.40	170.40	170.55	0.067169	3.20	0.56	1.81	1.01
Stream B	678	10 Year	2.87	170.00	170.52	170.52	170.73	0.058084	3.70	0.79	2.05	0.99
Stream B	678	50 Year	4.31	170.00	170.66	170.66	170.92	0.049493	4.13	1.11	2.33	0.96
Stream B	678	100 Year	6.45	170.00	170.84	170.84	171.16	0.043756	4.63	1.55	2.68	0.94
Stream B	678	200 Year	6.87	170.00	170.86	170.86	171.20	0.043913	4.75	1.62	2.73	0.95
Stream B	638		Culvert									
Stream B	598	2 Year	1.77	167.00	170.29	167.71	170.29	0.000008	0.11	17.03	11.58	0.01
Stream B	598	10 Year	2.87	167.00	170.40	167.86	170.40	0.000017	0.16	18.27	11.82	0.02
Stream B	598	50 Year	4.31	167.00	170.52	168.05	170.52	0.000031	0.23	19.75	12.11	0.03
Stream B	598	100 Year	6.45	167.00	170.67	168.19	170.68	0.000054	0.32	21.64	12.47	0.04
Stream B	598	200 Year	6.87	167.00	170.71	168.21	170.72	0.000057	0.33	22.14	12.57	0.04
Stream B	549	2 Year	1.77	168.00	170.29	168.67	170.29	0.000039	0.19	10.07	11.35	0.03
Stream B	549	10 Year	2.87	168.00	170.39	168.82	170.40	0.000076	0.28	11.27	11.56	0.04
Stream B	549	50 Year	4.31	168.00	170.52	169.05	170.52	0.000125	0.39	12.70	11.81	0.06
Stream B	549	100 Year	6.45	168.00	170.67	169.15	170.67	0.000196	0.51	14.51	12.12	0.07
Stream B	549	200 Year	6.87	168.00	170.71	169.16	170.71	0.000204	0.53	14.98	12.20	0.07
Stream B	486	2 Year	1.77	170.00	170.25	170.16	170.28	0.014414	1.35	1.32	5.81	0.49
Stream B	486	10 Year	2.87	170.00	170.34	170.22	170.37	0.013335	1.59	1.83	6.09	0.50
Stream B	486	50 Year	4.31	170.00	170.44	170.28	170.49	0.011756	1.80	2.47	6.43	0.49
Stream B	486	100 Year	6.45	170.00	170.56	170.37	170.63	0.010938	2.06	3.30	6.85	0.49
Stream B	486	200 Year	6.87	170.00	170.60	170.38	170.67	0.009713	2.04	3.57	6.98	0.47
Stream B	443	2 Year	3.14	169.00	169.27	169.22	169.33	0.028658	1.98	1.59	6.41	0.70
Stream B	443	10 Year	5.02	169.00	169.35	169.29	169.44	0.030103	2.42	2.09	6.58	0.75
Stream B	443	50 Year	7.84	169.00	169.44	169.38	169.57	0.032239	2.95	2.69	6.78	0.80
Stream B	443	100 Year	11.87	169.00	169.56	169.50	169.74	0.031295	3.45	3.53	7.04	0.83
Stream B	443	200 Year	12.56	169.00	169.55	169.51	169.76	0.036775	3.70	3.48	7.02	0.89
Stream B	375	2 Year	3.14	166.00	166.43	166.43	166.57	0.059772	3.07	1.02	3.53	1.00
Stream B	375	10 Year	5.02	166.00	166.54	166.54	166.73	0.053586	3.55	1.43	3.92	1.00
Stream B	375	50 Year	7.84	166.00	166.68	166.68	166.93	0.046156	4.04	2.02	4.46	0.98
Stream B	375	100 Year	11.87	166.00	166.83	166.83	167.16	0.045066	4.71	2.72	5.03	1.00
Stream B	375	200 Year	12.56	166.00	166.89	166.89	167.20	0.037682	4.55	3.04	5.64	0.93
Stream B	308	2 Year	5.79	165.00	165.80		165.82	0.001661	0.93	6.22	8.59	0.19
Stream B	308	10 Year	8.79	165.00	165.99		166.01	0.001899	1.12	7.84	8.95	0.21

HEC-RAS Plan: Existing River: Stream B Reach: Stream B (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Stream B	308	50 Year	12.34	165.00	166.16		166.19	0.002053	1.31	9.46	9.76	0.23
Stream B	308	100 Year	16.89	165.00	166.35		166.39	0.002184	1.51	11.41	10.53	0.24
Stream B	308	200 Year	18.48	165.00	166.41		166.45	0.002240	1.58	12.02	10.71	0.24
Stream B	237	2 Year	5.79	165.00	165.41		165.51	0.027924	2.52	2.29	6.01	0.72
Stream B	237	10 Year	8.79	165.00	165.52		165.66	0.029275	3.01	2.92	6.21	0.77
Stream B	237	50 Year	12.34	165.00	165.62		165.81	0.030679	3.50	3.55	6.40	0.81
Stream B	237	100 Year	16.89	165.00	165.72	165.66	165.97	0.032748	4.04	4.24	6.60	0.86
Stream B	237	200 Year	18.48	165.00	165.75	165.70	166.03	0.033606	4.22	4.45	6.67	0.88
Stream B	161	2 Year	5.79	164.00	164.40		164.43	0.008419	1.42	4.09	10.67	0.40
Stream B	161	10 Year	8.79	164.00	164.51		164.55	0.008280	1.67	5.29	10.84	0.42
Stream B	161	50 Year	12.34	164.00	164.62		164.68	0.008292	1.91	6.51	11.01	0.43
Stream B	161	100 Year	16.89	164.00	164.75		164.82	0.008043	2.14	7.98	11.21	0.44
Stream B	161	200 Year	18.48	164.00	164.80		164.87	0.007952	2.21	8.47	11.27	0.44
Stream B	109	2 Year	5.79	163.00	163.34	163.34	163.49	0.056815	3.20	1.81	5.79	1.00
Stream B	109	10 Year	8.79	163.00	163.44	163.44	163.65	0.050985	3.66	2.42	5.97	1.00
Stream B	109	50 Year	12.34	163.00	163.55	163.55	163.80	0.046786	4.08	3.07	6.17	0.99
Stream B	109	100 Year	16.89	163.00	163.67	163.67	163.98	0.043642	4.52	3.82	6.39	0.99
Stream B	109	200 Year	18.48	163.00	163.71	163.71	164.04	0.042801	4.66	4.08	6.46	0.99
Stream B	19	2 Year	5.79	160.00	160.27	160.12	160.28	0.005002	0.87	6.67	25.14	0.30
Stream B	19	10 Year	8.79	160.00	160.35	160.16	160.36	0.005002	1.02	8.58	25.29	0.31
Stream B	19	50 Year	12.34	160.00	160.42	160.20	160.45	0.005003	1.17	10.54	25.45	0.32
Stream B	19	100 Year	16.89	160.00	160.51	160.24	160.54	0.005002	1.33	12.75	25.62	0.33
Stream B	19	200 Year	18.48	160.00	160.54	160.26	160.57	0.005002	1.38	13.47	25.68	0.33

Proposed Conditions

HEC-RAS Plan: Flood Haz River: Stream B Reach: Stream B

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Stream B	1155	2 Year	1.77	171.04	171.78	171.31	171.79	0.001571	0.77	2.31	3.96	0.17
Stream B	1155	10 Year	2.87	171.04	171.95	171.39	171.97	0.001800	0.97	3.02	4.33	0.19
Stream B	1155	50 Year	4.31	171.04	172.14	171.49	172.16	0.001972	1.17	3.85	4.64	0.21
Stream B	1155	100 Year	6.45	171.04	172.36	171.62	172.39	0.002190	1.41	4.90	4.97	0.23
Stream B	1155	200 Year	6.87	171.04	172.40	171.64	172.43	0.002223	1.45	5.10	5.03	0.23
Stream B	1076	2 Year	1.77	171.00	171.28	171.28	171.40	0.064487	2.84	0.62	2.52	1.00
Stream B	1076	10 Year	2.87	171.00	171.37	171.37	171.54	0.056540	3.31	0.88	2.72	0.99
Stream B	1076	50 Year	4.31	171.00	171.48	171.48	171.70	0.051256	3.77	1.18	2.94	0.98
Stream B	1076	100 Year	6.45	171.00	171.62	171.62	171.90	0.045859	4.26	1.62	3.22	0.97
Stream B	1076	200 Year	6.87	171.00	171.65	171.65	171.93	0.045300	4.35	1.70	3.27	0.97
Stream B	1002	2 Year	1.77	170.34	171.27	170.51	171.27	0.000121	0.27	6.88	11.05	0.05
Stream B	1002	10 Year	2.87	170.34	171.38	170.57	171.38	0.000199	0.38	8.12	12.01	0.07
Stream B	1002	50 Year	4.31	170.34	171.52	170.64	171.52	0.000265	0.48	9.89	13.27	0.08
Stream B	1002	100 Year	6.45	170.34	171.72	170.72	171.73	0.000303	0.58	12.77	15.09	0.09
Stream B	1002	200 Year	6.87	170.34	171.76	170.73	171.76	0.000308	0.59	13.33	15.42	0.09
Stream B	917	2 Year	1.77	171.00	171.15	171.15	171.23	0.076073	2.23	0.80	5.51	1.03
Stream B	917	10 Year	2.87	171.00	171.21	171.21	171.31	0.065763	2.55	1.12	5.67	1.01
Stream B	917	50 Year	4.31	171.00	171.38	171.27	171.44	0.018775	2.06	2.12	5.98	0.60
Stream B	917	100 Year	6.45	171.00	171.59	171.35	171.65	0.009096	1.94	3.43	6.38	0.45
Stream B	917	200 Year	6.87	171.00	171.63	171.37	171.69	0.008377	1.94	3.66	6.45	0.44
Stream B	834	2 Year	1.77	170.00	170.78	170.22	170.79	0.000894	0.61	2.92	4.49	0.13
Stream B	834	10 Year	2.87	170.00	170.98	170.30	170.99	0.001066	0.75	3.85	4.87	0.15
Stream B	834	50 Year	4.31	170.00	171.19	170.38	171.20	0.001070	0.87	5.28	7.30	0.15
Stream B	834	100 Year	6.45	170.00	171.42	170.49	171.43	0.001122	1.02	7.02	7.78	0.16
Stream B	834	200 Year	6.87	170.00	171.46	170.51	171.47	0.001132	1.05	7.33	7.87	0.16
Stream B	756	2 Year	1.77	170.00	170.72	170.18	170.73	0.000609	0.51	3.46	5.48	0.11
Stream B	756	10 Year	2.87	170.00	170.91	170.24	170.92	0.000670	0.64	4.54	5.89	0.12
Stream B	756	50 Year	4.31	170.00	171.12	170.32	171.13	0.000712	0.76	6.13	13.10	0.13
Stream B	756	100 Year	6.45	170.00	171.35	170.41	171.36	0.000696	0.86	9.27	13.86	0.13
Stream B	756	200 Year	6.87	170.00	171.39	170.43	171.40	0.000691	0.88	9.83	13.94	0.13
Stream B	678	2 Year	1.77	170.00	170.40	170.40	170.55	0.065537	3.17	0.56	1.81	1.00
Stream B	678	10 Year	2.87	170.00	170.52	170.52	170.73	0.057988	3.70	0.79	2.05	0.99
Stream B	678	50 Year	4.31	170.00	170.66	170.66	170.92	0.050981	4.17	1.09	2.32	0.97
Stream B	678	100 Year	6.45	170.00	170.83	170.83	171.16	0.045156	4.68	1.53	2.66	0.95
Stream B	678	200 Year	6.87	170.00	170.86	170.86	171.20	0.044158	4.76	1.61	2.73	0.95
Stream B	638		Culvert									
Stream B	598	2 Year	1.77	167.00	170.22	167.70	170.22	0.000009	0.11	18.35	27.88	0.01
Stream B	598	10 Year	2.87	167.00	170.29	167.85	170.29	0.000020	0.17	20.45	32.25	0.02
Stream B	598	50 Year	4.31	167.00	170.37	168.05	170.37	0.000036	0.23	23.26	37.30	0.03
Stream B	598	100 Year	6.45	167.00	170.46	168.18	170.47	0.000064	0.32	27.11	43.27	0.04
Stream B	598	200 Year	6.87	167.00	170.49	168.20	170.49	0.000069	0.34	28.07	44.64	0.04
Stream B	549	2 Year	1.77	168.00	170.22	168.67	170.22	0.000045	0.20	11.08	28.07	0.03
Stream B	549	10 Year	2.87	168.00	170.28	168.81	170.29	0.000090	0.29	13.18	33.54	0.05
Stream B	549	50 Year	4.31	168.00	170.36	169.06	170.37	0.000150	0.39	16.08	39.85	0.06
Stream B	549	100 Year	6.45	168.00	170.46	169.15	170.46	0.000234	0.51	20.12	47.26	0.07
Stream B	549	200 Year	6.87	168.00	170.48	169.17	170.48	0.000243	0.53	21.15	48.98	0.08
Stream B	486	2 Year	1.77	170.00	170.19	170.13	170.21	0.012743	1.06	2.42	20.20	0.44
Stream B	486	10 Year	2.87	170.00	170.25	170.16	170.27	0.010532	1.16	3.75	24.84	0.42
Stream B	486	50 Year	4.31	170.00	170.32	170.20	170.34	0.008068	1.21	5.68	30.35	0.38
Stream B	486	100 Year	6.45	170.00	170.41	170.25	170.42	0.006489	1.27	8.45	36.82	0.36
Stream B	486	200 Year	6.87	170.00	170.43	170.25	170.44	0.005788	1.24	9.28	38.55	0.34
Stream B	443	2 Year	3.14	169.00	169.27	169.22	169.33	0.028798	1.98	1.59	6.41	0.70
Stream B	443	10 Year	5.02	169.00	169.35	169.29	169.44	0.030122	2.42	2.09	6.58	0.75
Stream B	443	50 Year	7.84	169.00	169.44	169.38	169.57	0.032322	2.95	2.69	6.78	0.81
Stream B	443	100 Year	11.87	169.00	169.56	169.50	169.74	0.031391	3.45	3.53	7.04	0.83
Stream B	443	200 Year	12.56	169.00	169.55	169.52	169.76	0.036750	3.70	3.48	7.02	0.89
Stream B	375	2 Year	3.14	166.00	166.43	166.43	166.57	0.059772	3.07	1.02	3.53	1.00
Stream B	375	10 Year	5.02	166.00	166.54	166.54	166.73	0.053586	3.55	1.43	3.92	1.00
Stream B	375	50 Year	7.84	166.00	166.68	166.68	166.93	0.046156	4.04	2.02	4.46	0.98
Stream B	375	100 Year	11.87	166.00	166.83	166.83	167.16	0.045066	4.71	2.72	5.03	1.00
Stream B	375	200 Year	12.56	166.00	166.89	166.89	167.20	0.037682	4.55	3.04	5.64	0.93
Stream B	308	2 Year	5.79	165.00	165.80	165.28	165.82	0.001661	0.93	6.22	8.59	0.19
Stream B	308	10 Year	8.79	165.00	165.99	165.36	166.01	0.001899	1.12	7.84	8.95	0.21

HEC-RAS Plan: Flood Haz River: Stream B Reach: Stream B (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Stream B	308	50 Year	12.34	165.00	166.16	165.45	166.19	0.002053	1.31	9.46	9.76	0.23
Stream B	308	100 Year	16.89	165.00	166.35	165.55	166.39	0.002184	1.51	11.41	10.53	0.24
Stream B	308	200 Year	18.48	165.00	166.41	165.59	166.45	0.002240	1.58	12.02	10.71	0.24
Stream B	237	2 Year	5.79	165.00	165.41	165.33	165.51	0.027924	2.52	2.29	6.01	0.72
Stream B	237	10 Year	8.79	165.00	165.52	165.44	165.66	0.029275	3.01	2.92	6.21	0.77
Stream B	237	50 Year	12.34	165.00	165.62	165.54	165.81	0.030679	3.50	3.55	6.40	0.81
Stream B	237	100 Year	16.89	165.00	165.72	165.66	165.97	0.032748	4.04	4.24	6.60	0.86
Stream B	237	200 Year	18.48	165.00	165.75	165.70	166.03	0.033606	4.22	4.45	6.67	0.88
Stream B	161	2 Year	5.79	164.00	164.40	164.22	164.43	0.008419	1.42	4.09	10.67	0.40
Stream B	161	10 Year	8.79	164.00	164.51	164.29	164.55	0.008280	1.67	5.29	10.84	0.42
Stream B	161	50 Year	12.34	164.00	164.62	164.36	164.68	0.008292	1.91	6.51	11.01	0.43
Stream B	161	100 Year	16.89	164.00	164.75	164.44	164.82	0.008043	2.14	7.98	11.21	0.44
Stream B	161	200 Year	18.48	164.00	164.80	164.47	164.87	0.007952	2.21	8.47	11.27	0.44
Stream B	109	2 Year	5.79	163.00	163.34	163.34	163.49	0.056815	3.20	1.81	5.79	1.00
Stream B	109	10 Year	8.79	163.00	163.44	163.44	163.65	0.050985	3.66	2.42	5.97	1.00
Stream B	109	50 Year	12.34	163.00	163.55	163.55	163.80	0.046786	4.08	3.07	6.17	0.99
Stream B	109	100 Year	16.89	163.00	163.67	163.67	163.98	0.043642	4.52	3.82	6.39	0.99
Stream B	109	200 Year	18.48	163.00	163.71	163.71	164.04	0.042801	4.66	4.08	6.46	0.99
Stream B	19	2 Year	5.79	160.00	160.27	160.12	160.28	0.005002	0.87	6.67	25.14	0.30
Stream B	19	10 Year	8.79	160.00	160.35	160.16	160.36	0.005002	1.02	8.58	25.29	0.31
Stream B	19	50 Year	12.34	160.00	160.42	160.20	160.45	0.005003	1.17	10.54	25.45	0.32
Stream B	19	100 Year	16.89	160.00	160.51	160.24	160.54	0.005002	1.33	12.75	25.62	0.33
Stream B	19	200 Year	18.48	160.00	160.54	160.26	160.57	0.005002	1.38	13.47	25.68	0.33

ATTACHMENT 6

