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CITY OF MONROE

STORMWATER SITE PLAN

Preliminary Plat of Eaglemont 7

13609 191st Avenue S.E.
Monroe, Washington

City File No. TBD

MainVue WA, LLC
1110 112th Avenue N.E., Suite 202
Bellevue, WA 98004

March 19, 2019

Our Job No. 18537

BARRY J. TALKINGTON
STATE OF WASHINGTON
41423
REGISTERED
PROFESSIONAL ENGINEER
3/19/19

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STORMWATER SITE PLAN

Preliminary Plat of Eaglemont 7

Monroe, Washington

Our Job No. 18537

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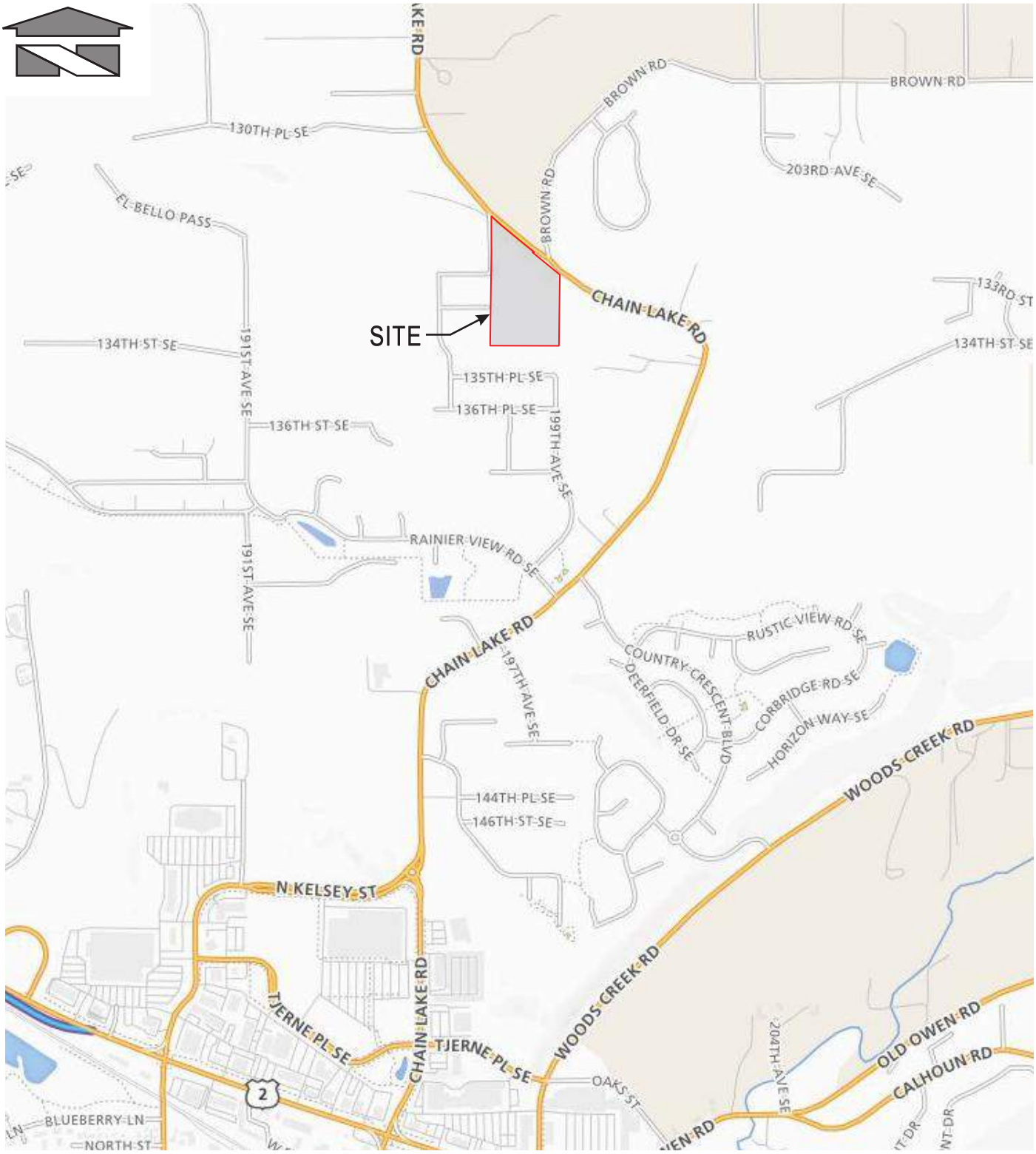
1.0 PROJECT OVERVIEW

The Plat of Eaglemont 7 project is a proposed single-family residential development consisting of 46, all located on an 9.54 acre site. The proposed development is located at 13511 191st Avenue SE and 13107 197th Avenue SE (Stahl property) in the City of Monroe and Snohomish County respectively. The City of Monroe is currently in the process of annexing the Stahl property which currently lies in the urban growth area of the City. The project will clear, grade, and construct roads, utility extensions, features, and eventually single-family residences on the lots. The project is located in the northeast quarter of Section 36, Township 28 North, Range 6 East, Willamette Meridian and occupies Snohomish County Tax Lot No. 28073100202300 and 28073000301300. A Vicinity Map has been included (see Figure – 1.0.1 - located within this section).

The northern property contains a single family residence and the southern is predominantly undeveloped forest land, with an old building foundation location near the center of the site. The site lies within two drainage basins that are delignated by a high point adjacent to 133rd Pl SE on the western property line with the topography falling towards the north along Chain Lake Road drainage ditch and east towards the adjacent property, then towards Chain Lake Road drainage ditch. Surface runoff can generally be expected to follow the existing topography, and discharge overland toward the north and east. The threshold discharge areas do not meet within one-quarter mile of the site requiring two drainage basins. Surface runoff from the developed project site will be collected and conveyed via an underground pipe network into two stormwater drainage facilities, located within Tract A. Water quality treatment will be provided by two Baysaver Bayfilter vaults downstream of each detention facility.

NRCS soil survey identifies the underlying soils as Tokul Gravelly Medial Loam, which is common throughout the region and is generally considered to be a glacially consolidated till. This type of soil is typically characterized as a dense "hardpan" soil, with moderate runoff rates and low permeability. For further reference please refer to the Geotechnical Engineering Report by Earth Solutions NW, LLC dated July 30, 2018, located in Section 7.0 of this report. All onsite drainage calculations were modeled as till soils.

Site drainage designs are based on the 2012 Stormwater Management Manual for Western Washington (2014 SWMMWW), as Amended in December 2014. Please refer to Section 5.5 of this Stormwater Site Plan, for further details regarding the drainage facility design.



REFERENCE: Rand McNally (2018)

Scale: *Horizontal:* ***N.T.S.*** *Vertical:* ***N/A***	*For:* Eaglemont 7 Monroe, Washington	Job Number 18537
BARGHAUSEN CONSULTING ENGINEERS, INC. 18215 72ND AVENUE SOUTH KENT, WA 98032 (425) 251-6222 (425) 251-8782 CIVIL ENGINEERING, LAND PLANNING, SURVEYING, ENVIRONMENTAL SERVICES	*Title:* VICINITY MAP	FIGURE 1.0.1
		DATE: 07/13/18

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Tab 2.0

2.0 CONDITIONS AND REQUIREMENTS SUMMARY

This section contains the following information:

2.1 Analysis of the Minimum Requirements

2.1 Analysis of the Minimum Requirements

Minimum Requirements	How Project Has Addressed Requirement
No. 1: Preparation of Stormwater Site Plans	This Minimum Requirement has been fulfilled by the preparation and completion of this Stormwater Site Plan.
No. 2: Construction Stormwater Pollution Prevention (SWPP)	A completed Construction Stormwater Pollution Prevention Plan (SWPPP) will be submitted separately from, or together with, this report during Final Engineering Review.
No. 3: Source Control of Pollution	The project is not classified as a high-use site, and no hazardous materials requiring source control BMPs are proposed to be stored on-site.
No. 4: Preservation of Natural Drainage Systems and Outfalls	The existing site topography falls moderately to the north and east, surface runoff can generally be expected to follow over existing ground topography, flowing overland and discharging across the northern boundary along Chain Lake Road. Runoff that flows to the east will discharge to the adjacent property, than sheet flows towards Chain Lake Road. The project proposes to collect surface runoff and provide flow control via two hydraulically separate vaults located within Tract A, adjacent to Chain Lake Road. Runoff will discharge from the North Basin to a downstream conveyance system that will be constructed within Chain Lake Road. Runoff will discharge into the existing ditch along Chain Lake Road approximately 610 feet northwest of the vault outfall. Runoff will discharge from the South Basin to a downstream conveyance system that will be constructed within Chain Lake Road right of way. Runoff will discharge into the existing ditch along Chain Lake Road approximately 300 feet southeast of the vault outfall.
No. 5: On-site Stormwater Management	Due to native soil condition, Tokul Gravelly Medial Loam, and the project being constructed on fill, causes the Low Impact Development (LID) requirements become impractical for the site. Therefore the developer has opted to not meet the LID Performance Standard for Flow Control. As a result, this project will be providing the individual lot BMPs. All soil in the lawn and landscaped areas for the site will be amended to meet the post-Construction Soil Quality and Depth requirement. Each individual lot will have a perforated stub-out connection for rooftops.
No. 6: Runoff Treatment	This project proposes the use of a Baysaver Bayfilter to treat the areas tributary to the North Detention Tank and South Detention vault.
No. 7: Flow Control	Flow Control for the North Detention Vault and Tank and South Detention vault is provided by matching developed discharge durations to forested durations for the range of pre-developed discharge rates from 50 percent of the two-year peak flow up to the full 50-year peak flow. As required by the 2014 SWMMWW.
No. 8: Wetlands Protection	There are no documented wetlands recorded for Eaglemont 7.
No. 9: Operation and Maintenance	The drainage facility for this project will be a public facility, owned and maintained by the City. An Operation and Maintenance Manual will be provided in Section 9.0 of this Stormwater Site Plan during Final Engineering Review.

Tab 3.0

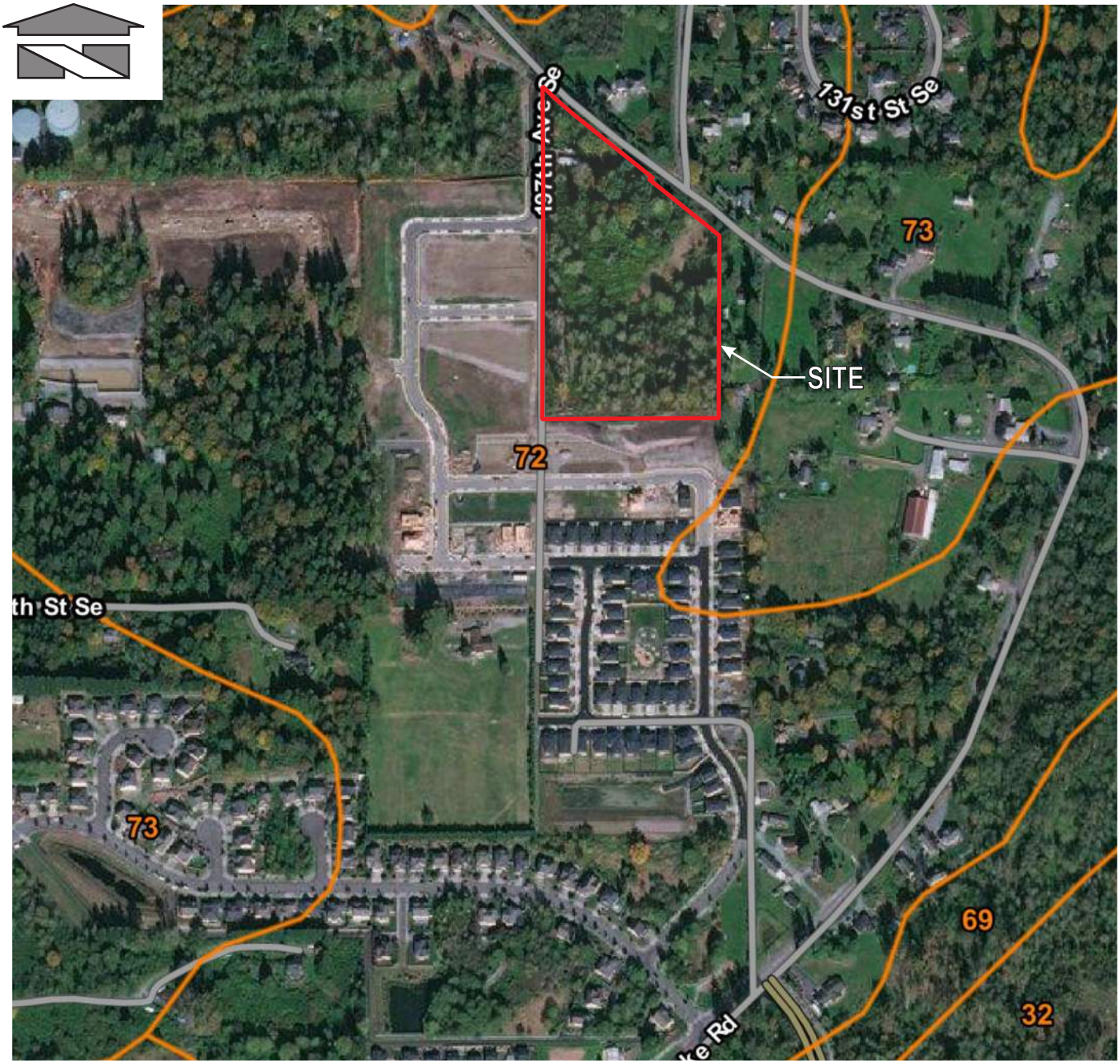
3.0 EXISTING CONDITIONS SUMMARY

The Plat of Eaglemont 7 project is a proposed single family residential development consisting of 46 Lots, all located on an 9.54 acre site. The site contains two tax parcels: 28073100202300 and 28073000301300. An Assessors Map (Figure 3.0.3) has been included within this section of the report for visual reference of the existing on-site parcels. The project is located in the northeast quarter of Section 36, Township 28 North, Range 6 East, Willamette Meridian. The proposed development is located at 13511 191ST Avenue SE and 13107 197th Avenue SE in the City of Monroe and Snohomish county respectively. Please reference the Vicinity Map (Figure 1.0.1), located in Section 1.0 of this report for a visualization of the exact location of the project site.

The site is rectangle in shape with single family homes to the south, west and east. The northern edge of the site is Chain Lake Road. The topography of the property slopes, from 0 to 12 percent, to the north and towards the east. The property is mostly wooded with areas next to Chain Lake Road having tall grass.

The elevations for the site range from 398 to 354 feet. The site slopes to the north and east, towards Chain Lake Road and the adjacent property to the east. On-site soils are mapped as tokul gravelly medial loam, which is common throughout the region and is generally considered to be a glacially consolidated till. This type of soil is typically characterized as a dense 'hardpan' soil, with moderate runoff rates and low permeability. For further information please reference the soil survey map (Figure 3.0.1), located in this section of the report. For a detailed analysis of the on-site soils please reference the Geotechnical Engineering Report by Earth Solutions NW LLC dated July 30, 2018, located in Section 7.0 of this report.

The site is located in Zone X outside of the 500-year floodplain. Please reference the FEMA Map (Figure 3.0.4) located within this section of the report.



REFERENCE: USDA, Natural Resources Conservation Service

LEGEND:
72 = Tokul gravelly medial loam, 0-8% slopes

Scale:
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For:
Eaglemont 7
Monroe, Washington

Title:
SOIL SURVEY MAP

Job Number
18537

FIGURE 3.0.1

DATE: 07/13/18

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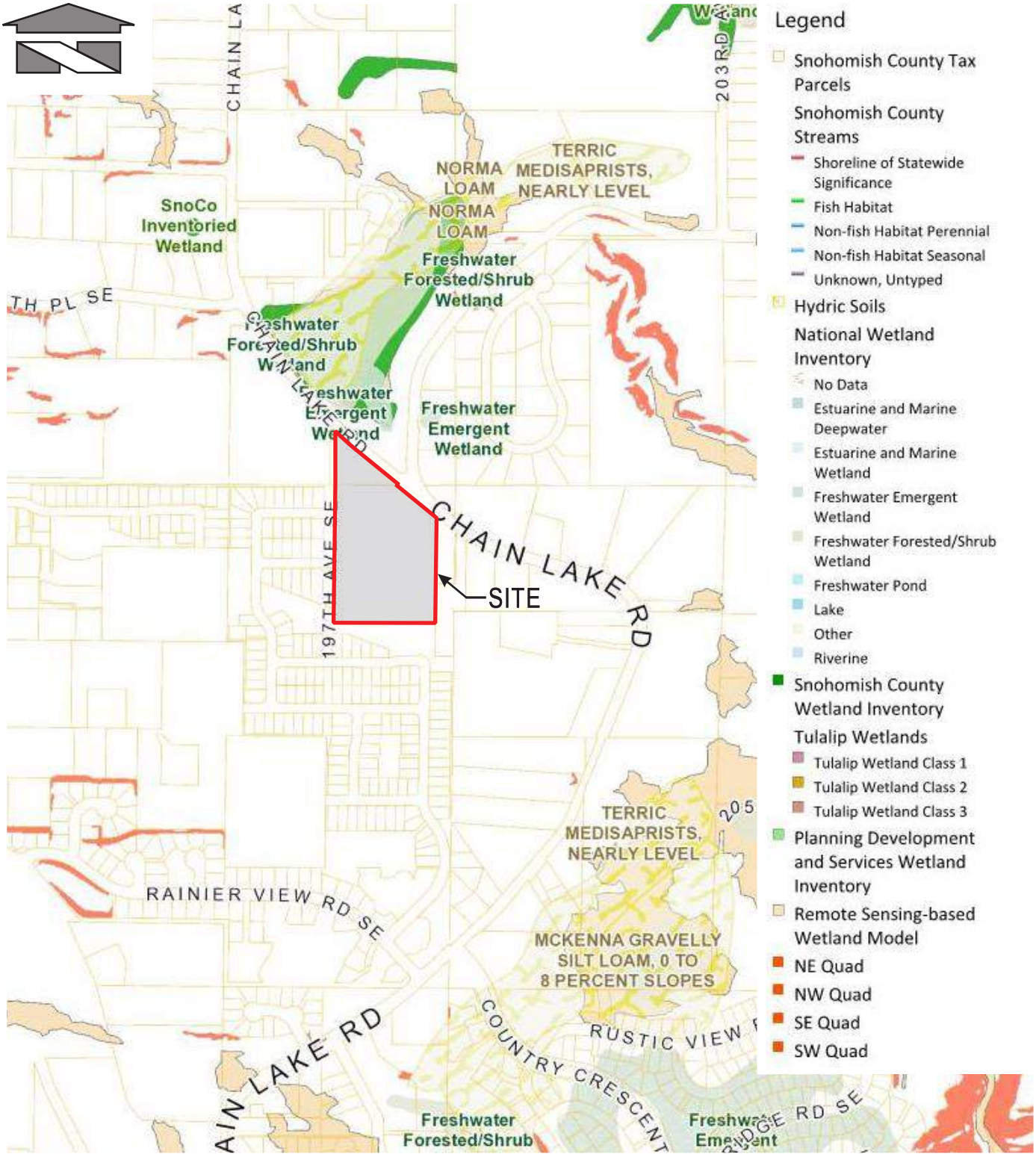

REFERENCE: Snohomish County PDS Map Portal (2018)

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For:
Eaglemont 7
Monroe, Washington

Title:
SENSITIVE AREAS MAP

Job Number
18537

FIGURE 3.0.2

DATE: 07/13/18

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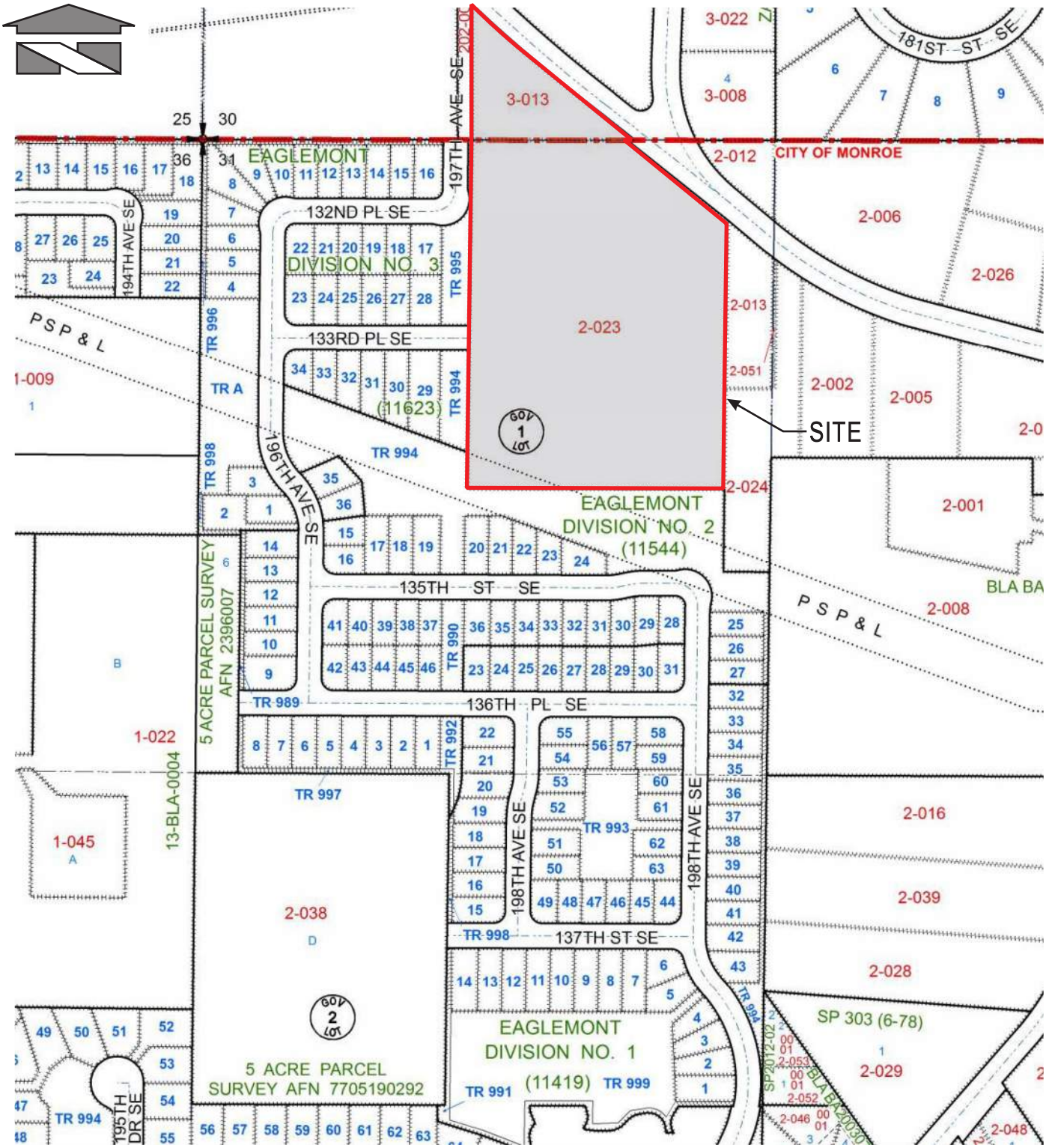

REFERENCE: Snohomish County Department of Assessments (Dec. 2017)

Scale: Horizontal: **N.T.S.** Vertical: **N/A**	*For:* Eaglemont 7 Monroe, Washington	Job Number 18537
BARGHAUSEN CONSULTING ENGINEERS, INC. 18215 72ND AVENUE SOUTH KENT, WA 98032 (425) 251-6222 (425) 251-8782 CIVIL ENGINEERING, LAND PLANNING, SURVEYING, ENVIRONMENTAL SERVICES	*Title:* ASSESSOR MAP	FIGURE 3.0.3
		DATE: 07/13/18

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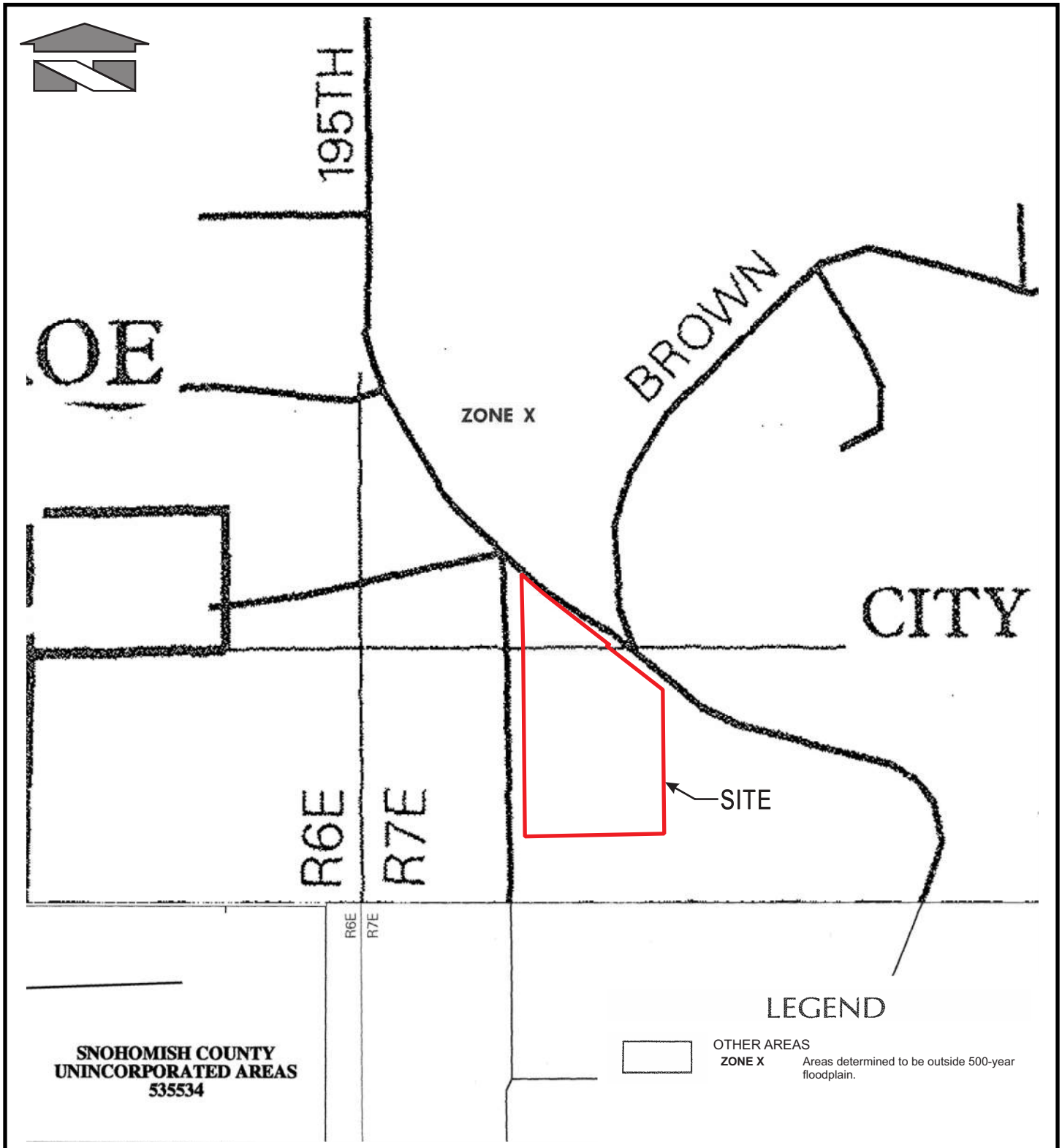

REFERENCE: Federal Emergency Management Agency (Portion of Map 53061C1100 E, Nov. 1999)

Scale: *Horizontal:* ***N.T.S.*** *Vertical:* ***N/A***	*For:* Eaglemont 7 Monroe, Washington	Job Number 18537
BARGHAUSEN CONSULTING ENGINEERS, INC. 18215 72ND AVENUE SOUTH KENT, WA 98032 (425) 251-6222 (425) 251-8782 CIVIL ENGINEERING, LAND PLANNING, SURVEYING, ENVIRONMENTAL SERVICES	*Title:* FEMA MAP	FIGURE 3.0.4
		DATE: 07/13/18

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Tab 4.0

4.0 OFF-SITE ANALYSIS REPORT

The project is subject to the provisions of the City of Monroe design and development standards, as well as the 2014 Stormwater Management Manual for Western Washington, issued by the Washington State Department of Ecology. This report and accompanying plans are intended to satisfy the site plan preparation requirements outlined in the regulatory documents listed above. The DOE Stormwater Manual requires completion of the following four tasks as part of the site plan preparation process:

Task 1: Define and map the study area

The project study area includes the project site itself, as well as a tributary upstream basin, and a downstream flowpath for a distance of one-quarter mile.

Task 2: Review all available information on the study area

- **Critical Drainage Area Map**

The City of Monroe Stream and Wetlands Map indicates an unclassified wetland located in the downstream path of the north drainage basins. See Figure 4.0.4 - City of Monroe Stream and Wetlands Map located this section of the report.

- **Floodplain/Floodway (FEMA) Map**

Referencing Figure 3.0.4 - FEMA Map located in this section of the report shows that the project site and surrounding area are not shown to be within a flood hazard area.

- **Offsite Analysis Reports**

The Snohomish County Drainage inventory was used to identify existing drainage structures/facilities north and south of the site. See Figure 4.0.3 - Snohomish County Drainage inventory Map located in this section of the report.

- **Basin Plans**

The project site drains to the French Creek and Woods Creek watershed both watersheds are non-fish baring do to manmade obstacles. See the French Creek Watershed Management Plan and Woods Creek Watershed Management Plan located in Appendix A in Section 10.0 for more detail.

- **Sensitive Area Information**

The Snohomish county PDS Map Portal indicated no sensitive areas to the south, east and west. There is a freshwater wet land to the north of Chain Lake Road. See Figure 3.0.2 – Sensitive Areas Map located in this section of the report

The National Wetlands Inventory was review and deemed to have no significant wetlands onsite.

- **Drainage Complaints**

City of Monroe drainage complaints indicate high flows and lack of ditch maintenance reported near 13304 Chain Lake Road. The development of Eaglemont 7 will remedy this issue. All other drainage complaints are further than one-quarter mile downstream of Eaglemont 7. See Figure 4.0.5 – City of Monroe Drainage Complaints located in this section of the report..

- **Soils Map**

NRCS soil survey identifies the underlying soils as Tokul Gravelly Medial Loam, which is common throughout the region and is generally considered to be a glacially consolidated till. This type of soil is typically characterized as a dense "hardpan" soil, with moderate runoff rates and low permeability. For further information please see Figure 3.0.1 - Soil Survey Map provided in Section 3.0.

Task 3: Field inspect the study area

A downstream drainage analysis for the site is presented in this section. The site drains into two separate drainage basins to the north and south. The north drainage goes into French Creek watershed and south goes into Woods Creek watershed. Both eventually flow into the Skykomish River. (Figure 4.0.4 – City of Monroe Stream and Wetlands Map). The proposed developed portion of the site represent two threshold discharge areas. The threshold discharge areas do not meet within one-quarter mile of the site requiring two drainage basins.

The north drainage course from the site was assessed on February 2, 2018 with weather conditions moderately cloudy and damp. The south drainage course from the site was assessed on March 20, 2018 with weather conditions being sunny and dry. The downstream conveyance system is described below and illustrated in Figure 4.0.1 – North Downstream Drainage Course and Figure 4.0.2 – South Downstream Drainage Course. Further descriptions of drainage features are summarized in Section 5.2 of this report.

Upstream Drainage Analysis:

The project is bounded to the north by Chain Lake Road and its associated roadside drainage ditch. Existing single family residences border the site to the south, east and west. The general topography of the region slopes in a northern and western direction. Offsite runoff is not expected from Chain Lake to the north since all surface runoff is conveyed by an existing roadside drainage ditch. The neighborhoods bordering the site to the west and south have their own conveyance system and collects any potential offsite runoff. The neighborhood to the east is lower than the property. Please refer to Figure 5.1.1 - Predeveloped Basin Map in Section 5.1 for further detail.

Onsite Drainage

The topography of the front two-thirds property slopes, to north towards Chain Lake Road roadside drainage ditch. The back one-third of the property slopes to the east towards the adjacent property and eventually connecting the south roadside drainage ditch of Chain Lake Road. From an aerial the property seems mostly forested and vegetated with grass and various plants. See photos below for details:

Onsite – Front two-thirds of the property sloping towards Chain Lake Road.

Onsite – Back one-third of the property slopes to the west.

There is no existing drainage system onsite, all runoff is conveyed via a roadside drainage ditch within the right of way of Chain Lake Road to the northwest and southeast.

Downstream Drainage Course

The property contains two downstream basins that are delignated by a high point adjacent to 133rd Place SE on the western property line with the topography falling towards the north along Chain Lake Road drainage ditch and east towards the adjacent property, then towards Chan Lake Road drainage ditch. The threshold discharge areas do not meet within one-quarter mile of the site requiring two drainage basins.

A. North Basin (See Figure 4.0.1 – North Downstream Drainage Course)

A detailed downstream drainage analysis was conducted by Barghausen Consulting Engineers, Inc. on February 2, 2018. The time was around 11:00 AM and conditions were moderately cloudy and damp. Steady rainfall had occurred within the last 24 hours and pooling was observed in the onsite portions of Chain Lake Road roadside drainage dich, upstream of the proposed outfall for the onsite drainage facility.

North Basin - Pooling along Chain Lake Road

North Basin - Inlet of 12-inch PVC culvert #1.

The north basin sheet flows to the north of the property to a roadside drainage ditch along the south side of Chain Lake Road. The ditch line is shallow with vegetation and debris. Runoff then feeds directly into a 60 LF of existing 12-inch PVC storm system bypass, for naming purposes culvert #1, going under 197th Ave SE, with standing water at the inlet. After culvert #1 runoff enters a vegetated/ debris ridden, grassed line ditch for approximately 760 LF. See photos below for details:

North Basin – Outlet of 12-inch concrete culvert #1.

North Basin – 760 LF of ditch line with over grown vegetation.

A portion of Chain Lake Road and Brown Road flows to the north along Brown Road via 42 LF of ditch line where it enters a 30 LF of 12-inch concrete culvert #5 that goes underneath an existing driveway to an additional 80 LF of ditch line. At this point runoff crosses under Brown Road via a 50 LF of 12-inch culvert #5 towards Cripple Creek and an unclassified wetland. Runoff continues toward Cripple Creek for an unknown distance than crosses under Chain Lake Road at the intersection of 130th Place SE via 40 LF of 24-culvert #6. The road crossing was changed at an unknown time and is different than what is reported on Snohomish County Drainage Inventory. See photos below for details:

North Basin - Runoff along Brown Road

North Basin #6 - under Brown Road

At the intersection of Chain Lake Road and 130th Place SE runoff from Brown Road combines with the rest of the site via 40 LF of existing 24-inch culvert #7 within one-quarter mile of the site. Runoff then goes under 130th Pl SE via a 56 LF of existing 30-inch culvert #2 than flows west along the roads north ditch line for 220 LF. See photos below for details:

North Basin – Inlet of existing 24-inch culvert #7 going under Chain Lake RD

North Basin – Inlet of existing 30-inch culvert #2 going under 130th Pl SE

North Basin – Outlet of existing 30-inch culvert#2 going under 130th Pl SE

North Basin – 220 LF of ditch line on the north side of 130th Pl SE

After runoff travels on the north ditch line of 130th Pl SE, runoff goes under 130th Pl SE via an existing 24-inch culvert #3 to the south side of 130th Pl SE for another 220 LF at this point we have reach one-quarter mile downstream of Eaglemont 7 site. See Picture below.

North Basin – Inlet of existing 24-inch culvert#3 going south under 130th Pl SE

North Basin – Outlet of existing 24-inch culvert#3 going south under 130th Pl SE

North Basin – 220 LF of ditch line on the south side of 130th Pl SE

After conducting a thorough downstream investigation of the North Basin, it can be confidently determined, with minor upgrades and maintenance, that the development of this project will not negatively impact the downstream system. The ditch line and the associated crossings show an

ability to convey the storm water runoff from the developed site. Any impacts are further mitigated by the proposed detention facility because the discharges are designed to match developed discharge durations to pre-developed durations for the range of pre-developed discharge rates from 50 percent of the two-year peak flow up to the full 50-year peak flow.

See the drainage design in Section 5.0 of this report for further information on the sizing of the detention facility.

B. South Basin (See Figure 4.0.2 – South Downstream Drainage Course)

A detailed downstream drainage analysis was conducted by Barghausen Consulting Engineers, Inc. on March 20, 2018. The time was around 2:00 PM and conditions were moderately sunny with no signs of recent rainfall.

South Basin – Sheet flow for 450 LF over adjacent property towards the south side of Chain Lake Road.

South Basin – South side of Chain Lake Road ditch line.

The south basin sheet flows to the east of the property to adjacent property which is well vegetated and has no clear path defined, see photos above, eventually reaching the south side of Chain Lake Road. Once reaching Chain Lake Road, runoff enters a 21 LF of existing 12-inch culvert #8 going under an existing driveway. Then outfalls to 160 LF of ditch line to the existing inlet of culvert #9. Culvert #9 has a diameter of 12-inches and run for 43 LF under an existing driveway. Run off continues along the south side of Chain Lake Road going in and out of two additional 12-inch culverts, #10 and #11. See photos below for details:

South Basin – Inlet of existing 12-inch culvert #8.

South Basin – 160 LF of ditch line on the south side of Chain Lake Road.

South Basin – Inlet of existing 12-inch culvert #9.

South Basin – Inlet of existing 12-inch culvert #10.

South Basin – Inlet of existing 12-inch culvert #11.

South Basin – Beginning of 560 LF of ditch line on the south side of Chain Lake Road.

From culvert #11 runoff continues along the south side of Chain Lake Road for approximately 560 LF. The ditch line is overgrown and has debris in places. At this point we have reached one-quart mile downstream from the site.

After conducting a thorough downstream investigation of the South Basin, it can be confidently determined, with minor upgrades and maintenance, that the development of this project will not negatively impact the downstream system. The ditch line and the associated crossings show an ability to convey the storm water runoff from the developed site. Any impacts are further mitigated by the proposed detention facility because the discharges are designed to match developed discharge durations to pre-developed durations for the range of pre-developed discharge rates from 50 percent of the two-year peak flow up to the full 50-year peak flow.

See the drainage design in Section 5.0 of this report for further information on the sizing of the detention facility.

FIG 4.0.2 - SOUTH DOWNSTREAM DRAINAGE COURSE

FOR

PRELIMINARY PLAT OF EAGLEMONT 7 PRD

A PORTION OF NE1/4 OF, SEC. 36, TWP. 28 N., RANGE 06 E., W.M.

CITY OF MONROE, SNOHOMISH COUNTY, WA

1"=150'

0 75 150 300

No.	Date	By	Ckd.	Appr.	Revision

Title: SOUTH DOWNSTREAM DRAINAGE COURSE FOR PRELIMINARY PLAT OF EAGLEMONT 7 PRD

For: MAINVUE WA LLC
1110 112TH AVE NE, SUITE 202
CONTACT: MONA DAVIS
BELLEVUE, WA 98004

PRELIMINARY

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Designed TJS
Drawn TJS
Checked BJT
Approved BJT
Date 1/11/18

Scale: Horizontal 1"=150' Vertical N/A

Job Number 18537

Sheet FIG 4.0.2

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FIG 4.0.1 - NORTH DOWNSTREAM DRAINAGE COURSE

FOR

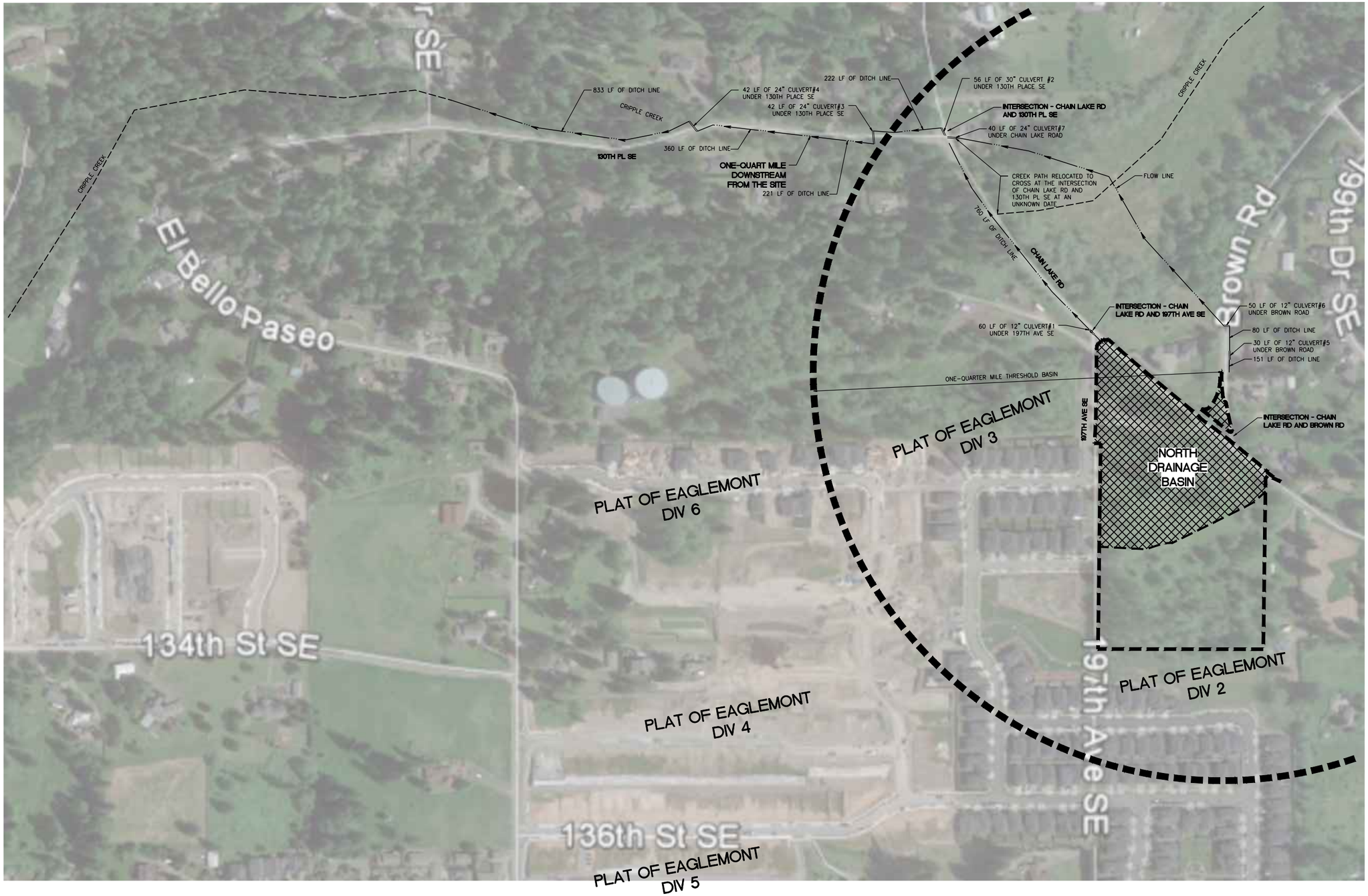
PRELIMINARY PLAT OF EAGLEMONT 7 PRD

A PORTION OF NE1/4 OF, SEC. 36, TWP. 28 N., RANGE 06 E., W.M.

CITY OF MONROE, SNOHOMISH COUNTY, WA

1"=150'

0 75 150 300



No.	Date	By	Ckd.	Appr.	Revision

Title: NORTH DOWNSTREAM DRAINAGE COURSE FOR PRELIMINARY PLAT OF EAGLEMONT 7 PRD

For: MAINVUE WA LLC
1110 112TH AVE NE, SUITE 202
CONTACT: MONA DAVIS
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BARRY J. TALKINGTON STATE OF WASHINGTON 22423 REGISTERED PROFESSIONAL ENGINEER

PRELIMINARY

Scale: Horizontal 1"=150' Vertical N/A

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Drawn TJS
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Approved BJT
Date 1/11/18

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SURVEYING, ENVIRONMENTAL SERVICES

Job Number 18537

Sheet FIG 4.0.1 of

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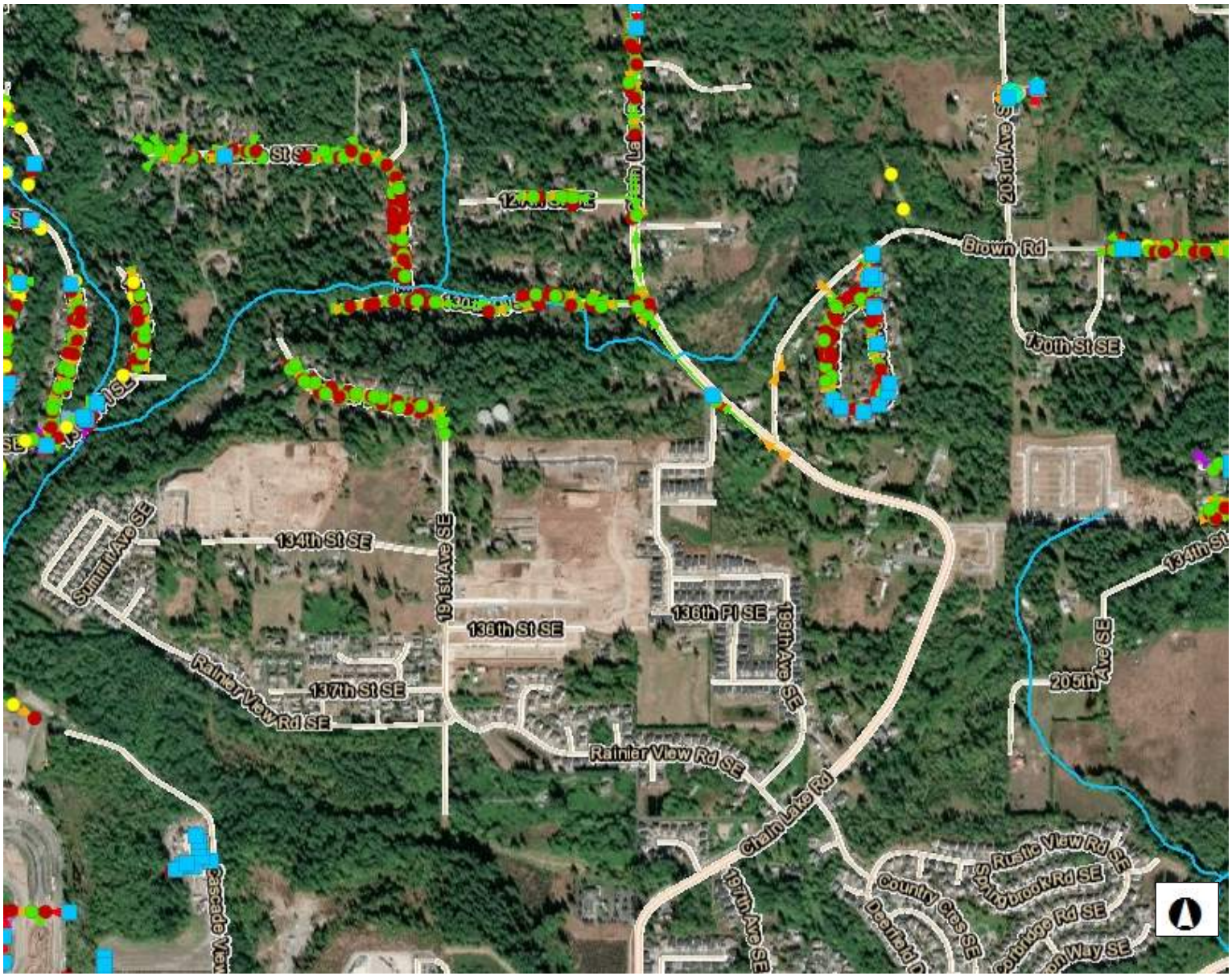
Snohomish County
Public Works

Snohomish County Drainage Inventory Online Mapping Tool

Surface Water Management

7/12/2018



Legend

- Catch Basin
- Media Filter Structure
- Energy Dissipator
- Overflow Control
- Auxiliary Point
  - Pipe In
  - Pipe Out
  - Pipe Invert
  - Other Auxiliary Point
- Culvert
- Enclosed Pipe
- Open Channel
- Other Flow Network
- Facility Access
- Closed Detention
- Permeable Pavement
- Pond
- Water Quality Feature
- Watercourse
- County Boundary

0.6 0 0.28 0.6 Miles

WGS_1984_Web_Mercator_Auxiliary_Sphere
Surface Water Management, Snohomish County Public Works

All maps, data, and information set forth herein ("Data"), are for illustrative purposes only and are not to be considered an official citation to, or representation of, the Snohomish County Code. Amendments and updates to the Data, together with other applicable County Code provisions, may apply which are not depicted herein. Snohomish County makes no representation or warranty concerning the content, accuracy, currency, completeness or quality of the Data contained herein and expressly disclaims any warranty of merchantability or fitness for any particular purpose. All persons accessing or otherwise using this Data assume all responsibility for use thereof and agree to hold Snohomish County harmless from and against any damages, loss, claim or liability arising out of any error, defect or omission contained within said Data. Washington State Law, Ch. 42.56 RCW, prohibits state and local agencies from providing access to lists of individuals intended for use for commercial purposes and, thus, no commercial use may be made of any Data comprising lists of individuals contained herein.

City of Monroe

MONROE
WASHINGTON

Stream & Wetlands

STREAMS

- Type 1
- Type 3
- Type 3u*
- Type 4
- Type 5
- Unclassifed Stream
- # Stream Inventory No.

*Unless determined an artifical waterway

WETLANDS

- Cat I
- Cat II
- Cat III
- Cat IV
- Unclassified Wetlands
- # Wetland Inventory No.

BOUNDARIES

- Urban Growth Area
- Monroe City Limits
- Shoreline Boundary

BUFFERS*

- Combined Critcal Areas Buffers

* Type 4 stream buffer shown as 150 ft on each side of the channel., Type 4 streams, beyond a quarter mile of a stream with salmonids, have a buffer of 75 ft on each side of the channel. See MMC 20.05 for specific buffers.

Notes:

1) The locations decpicted are approximate boundaries for critical areas within the city limits. This maps provides only approximate boundaries of known features and is not a substitute for more detailed maps and/or studies to identify the exact locations of known features or additional critical area features not illustrated on the map.
2) The points where streams change classification are approximate and subject to confirmation and refinement.
3) Classifications are subject to refinement based upon on additional or updated fish use and seasonality of water flow information.

Map data shown is the property of the sources listed below. Inaccuracies may exist, and the City of Monroe implies no warranties or guarantees regarding any aspect of data depiction. This map is not an actual survey of individually noted critical areas. Streams have been categorized using the water typing system defined in Monroe Municipal Code Chapter 20.05 (equivalent to WAC 222-16-031). Wetlands were classified using the Washington Department of Ecology's Washington State Wetland Rating system for Western Washington. Wetland size, shape and location are approximate based on a reconnaissance level evaluation. The City of Monroe and the Urban Growth Area may contain additional critical areas not identified on this map. Therefore this map is to be used for reference purposes only.

Source: City of Monroe GIS, 2008;
The Watershed Company;
Snohomish County GIS, 2007

Project: Streams & Wetlands 11x17
Location: Y:\GIS\Departments\CD\Comprehensive Plan\Comp Plan 2013\For_Commerce
Revised: 10-08-13
Author: M. Sartorius

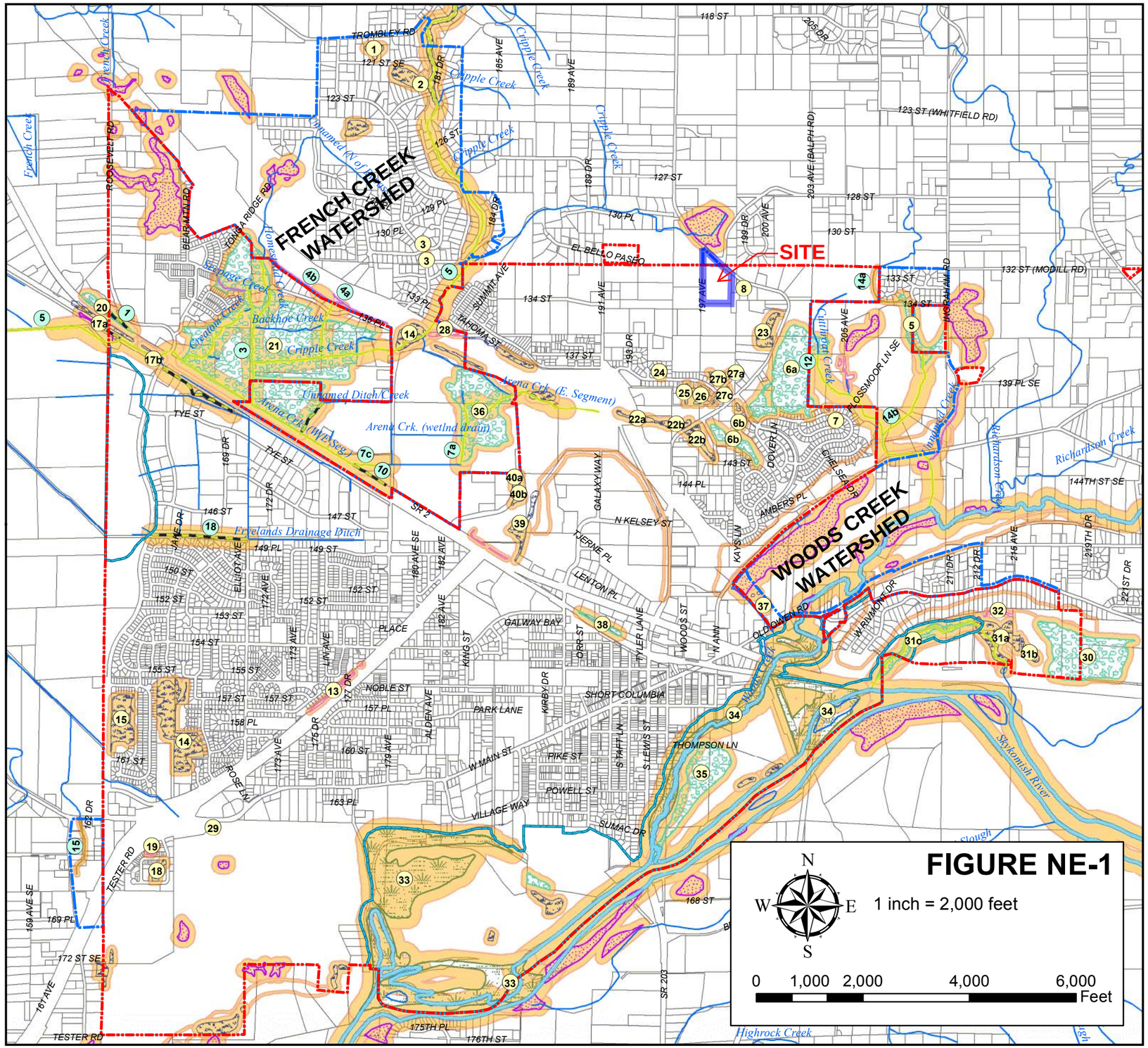


FIGURE NE-1

Trenton Skoda

From: Trenton Skoda
Sent: Monday, July 30, 2018 9:52 AM
To: 'Scott Hawkins'
Subject: RE: Eaglemont 7 - Drainage complaints on CLR

Thanks Scott!

Trent Skoda | Design Engineer
Office: 425-251-6222 x 7314 | Cell: 253-486-7143
Barghausen Consulting Engineers, Inc.
18215 72nd Avenue South, Kent, WA 98032
www.barghausen.com

From: Scott Hawkins <SHawkins@monroewa.gov>
Sent: Monday, July 30, 2018 9:25 AM
To: Trenton Skoda <tskoda@barghausen.com>
Subject: FW: Eaglemont 7 - Drainage complaints on CLR

Hi Trenton.

I had passed your question along to staff in regard to drainage complaints near what is proposed to be Eaglemont 7. I have been out of the office a couple of weeks but am back as of this a.m. The comment below sent from Vince July 18th should give you some of the pertinent information you may have been seeking.

If you have any further questions please let me know. If your questions have already been answered prior then please disregard.

Thanks…

From: Vince Bertrand
Sent: Wednesday, July 18, 2018 10:31 AM
To: Scott Hawkins <SHawkins@monroewa.gov>; Scott Peterson <SPeterson@monroewa.gov>; Ryan Anderson <RAnderson@monroewa.gov>
Cc: Tom Gathmann <TGathmann@monroewa.gov>; Jim Gardner <JGardner@monroewa.gov>; Mark Neumann <MNeumann@monroewa.gov>; Kimmy Klinkers (kimmyklinkers@gmail.com) <kimmyklinkers@gmail.com>; Kim Shaw <KShaw@monroewa.gov>
Subject: RE: Eaglemont 7 - Drainage complaints on CLR

Scott,
Over the years I've had two concerns brought to my attention regarding stormwater in that area. The first was a complaint about erosion and scouring occurring near the address of 13304 Chain Lake Road. There were high flows reported combined with a lack of ditch maintenance. This would be downstream of Gil Marten (from where the "break" is) and the south side of CLR. City crews performed some ditch maintenance in this area.
The second was more recent and could have been associated with the recent Pulte development near 13410 Chain Lake Road. The resident informed the city that the ditch in front of his home appeared to be taking a lot of water and might overflow its banks… The resident was concerned that the fast moving/rushing water might erode the ditch and undermine the stability of the roadway. This situation seemed to resolve itself when the waters receded.

On another note, relating to stormwater, but not flow. This past year the resident living in the mobile at Gil Marten was seen dumping something into the catch basin(s) along 197th Ave SE.
Ryan advised me that the stormwater coming off Eaglemont 7 would most likely flow to the county based on the break and topography. He can meet someone on site if needed. Contact me with questions. Thank you.

Vince Bertrand
CESCL/Stormwater Coordinator
City of Monroe
***P**: 360-863-4552*
***E**: vbertrand@monroewa.gov*

From: Scott Hawkins
Sent: Tuesday, July 17, 2018 12:02 PM
To: Scott Peterson <SPeterson@monroewa.gov>; Ryan Anderson <RAnderson@monroewa.gov>
Cc: Vince Bertrand <VBertrand@monroewa.gov>; Tom Gathmann <TGathmann@monroewa.gov>; Jim Gardner <JGardner@monroewa.gov>; Mark Neumann <MNeumann@monroewa.gov>; Kimmy Klinkers (kimmyklinkers@gmail.com) <kimmyklinkers@gmail.com>; Kim Shaw <KShaw@monroewa.gov>
Subject: FW: Eaglemont 7 - Drainage complaints on CLR

Hi Scott, Ryan and to all.

This maybe most a Ryan or Vince question, but if the below mail chain is read the question is ----- "Has the City received documented citizen complaints" of storm water control or storm water related issues coming from the proposed Eaglemont 7 site? The Eaglemont 7 site would be formally known as the Gil Marten plat. For those folks not aware of the Gil Marten plat it is the property heading in a northwesterly direction, heading up Chain Lake Road and toward the Brown Road, the left hand side of CLR most at the Brown Road intersect---- (what was or still is a permanent single wide mobile home with several satellite trailers, sheds and other stuff).The map address of 13107 and 13202 near 197thish and CLR…. The project will split storm drainage kind of in half some flow down CLR and the other toward the County
Any input will be appreciated from what was described to me being from a design prospective of and for this property.

Let me know and we can forward back to Trenton.

Thanks…….

From: Kim Shaw
Sent: Tuesday, July 17, 2018 11:16 AM
To: Trenton Skoda <tskoda@barghausen.com>
Cc: Barry Talkington <btalkington@barghausen.com>; Bryan Schwartz <bschwartz@barghausen.com>; Scott Hawkins <SHawkins@monroewa.gov>
Subject: RE: Eaglemont 7 - Drainage complaints

HI Trenton,

I am actually not the one to talk to, but I believe the one to address that for you would be Scott Hawkins, Construction Inspector Supervisor and his crew. I have included Scott in this email or you can reach him at (360) 863-4549 as well.

Thanks,
Kim

Kim Shaw, C.P.T

Task 4: Describe the drainage system and its existing and predicted problems

Downstream Drainage Complaints

City of Monroe drainage complaints indicate high flows and lack of ditch maintenance reported near 13304 Chain Lake Road. The development of Eaglemont 7 will remedy this issue. All other drainage complaints are further than one-quarter mile downstream of Eaglemont 7. See Figure 4.0.5 – City of Monroe Drainage Complaints located in this section of the report.

Tab 5.0

5.0 PERMANENT STORMWATER CONTROL PLAN

This section contains the following information:

5.1 Existing Site Hydrology

5.2 Developed Site Hydrology

5.3 Performance Standards and Goals

5.4 Low Impact Development Features

5.5 Flow Control System

5.6 Water Quality System

5.7 Conveyance System Analysis and Design

5.1 Existing Site Hydrology

The project site occupies two drainage basins, approximately 5.35 and 4.65 acres in size. Runoff generally flows north towards Chain Lake Road and east towards an adjacent property. The existing site is mostly unoccupied and undeveloped, except for a building foundation near the center of the project and a single family residence on the northern portion of the property. The breakdown of each existing predeveloped basin is as follows:

- Predeveloped North Basin is 5.35 acres in size and includes the detention vault and tank. North Basin has been modeled as 3.58 acres of moderate slope and 1.77 acres as flat slope with both classified as fully forested.

- Predeveloped South Basin is 4.65 acres in size and includes the detention vault, is made up of the remaining on-site areas; it is to be modeled as 1.16 acres of moderate slope and 3.49 acres as flat slope with both classified as fully forested.

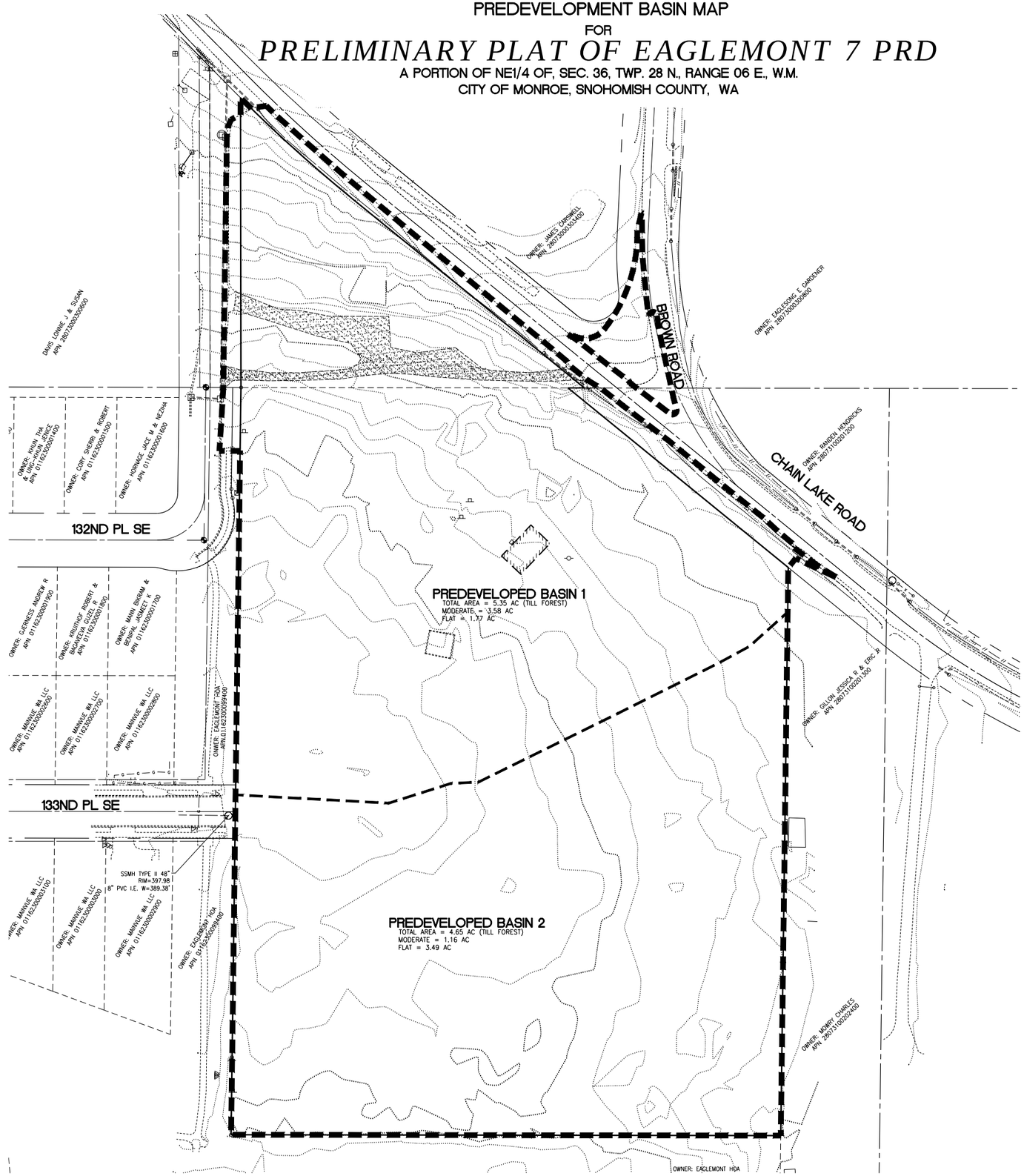
There is no upstream basin flowing on to the site, for further information please reference Figure 5.1.1 - Predeveloped Basin Map, located within Section 5.0.

For a detailed explanation of the procedures used for the sizing of the proposed detention vaults please reference Section 5.5 of this report.

PREDEVELOPMENT BASIN MAP
FOR
PRELIMINARY PLAT OF EAGLEMONT 7 PRD
A PORTION OF NE1/4 OF, SEC. 36, TWP. 28 N., RANGE 06 E., W.M.
CITY OF MONROE, SNOHOMISH COUNTY, WA

1"=50'

0 25 50 100



CALL BEFORE YOU DIG:
1-800-424-5555

No.	Date	By	Ckd.	Appr.	Revision

Title: PREDEVELOPMENT BASIN MAP FOR PRELIMINARY PLAT OF EAGLEMONT 7 PRD

For: MAINVUE WA LLC
1110 112TH AVE NE, SUITE 202
CONTACT: MONA DAVIS
BELLEVUE, WA 98004

PRELIMINARY
BARRY J. TALKINGTON
STATE OF WASHINGTON
423
REGISTERED
PROFESSIONAL ENGINEER

Scale: Horizontal 1"=50' Vertical N/A

Designed TJS
Drawn TJS
Checked BJT
Approved BJT
Date 1/11/18

BARGHAUSEN CONSULTING ENGINEERS, INC.
18215 72ND AVENUE SOUTH
KENT, WA 98032
(425)251-6222
(425)251-8782 FAX
CIVIL ENGINEERING, LAND PLANNING, SURVEYING, ENVIRONMENTAL SERVICES

Job Number 18537
Sheet FIG 5.1.1

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5.2 Developed Site Hydrology

The Plat of Eaglemont 7 will be construct 46 new single-family homes. New impervious surfaces will include sidewalk, driveways, and roof areas. The project will have landscaped pervious areas; open space/park areas, and utilize two drainage facilities.

A conveyance system consisting of catch basins and storm pipes will be constructed in the roadways to collect drainage from impervious surfaces and lots, then routed to one of the two new drainage facilities, located onsite in Tract A, adjacent to Chain Lake Road and Road A.

Water quality for the project will be provided by two Baysaver BayFilter vaults, North Basin and South Basin, immediately downstream of each detention vault. For further information on water quality treatment and sizing, please reference section 5.6 - Runoff Treatment of this report.

Both detention vaults have been sized using WWHM2012 stormwater program. Discharges are designed to match developed discharge durations to predeveloped durations for the range of predeveloped discharge rates from 50 percent of the 2-year peak flow up to the full 50-year peak flow.

A. **North Basin**

The North Basin is divided into two detention systems, a vault and a tank, both has been sized to accommodate over half of the proposed impervious surface from the new roads and lot areas. For the purposes of sizing the vault, we assumed the maximum impervious coverage as follows: newly constructed lot areas were assumed to be 60 percent impervious, new right-of-way area onsite is assumed to be 100 percent impervious, and frontage areas excluding landscape strips. The developed drainage basin tributary to the detention vault (developed Basin A) can be broken down as follows:

Impervious	Pervious	Total Area
2.77 Ac(1)(3)	1.88 Ac(2)(3)(4)	4.55 Ac

Notes:

1. Roads and Sidewalks (100% of ROW) = 1.12 Ac
   Lot Area @ 60% impervious = 1.25 Ac
   Vault = 0.30 Ac
   Treatment Trade Impervious = 0.10 Ac
2. Modeled as till lawn.
3. Frontage (100% excluding landscape strip)
4. Bypass = 0.33 Ac

The developed drainage basin tributary to the detention tank (developed Basin A) can be broken down as follows:

Impervious	Pervious	Total Area
0.56 Ac(1)(3)	0.25 Ac(2)(3)(4)	0.80 Ac

Notes:

1. Roads and Sidewalks (100% of ROW) = 0.32 Ac
   Lot Area @ 60% impervious = 0.16 Ac
   Treatment Trade Impervious = 0.29 Ac
2. Modeled as till lawn.
3. Frontage (100% excluding landscape strip)
4. Treatment Trade = 0.07 Ac

Additionally, there is a part of the anticipated frontage improvements from North Basin that cannot be routed to the proposed facility, due to site constraints. This area is approximately 0.33 acres in size of pervious surface for modeling purposes, all impervious surface will be mitigated through a treatment trade. As a result, portions of the existing asphalt located from the crown of Chain Lake Road to the existing edge of pavement and parts of Brown Road realignment will be collected and conveyed to the on-site detention vault/tank and water quality facility to compensate for the undetailed and treated portion of the proposed off-site frontage improvements. This type of "treatment trade" or "retrofit" which is described in the DOE 2014 Manual I-1.6.2, modifying existing BMPS using best professional judgment to provide reasonable improvements in stormwater management. This is commonly used for frontage and road improvement projects which consist of this type of widening. As a result, the detention and water quality facility will be designed to detain and treat flows from the off-site frontage improvement areas as vertical constraints allow, either in the form of new impervious surfaces where possible, or in the form of "treatment trade" or "retrofit" and as bypass.

The total area tributary to the North Basin detention vault is 5.35 acres, with a total impervious area of 3.33 acres and 2.02 acres of pervious till grass, which includes the onsite developed North Basin, treatment trade and bypass. Please reference Figure 5.2.1 - Developed Basin Map, located within this section for further detail.

The proposed north detention vault and tank provided volumes are 83,230 and 14,800 cubic feet respectively. For further information on the north detention vault design and sizing calculations please refer to Section 5.5 - Flow Control of this report.

B. **South Basin**

The South Basin detention vault has been sized to accommodate the remaining proposed impervious surface from the new roads and lot areas to be constructed as part of Eaglemont 7. Newly constructed lot areas were assumed to be 60 percent impervious, and new right-of-way area is assumed to be 100 percent impervious.

The developed drainage basin tributary to the South Basin detention vault (developed South Basin) can be broken down as follows:

Impervious	Pervious	Total Area
3.18 Ac(1)	1.47 Ac(2)	4.65 Ac

Notes:
1. Roads and Sidewalks (100% of ROW) = 0.83 Ac
   Lot Area @ 60% impervious = 2.07 Ac
   Vault = 0.28 Ac
2. Modeled as till lawn

The total area tributary to the South Basin detention vault is 4.65 acres with a total impervious area of 3.18 acres and 1.47 acres of pervious till grass. Please reference Figure 5.2.1 - Developed Basin Map, located within Section 5.2 for further detail.

The proposed detention vault provides a volume of 78,310 cubic feet. For further information on the South Basin detention vault design and sizing calculations please refer to Section 5.5 - Flow Control of this report.

A detailed report on the procedures used for the sizing of the proposed detention vault is provided in Section 5.4 of this report.

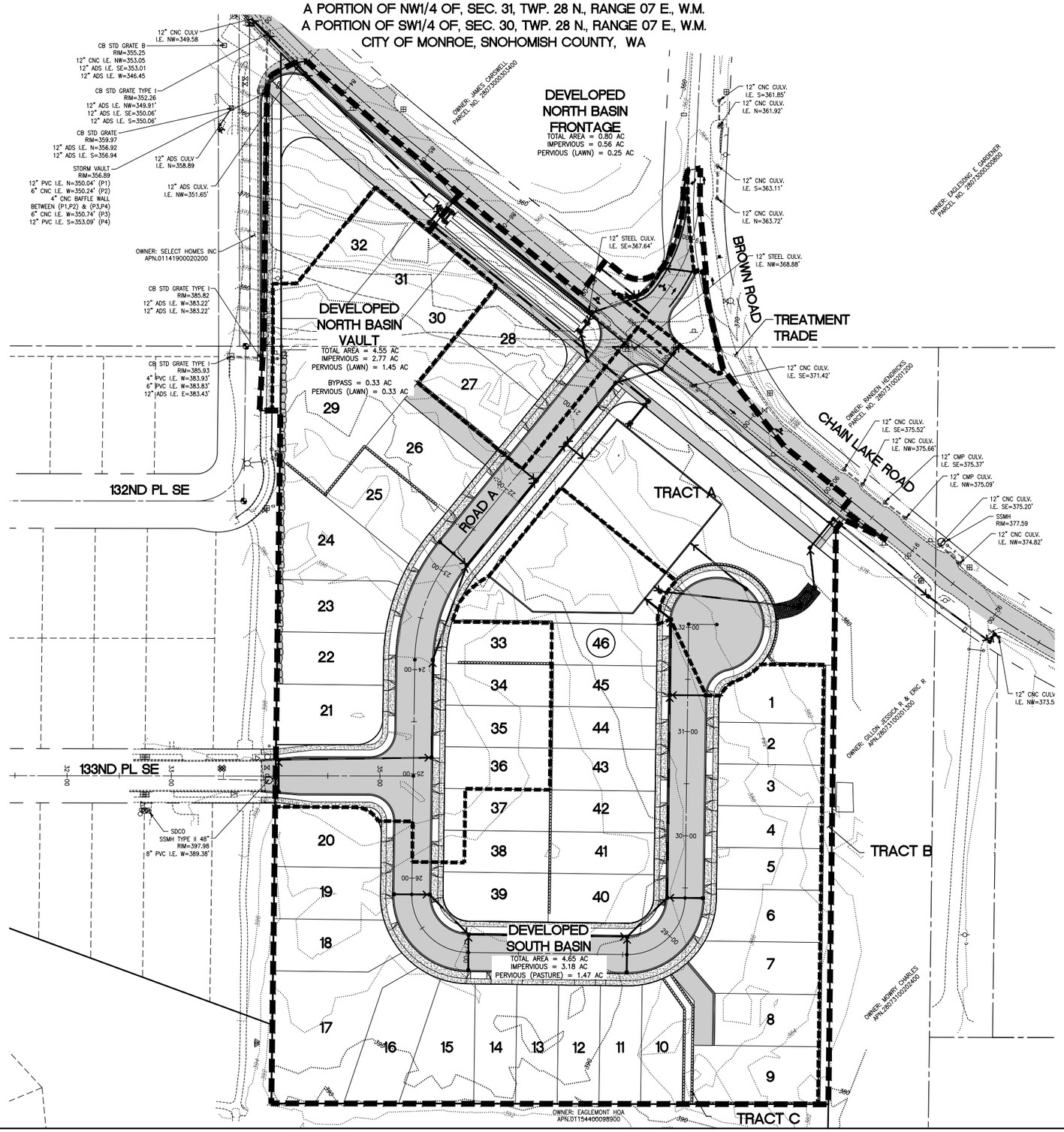
See Section 5.4 Low Impact Development of this report for LID Performance Standard for Flow Control.

DEVELOPED BASIN MAP
FOR
PRELIMINARY PLAT OF EAGLEMONT 7 PRD

A PORTION OF NW1/4 OF, SEC. 31, TWP. 28 N., RANGE 07 E., W.M.
A PORTION OF SW1/4 OF, SEC. 30, TWP. 28 N., RANGE 07 E., W.M.
CITY OF MONROE, SNOHOMISH COUNTY, WA

1"=50'

0 25 50 100



No.	Date	By	Ckd.	Appr.	Revision

Title: DEVELOPED BASIN MAP FOR PRELIMINARY PLAT OF EAGLEMONT 7 PRD

For: MAINVUE WA LLC
1110 112TH AVE NE, SUITE 202
CONTACT: MONA DAVIS
BELLEVUE, WA 98004

BARRY L. TALLINGTON, STATE OF WASHINGTON, 41423, REGISTERED PROFESSIONAL ENGINEER, 1/17/19

Scale: Horizontal 1"=50' Vertical N/A

Designed TJS
Drawn TJS
Checked BJT
Approved BJT
Date 1/17/19

BARGHAUSEN CONSULTING ENGINEERS, INC.
18215 72ND AVENUE SOUTH
KENT, WA 98032
(425)251-6222
(425)251-8782 FAX
CIVIL ENGINEERING, LAND PLANNING, SURVEYING, ENVIRONMENTAL SERVICES

Job Number 18537

Sheet FIG 5.2.1 of

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5.3 Performance Standards and Goals

The project is subject to the provisions of the City of Monroe's design standards and guidelines, as well as the 2012 Stormwater Management Manual for Western Washington (2014 SWMMWW), as Amended in December 2014 , by the Washington State Department of Ecology. This report, along with the accompanying plans, are intended to satisfy the Stormwater Site Plan preparation requirements outlined in the regulatory documents listed above.

Hydrologic modeling was performed using the 2012 Western Washington Hydrology Model hence forth referred to as WWHM2012. WWHM2012 is a locally calibrated continuous simulation model developed by the Washington State Department of Ecology. The model evaluates several decades of hydrologic data to derive peak flow rate and duration information per Figure 5.3.1 Treatment Facility Selection Flow Chart. Please reference, Section 5.5 - Flow Control System, of this report for further information.

Water quality treatment will be provided via two Baysaver BayFilter vaults. Design of this facility will be done by Advanced Drainage Systems, Inc. and will be in compliance with Volume V of the Washington State Department of Ecology regulations. Please reference Section 5.6 – Water Quality System of this report for further information.

This project has opted to use the List #2 per the Flow Chart for Determining LID MR #5 Requirements (Figure 5.3.2), located within this section of the report. In order to meet the requirements for List #2 all individual on-site lots will have the following BMPs on top of the 60% maximum impervious surface coverage per lot. All soil in the lawn and landscaped areas for the site will be amended to meet the post-Construction Soil Quality and Depth requirement. Each individual lot will have a perforated stub-out connection for rooftops and have permeable pavement driveways. For more information on the LID Features for the project please reference Section 5.4 Low Impact Development of this report.

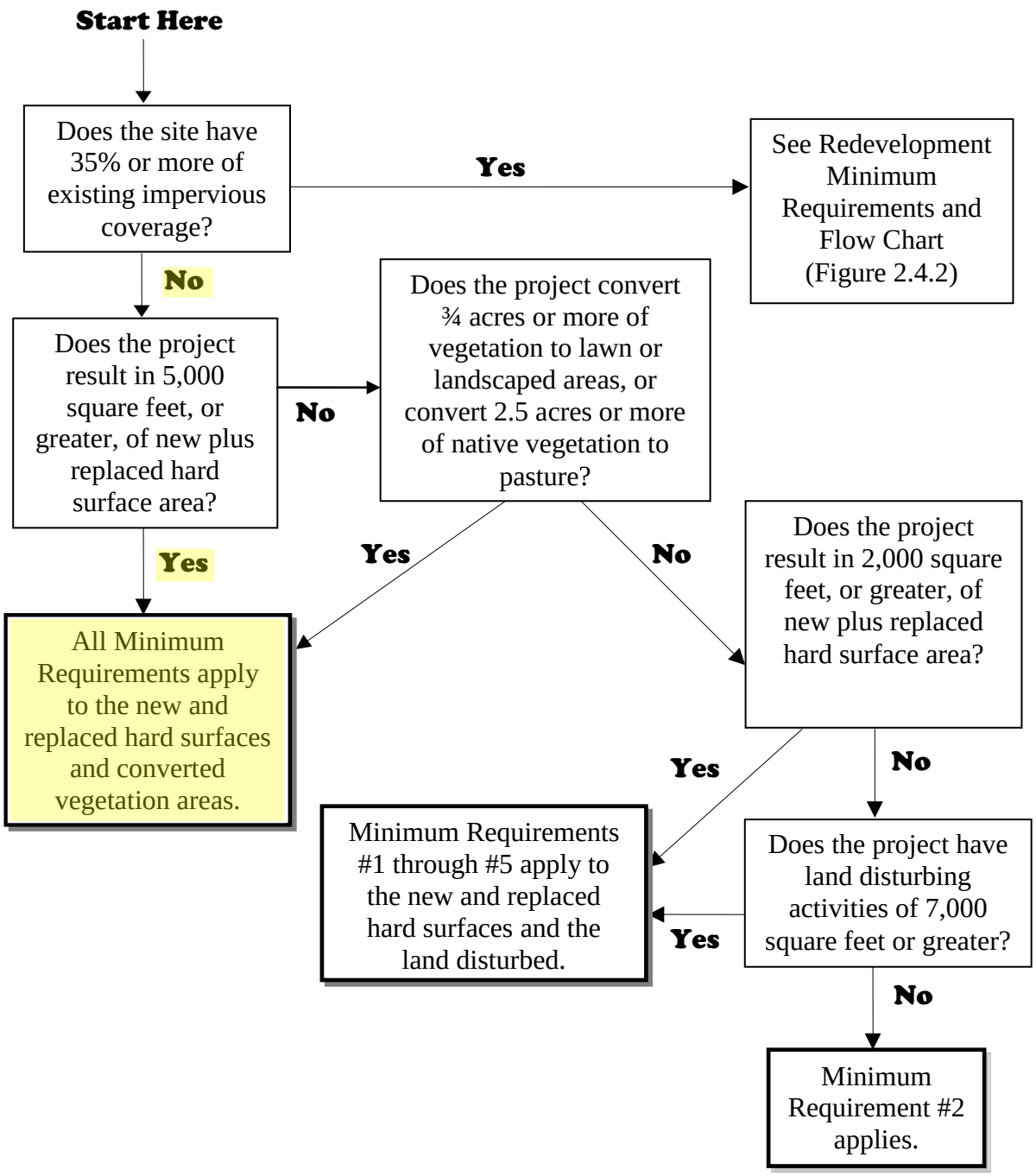
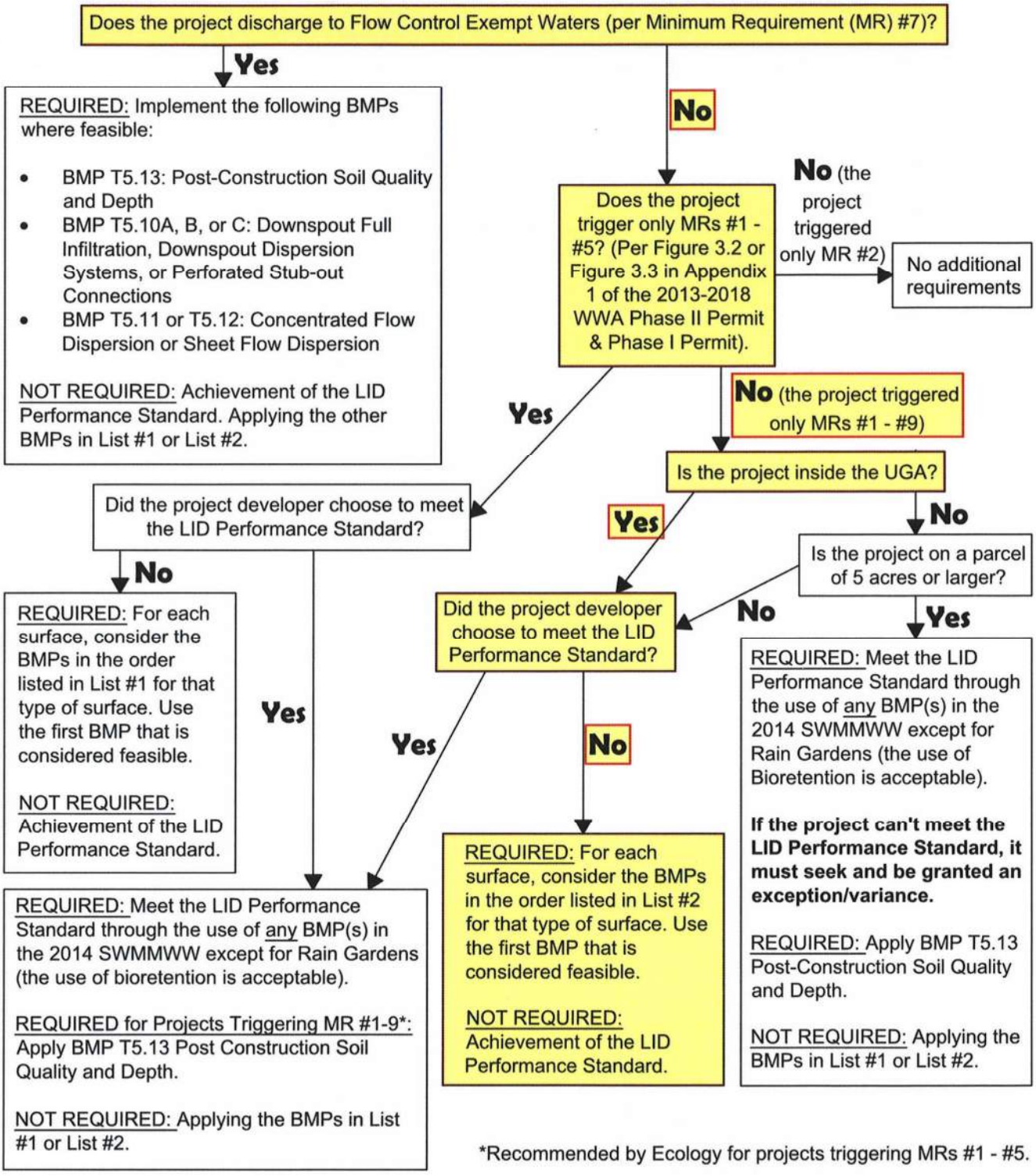


Figure 2.4.1 – Flow Chart for Determining Requirements for New Development



DEPARTMENT OF ECOLOGY
State of Washington

Figure I-2.5.1
Flow Chart for Determining LID MR #5 Requirements

Revised June 2015

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5.4 Low Impact Development Features

Eaglemont 7 is subject to Low Impact Development performance standard requiring the analysis of List #1 and #2 per the 2014 SWMMWW. List #1 requires matching developed discharged 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. List #1 becomes unpractical when developing large residence plats, resulting in drainage facility roughly the same size as the plat. Therefore, Eaglemont 7 has opted to use the List #2 per the Flow Chart for Determining LID Requirements (Figure 5.3.2), located within Section 5.3 of this report. In order to meet the requirements for List #2 all individual on-site lots will have the following BMPs on top of the 60 percent maximum impervious surface coverage per lot. All soil in the lawn and landscaped areas for the site will be amended to meet BMP T5.13 Post-Construction Soil Quality and Depth.

Additionally each individual lot will have a Perforated Stub-Out Connection in compliance with BMP T5.10C, for all rooftop areas. Driveway areas for each lot are to be Permeable Pavement in accordance with BMP T5.15. Due to lot configurations and size, Full Dispersion, Downspout Dispersion Systems for rooftop runoff and Bioretention system are not feasible. Full Infiltration on the individual lot areas is not feasible, due to the mass grading of the site causing large quantities of cut and compacted fill unsuitable for infiltration.

Flow Control for the North and South detention vault is provided by matching developed discharge durations to forested durations for the range of pre-developed discharge rates from 50 percent of the two-year peak flow up to the full 50-year peak flow. As required by the List #2 in the 2014 SWMMWW. For details on the sizing of the North and South Detention vaults please reference Section 5.5 Flow Control System of this report.

WWHM2012

EAGLEMONT 7 - NORTH BASIN
DETENTION VAULT

PROJECT REPORT

General Model Information

Project Name:	18537 - EAGLEMONT 7 - NORTH BASIN
Site Name:	
Site Address:	
City:	
Report Date:	12/7/2018
Gage:	Everett
Data Start:	1948/10/01
Data End:	2009/09/30
Timestep:	15 Minute
Precip Scale:	1.200
Version Date:	2018/03/02
Version:	4.2.14

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

North Basin

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Flat	1.51
C, Forest, Mod	3.06
Pervious Total	4.57
Impervious Land Use	acre
Impervious Total	0
Basin Total	4.57

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

EAGLEMONT 7 - NORTH BASIN - DETENTION VAULT

North Basin

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Lawn, Flat	1.47
Pervious Total	1.47
Impervious Land Use	acre
ROADS FLAT	2.77
Impervious Total	2.77
Basin Total	4.24

Element Flows To:

Surface	Interflow	Groundwater
North Vault	North Vault	

BYPASS

Bypass:	Yes
GroundWater:	No
Pervious Land Use	acre
C, Lawn, Flat	0.33
Pervious Total	0.33
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.33

Element Flows To:

Surface	Interflow	Groundwater

Routing Elements
Predeveloped Routing

Mitigated Routing

EAGLEMONT 7 - NORTH BASIN - DETENTION VAULT

North Vault

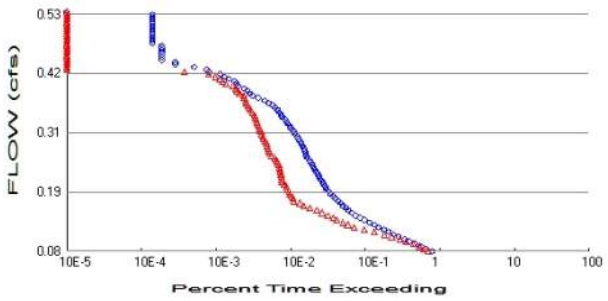
Width:	102 ft.	REQUIRED = 82,232 CF
Length:	102 ft.	(10,404 SF)
Depth:	9 ft.	
Discharge Structure		
Riser Height:	8 ft.	
Riser Diameter:	18 in.	
Orifice 1 Diameter:	1.219 in.	Elevation:0 ft.
Orifice 2 Diameter:	1.031 in.	Elevation:3 ft.
Orifice 3 Diameter:	2.875 in.	Elevation:5.9 ft.
Element Flows To:		
Outlet 1	Outlet 2	

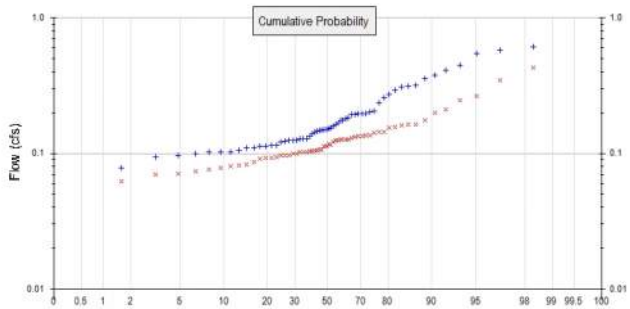
Vault Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.238	0.000	0.000	0.000
0.1000	0.238	0.023	0.012	0.000
0.2000	0.238	0.047	0.018	0.000
0.3000	0.238	0.071	0.022	0.000
0.4000	0.238	0.095	0.025	0.000
0.5000	0.238	0.119	0.028	0.000
0.6000	0.238	0.143	0.031	0.000
0.7000	0.238	0.167	0.033	0.000
0.8000	0.238	0.191	0.036	0.000
0.9000	0.238	0.215	0.038	0.000
1.0000	0.238	0.238	0.040	0.000
1.1000	0.238	0.262	0.042	0.000
1.2000	0.238	0.286	0.044	0.000
1.3000	0.238	0.310	0.046	0.000
1.4000	0.238	0.334	0.047	0.000
1.5000	0.238	0.358	0.049	0.000
1.6000	0.238	0.382	0.051	0.000
1.7000	0.238	0.406	0.052	0.000
1.8000	0.238	0.429	0.054	0.000
1.9000	0.238	0.453	0.055	0.000
2.0000	0.238	0.477	0.057	0.000
2.1000	0.238	0.501	0.058	0.000
2.2000	0.238	0.525	0.059	0.000
2.3000	0.238	0.549	0.061	0.000
2.4000	0.238	0.573	0.062	0.000
2.5000	0.238	0.597	0.063	0.000
2.6000	0.238	0.621	0.065	0.000
2.7000	0.238	0.644	0.066	0.000
2.8000	0.238	0.668	0.067	0.000
2.9000	0.238	0.692	0.068	0.000
3.0000	0.238	0.716	0.069	0.000
3.1000	0.238	0.740	0.080	0.000
3.2000	0.238	0.764	0.085	0.000
3.3000	0.238	0.788	0.089	0.000
3.4000	0.238	0.812	0.092	0.000
3.5000	0.238	0.836	0.095	0.000
3.6000	0.238	0.859	0.098	0.000
3.7000	0.238	0.883	0.101	0.000

3.8000	0.238	0.907	0.104	0.000
3.9000	0.238	0.931	0.107	0.000
4.0000	0.238	0.955	0.109	0.000
4.1000	0.238	0.979	0.111	0.000
4.2000	0.238	1.003	0.114	0.000
4.3000	0.238	1.027	0.116	0.000
4.4000	0.238	1.050	0.118	0.000
4.5000	0.238	1.074	0.120	0.000
4.6000	0.238	1.098	0.123	0.000
4.7000	0.238	1.122	0.125	0.000
4.8000	0.238	1.146	0.127	0.000
4.9000	0.238	1.170	0.129	0.000
5.0000	0.238	1.194	0.131	0.000
5.1000	0.238	1.218	0.132	0.000
5.2000	0.238	1.242	0.134	0.000
5.3000	0.238	1.265	0.136	0.000
5.4000	0.238	1.289	0.138	0.000
5.5000	0.238	1.313	0.140	0.000
5.6000	0.238	1.337	0.141	0.000
5.7000	0.238	1.361	0.143	0.000
5.8000	0.238	1.385	0.145	0.000
5.9000	0.238	1.409	0.147	0.000
6.0000	0.238	1.433	0.219	0.000
6.1000	0.238	1.456	0.250	0.000
6.2000	0.238	1.480	0.274	0.000
6.3000	0.238	1.504	0.295	0.000
6.4000	0.238	1.528	0.313	0.000
6.5000	0.238	1.552	0.330	0.000
6.6000	0.238	1.576	0.346	0.000
6.7000	0.238	1.600	0.360	0.000
6.8000	0.238	1.624	0.374	0.000
6.9000	0.238	1.648	0.387	0.000
7.0000	0.238	1.671	0.399	0.000
7.1000	0.238	1.695	0.411	0.000
7.2000	0.238	1.719	0.423	0.000
7.3000	0.238	1.743	0.434	0.000
7.4000	0.238	1.767	0.444	0.000
7.5000	0.238	1.791	0.455	0.000
7.6000	0.238	1.815	0.465	0.000
7.7000	0.238	1.839	0.475	0.000
7.8000	0.238	1.863	0.485	0.000
7.9000	0.238	1.886	0.494	0.000
8.0000	0.238	1.910	0.503	0.000
8.1000	0.238	1.934	1.014	0.000
8.2000	0.238	1.958	1.925	0.000
8.3000	0.238	1.982	3.031	0.000
8.4000	0.238	2.006	4.170	0.000
8.5000	0.238	2.030	5.186	0.000
8.6000	0.238	2.054	5.956	0.000
8.7000	0.238	2.077	6.455	0.000
8.8000	0.238	2.101	6.909	0.000
8.9000	0.238	2.125	7.301	0.000
9.0000	0.238	2.149	7.673	0.000
9.1000	0.238	2.173	8.026	0.000
9.2000	0.000	0.000	8.364	0.000

Analysis Results
POC 1





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 4.57
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 1.8
Total Impervious Area: 2.77

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.163725
5 year	0.258344
10 year	0.332882
25 year	0.441313
50 year	0.532923
100 year	0.634237

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.11415
5 year	0.160783
10 year	0.196691
25 year	0.248204
50 year	0.291321
100 year	0.338748

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1949	0.175	0.116
1950	0.180	0.136
1951	0.155	0.080
1952	0.125	0.102
1953	0.102	0.092
1954	0.613	0.161
1955	0.201	0.144
1956	0.176	0.127
1957	0.235	0.145
1958	0.194	0.246

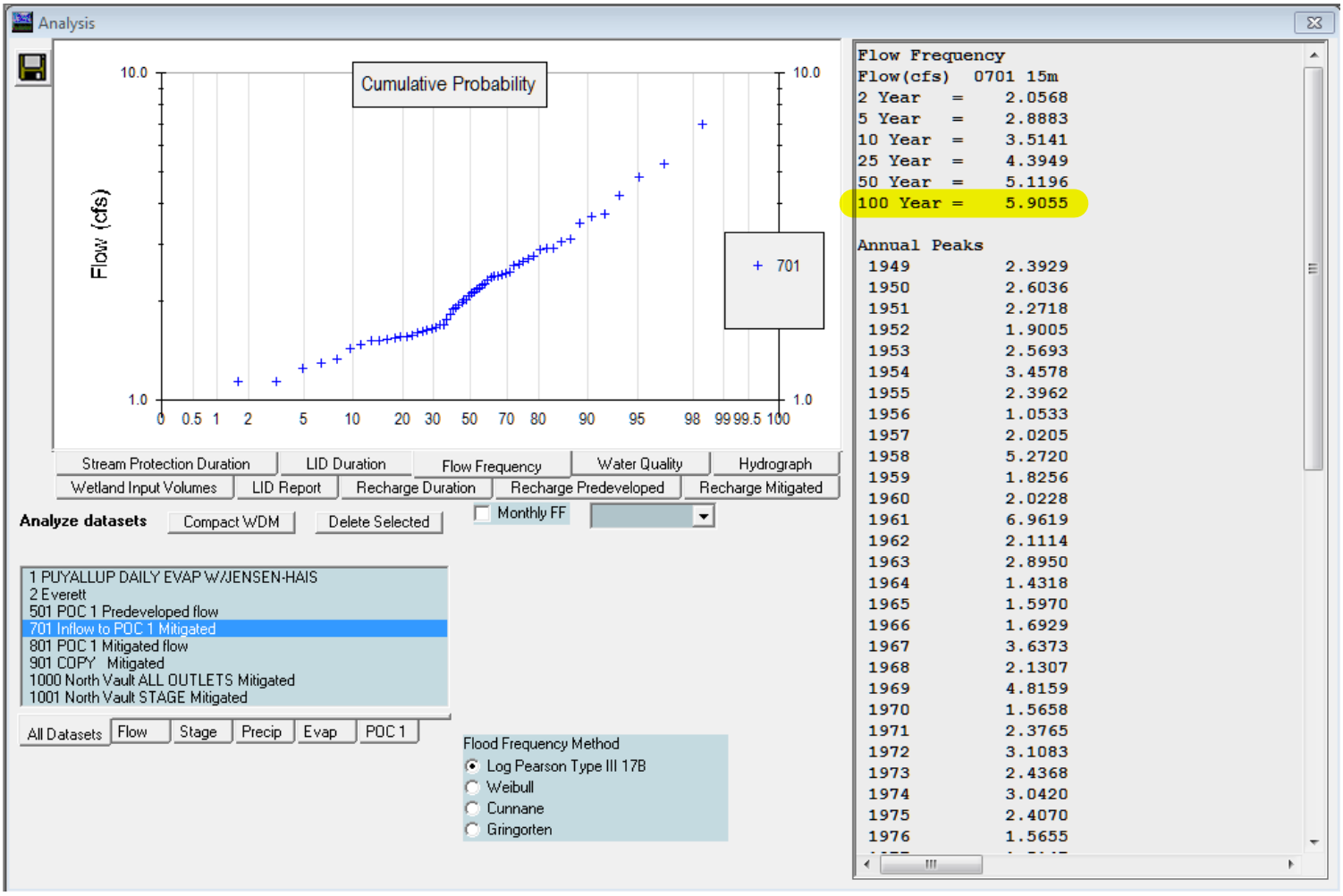
1959	0.163	0.092
1960	0.148	0.100
1961	0.315	0.349
1962	0.153	0.106
1963	0.256	0.156
1964	0.197	0.076
1965	0.133	0.097
1966	0.078	0.070
1967	0.158	0.086
1968	0.193	0.107
1969	0.573	0.264
1970	0.110	0.082
1971	0.197	0.134
1972	0.128	0.164
1973	0.125	0.099
1974	0.316	0.127
1975	0.121	0.104
1976	0.128	0.081
1977	0.097	0.071
1978	0.114	0.074
1979	0.358	0.163
1980	0.168	0.092
1981	0.113	0.077
1982	0.146	0.125
1983	0.290	0.113
1984	0.151	0.141
1985	0.195	0.136
1986	0.444	0.199
1987	0.204	0.154
1988	0.106	0.120
1989	0.125	0.103
1990	0.143	0.116
1991	0.147	0.097
1992	0.112	0.105
1993	0.103	0.062
1994	0.102	0.103
1995	0.150	0.126
1996	0.274	0.125
1997	0.543	0.427
1998	0.094	0.127
1999	0.122	0.107
2000	0.099	0.130
2001	0.037	0.054
2002	0.139	0.112
2003	0.109	0.094
2004	0.184	0.133
2005	0.128	0.096
2006	0.408	0.175
2007	0.307	0.132
2008	0.378	0.211
2009	0.115	0.102

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.6132	0.4269
2	0.5734	0.3486
3	0.5434	0.2644

4	0.4444	0.2464
5	0.4078	0.2112
6	0.3781	0.1994
7	0.3578	0.1754
8	0.3158	0.1639
9	0.3145	0.1630
10	0.3071	0.1612
11	0.2902	0.1563
12	0.2737	0.1537
13	0.2564	0.1445
14	0.2348	0.1439
15	0.2045	0.1409
16	0.2009	0.1356
17	0.1971	0.1356
18	0.1969	0.1342
19	0.1950	0.1331
20	0.1945	0.1318
21	0.1927	0.1304
22	0.1836	0.1273
23	0.1796	0.1272
24	0.1761	0.1265
25	0.1751	0.1261
26	0.1676	0.1250
27	0.1627	0.1246
28	0.1584	0.1205
29	0.1545	0.1165
30	0.1531	0.1155
31	0.1507	0.1128
32	0.1499	0.1125
33	0.1483	0.1067
34	0.1474	0.1067
35	0.1463	0.1057
36	0.1431	0.1049
37	0.1393	0.1044
38	0.1333	0.1033
39	0.1285	0.1028
40	0.1284	0.1025
41	0.1278	0.1025
42	0.1252	0.0999
43	0.1246	0.0993
44	0.1245	0.0967
45	0.1222	0.0965
46	0.1208	0.0963
47	0.1152	0.0942
48	0.1138	0.0924
49	0.1128	0.0923
50	0.1123	0.0917
51	0.1103	0.0862
52	0.1092	0.0822
53	0.1059	0.0808
54	0.1027	0.0803
55	0.1023	0.0775
56	0.1020	0.0760
57	0.0995	0.0740
58	0.0970	0.0710
59	0.0936	0.0696
60	0.0780	0.0624
61	0.0368	0.0535


Analysis
Cumulative Probability
Flow (cfs)
10.0
1.0
0 0.5 1 2 5 10 20 30 50 70 80 90 95 98 99 99.5 100
701
Stream Protection Duration
LID Duration
Flow Frequency
Water Quality
Hydrograph
Wetland Input Volumes
LID Report
Recharge Duration
Recharge Predeveloped
Recharge Mitigated
Analyze datasets
Compact WDM
Delete Selected
Monthly FF
1 PUYALLUP DAILY EVAP WAJENSEN-HAIS
2 Everett
501 POC 1 Predeveloped flow
701 Inflow to POC 1 Mitigated
801 POC 1 Mitigated flow
901 COPY Mitigated
1000 North Vault ALL OUTLETS Mitigated
1001 North Vault STAGE Mitigated
All Datasets
Flow
Stage
Precip
Evap
POC 1
Flood Frequency Method
Log Pearson Type III 17B
Weibull
Cunnane
Gringorten
Flow Frequency
Flow(cfs) 0701 15m
2 Year = 2.0568
5 Year = 2.8883
10 Year = 3.5141
25 Year = 4.3949
50 Year = 5.1196
100 Year = 5.9055
Annual Peaks
1949 2.3929
1950 2.6036
1951 2.2718
1952 1.9005
1953 2.5693
1954 3.4578
1955 2.3962
1956 1.0533
1957 2.0205
1958 5.2720
1959 1.8256
1960 2.0228
1961 6.9619
1962 2.1114
1963 2.8950
1964 1.4318
1965 1.5970
1966 1.6929
1967 3.6373
1968 2.1307
1969 4.8159
1970 1.5658
1971 2.3765
1972 3.1083
1973 2.4368
1974 3.0420
1975 2.4070
1976 1.5655

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0819	16792	14767	87	Pass
0.0864	13988	13079	93	Pass
0.0910	12040	11456	95	Pass
0.0955	9939	9424	94	Pass
0.1001	8260	7488	90	Pass
0.1046	7129	6239	87	Pass
0.1092	5942	4832	81	Pass
0.1138	5148	3854	74	Pass
0.1183	4370	2804	64	Pass
0.1229	3790	2059	54	Pass
0.1274	3210	1517	47	Pass
0.1320	2817	1263	44	Pass
0.1365	2421	1067	44	Pass
0.1411	2063	883	42	Pass
0.1456	1792	793	44	Pass
0.1502	1561	677	43	Pass
0.1548	1423	571	40	Pass
0.1593	1266	481	37	Pass
0.1639	1169	386	33	Pass
0.1684	1064	320	30	Pass
0.1730	1002	286	28	Pass
0.1775	922	235	25	Pass
0.1821	839	228	27	Pass
0.1867	788	218	27	Pass
0.1912	727	208	28	Pass
0.1958	692	204	29	Pass
0.2003	640	195	30	Pass
0.2049	621	187	30	Pass
0.2094	591	175	29	Pass
0.2140	570	165	28	Pass
0.2185	542	162	29	Pass
0.2231	511	160	31	Pass
0.2277	495	159	32	Pass
0.2322	472	155	32	Pass
0.2368	454	155	34	Pass
0.2413	434	152	35	Pass
0.2459	417	148	35	Pass
0.2504	395	142	35	Pass
0.2550	383	138	36	Pass
0.2596	361	131	36	Pass
0.2641	347	117	33	Pass
0.2687	339	111	32	Pass
0.2732	327	108	33	Pass
0.2778	319	106	33	Pass
0.2823	308	103	33	Pass
0.2869	295	101	34	Pass
0.2914	282	97	34	Pass
0.2960	271	92	33	Pass
0.3006	263	90	34	Pass
0.3051	243	87	35	Pass
0.3097	234	85	36	Pass
0.3142	221	82	37	Pass
0.3188	209	80	38	Pass

0.3233	197	78	39	Pass
0.3279	189	76	40	Pass
0.3325	177	73	41	Pass
0.3370	165	71	43	Pass
0.3416	158	70	44	Pass
0.3461	150	65	43	Pass
0.3507	143	62	43	Pass
0.3552	131	59	45	Pass
0.3598	121	57	47	Pass
0.3643	108	54	50	Pass
0.3689	96	53	55	Pass
0.3735	78	51	65	Pass
0.3780	66	50	75	Pass
0.3826	60	44	73	Pass
0.3871	56	41	73	Pass
0.3917	51	39	76	Pass
0.3962	42	36	85	Pass
0.4008	40	29	72	Pass
0.4054	38	26	68	Pass
0.4099	32	24	75	Pass
0.4145	28	21	75	Pass
0.4190	24	17	70	Pass
0.4236	17	8	47	Pass
0.4281	16	0	0	Pass
0.4327	11	0	0	Pass
0.4372	6	0	0	Pass
0.4418	6	0	0	Pass
0.4464	4	0	0	Pass
0.4509	4	0	0	Pass
0.4555	4	0	0	Pass
0.4600	4	0	0	Pass
0.4646	4	0	0	Pass
0.4691	4	0	0	Pass
0.4737	4	0	0	Pass
0.4782	3	0	0	Pass
0.4828	3	0	0	Pass
0.4874	3	0	0	Pass
0.4919	3	0	0	Pass
0.4965	3	0	0	Pass
0.5010	3	0	0	Pass
0.5056	3	0	0	Pass
0.5101	3	0	0	Pass
0.5147	3	0	0	Pass
0.5193	3	0	0	Pass
0.5238	3	0	0	Pass
0.5284	3	0	0	Pass
0.5329	3	0	0	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	0.3801 acre-feet
On-line facility target flow:	0.5172 cfs.
Adjusted for 15 min:	0.5172 cfs.
Off-line facility target flow:	0.2918 cfs.
Adjusted for 15 min:	0.2918 cfs.

LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
North Vault POC	☐	632.66			☐	0.00			
Total Volume Infiltrated		632.66	0.00	0.00		0.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Failed

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

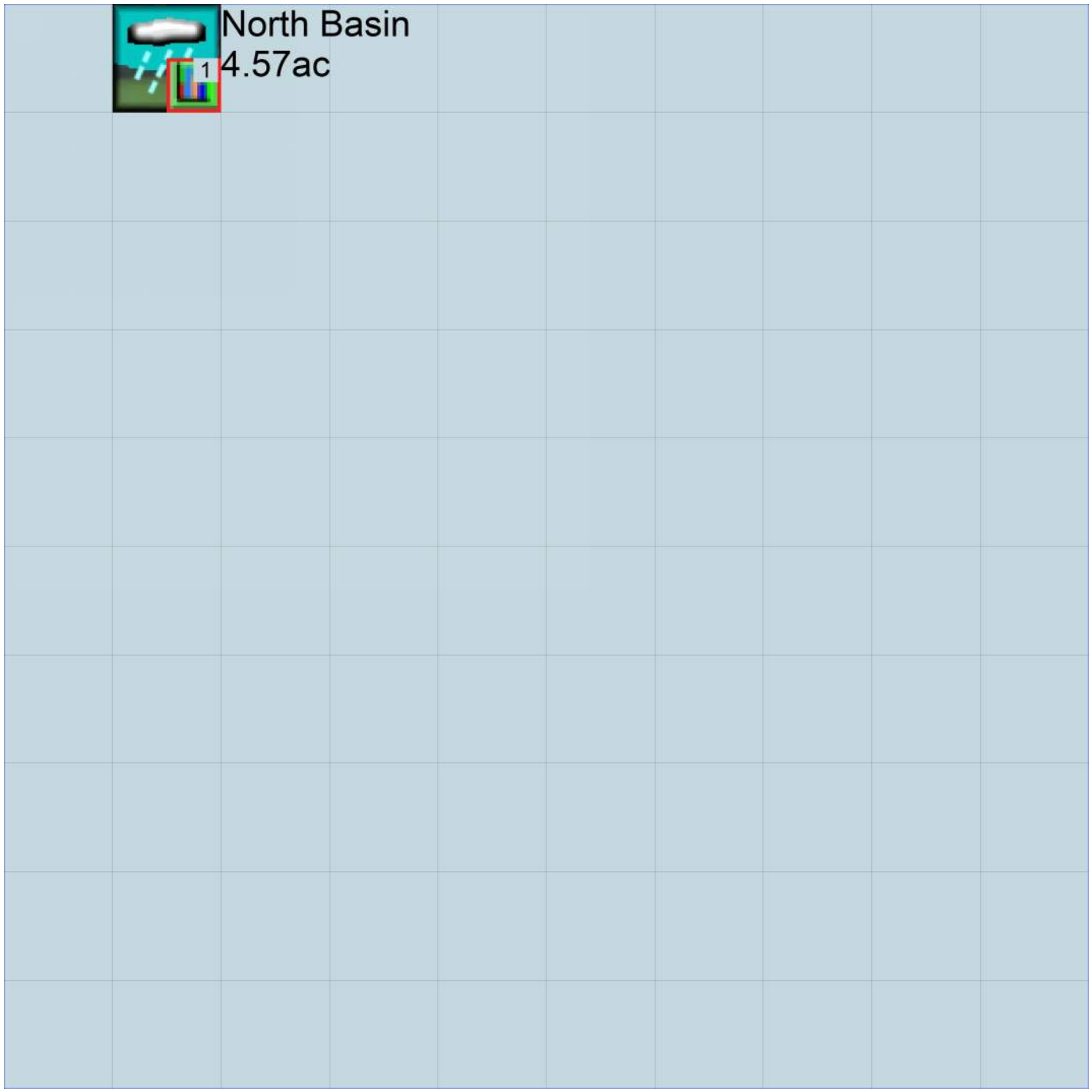
No PERLND changes have been made.

IMPLND Changes

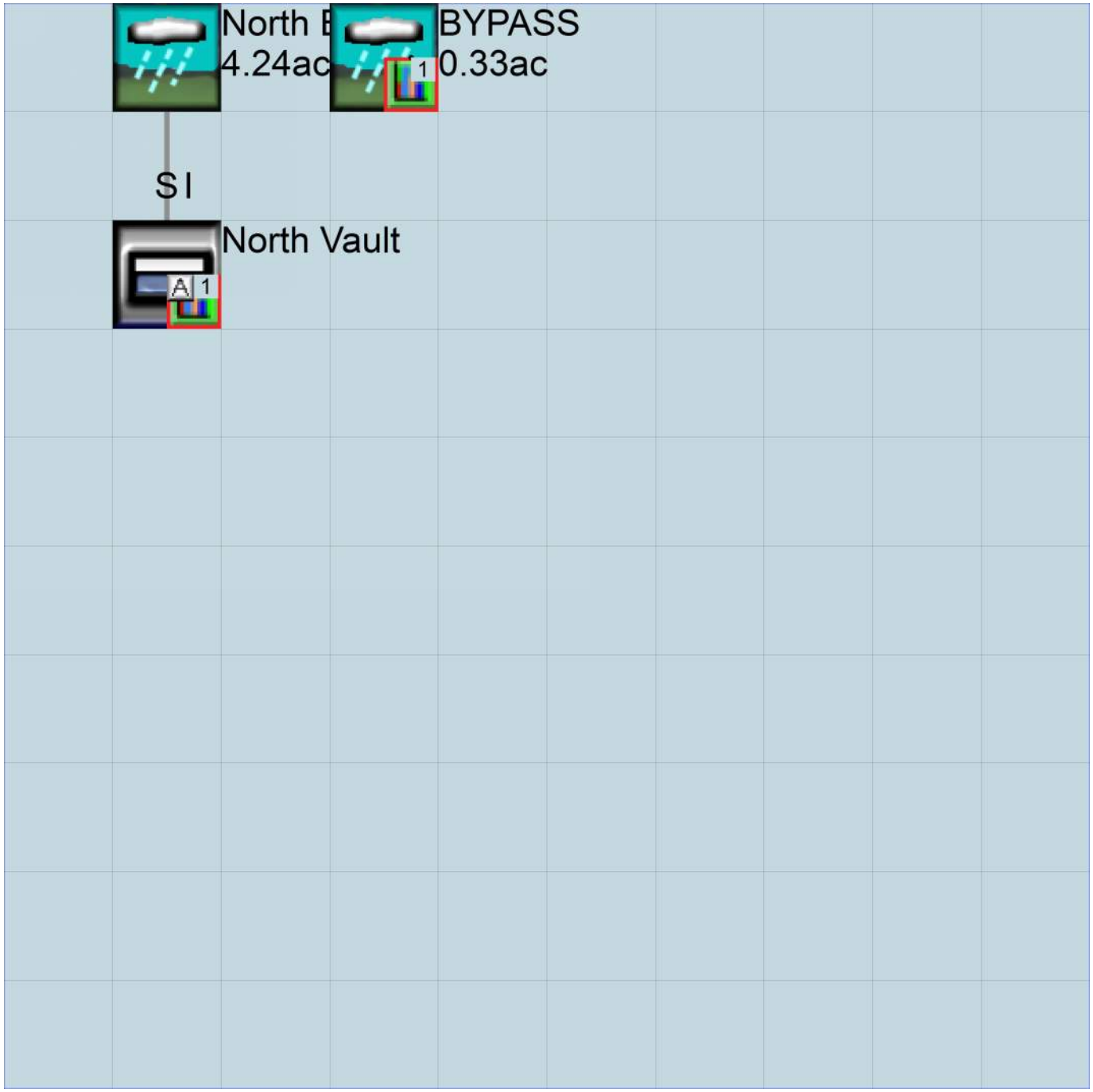
No IMPLND changes have been made.

Appendix

Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

```
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   18537 - EAGLEMONT 7 - NORTH BASIN.wdm
MESSU      25   Pre18537 - EAGLEMONT 7 - NORTH BASIN.MES
           27   Pre18537 - EAGLEMONT 7 - NORTH BASIN.L61
           28   Pre18537 - EAGLEMONT 7 - NORTH BASIN.L62
           30   POC18537 - EAGLEMONT 7 - NORTH BASIN1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      10
      PERLND      11
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        North Basin                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           ***
   10     C, Forest, Flat         1    1    1    1   27    0
   11     C, Forest, Mod          1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   10         0    0    1    0    0    0    0    0    0    0    0    0
   11         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

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

```
  10         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  11         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
  10         0    0    0    0    0    0    0    0    0    0    0
  11         0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
  10              0       4.5      0.08       400      0.05       0.5     0.996
  11              0       4.5      0.08       400       0.1       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
  10              0         0         2         2         0         0         0
  11              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                                  ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
  10            0.2       0.5      0.35         6       0.5       0.7
  11            0.2       0.5      0.35         6       0.5       0.7
  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
  10              0         0         0         0       2.5         1         0
  11              0         0         0         0       2.5         1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
  END GEN-INFO
  *** Section IWATER***

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

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

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

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

  IWAT-PARM3
```

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

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

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
North Basin***
PERLND  10                        1.51     COPY   501     12
PERLND  10                        1.51     COPY   501     13
PERLND  11                        3.06     COPY   501     12
PERLND  11                        3.06     COPY   501     13

******Routing******
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                              ***
  END GEN-INFO
  *** Section RCHRES***

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

  PRINT-INFO
    <PLS > ***************** Print-flags ******************* PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  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
             *  *  *  *    *  *  *  *  *       *  *  *  *  *         ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
  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
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES
```

```
SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
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    1.2            PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1.2            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***
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    501 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13


END MASS-LINK

END RUN
```

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   18537 - EAGLEMONT 7 - NORTH BASIN.wdm
MESSU      25   Mit18537 - EAGLEMONT 7 - NORTH BASIN.MES
           27   Mit18537 - EAGLEMONT 7 - NORTH BASIN.L61
           28   Mit18537 - EAGLEMONT 7 - NORTH BASIN.L62
           30   POC18537 - EAGLEMONT 7 - NORTH BASIN1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      16
      IMPLND       1
      RCHRES       1
      COPY         1
      COPY       501
      COPY       601
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        North Vault                MAX                     1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  601         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           ***
   16     C, Lawn, Flat           1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   16         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
```

```
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   16         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   16         0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   16              0       4.5      0.03       400      0.05       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   16              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                                  ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   16            0.1      0.25      0.25         6       0.5      0.25
  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
   16              0         0         0         0       2.5         1         0
  END PWAT-STATE1

END PERLND

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

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

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    1         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     ***
    1         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    1            400      0.01       0.1       0.1
  END IWAT-PARM2
```

```
  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    1             0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    1             0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
North Basin***
PERLND  16                        1.47     RCHRES   1      2
PERLND  16                        1.47     RCHRES   1      3
IMPLND   1                        2.77     RCHRES   1      5
BYPASS***
PERLND  16                        0.33     COPY   501     12
PERLND  16                        0.33     COPY   601     12
PERLND  16                        0.33     COPY   501     13
PERLND  16                        0.33     COPY   601     13

******Routing******
PERLND  16                        1.47     COPY     1     12
IMPLND   1                        2.77     COPY     1     15
PERLND  16                        1.47     COPY     1     13
RCHRES   1                           1     COPY   501     16
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     North Vault             1    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  0  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      0.02       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  0.0  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    4
     Depth      Area    Volume  Outflow1 Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.238843  0.000000  0.000000
  0.100000  0.238843  0.023884  0.012752
  0.200000  0.238843  0.047769  0.018034
  0.300000  0.238843  0.071653  0.022086
  0.400000  0.238843  0.095537  0.025503
  0.500000  0.238843  0.119421  0.028514
  0.600000  0.238843  0.143306  0.031235
  0.700000  0.238843  0.167190  0.033738
  0.800000  0.238843  0.191074  0.036067
  0.900000  0.238843  0.214959  0.038255
  1.000000  0.238843  0.238843  0.040324
  1.100000  0.238843  0.262727  0.042292
  1.200000  0.238843  0.286612  0.044173
  1.300000  0.238843  0.310496  0.045977
  1.400000  0.238843  0.334380  0.047712
  1.500000  0.238843  0.358264  0.049387
  1.600000  0.238843  0.382149  0.051007
  1.700000  0.238843  0.406033  0.052576
  1.800000  0.238843  0.429917  0.054101
  1.900000  0.238843  0.453802  0.055583
  2.000000  0.238843  0.477686  0.057027
  2.100000  0.238843  0.501570  0.058435
  2.200000  0.238843  0.525455  0.059811
  2.300000  0.238843  0.549339  0.061155
  2.400000  0.238843  0.573223  0.062470
  2.500000  0.238843  0.597107  0.063758
  2.600000  0.238843  0.620992  0.065021
  2.700000  0.238843  0.644876  0.066259
  2.800000  0.238843  0.668760  0.067475
  2.900000  0.238843  0.692645  0.068670
  3.000000  0.238843  0.716529  0.069844
  3.100000  0.238843  0.740413  0.080120
  3.200000  0.238843  0.764298  0.085034
  3.300000  0.238843  0.788182  0.089052
  3.400000  0.238843  0.812066  0.092598
  3.500000  0.238843  0.835950  0.095836
  3.600000  0.238843  0.859835  0.098853
  3.700000  0.238843  0.883719  0.101699
  3.800000  0.238843  0.907603  0.104406
  3.900000  0.238843  0.931488  0.106999
  4.000000  0.238843  0.955372  0.109494
  4.100000  0.238843  0.979256  0.111904
  4.200000  0.238843  1.003140  0.114239
  4.300000  0.238843  1.027025  0.116507
  4.400000  0.238843  1.050909  0.118715
```

```
  4.500000  0.238843  1.074793  0.120869
  4.600000  0.238843  1.098678  0.122973
  4.700000  0.238843  1.122562  0.125031
  4.800000  0.238843  1.146446  0.127046
  4.900000  0.238843  1.170331  0.129022
  5.000000  0.238843  1.194215  0.130961
  5.100000  0.238843  1.218099  0.132866
  5.200000  0.238843  1.241983  0.134738
  5.300000  0.238843  1.265868  0.136580
  5.400000  0.238843  1.289752  0.138392
  5.500000  0.238843  1.313636  0.140177
  5.600000  0.238843  1.337521  0.141936
  5.700000  0.238843  1.361405  0.143671
  5.800000  0.238843  1.385289  0.145381
  5.900000  0.238843  1.409174  0.147069
  6.000000  0.238843  1.433058  0.219666
  6.100000  0.238843  1.456942  0.250692
  6.200000  0.238843  1.480826  0.274862
  6.300000  0.238843  1.504711  0.295475
  6.400000  0.238843  1.528595  0.313807
  6.500000  0.238843  1.552479  0.330516
  6.600000  0.238843  1.576364  0.345990
  6.700000  0.238843  1.600248  0.360484
  6.800000  0.238843  1.624132  0.374175
  6.900000  0.238843  1.648017  0.387191
  7.000000  0.238843  1.671901  0.399629
  7.100000  0.238843  1.695785  0.411566
  7.200000  0.238843  1.719669  0.423061
  7.300000  0.238843  1.743554  0.434164
  7.400000  0.238843  1.767438  0.444914
  7.500000  0.238843  1.791322  0.455346
  7.600000  0.238843  1.815207  0.465488
  7.700000  0.238843  1.839091  0.475364
  7.800000  0.238843  1.862975  0.484996
  7.900000  0.238843  1.886860  0.494403
  8.000000  0.238843  1.910744  0.503600
  8.100000  0.238843  1.934628  1.014779
  8.200000  0.238843  1.958512  1.925884
  8.300000  0.238843  1.982397  3.031330
  8.400000  0.238843  2.006281  4.170756
  8.500000  0.238843  2.030165  5.185982
  8.600000  0.238843  2.054050  5.956302
  8.700000  0.238843  2.077934  6.455671
  8.800000  0.238843  2.101818  6.909572
  8.900000  0.238843  2.125702  7.301871
  9.000000  0.238843  2.149587  7.673222
  9.100000  0.238843  2.173471  8.026690
  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    1.2            PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1.2            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   STAGE  1 1        1      WDM   1001 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
COPY   601 OUTPUT MEAN   1 1     48.4      WDM    901 FLOW     ENGL      REPL
END EXT TARGETS
```

```
MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        2
PERLND     PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    2

  MASS-LINK        3
PERLND     PWATER IFWO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    3

  MASS-LINK        5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    5

  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13

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

  MASS-LINK       16
RCHRES     ROFLOW                          COPY           INPUT  MEAN
  END MASS-LINK   16


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

Disclaimer

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WWHM2012

EAGLEMONT 7 - NORTH BASIN
DETENTION TANK

PROJECT REPORT

General Model Information

Project Name:	18537 - EAGLEMONT 7 - FRONTAGE BASIN
Site Name:	
Site Address:	
City:	
Report Date:	12/7/2018
Gage:	Everett
Data Start:	1948/10/01
Data End:	2009/09/30
Timestep:	15 Minute
Precip Scale:	1.200
Version Date:	2018/03/02
Version:	4.2.14

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

North Basin

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Flat	0.8
Pervious Total	0.8
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.8

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

EAGLEMONT 7 - NORTH BASIN - DETENTION TANK

North Basin

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Lawn, Flat	0.24
Pervious Total	0.24
Impervious Land Use	acre
ROADS FLAT	0.56
Impervious Total	0.56
Basin Total	0.8

Element Flows To:

Surface	Interflow	Groundwater
Tank 1	Tank 1	

Routing Elements
Predeveloped Routing

Mitigated Routing

EAGLEMONT 7 - NORTH BASIN - DETENTION TANK

Tank 1

Dimensions

Depth:	8 ft.	REQUIRED = 14.506 CF
Tank Type:	Circular	
Diameter:	8 ft.	
Length:	310 ft.	
Discharge Structure		
Riser Height:	7 ft.	
Riser Diameter:	18 in.	
Orifice 1 Diameter:	0.531 in. Elevation:0 ft.	
Orifice 2 Diameter:	0.875 in. Elevation:3.83 ft.	
Orifice 3 Diameter:	0.813 in. Elevation:4.8 ft.	
Element Flows To:		
Outlet 1	Outlet 2	

Tank Hydraulic Table

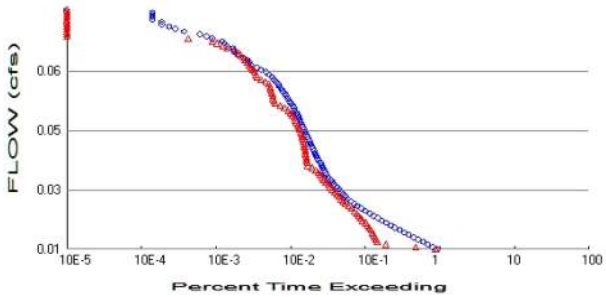
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.000	0.000	0.000	0.000
0.0889	0.011	0.000	0.002	0.000
0.1778	0.016	0.002	0.003	0.000
0.2667	0.020	0.003	0.004	0.000
0.3556	0.023	0.005	0.004	0.000
0.4444	0.026	0.007	0.005	0.000
0.5333	0.028	0.010	0.005	0.000
0.6222	0.030	0.012	0.006	0.000
0.7111	0.032	0.015	0.006	0.000
0.8000	0.034	0.018	0.006	0.000
0.8889	0.035	0.021	0.007	0.000
0.9778	0.037	0.025	0.007	0.000
1.0667	0.038	0.028	0.007	0.000
1.1556	0.040	0.031	0.008	0.000
1.2444	0.041	0.035	0.008	0.000
1.3333	0.042	0.039	0.008	0.000
1.4222	0.043	0.043	0.009	0.000
1.5111	0.044	0.046	0.009	0.000
1.6000	0.045	0.050	0.009	0.000
1.6889	0.046	0.055	0.009	0.000
1.7778	0.047	0.059	0.010	0.000
1.8667	0.048	0.063	0.010	0.000
1.9556	0.048	0.067	0.010	0.000
2.0444	0.049	0.072	0.010	0.000
2.1333	0.050	0.076	0.011	0.000
2.2222	0.051	0.081	0.011	0.000
2.3111	0.051	0.085	0.011	0.000
2.4000	0.052	0.090	0.011	0.000
2.4889	0.052	0.094	0.012	0.000
2.5778	0.053	0.099	0.012	0.000
2.6667	0.053	0.104	0.012	0.000
2.7556	0.054	0.109	0.012	0.000
2.8444	0.054	0.114	0.012	0.000
2.9333	0.054	0.118	0.013	0.000
3.0222	0.055	0.123	0.013	0.000
3.1111	0.055	0.128	0.013	0.000

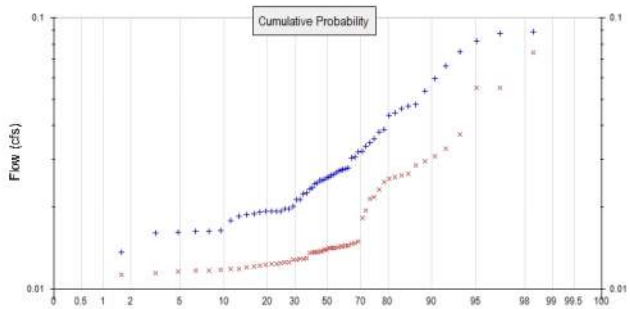
3.2000	0.055	0.133	0.013	0.000
3.2889	0.056	0.138	0.013	0.000
3.3778	0.056	0.143	0.014	0.000
3.4667	0.056	0.148	0.014	0.000
3.5556	0.056	0.153	0.014	0.000
3.6444	0.056	0.158	0.014	0.000
3.7333	0.056	0.163	0.014	0.000
3.8222	0.056	0.168	0.015	0.000
3.9111	0.056	0.173	0.021	0.000
4.0000	0.056	0.178	0.023	0.000
4.0889	0.056	0.183	0.026	0.000
4.1778	0.056	0.189	0.027	0.000
4.2667	0.056	0.194	0.029	0.000
4.3556	0.056	0.199	0.031	0.000
4.4444	0.056	0.204	0.032	0.000
4.5333	0.056	0.209	0.033	0.000
4.6222	0.056	0.214	0.034	0.000
4.7111	0.056	0.219	0.036	0.000
4.8000	0.055	0.224	0.037	0.000
4.8889	0.055	0.229	0.043	0.000
4.9778	0.055	0.234	0.046	0.000
5.0667	0.054	0.238	0.049	0.000
5.1556	0.054	0.243	0.052	0.000
5.2444	0.054	0.248	0.054	0.000
5.3333	0.053	0.253	0.056	0.000
5.4222	0.053	0.258	0.058	0.000
5.5111	0.052	0.262	0.060	0.000
5.6000	0.052	0.267	0.061	0.000
5.6889	0.051	0.272	0.063	0.000
5.7778	0.051	0.276	0.065	0.000
5.8667	0.050	0.281	0.066	0.000
5.9556	0.049	0.285	0.068	0.000
6.0444	0.048	0.290	0.069	0.000
6.1333	0.048	0.294	0.071	0.000
6.2222	0.047	0.298	0.072	0.000
6.3111	0.046	0.302	0.074	0.000
6.4000	0.045	0.306	0.075	0.000
6.4889	0.044	0.310	0.076	0.000
6.5778	0.043	0.314	0.078	0.000
6.6667	0.042	0.318	0.079	0.000
6.7556	0.041	0.322	0.080	0.000
6.8444	0.040	0.325	0.081	0.000
6.9333	0.038	0.329	0.082	0.000
7.0222	0.037	0.332	0.136	0.000
7.1111	0.035	0.336	0.673	0.000
7.2000	0.034	0.339	1.490	0.000
7.2889	0.032	0.342	2.462	0.000
7.3778	0.030	0.344	3.475	0.000
7.4667	0.028	0.347	4.415	0.000
7.5556	0.026	0.349	5.188	0.000
7.6444	0.023	0.352	5.741	0.000
7.7333	0.020	0.354	6.107	0.000
7.8222	0.016	0.355	6.520	0.000
7.9111	0.011	0.357	6.859	0.000
8.0000	0.000	0.357	7.182	0.000
8.0889	0.000	0.000	7.492	0.000

Analysis Results

POC 1

EAGLEMONT 7 - NORTH BASIN - DETENTION TANK





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.8
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.24
Total Impervious Area: 0.56

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.02688
5 year	0.041235
10 year	0.052306
25 year	0.068146
50 year	0.081337
100 year	0.095764

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.015664
5 year	0.023316
10 year	0.029722
25 year	0.039581
50 year	0.048373
100 year	0.058558

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1949	0.027	0.013
1950	0.027	0.014
1951	0.025	0.012
1952	0.019	0.012
1953	0.016	0.012
1954	0.088	0.014
1955	0.035	0.026
1956	0.031	0.029
1957	0.038	0.019
1958	0.027	0.013

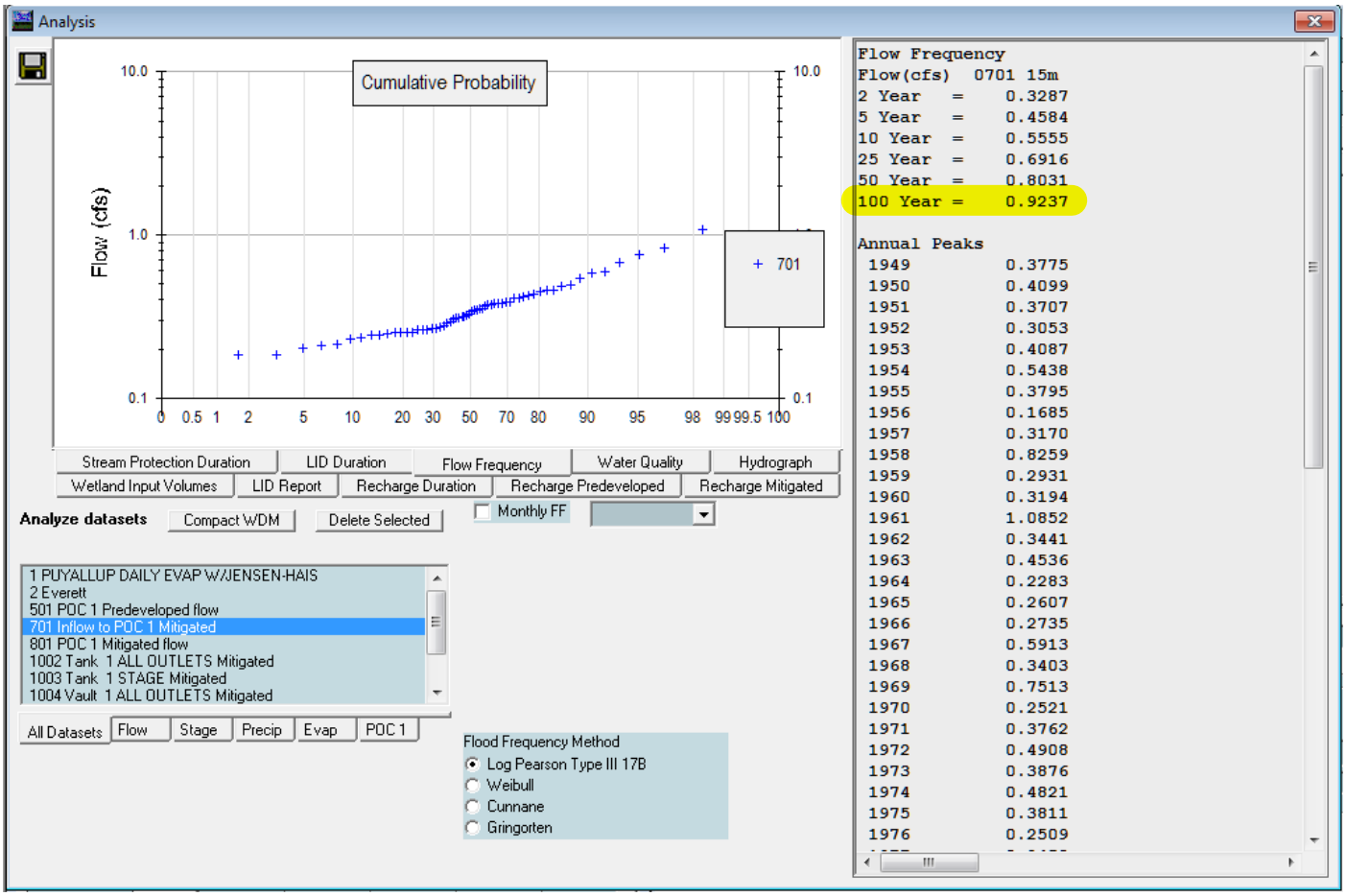
1959	0.027	0.014
1960	0.025	0.014
1961	0.048	0.023
1962	0.024	0.013
1963	0.039	0.013
1964	0.028	0.011
1965	0.023	0.014
1966	0.014	0.012
1967	0.028	0.012
1968	0.034	0.015
1969	0.082	0.013
1970	0.019	0.012
1971	0.031	0.031
1972	0.023	0.014
1973	0.021	0.014
1974	0.046	0.014
1975	0.019	0.012
1976	0.019	0.014
1977	0.016	0.013
1978	0.019	0.012
1979	0.054	0.013
1980	0.025	0.012
1981	0.020	0.012
1982	0.026	0.018
1983	0.044	0.012
1984	0.026	0.033
1985	0.032	0.026
1986	0.075	0.055
1987	0.036	0.037
1988	0.019	0.025
1989	0.019	0.011
1990	0.025	0.015
1991	0.026	0.014
1992	0.020	0.014
1993	0.016	0.012
1994	0.018	0.014
1995	0.026	0.027
1996	0.045	0.022
1997	0.089	0.074
1998	0.016	0.012
1999	0.021	0.014
2000	0.016	0.030
2001	0.006	0.010
2002	0.024	0.014
2003	0.019	0.014
2004	0.032	0.026
2005	0.022	0.014
2006	0.060	0.021
2007	0.047	0.015
2008	0.066	0.055
2009	0.020	0.014

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	**Predeveloped**	**Mitigated**
1	0.0890	0.0744
2	0.0878	0.0554
3	0.0819	0.0551

4	0.0751	0.0371
5	0.0662	0.0330
6	0.0596	0.0309
7	0.0538	0.0296
8	0.0477	0.0286
9	0.0472	0.0266
10	0.0461	0.0263
11	0.0448	0.0259
12	0.0437	0.0255
13	0.0388	0.0247
14	0.0378	0.0233
15	0.0358	0.0218
16	0.0346	0.0214
17	0.0337	0.0194
18	0.0322	0.0182
19	0.0319	0.0149
20	0.0305	0.0148
21	0.0305	0.0147
22	0.0279	0.0145
23	0.0277	0.0144
24	0.0275	0.0144
25	0.0273	0.0144
26	0.0271	0.0142
27	0.0269	0.0142
28	0.0264	0.0142
29	0.0262	0.0141
30	0.0258	0.0141
31	0.0256	0.0140
32	0.0253	0.0139
33	0.0252	0.0138
34	0.0251	0.0138
35	0.0246	0.0136
36	0.0244	0.0136
37	0.0236	0.0136
38	0.0233	0.0135
39	0.0225	0.0130
40	0.0224	0.0129
41	0.0214	0.0129
42	0.0213	0.0128
43	0.0202	0.0128
44	0.0197	0.0126
45	0.0197	0.0125
46	0.0194	0.0124
47	0.0193	0.0124
48	0.0193	0.0123
49	0.0193	0.0123
50	0.0191	0.0122
51	0.0189	0.0121
52	0.0188	0.0120
53	0.0186	0.0119
54	0.0179	0.0119
55	0.0164	0.0118
56	0.0163	0.0117
57	0.0163	0.0116
58	0.0162	0.0116
59	0.0161	0.0115
60	0.0137	0.0113
61	0.0064	0.0105


Analysis
Cumulative Probability
Flow (cfs)
10.0
1.0
0.1
0 0.5 1 2 5 10 20 30 50 70 80 90 95 98 99 99.5 100
701
Stream Protection Duration
LID Duration
Flow Frequency
Water Quality
Hydrograph
Wetland Input Volumes
LID Report
Recharge Duration
Recharge Predeveloped
Recharge Mitigated
Analyze datasets
Compact WDM
Delete Selected
Monthly FF
1 PUYALLUP DAILY EVAP W/JENSEN-HAIS
2 Everett
501 POC 1 Predeveloped flow
701 Inflow to POC 1 Mitigated
801 POC 1 Mitigated flow
1002 Tank 1 ALL OUTLETS Mitigated
1003 Tank 1 STAGE Mitigated
1004 Vault 1 ALL OUTLETS Mitigated
All Datasets
Flow
Stage
Precip
Evap
POC 1
Flood Frequency Method
Log Pearson Type III 17B
Weibull
Cunnane
Gringorten
Flow Frequency
Flow(cfs) 0701 15m
2 Year = 0.3287
5 Year = 0.4584
10 Year = 0.5555
25 Year = 0.6916
50 Year = 0.8031
100 Year = 0.9237
Annual Peaks
1949 0.3775
1950 0.4099
1951 0.3707
1952 0.3053
1953 0.4087
1954 0.5438
1955 0.3795
1956 0.1685
1957 0.3170
1958 0.8259
1959 0.2931
1960 0.3194
1961 1.0852
1962 0.3441
1963 0.4536
1964 0.2283
1965 0.2607
1966 0.2735
1967 0.5913
1968 0.3403
1969 0.7513
1970 0.2521
1971 0.3762
1972 0.4908
1973 0.3876
1974 0.4821
1975 0.3811
1976 0.2509

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0134	19590	18651	95	Pass
0.0141	17002	10145	59	Pass
0.0148	14668	4047	27	Pass
0.0155	12741	3089	24	Pass
0.0162	10930	2982	27	Pass
0.0169	9450	2875	30	Pass
0.0176	8173	2768	33	Pass
0.0182	7075	2633	37	Pass
0.0189	6136	2547	41	Pass
0.0196	5311	2408	45	Pass
0.0203	4656	2280	48	Pass
0.0210	4068	2152	52	Pass
0.0217	3557	1953	54	Pass
0.0224	3140	1839	58	Pass
0.0230	2759	1739	63	Pass
0.0237	2449	1647	67	Pass
0.0244	2145	1520	70	Pass
0.0251	1894	1390	73	Pass
0.0258	1657	1271	76	Pass
0.0265	1508	1144	75	Pass
0.0272	1370	1074	78	Pass
0.0278	1250	1017	81	Pass
0.0285	1154	947	82	Pass
0.0292	1069	887	82	Pass
0.0299	1009	825	81	Pass
0.0306	950	774	81	Pass
0.0313	888	725	81	Pass
0.0320	825	688	83	Pass
0.0326	777	632	81	Pass
0.0333	734	592	80	Pass
0.0340	686	562	81	Pass
0.0347	648	531	81	Pass
0.0354	622	502	80	Pass
0.0361	602	460	76	Pass
0.0368	583	410	70	Pass
0.0374	561	364	64	Pass
0.0381	538	355	65	Pass
0.0388	507	351	69	Pass
0.0395	487	346	71	Pass
0.0402	473	343	72	Pass
0.0409	457	338	73	Pass
0.0416	440	335	76	Pass
0.0422	424	331	78	Pass
0.0429	408	327	80	Pass
0.0436	394	322	81	Pass
0.0443	380	316	83	Pass
0.0450	368	310	84	Pass
0.0457	353	304	86	Pass
0.0464	341	298	87	Pass
0.0470	333	290	87	Pass
0.0477	322	280	86	Pass
0.0484	313	271	86	Pass
0.0491	302	264	87	Pass

0.0498	293	256	87	Pass
0.0505	284	247	86	Pass
0.0512	276	236	85	Pass
0.0518	265	225	84	Pass
0.0525	257	212	82	Pass
0.0532	241	198	82	Pass
0.0539	234	175	74	Pass
0.0546	226	155	68	Pass
0.0553	212	132	62	Pass
0.0560	205	127	61	Pass
0.0566	195	125	64	Pass
0.0573	187	123	65	Pass
0.0580	177	120	67	Pass
0.0587	166	117	70	Pass
0.0594	160	115	71	Pass
0.0601	150	113	75	Pass
0.0608	146	109	74	Pass
0.0614	135	99	73	Pass
0.0621	128	85	66	Pass
0.0628	120	77	64	Pass
0.0635	111	74	66	Pass
0.0642	99	70	70	Pass
0.0649	85	67	78	Pass
0.0656	75	63	84	Pass
0.0662	63	59	93	Pass
0.0669	59	56	94	Pass
0.0676	56	52	92	Pass
0.0683	50	50	100	Pass
0.0690	42	46	109	Pass
0.0697	39	42	107	Pass
0.0704	37	38	102	Pass
0.0710	36	30	83	Pass
0.0717	30	26	86	Pass
0.0724	28	22	78	Pass
0.0731	26	19	73	Pass
0.0738	19	9	47	Pass
0.0745	16	0	0	Pass
0.0752	13	0	0	Pass
0.0759	8	0	0	Pass
0.0765	6	0	0	Pass
0.0772	5	0	0	Pass
0.0779	4	0	0	Pass
0.0786	4	0	0	Pass
0.0793	3	0	0	Pass
0.0800	3	0	0	Pass
0.0807	3	0	0	Pass
0.0813	3	0	0	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	0.4701 acre-feet
On-line facility target flow:	0.6404 cfs.
Adjusted for 15 min:	0.6404 cfs.
Off-line facility target flow:	0.3615 cfs.
Adjusted for 15 min:	0.3615 cfs.

LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
Tank 1 POC	☐	122.30			☐	0.00			
Total Volume Infiltrated		122.30	0.00	0.00		0.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Failed

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

```
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   18537 - EAGLEMONT 7 - FRONTAGE BASIN.wdm
MESSU      25   Pre18537 - EAGLEMONT 7 - FRONTAGE BASIN.MES
           27   Pre18537 - EAGLEMONT 7 - FRONTAGE BASIN.L61
           28   Pre18537 - EAGLEMONT 7 - FRONTAGE BASIN.L62
           30   POC18537 - EAGLEMONT 7 - FRONTAGE BASIN1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      10
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        North Basin                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           ***
   10     C, Forest, Flat         1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   10         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   10         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO
```

```
  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   10         0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   10              0       4.5      0.08       400      0.05       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   10              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   10            0.2       0.5      0.35         6       0.5       0.7
  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
   10              0         0         0         0       2.5         1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                       in  out           ***
  END GEN-INFO
  *** Section IWATER***

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

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

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

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

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

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

```
END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
North Basin***
PERLND  10                        0.8     COPY   501     12
PERLND  10                        0.8     COPY   501     13

******Routing******
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                                ***
  END GEN-INFO
  *** Section RCHRES***

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

  PRINT-INFO
    <PLS > ***************** Print-flags ******************* PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  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
             *  *  *  *    *  *  *  *  *      *  *  *  *  *        ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
  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
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
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    1.2            PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1.2            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***
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    501 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13


END MASS-LINK

END RUN
```

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   18537 - EAGLEMONT 7 - FRONTAGE BASIN.wdm
MESSU      25   Mit18537 - EAGLEMONT 7 - FRONTAGE BASIN.MES
           27   Mit18537 - EAGLEMONT 7 - FRONTAGE BASIN.L61
           28   Mit18537 - EAGLEMONT 7 - FRONTAGE BASIN.L62
           30   POC18537 - EAGLEMONT 7 - FRONTAGE BASIN1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      16
      IMPLND       1
      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        Tank  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           ***
   16     C, Lawn, Flat           1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   16         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

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

```
  16         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
  16         0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
  16             0       4.5      0.03       400      0.05       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
  16             0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                                ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
  16           0.1      0.25      0.25         6       0.5      0.25
  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
  16             0         0         0         0       2.5         1         0
  END PWAT-STATE1

END PERLND

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

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

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    1         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     ***
    1         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    1            400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
```

```
    # -  # ***PETMAX    PETMIN
    1             0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    1             0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
North Basin***
PERLND  16                        0.24     RCHRES   1      2
PERLND  16                        0.24     RCHRES   1      3
IMPLND   1                        0.56     RCHRES   1      5

******Routing******
PERLND  16                        0.24     COPY     1     12
IMPLND   1                        0.56     COPY     1     15
PERLND  16                        0.24     COPY     1     13
RCHRES   1                           1     COPY   501     16
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     Tank  1                1    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  0  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      0.06       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  0.0  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
   91    4
     Depth      Area    Volume  Outflow1 Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.000000  0.000000  0.000000
  0.088889  0.011936  0.000709  0.002281
  0.177778  0.016784  0.001998  0.003226
  0.266667  0.020440  0.003659  0.003951
  0.355556  0.023466  0.005614  0.004562
  0.444444  0.026082  0.007818  0.005101
  0.533333  0.028403  0.010242  0.005588
  0.622222  0.030496  0.012861  0.006036
  0.711111  0.032404  0.015658  0.006452
  0.800000  0.034160  0.018617  0.006844
  0.888889  0.035785  0.021727  0.007214
  0.977778  0.037296  0.024976  0.007566
  1.066667  0.038707  0.028354  0.007902
  1.155556  0.040028  0.031854  0.008225
  1.244444  0.041269  0.035468  0.008536
  1.333333  0.042435  0.039189  0.008835
  1.422222  0.043534  0.043010  0.009125
  1.511111  0.044569  0.046926  0.009406
  1.600000  0.045546  0.050932  0.009678
  1.688889  0.046468  0.055022  0.009944
  1.777778  0.047339  0.059191  0.010202
  1.866667  0.048160  0.063436  0.010454
  1.955556  0.048935  0.067752  0.010700
  2.044444  0.049665  0.072134  0.010940
  2.133333  0.050353  0.076580  0.011176
  2.222222  0.051001  0.081085  0.011406
  2.311111  0.051609  0.085645  0.011632
  2.400000  0.052180  0.090258  0.011854
  2.488889  0.052714  0.094921  0.012071
  2.577778  0.053213  0.099629  0.012285
  2.666667  0.053677  0.104380  0.012495
  2.755556  0.054108  0.109170  0.012701
  2.844444  0.054505  0.113998  0.012905
  2.933333  0.054871  0.118859  0.013105
  3.022222  0.055206  0.123752  0.013302
  3.111111  0.055509  0.128673  0.013496
  3.200000  0.055783  0.133619  0.013687
  3.288889  0.056026  0.138589  0.013876
  3.377778  0.056240  0.143579  0.014063
  3.466667  0.056425  0.148586  0.014246
  3.555556  0.056580  0.153609  0.014428
  3.644444  0.056708  0.158644  0.014607
  3.733333  0.056806  0.163689  0.014784
  3.822222  0.056877  0.168742  0.014959
  3.911111  0.056919  0.173800  0.021049
  4.000000  0.056933  0.178860  0.023869
  4.088889  0.056919  0.183920  0.026044
  4.177778  0.056877  0.188978  0.027892
  4.266667  0.056806  0.194031  0.029534
  4.355556  0.056708  0.199076  0.031031
  4.444444  0.056580  0.204112  0.032417
  4.533333  0.056425  0.209134  0.033716
```

```
  4.622222  0.056240  0.214142  0.034943
  4.711111  0.056026  0.219132  0.036110
  4.800000  0.055783  0.224101  0.037226
  4.888889  0.055509  0.229048  0.043645
  4.977778  0.055206  0.233969  0.046893
  5.066667  0.054871  0.238861  0.049590
  5.155556  0.054505  0.243722  0.051989
  5.244444  0.054108  0.248550  0.054190
  5.333333  0.053677  0.253341  0.056244
  5.422222  0.053213  0.258092  0.058182
  5.511111  0.052714  0.262800  0.060026
  5.600000  0.052180  0.267462  0.061791
  5.688889  0.051609  0.272075  0.063488
  5.777778  0.051001  0.276636  0.065125
  5.866667  0.050353  0.281141  0.066708
  5.955556  0.049665  0.285586  0.068245
  6.044444  0.048935  0.289969  0.069738
  6.133333  0.048160  0.294284  0.071193
  6.222222  0.047339  0.298529  0.072612
  6.311111  0.046468  0.302699  0.073997
  6.400000  0.045546  0.306789  0.075353
  6.488889  0.044569  0.310794  0.076679
  6.577778  0.043534  0.314710  0.077980
  6.666667  0.042435  0.318532  0.079255
  6.755556  0.041269  0.322252  0.080507
  6.844444  0.040028  0.325866  0.081737
  6.933333  0.038707  0.329366  0.082946
  7.022222  0.037296  0.332745  0.136873
  7.111111  0.035785  0.335994  0.673111
  7.200000  0.034160  0.339103  1.490923
  7.288889  0.032404  0.342063  2.462319
  7.377778  0.030496  0.344859  3.474998
  7.466667  0.028403  0.347479  4.415846
  7.555556  0.026082  0.349902  5.188263
  7.644444  0.023466  0.352107  5.741404
  7.733333  0.020440  0.354062  6.107035
  7.822222  0.016784  0.355722  6.520035
  7.911111  0.011936  0.357011  6.859507
  8.000000  0.000000  0.357720  7.182822
  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    1.2            PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1.2            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   1006 FLOW     ENGL      REPL
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1007 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        2
PERLND     PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    2

  MASS-LINK        3
PERLND     PWATER IFWO       0.083333      RCHRES         INFLOW IVOL
```

```
  END MASS-LINK    3

  MASS-LINK        5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    5

  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13

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

  MASS-LINK       16
RCHRES     ROFLOW                          COPY           INPUT  MEAN
  END MASS-LINK   16


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

Disclaimer

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WWHM2012

EAGLEMONT 7 - SOUTH BASIN
DETENTION VAULT

PROJECT REPORT

General Model Information

Project Name:	18537 - EAGLEMONT 7 - SOUTH BASIN
Site Name:	Plat of Eaglemont 7
Site Address:	
City:	
Report Date:	12/14/2018
Gage:	Everett
Data Start:	1948/10/01
Data End:	2009/09/30
Timestep:	15 Minute
Precip Scale:	0.000 (adjusted)
Version Date:	2018/03/02
Version:	4.2.14

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

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Flat	3.49
C, Forest, Mod	1.16
Pervious Total	4.65
Impervious Land Use	acre
Impervious Total	0
Basin Total	4.65

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

EAGLEMONT 7 - SOUTH BASIN - DETENTION VAULT

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Lawn, Flat	1.47
Pervious Total	1.47
Impervious Land Use	acre
ROADS FLAT	3.18
Impervious Total	3.18
Basin Total	4.65

Element Flows To:

Surface	Interflow	Groundwater
Vault 1	Vault 1	

Routing Elements
Predeveloped Routing

Mitigated Routing

EAGLEMONT 7 - SOUTH BASIN - DETENTION VAULT

Vault 1

Width:	106 ft.	REQUIRED = 75,843 CF
Length:	106 ft.	(11,236 SF)
Depth:	7.25 ft.	
Discharge Structure		
Riser Height:	6.75 ft.	
Riser Diameter:	18 in.	
Orifice 1 Diameter:	1.313 in. Elevation:0 ft.	
Orifice 2 Diameter:	1.313 in. Elevation:3.05 ft.	
Orifice 3 Diameter:	2.281 in. Elevation:4.45 ft.	
Element Flows To:		
Outlet 1	Outlet 2	

Vault Hydraulic Table

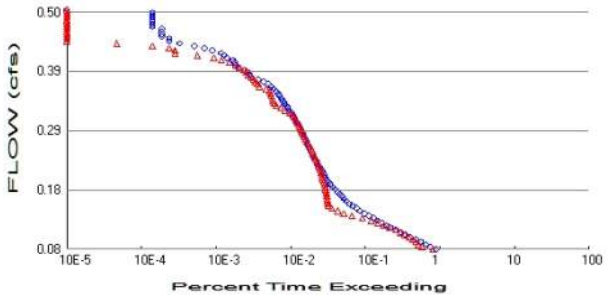
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.257	0.000	0.000	0.000
0.0806	0.257	0.020	0.013	0.000
0.1611	0.257	0.041	0.018	0.000
0.2417	0.257	0.062	0.023	0.000
0.3222	0.257	0.083	0.026	0.000
0.4028	0.257	0.103	0.029	0.000
0.4833	0.257	0.124	0.032	0.000
0.5639	0.257	0.145	0.035	0.000
0.6444	0.257	0.166	0.037	0.000
0.7250	0.257	0.187	0.039	0.000
0.8056	0.257	0.207	0.042	0.000
0.8861	0.257	0.228	0.044	0.000
0.9667	0.257	0.249	0.046	0.000
1.0472	0.257	0.270	0.047	0.000
1.1278	0.257	0.290	0.049	0.000
1.2083	0.257	0.311	0.051	0.000
1.2889	0.257	0.332	0.053	0.000
1.3694	0.257	0.353	0.054	0.000
1.4500	0.257	0.374	0.056	0.000
1.5306	0.257	0.394	0.057	0.000
1.6111	0.257	0.415	0.059	0.000
1.6917	0.257	0.436	0.060	0.000
1.7722	0.257	0.457	0.062	0.000
1.8528	0.257	0.477	0.063	0.000
1.9333	0.257	0.498	0.065	0.000
2.0139	0.257	0.519	0.066	0.000
2.0944	0.257	0.540	0.067	0.000
2.1750	0.257	0.561	0.069	0.000
2.2556	0.257	0.581	0.070	0.000
2.3361	0.257	0.602	0.071	0.000
2.4167	0.257	0.623	0.072	0.000
2.4972	0.257	0.644	0.073	0.000
2.5778	0.257	0.664	0.075	0.000
2.6583	0.257	0.685	0.076	0.000
2.7389	0.257	0.706	0.077	0.000
2.8194	0.257	0.727	0.078	0.000
2.9000	0.257	0.748	0.079	0.000
2.9806	0.257	0.768	0.080	0.000

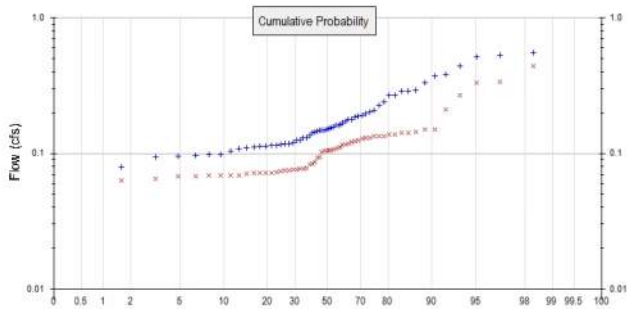
3.0611	0.257	0.789	0.086	0.000
3.1417	0.257	0.810	0.097	0.000
3.2222	0.257	0.831	0.103	0.000
3.3028	0.257	0.851	0.108	0.000
3.3833	0.257	0.872	0.113	0.000
3.4639	0.257	0.893	0.117	0.000
3.5444	0.257	0.914	0.121	0.000
3.6250	0.257	0.935	0.124	0.000
3.7056	0.257	0.955	0.127	0.000
3.7861	0.257	0.976	0.131	0.000
3.8667	0.257	0.997	0.134	0.000
3.9472	0.257	1.018	0.137	0.000
4.0278	0.257	1.038	0.140	0.000
4.1083	0.257	1.059	0.143	0.000
4.1889	0.257	1.080	0.145	0.000
4.2694	0.257	1.101	0.148	0.000
4.3500	0.257	1.122	0.150	0.000
4.4306	0.257	1.142	0.153	0.000
4.5111	0.257	1.163	0.190	0.000
4.5917	0.257	1.184	0.211	0.000
4.6722	0.257	1.205	0.227	0.000
4.7528	0.257	1.225	0.240	0.000
4.8333	0.257	1.246	0.252	0.000
4.9139	0.257	1.267	0.263	0.000
4.9944	0.257	1.288	0.274	0.000
5.0750	0.257	1.309	0.283	0.000
5.1556	0.257	1.329	0.292	0.000
5.2361	0.257	1.350	0.301	0.000
5.3167	0.257	1.371	0.309	0.000
5.3972	0.257	1.392	0.317	0.000
5.4778	0.257	1.413	0.325	0.000
5.5583	0.257	1.433	0.333	0.000
5.6389	0.257	1.454	0.340	0.000
5.7194	0.257	1.475	0.347	0.000
5.8000	0.257	1.496	0.354	0.000
5.8806	0.257	1.516	0.361	0.000
5.9611	0.257	1.537	0.367	0.000
6.0417	0.257	1.558	0.374	0.000
6.1222	0.257	1.579	0.380	0.000
6.2028	0.257	1.600	0.386	0.000
6.2833	0.257	1.620	0.392	0.000
6.3639	0.257	1.641	0.398	0.000
6.4444	0.257	1.662	0.404	0.000
6.5250	0.257	1.683	0.410	0.000
6.6056	0.257	1.703	0.415	0.000
6.6861	0.257	1.724	0.421	0.000
6.7667	0.257	1.745	0.461	0.000
6.8472	0.257	1.766	0.913	0.000
6.9278	0.257	1.787	1.619	0.000
7.0083	0.257	1.807	2.473	0.000
7.0889	0.257	1.828	3.393	0.000
7.1694	0.257	1.849	4.295	0.000
7.2500	0.257	1.870	5.097	0.000
7.3306	0.247	1.754	5.738	0.000

Analysis Results

POC 1

EAGLEMONT 7 - SOUTH BASIN - DETENTION VAULT





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 4.65
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 1.47
Total Impervious Area: 3.18

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.159972
5 year	0.24816
10 year	0.316747
25 year	0.415524
50 year	0.498259
100 year	0.589142

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0.099706
5 year	0.147206
10 year	0.185928
25 year	0.244182
50 year	0.29507
100 year	0.353021

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1949	0.164	0.076
1950	0.168	0.107
1951	0.148	0.072
1952	0.118	0.069
1953	0.098	0.069
1954	0.553	0.086
1955	0.202	0.135
1956	0.178	0.142
1957	0.225	0.124
1958	0.173	0.077

1959	0.161	0.094
1960	0.148	0.109
1961	0.293	0.133
1962	0.144	0.072
1963	0.239	0.075
1964	0.177	0.063
1965	0.136	0.105
1966	0.079	0.072
1967	0.161	0.073
1968	0.196	0.116
1969	0.516	0.077
1970	0.112	0.074
1971	0.186	0.151
1972	0.131	0.083
1973	0.125	0.106
1974	0.288	0.092
1975	0.110	0.069
1976	0.119	0.084
1977	0.096	0.075
1978	0.114	0.069
1979	0.332	0.076
1980	0.155	0.068
1981	0.115	0.070
1982	0.149	0.137
1983	0.269	0.073
1984	0.153	0.209
1985	0.190	0.130
1986	0.442	0.336
1987	0.208	0.270
1988	0.108	0.138
1989	0.116	0.067
1990	0.146	0.129
1991	0.150	0.106
1992	0.114	0.116
1993	0.098	0.065
1994	0.104	0.110
1995	0.153	0.143
1996	0.267	0.135
1997	0.531	0.443
1998	0.095	0.072
1999	0.124	0.117
2000	0.093	0.149
2001	0.037	0.057
2002	0.142	0.121
2003	0.111	0.104
2004	0.187	0.144
2005	0.130	0.102
2006	0.372	0.130
2007	0.288	0.123
2008	0.385	0.332
2009	0.117	0.111

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	**Predeveloped**	**Mitigated**
1	0.5527	0.4432
2	0.5307	0.3363
3	0.5161	0.3320

4	0.4422	0.2696
5	0.3847	0.2094
6	0.3719	0.1507
7	0.3317	0.1494
8	0.2934	0.1438
9	0.2884	0.1426
10	0.2878	0.1417
11	0.2693	0.1377
12	0.2671	0.1375
13	0.2389	0.1348
14	0.2255	0.1346
15	0.2081	0.1331
16	0.2023	0.1305
17	0.1958	0.1302
18	0.1904	0.1288
19	0.1869	0.1240
20	0.1859	0.1233
21	0.1782	0.1209
22	0.1766	0.1175
23	0.1734	0.1160
24	0.1682	0.1159
25	0.1643	0.1111
26	0.1610	0.1104
27	0.1606	0.1088
28	0.1554	0.1069
29	0.1532	0.1057
30	0.1525	0.1056
31	0.1500	0.1051
32	0.1489	0.1042
33	0.1481	0.1016
34	0.1480	0.0941
35	0.1457	0.0924
36	0.1440	0.0859
37	0.1418	0.0842
38	0.1356	0.0830
39	0.1308	0.0775
40	0.1301	0.0774
41	0.1249	0.0765
42	0.1244	0.0761
43	0.1190	0.0754
44	0.1178	0.0751
45	0.1172	0.0745
46	0.1158	0.0733
47	0.1147	0.0731
48	0.1143	0.0721
49	0.1136	0.0720
50	0.1123	0.0718
51	0.1111	0.0716
52	0.1101	0.0703
53	0.1078	0.0691
54	0.1041	0.0689
55	0.0983	0.0688
56	0.0978	0.0685
57	0.0960	0.0680
58	0.0953	0.0674
59	0.0934	0.0648
60	0.0794	0.0631
61	0.0375	0.0568

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0800	18991	17113	90	Pass
0.0842	15853	12279	77	Pass
0.0884	13740	10970	79	Pass
0.0927	11832	10125	85	Pass
0.0969	10164	9383	92	Pass
0.1011	8498	8237	96	Pass
0.1053	7347	7283	99	Pass
0.1096	6370	6329	99	Pass
0.1138	5491	5501	100	Pass
0.1180	4656	4451	95	Pass
0.1222	4066	3805	93	Pass
0.1265	3548	3166	89	Pass
0.1307	3138	2584	82	Pass
0.1349	2755	1941	70	Pass
0.1391	2370	1415	59	Pass
0.1434	2086	1102	52	Pass
0.1476	1826	927	50	Pass
0.1518	1619	755	46	Pass
0.1560	1438	687	47	Pass
0.1603	1311	678	51	Pass
0.1645	1203	669	55	Pass
0.1687	1111	661	59	Pass
0.1729	1038	655	63	Pass
0.1772	965	646	66	Pass
0.1814	901	641	71	Pass
0.1856	837	634	75	Pass
0.1898	785	627	79	Pass
0.1941	726	612	84	Pass
0.1983	687	594	86	Pass
0.2025	648	578	89	Pass
0.2067	623	569	91	Pass
0.2110	603	555	92	Pass
0.2152	576	545	94	Pass
0.2194	558	535	95	Pass
0.2236	531	524	98	Pass
0.2279	504	514	101	Pass
0.2321	481	495	102	Pass
0.2363	467	480	102	Pass
0.2405	446	461	103	Pass
0.2448	429	444	103	Pass
0.2490	416	430	103	Pass
0.2532	397	417	105	Pass
0.2574	382	403	105	Pass
0.2617	372	388	104	Pass
0.2659	357	367	102	Pass
0.2701	341	345	101	Pass
0.2743	332	334	100	Pass
0.2786	322	325	100	Pass
0.2828	315	318	100	Pass
0.2870	302	305	100	Pass
0.2912	290	295	101	Pass
0.2955	279	281	100	Pass
0.2997	272	274	100	Pass

0.3039	262	263	100	Pass
0.3081	247	252	102	Pass
0.3124	236	238	100	Pass
0.3166	229	226	98	Pass
0.3208	219	208	94	Pass
0.3250	206	178	86	Pass
0.3293	196	156	79	Pass
0.3335	187	137	73	Pass
0.3377	175	127	72	Pass
0.3419	167	124	74	Pass
0.3462	160	121	75	Pass
0.3504	151	117	77	Pass
0.3546	147	115	78	Pass
0.3588	136	111	81	Pass
0.3631	126	100	79	Pass
0.3673	117	81	69	Pass
0.3715	107	76	71	Pass
0.3757	93	72	77	Pass
0.3800	78	68	87	Pass
0.3842	64	63	98	Pass
0.3884	60	57	95	Pass
0.3926	56	54	96	Pass
0.3969	51	51	100	Pass
0.4011	42	44	104	Pass
0.4053	39	39	100	Pass
0.4095	38	32	84	Pass
0.4138	36	25	69	Pass
0.4180	30	20	66	Pass
0.4222	28	12	42	Pass
0.4264	25	6	24	Pass
0.4307	19	6	31	Pass
0.4349	15	5	33	Pass
0.4391	11	3	27	Pass
0.4433	7	1	14	Pass
0.4476	5	0	0	Pass
0.4518	5	0	0	Pass
0.4560	4	0	0	Pass
0.4602	4	0	0	Pass
0.4645	4	0	0	Pass
0.4687	4	0	0	Pass
0.4729	3	0	0	Pass
0.4771	3	0	0	Pass
0.4814	3	0	0	Pass
0.4856	3	0	0	Pass
0.4898	3	0	0	Pass
0.4940	3	0	0	Pass
0.4983	3	0	0	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	0.4268 acre-feet
On-line facility target flow:	0.5956 cfs.
Adjusted for 15 min:	0.5956 cfs.
Off-line facility target flow:	0.3363 cfs.
Adjusted for 15 min:	0.3363 cfs.

LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
Vault 1 POC	☐	704.87			☐	0.00			
Total Volume Infiltrated		704.87	0.00	0.00		0.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Failed

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

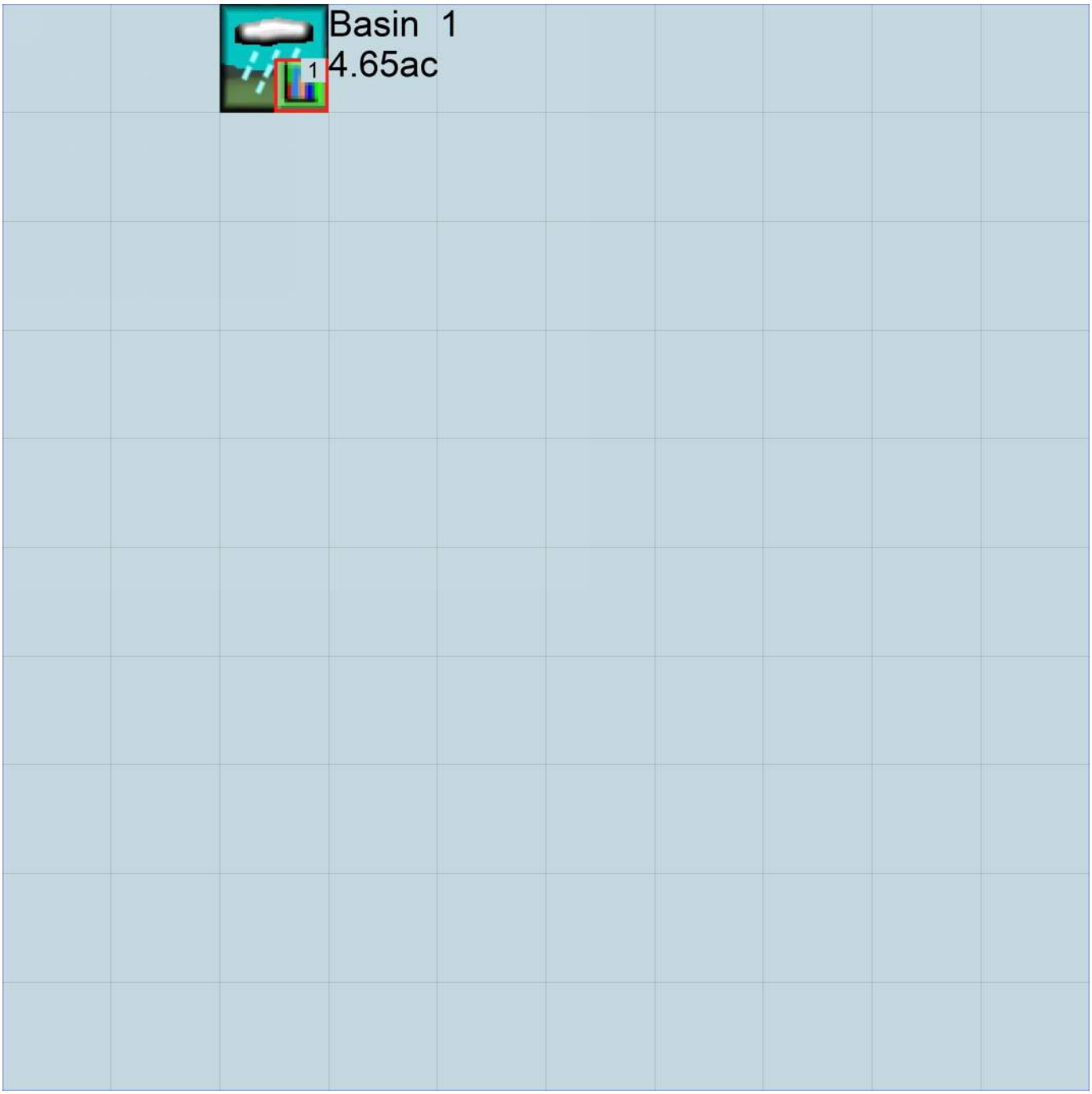
No PERLND changes have been made.

IMPLND Changes

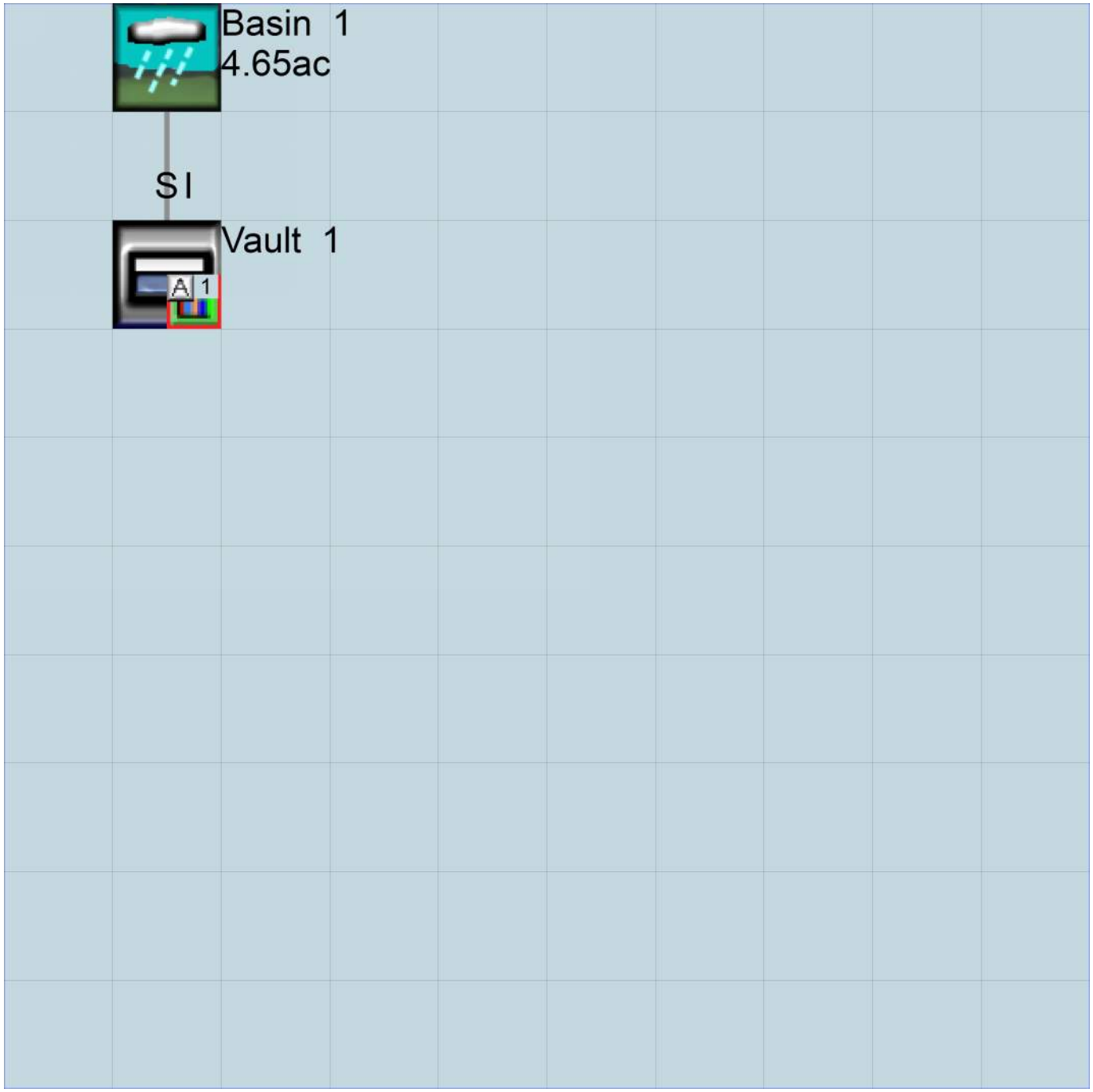
No IMPLND changes have been made.

Appendix

Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

```
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   18537 - EAGLEMONT 7 - SOUTH BASIN.wdm
MESSU      25   Pre18537 - EAGLEMONT 7 - SOUTH BASIN.MES
           27   Pre18537 - EAGLEMONT 7 - SOUTH BASIN.L61
           28   Pre18537 - EAGLEMONT 7 - SOUTH BASIN.L62
           30   POC18537 - EAGLEMONT 7 - SOUTH BASIN1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      10
      PERLND      11
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Basin  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           ***
   10     C, Forest, Flat         1    1    1    1   27    0
   11     C, Forest, Mod          1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   10         0    0    1    0    0    0    0    0    0    0    0    0
   11         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

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

```
  10         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  11         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
  10         0    0    0    0    0    0    0    0    0    0    0
  11         0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
  10              0       4.5      0.08       400      0.05       0.5     0.996
  11              0       4.5      0.08       400       0.1       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
  10              0         0         2         2         0         0         0
  11              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                                  ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
  10            0.2       0.5      0.35         6       0.5       0.7
  11            0.2       0.5      0.35         6       0.5       0.7
  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
  10              0         0         0         0       2.5         1         0
  11              0         0         0         0       2.5         1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
  END GEN-INFO
  *** Section IWATER***

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

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

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

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

  IWAT-PARM3
```

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

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

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND  10                        3.49     COPY   501     12
PERLND  10                        3.49     COPY   501     13
PERLND  11                        1.16     COPY   501     12
PERLND  11                        1.16     COPY   501     13

******Routing******
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                              ***
  END GEN-INFO
  *** Section RCHRES***

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

  PRINT-INFO
    <PLS > ***************** Print-flags ******************* PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  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
             *  *  *  *    *  *  *  *  *       *  *  *  *  *        ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
  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
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES
```

```
SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
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    1.2            PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1.2            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***
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    501 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13


END MASS-LINK

END RUN
```

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   18537 - EAGLEMONT 7 - SOUTH BASIN.wdm
MESSU      25   Mit18537 - EAGLEMONT 7 - SOUTH BASIN.MES
           27   Mit18537 - EAGLEMONT 7 - SOUTH BASIN.L61
           28   Mit18537 - EAGLEMONT 7 - SOUTH BASIN.L62
           30   POC18537 - EAGLEMONT 7 - SOUTH BASIN1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      16
      IMPLND       1
      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        Vault  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           ***
   16     C, Lawn, Flat           1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   16         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

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

```
  16         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
  16         0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
  16             0       4.5      0.03       400      0.05       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
  16             0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                                ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
  16           0.1      0.25      0.25         6       0.5      0.25
  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
  16             0         0         0         0       2.5         1         0
  END PWAT-STATE1

END PERLND

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

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

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    1         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     ***
    1         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    1            400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
```

```
    # -  # ***PETMAX    PETMIN
    1             0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    1             0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND  16                        1.47     RCHRES   1      2
PERLND  16                        1.47     RCHRES   1      3
IMPLND   1                        3.18     RCHRES   1      5

******Routing******
PERLND  16                        1.47     COPY     1     12
IMPLND   1                        3.18     COPY     1     15
PERLND  16                        1.47     COPY     1     13
RCHRES   1                           1     COPY   501     16
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     Vault  1               1    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  0  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      0.02       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  0.0  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
   91    4
     Depth      Area    Volume  Outflow1 Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.257943  0.000000  0.000000
  0.080556  0.257943  0.020779  0.013278
  0.161111  0.257943  0.041557  0.018778
  0.241667  0.257943  0.062336  0.022998
  0.322222  0.257943  0.083115  0.026556
  0.402778  0.257943  0.103894  0.029691
  0.483333  0.257943  0.124672  0.032525
  0.563889  0.257943  0.145451  0.035131
  0.644444  0.257943  0.166230  0.037556
  0.725000  0.257943  0.187009  0.039834
  0.805556  0.257943  0.207787  0.041989
  0.886111  0.257943  0.228566  0.044038
  0.966667  0.257943  0.249345  0.045997
  1.047222  0.257943  0.270124  0.047875
  1.127778  0.257943  0.290902  0.049682
  1.208333  0.257943  0.311681  0.051426
  1.288889  0.257943  0.332460  0.053112
  1.369444  0.257943  0.353239  0.054747
  1.450000  0.257943  0.374017  0.056334
  1.530556  0.257943  0.394796  0.057878
  1.611111  0.257943  0.415575  0.059381
  1.691667  0.257943  0.436354  0.060848
  1.772222  0.257943  0.457132  0.062280
  1.852778  0.257943  0.477911  0.063680
  1.933333  0.257943  0.498690  0.065049
  2.013889  0.257943  0.519469  0.066390
  2.094444  0.257943  0.540247  0.067705
  2.175000  0.257943  0.561026  0.068995
  2.255556  0.257943  0.581805  0.070261
  2.336111  0.257943  0.602584  0.071505
  2.416667  0.257943  0.623362  0.072727
  2.497222  0.257943  0.644141  0.073929
  2.577778  0.257943  0.664920  0.075112
  2.658333  0.257943  0.685699  0.076277
  2.738889  0.257943  0.706477  0.077424
  2.819444  0.257943  0.727256  0.078554
  2.900000  0.257943  0.748035  0.079669
  2.980556  0.257943  0.768814  0.080768
  3.061111  0.257943  0.789592  0.086783
  3.141667  0.257943  0.810371  0.097086
  3.222222  0.257943  0.831150  0.103393
  3.302778  0.257943  0.851929  0.108542
  3.383333  0.257943  0.872707  0.113062
  3.463889  0.257943  0.893486  0.117168
  3.544444  0.257943  0.914265  0.120973
  3.625000  0.257943  0.935044  0.124547
  3.705556  0.257943  0.955822  0.127935
  3.786111  0.257943  0.976601  0.131168
  3.866667  0.257943  0.997380  0.134271
  3.947222  0.257943  1.018159  0.137260
  4.027778  0.257943  1.038937  0.140151
  4.108333  0.257943  1.059716  0.142953
```

```
  4.188889  0.257943  1.080495  0.145676
  4.269444  0.257943  1.101274  0.148328
  4.350000  0.257943  1.122052  0.150915
  4.430556  0.257943  1.142831  0.153442
  4.511111  0.257943  1.163610  0.190817
  4.591667  0.257943  1.184389  0.211478
  4.672222  0.257943  1.205167  0.227267
  4.752778  0.257943  1.225946  0.240730
  4.833333  0.257943  1.246725  0.252744
  4.913889  0.257943  1.267504  0.263740
  4.994444  0.257943  1.288282  0.273968
  5.075000  0.257943  1.309061  0.283587
  5.155556  0.257943  1.329840  0.292707
  5.236111  0.257943  1.350619  0.301407
  5.316667  0.257943  1.371397  0.309748
  5.397222  0.257943  1.392176  0.317776
  5.477778  0.257943  1.412955  0.325527
  5.558333  0.257943  1.433734  0.333033
  5.638889  0.257943  1.454512  0.340317
  5.719444  0.257943  1.475291  0.347400
  5.800000  0.257943  1.496070  0.354299
  5.880556  0.257943  1.516849  0.361031
  5.961111  0.257943  1.537627  0.367607
  6.041667  0.257943  1.558406  0.374039
  6.122222  0.257943  1.579185  0.380337
  6.202778  0.257943  1.599964  0.386510
  6.283333  0.257943  1.620742  0.392566
  6.363889  0.257943  1.641521  0.398512
  6.444444  0.257943  1.662300  0.404354
  6.525000  0.257943  1.683079  0.410097
  6.605556  0.257943  1.703857  0.415748
  6.686111  0.257943  1.724636  0.421311
  6.766667  0.257943  1.745415  0.461049
  6.847222  0.257943  1.766194  0.913652
  6.927778  0.257943  1.786972  1.619091
  7.008333  0.257943  1.807751  2.473532
  7.088889  0.257943  1.828530  3.393946
  7.169444  0.257943  1.849308  4.295352
  7.250000  0.257943  1.870087  5.097195
  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    1.2            PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1.2            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   STAGE  1 1        1      WDM   1001 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        2
PERLND     PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    2

  MASS-LINK        3
PERLND     PWATER IFWO       0.083333      RCHRES         INFLOW IVOL
```

```
  END MASS-LINK    3

  MASS-LINK        5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    5

  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13

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

  MASS-LINK       16
RCHRES     ROFLOW                          COPY           INPUT  MEAN
  END MASS-LINK   16


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

Disclaimer

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5.5 Flow Control System

Surface runoff from the site will be routed to one of the two detention vaults, located in Tract A, adjacent to Chain Lake Road. A detailed breakdown of the basin areas can be located in Section 5.2 – Developed Site Hydrology of this report. The facilities have been sized using the WWHM2012 stormwater program, and perform hydraulically separate of one another. Discharges are designed to match developed discharge durations to predeveloped durations for the range of predeveloped discharge rates from 50 percent of the 2-year peak flow up to the full 50-year peak flow. These design calculations are provided within this section of the report.

DETENTION FACILITY	REQUIRED	PROVIDED
North Vault		83,230 CF
North Tank		14,800 CF
South Vault		78,310 CF

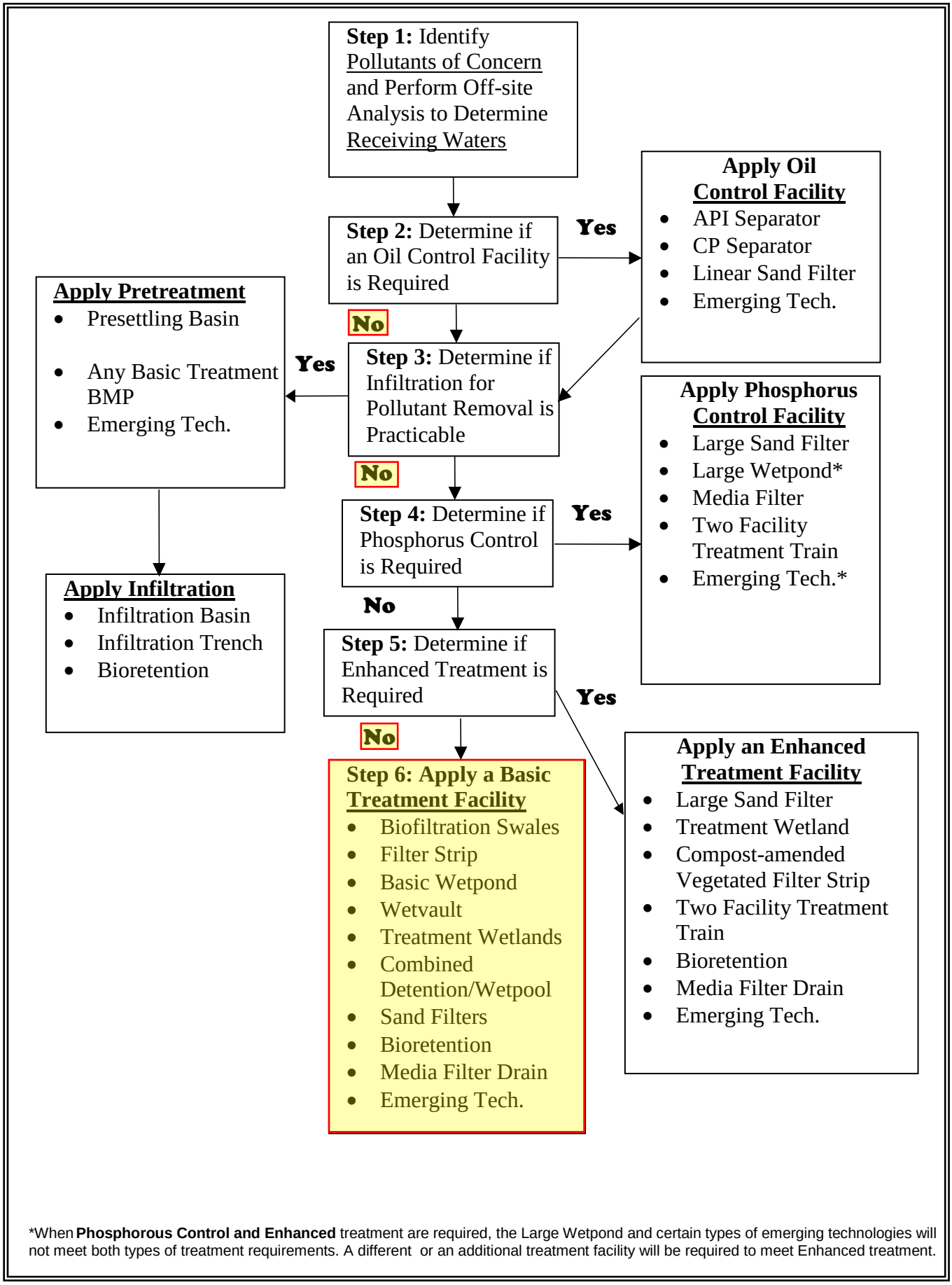

Figure 2.1.1 – Treatment Facility Selection Flow Chart

5.6 Water Quality System

North Basin runoff treatment will be provided by a Baysaver BayFilter Vault. The Baysaver BayFilter sault will be located immediately downstream of the detention tank and have an internal bypass to handle flows over the full 2 year mitigated release rate. The BayFilter Vault has been sized by Advanced Drainage Systems, Inc and is located within this section of the report. Per the WWHM2012 calculations located in Section 5.5 - Flow Control of this report, the water quality flow rate for North Basin is 0.35 cfs.

South Basin runoff treatment will be provided by a Baysaver BayFilter vault. The Baysaver BayFilter vault will be located immediately downstream of the detention vault and have an internal bypass to handle flows over the full 2 year mitigated release rate. The Baysaver BayFilter vault has been sized by Advanced Drainage Systems, Inc and is located within this section of the report. Per the WWHM2012 calculations located in Section 5.5 - Flow Control of this report, the water quality flow rate for North Basin is 0.34 cfs.

5.7 Conveyance System Analysis and Design

The on-site conveyance system will be sized in final engineering using the rational method and Manning's formula for the 25-year storm event.

Tab 6.0

6.0 CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN

The following is a list of the thirteen SWPPP elements and how they will be addressed for this project:

Element #1 - Preserve Vegetation / Mark Clearing Limits: Clearing Limits will be delineated on the engineering plans and will be flagged in the field.

Element #2 - Establish Construction Access: A stabilized gravel construction entrance will be shown on the engineering plans.

Element #3 - Control Flow Rates: A temporary sediment ponds will be shown on the engineering plans. Once the permanent detention facilities are constructed the temporary sediment ponds can be removed. The permanent facilities can be used throughout the remainder of construction.

Element #4 - Install Sediment Controls: Silt fence will be shown on the engineering plans for perimeter protection. In addition, temporary ditches to divert runoff to the sediment pond will be shown on the engineering plans.

Element #5 - Stabilize Soils: Cover measures will be addressed in the TESC notes on the engineering plans.

Element #6 - Protect Slopes: There are no significant slopes onsite, existing or proposed that require additional measures beyond the soil stabilization measures to be shown on the engineering plans.

Element #7 - Protect Permanent Drain Inlets: A detail for catch basin inserts will be shown on the final engineering plans along with a note specifying that they be installed once the permanent storm system is completed. A note will also be included that the contractor shall keep public roadways clear of dirt and debris.

Element #8 - Stabilize Channels and Outlets: Notes regarding outfall protection will be shown on the engineering plans. Temporary ditches shall be armored with rip rap for slopes greater than 5%.

Element #9 - Control Pollutants: A note will be added to the engineering plans that the contractor shall dispose of all pollutants and waste materials in a safe and timely manner.

Element #10 - Control Dewatering: Notes will be added to the engineering plans stating that water in underground utility trenches or low spots are to be routed to the temporary sediment pond via temporary ditches or perforated rock drains.

Element #11 - Maintain Best Management Practices: Once the engineering plans are completed the contractor shall maintain all erosion control measures in accordance with Snohomish County Standards and manufactures recommendations. In addition the contractor shall maintain a stockpile of erosion control materials onsite.

Element #12 - Manage the Project: Once the engineering plans are completed, the clearing, grading, and seasonal work shall be performed in accordance with Snohomish County Code. The contractor shall inspect, maintain, and repair all BMPs as needed to assure continued performance of their intended function. In addition to the engineering plans the contractor will be required to follow and maintain the Construction SWPPP which has been prepared according to Department of Ecology NPDES requirements. The completed SWPPP and TESC Plans will be provided during Final Engineering Review.

Element #13 – Protect Low Impact Development BMPs: Contractor shall keep all heavy equipment off existing soils under LID facilities, i.e. Perforated Stub-Out Connections, that have be excavated to final grade to retain the infiltration rat of the soils.

Tab 7.0

7.0 SPECIAL REPORTS AND STUDIES

This section contains the following information:

7.1 Geotechnical Engineering Study by Earth Solutions NW, LLC. Dated July 30, 2018

Earth Solutions NW LLC

Geotechnical Engineering
Construction Observation/Testing
Environmental Services

GEOTECHNICAL ENGINEERING STUDY
EAGLEMONT 7 PRD
13202 CHAIN LAKE ROAD AND
13107 - 197TH AVENUE SOUTHEAST
MONROE, WASHINGTON

ES-3217.12

1805 - 136th Place N.E., Suite 201 Bellevue, WA 98005
(425) 449-4704 Fax (425) 449-4711
www.earthsolutionsnw.com

PREPARED FOR

MAINVUE WA, LLC

October 3, 2017
Updated July 30, 2018

For: **Bogdan S. Tirtu, G.I.T.**
Staff Geologist

Raymond A. Coglas, P.E.
Principal Engineer

GEOTECHNICAL ENGINEERING STUDY
EAGLEMONT 7 PRD
13202 CHAIN LAKE ROAD AND
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Earth Solutions NW, LLC
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Bellevue, Washington 98005
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www.earthsolutionsnw.com

Important Information About Your

Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

The following information is provided to help you manage your risks.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual

subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

Rely, on Your ASFE-Member Geotechncial Engineer for Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you ASFE-member geotechnical engineer for more information.

ASFE
The Best People on Earth

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IIGER06045.0M

Earth Solutions NW LLC

Geotechnical Engineering, Construction Observation/Testing and Environmental Services

October 3, 2017
Updated July 30, 2018
ES-3217.12

MainVue WA, LLC
1110 – 112th Avenue Northeast, Suite 202
Bellevue, Washington 98004

Attention: Ms. Lisa Cavell

Dear Ms. Cavell:

Earth Solutions NW, LLC (ESNW) is pleased to present this report titled "Geotechnical Engineering Study, Eaglemont 7 PRD, 13202 Chain Lake Road and 13107 – 97th Avenue Southeast, Monroe, Washington". Based on the results of our investigation, the proposed residential development is feasible from a geotechnical standpoint. Our study indicates the site is underlain primarily by competent, dense to very dense glacial till.

Proposed residential structures may be constructed on conventional continuous and spread footing foundations bearing upon competent native soil or new structural fill. In general, competent native soil suitable for support of foundations will likely be encountered beginning at depths of about one to two feet below the existing ground surface. Where loose or unsuitable soil conditions are exposed at foundation subgrade elevations, overexcavation and replacement with suitable structural fill will be necessary.

Recommendations for foundation design, site preparation, drainage, and other pertinent development aspects are provided in this study. We appreciate the opportunity to be of service to you on this project. If you have questions regarding the content of this geotechnical engineering study, please call.

Sincerely,

EARTH SOLUTIONS NW, LLC

For: Bogdan S. Tirtu, G.I.T.
Staff Geologist

1805 - 136th Place N.E., Suite 201 • Bellevue, WA 98005 • (425) 449-4704 • FAX (425) 449-4711

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GEOTECHNICAL ENGINEERING STUDY
EAGLEMONT 7 PRD
13202 CHAIN LAKE ROAD AND
13107 – 197TH AVENUE SOUTHEAST
MONROE, WASHINGTON

ES-3217.12

INTRODUCTION

General

This geotechnical engineering study (study) was prepared for the proposed extension of the Eaglemont residential development to be completed at 13202 Chain Lake Road and 13107 – 97th Avenue Southeast, in Monroe, Washington. The purpose of this study was to provide geotechnical recommendations for the subject property. Our scope of services for completing this study included the following:

- Completing test pits for the purpose of characterizing site soil conditions;
- Laboratory testing of soil samples collected at the test pit locations;
- Conducting engineering analyses; and;
- Preparing this report.

The following documents and maps were reviewed as part of our study preparation:

- Preliminary Plat of Gilmartin, prepared by Harmsen and Associates, Inc., dated November 30, 2015;
- Preliminary Geotechnical Engineering Evaluation, prepared by Nelson Geotechnical Associates, Inc., dated August 27, 2015;
- Preliminary Eaglemont 7 Road and Drainage Plans, prepared by Barghausen Consulting Engineers, Inc., dated January 11, 2018;
- Online Web Soil Survey (WSS) resource, maintained by the Natural Resources Conservation Service under the United States Department of Agriculture;
- Snohomish County Drainage Manual (SCDM), dated January 2016;
- Snohomish County Code (SCC) Chapter 30.62B – Geologically Hazardous Areas;
- Monroe Municipal Code (MMC) Chapter 20.05 – Critical Areas;
- Snohomish County Liquefaction Susceptibility, endorsed by the Washington State Department of Natural Resources, October 2009, and;
- Geologic Map of the Monroe 7.5-minute Quadrangle, King and Snohomish Counties, Washington, by Joe D. Dragovich et al., November 2011.

Project Description

We understand existing structural improvements will be removed, and the site will be redeveloped into a residential subdivision comprised of about 47 single-family lots, a detention vault, and related infrastructure improvements. Site ingress and egress will be provided from the west by 133rd Place Southeast and from the northeast by a new roadway extension connecting to Chain Lake Road. The subject site is comprised of two tax parcels: one is within City of Monroe jurisdiction and the other is within Snohomish County jurisdiction. We anticipate that the northern tax parcel located within Snohomish County jurisdiction will be eventually annexed into the City of Monroe.

A stormwater tract is dedicated in the northeastern property area for installation of a stormwater detention vault. Construction of the proposed stormwater detention facilities in the northeastern site area is feasible from a geotechnical standpoint. Based on our field observations, grade cuts for the detention facilities are likely to expose very dense, undisturbed glacial till. The glacial till is expected to provide excellent support for the excavations necessary to reach subgrade elevations of the proposed detention facilities.

Specific grading and building load plans were not available for review at the time of report submission; however, based on our experience with similar developments, the proposed residential structures will likely be two to three stories in height and constructed using relatively lightly loaded wood framing supported on conventional foundations. Perimeter footing loads will likely be about 1 to 2 kips per lineal foot. Slab-on-grade loading is anticipated to be approximately 150 pounds per square foot (psf).

If the above design assumptions are incorrect or change, ESNW should be contacted to review the recommendations provided in this report. ESNW should review final designs to confirm that appropriate geotechnical recommendations have been incorporated into the plans.

SITE CONDITIONS

Surface

The subject site is located directly southwest of the Brown Road and Chain Lake Road intersection, near the boundary between unincorporated Snohomish County and the City of Monroe, Washington. The approximate location of the subject site is depicted on Plate 1 (Vicinity Map). The property is comprised of two tax parcels (Snohomish County Parcel Numbers 280731-002-023-00 and 280730-003-013-00) totaling approximately 9 acres. The site is currently developed with a vacant, dilapidated single-family residential home with a detached barn structure in the south-central site area and several mobile homes and outdoor structures in the northern site area. The remainder of the site is undeveloped, and vegetation is comprised of trees, shrubs, and grasses.

The site is bordered to the west and south by the Eaglemont residential development and associated improvements, to the north by Chain Lake Road and a single-family residence, and to the east by a single-family residence. Existing topography across the property is gentle, with slopes of about 5 to 10 percent and topographic change of approximately 28 feet.

Subsurface

An ESNW representative initially observed, logged, and sampled six test pits, excavated at accessible locations within Parcel 280731-002-023-00, on September 8, 2017 using a mini trackhoe and operator retaining by our firm. The test pits were completed for purposes of classifying site soils as well as characterizing groundwater conditions within accessible areas of the site. Subsequently, we returned to the site on June 28, 2018 and observed, logged, and sampled five test pits, excavated within Parcel 280730-003-013-00, using a mini trackhoe and operator retained by the client. The approximate locations of the ESNW test pits along with previous test pits completed by Nelson Geotechnical Associates, Inc. in August 2015 are depicted on Plate 2 (Test Pit Location Plan). Please refer to the test pit logs provided in Appendix A for a more detailed description of subsurface conditions. Representative soil samples collected at the test pit locations were analyzed in general accordance with Unified Soil Classification System (USCS) and United States Department of Agriculture (USDA) methods and procedures.

For clarity, all further references to subsurface soil and groundwater conditions will relate to the information collected during the ESNW subsurface explorations completed in September 2017 and June 2018. Although depicted on Plate 2 and included with the attached test pits logs, information collected by Nelson Geotechnical Associates, Inc. in August 2015 will not be referenced.

Topsoil and Fill

Topsoil was generally encountered in the upper 4 to 12 inches below the existing ground surface (bgs) at the test pit locations where native soils were present. The topsoil was characterized by dark brown color, the presence of fine organic material, and small root intrusions. Based on our field observations, we estimate topsoil will be encountered with an average thickness of about eight inches across the site.

Fill was encountered within the northern site area where existing improvements are located. TP-101 through TP-105 encountered about one to five feet of fill prior to transitioning into native material. In general, the deepest fills were encountered abutting Chain Lake Road within TP-101, TP-102, and TP-103. The northern site area includes a benched topography indicating that cuts and fills were utilized on the property to create level pads. The fill consisted of silty sand with gravel (USCS: SM) and contained deleterious material such as plastic bottles, bricks, concrete fragments, glass fragments, asphalt, and plastic sheeting. Due to the historically undisturbed, forested state of the southern site area, we anticipate significant fill deposits will be limited to the northern site area. Where encountered during construction, existing fill containing deleterious materials should be overexcavated to native soil and replaced with structural fill directly beneath structural elements.

Native Soil

Underlying topsoil and fill, native soils were encountered primarily as silty sand with gravel and silty gravel with sand (USCS: SM and GM), respectively, consistent with the typical makeup of glacial till. The upper, loose to medium dense deposits may be characterized as "weathered", and the at-depth, dense to very dense deposits may be characterized as "unweathered". The unweathered glacial till was weakly cemented at the test pit locations. Native soils were observed primarily in a moist condition extending to the maximum exploration depth of approximately seven feet bgs.

Geologic Setting

The referenced geologic map resource identifies Vashon lodgment till (Qgt_v) across the site and surrounding areas. According to the geologic map resource, Vashon lodgment till is primarily grayish blue to very dark gray, dense, and includes a silt-sand matrix containing gravels and cobbles. The material is typically very dense and weakly cemented as a result of glacial overburden during placement. Distinct features of the material are compactness, ability to maintain near-vertical slopes, and a heterogenous and nonsorted internal structure resembling concrete mix.

The referenced WSS resource identifies Tokul gravelly medial loam, with slopes ranging from zero to eight percent (Map Unit Symbol: 72) across the site and surrounding areas. The Tokul series was formed in glacial till plains and is present on hillslopes in the Monroe area. Based on our field observations, native soils likely to be encountered during grading activities will be consistent with the geologic setting of Tokul-series glacial till as outlined in this section.

Groundwater

During our subsurface exploration completed on September 2017 and June 2018, groundwater seepage was not encountered at the test pit locations. However, perched groundwater seeps are common within glacial till depending on the time of year; as such, it is our opinion the contractor should be prepared to respond to discrete zones of perched groundwater during construction. Seepage rates and elevations fluctuate depending on many factors, including precipitation duration and intensity, the time of year, and soil conditions. In general, groundwater flow rates are higher during the winter, spring, and early summer months.

Geologically Hazardous Areas

The subject property was evaluated for the presence of geologically hazardous areas in general accordance with SCC 30.62B and MMC 20.05. Based on our investigation, the site is not located within, or immediately adjacent to, any geologically hazardous areas as defined by the City of Monroe or Snohomish County.

DISCUSSION AND RECOMMENDATIONS

General

Construction of the proposed residential development is feasible from a geotechnical standpoint. The primary geotechnical considerations associated with the proposed development include foundation support, slab-on-grade subgrade support, the suitability of using on-site soils as structural fill, and temporary excavations.

Proposed residential structures may be constructed on conventional continuous and spread footing foundations bearing upon competent native soil or new structural fill. In general, competent native soil suitable for support of foundations will likely be encountered beginning at depths of about one to two feet bgs. Where loose or unsuitable soil conditions are exposed at foundation subgrade elevations, overexcavation and replacement with suitable structural fill, will be necessary.

This study has been prepared for the exclusive use of MainVue WA, LLC and their representatives. No warranty, expressed or implied, is made. This study has been prepared in a manner consistent with the level of care and skill ordinarily exercised by other members of the profession currently practicing under similar conditions in this area.

Site Preparation and Earthwork

Initial site preparation activities will consist of installing temporary erosion control measures, establishing grading limits, performing clearing and site stripping (as necessary), and removing existing structural elements. Subsequent earthwork activities will involve mass site grading and related infrastructure improvements.

Temporary Erosion Control

Prior to the installation of either initial or final pavement sections, temporary construction entrances and drive lanes, consisting of at least 6 to 12 inches of quarry spalls, should be considered to minimize off-site soil tracking and to provide a stable access entrance surface. Geotextile fabric may also be placed below the quarry spalls for greater stability of the temporary construction entrance. Erosion control measures should consist of silt fencing placed around the site perimeter. Soil stockpiles should be covered or otherwise protected to reduce soil erosion. Temporary approaches for controlling surface water runoff should be established prior to beginning earthwork activities. Additional Best Management Practices (BMPs), as specified by the project civil engineer and indicated on the plans, should be incorporated into construction activities. If warranted, erosion measures may be modified during construction, as approved by the site erosion control lead.

Stripping

Topsoil was encountered generally within the upper 4 to 12 inches of existing grades at the test pit locations, where encountered at the surface. ESNW should be retained to observe site stripping activities at the time of construction so that the degree of required stripping may be assessed. Over-stripping should be avoided, as it is unnecessary and may result in increased project development costs. Topsoil and organic-rich soil is neither suitable for foundation support nor for use as structural fill but may be used in non-structural areas, if desired.

Excavations and Slopes

Excavation activities are likely to expose areas of fill transitioning into medium dense to very dense native glacial till deposits. Provided appropriate methods of sloping and shoring (as necessary) for the excavations are incorporated into the design and construction, overall stability of site excavations is anticipated to be good. Based on the soil conditions observed at the test pit locations, the following allowable temporary slope inclinations, as a function of horizontal to vertical (H:V) inclination, may be used. The applicable Federal Occupation Safety and Health Administration (OSHA) and Washington Industrial Safety and Health Act (WISHA) soil classifications are also provided:

- Areas containing groundwater seepage — 1.5H:1V (Type C)
- Areas containing fill — 1.5H:1V (Type C)
- Medium dense soil — 1H:1V (Type B)
- Dense to very dense "hardpan" soil — 0.75H:1V (Type A)

Steeper temporary slope inclinations within dense to very dense "hardpan" glacial till may be feasible based on the soil and groundwater conditions exposed within the excavations. Steeper inclinations may be considered, and must be subsequently approved by ESNW, at the time of construction.

Permanent slopes should be planted with vegetation to enhance stability and to minimize erosion and should maintain a gradient of 2H:1V or flatter. The presence of perched groundwater may cause localized sloughing of temporary slopes due to excess seepage forces. An ESNW representative should observe temporary and permanent slopes to confirm the slope inclinations are suitable for the exposed soil conditions and to provide additional excavation and slope recommendations as necessary. If the recommended temporary slope inclinations cannot be achieved, temporary shoring may be necessary to support excavations.

In-situ and Imported Soils

On-site glacial till soils are moderately moisture sensitive, and successful use as structural fill will largely be dictated by the moisture content at the time of placement and compaction. Remedial measures, such as soil aeration and/or cement treatment (where approved by the local jurisdiction or utility district), may be necessary as part of site grading and earthwork activities. If the on-site soils cannot be successfully compacted, the use of an imported soil may be necessary. In our opinion, a contingency should be provided in the project budget for export of soil that cannot be successfully compacted as structural fill if grading activities take place during periods of extended rainfall activity. Soils with fines contents greater than 5 percent typically degrade rapidly when exposed to periods of rainfall.

Imported soil intended for use as structural fill should consist of a well-graded, granular soil with a moisture content that is at (or slightly above) the optimum level. During wet weather conditions, imported soil intended for use as structural fill should consist of a well-graded, granular soil with a fines content of 5 percent or less (where the fines content is defined as the percent passing the Number 200 sieve, based on the minus three-quarter-inch fraction).

Structural Fill

Structural fill placed and compacted during site grading activities should meet the following specifications and guidelines:

• Structural fill material	Granular soils*
• Moisture content	At or slightly above optimum**
• Relative compaction (minimum)	95 percent (Modified Proctor)
• Loose lift thickness (maximum)	12 inches

* *Existing on-site soils may not be suitable for use as structural fill, unless the soil is at or near the optimum moisture content at the time of placement and compaction*

** *Soils shall not be placed dry of optimum and should be evaluated by ESNW during construction*

With respect to underground utility installations and backfill, local jurisdictions may dictate the soil type(s) and compaction requirements. Areas of fill or otherwise unsuitable material and debris should be removed from structural areas and replaced with structural fill. Topsoil and organic-rich soil is neither suitable for foundation support nor for use as structural fill, but where encountered, may be used in non-structural areas as desired.

Foundations

Proposed residential structures may be supported on conventional continuous and spread footing foundations bearing on competent native soil or suitable structural fill placed on competent native soils. Competent soil suitable for foundation support will likely be encountered beginning at depths of about one to two feet bgs. Where encountered, unstable or yielding areas of the subgrades should be recompacted, or overexcavated and replaced with suitable structural fill, prior to construction of the foundations and/or slabs. Existing fill in the northern site area containing deleterious materials may require overexcavation. Provided foundations will be supported as prescribed, the following parameters may be used for design:

- Allowable soil bearing capacity — 2,500 psf
- Passive earth pressure — 350 pcf (equivalent fluid)
- Coefficient of friction — 0.40

A one-third increase in the allowable soil bearing capacity may be assumed for short-term wind and seismic loading conditions. The above passive pressure and friction values include a factor-of-safety of 1.5. With structural loading as expected, total settlement in the range of one inch and differential settlement of approximately one-half inch is anticipated. The majority of anticipated settlement should occur during construction, as dead loads are applied.

Seismic Design

The 2015 International Building Code recognizes the American Society of Civil Engineers (ASCE) for seismic site class definitions. In accordance with Table 20.3-1 of the ASCE Minimum Design Loads for Buildings and Other Structures manual, Site Class D should be used for design.

The referenced liquefaction susceptibility map indicates the site and surrounding areas maintain very low to low liquefaction susceptibility. Liquefaction is a phenomenon where saturated and loose, sandy soils suddenly lose internal strength and behave as a fluid. This behavior is in response to increased pore water pressures resulting from an earthquake or other intense ground shaking. In our opinion, site susceptibility to liquefaction can be considered negligible. The soil relative density and the absence of a uniformly established, shallow groundwater table were the primary bases for this consideration.

Slab-on-Grade Floors

Each slab-on-grade floor should be supported on a well-compacted, firm and unyielding subgrade. Where feasible, native soils exposed at the slab-on-grade subgrade level can likely be compacted in situ to the specifications of structural fill. Unstable or yielding areas of the subgrade should be recompacted, or overexcavated and replaced with suitable structural fill, prior to construction of the slab.

A capillary break consisting of a minimum of four inches of free-draining crushed rock or gravel should be placed below the slab. The free-draining material should have a fines content of 5 percent or less (where the fines content is defined as the percent passing the Number 200 sieve, based on the minus three-quarter-inch fraction). In areas where slab moisture is undesirable, installation of a vapor barrier below the slab should be considered. If a vapor barrier is to be utilized, it should be a material specifically designed for use as a vapor barrier and should be installed in accordance with the specifications of the manufacturer.

Retaining Walls

Retaining walls must be designed to resist earth pressures and applicable surcharge loads. The following parameters may be used for design:

• Active earth pressure (yielding condition)	35 pcf (equivalent fluid)
• At-rest earth pressure (restrained condition)	50 pcf
• Traffic surcharge (passenger vehicles)	70 psf (rectangular distribution)*
• Passive earth pressure	350 pcf (equivalent fluid)
• Coefficient of friction	0.40
• Seismic surcharge	6H**

* *Where applicable*
** *Where H equals the retained height (in feet)*

The above design parameters are based on a level backfill condition and level grade at the wall toe. Revised design values will be necessary if sloping grades are to be used above or below retaining walls. Additional surcharge loading from adjacent foundations, sloped backfill, or other relevant loads should be included in the retaining wall design.

Retaining walls should be backfilled with free-draining material that extends along the height of the wall and a distance of at least 18 inches behind the wall. The upper 12 inches of the wall backfill may consist of a less permeable soil, if desired. A perforated drainpipe should be placed along the base of the wall and connected to an approved discharge location. A typical retaining wall drainage detail is provided on Plate 3. If drainage is not provided, hydrostatic pressures should be included in the wall design.

Drainage

Temporary measures to control surface water runoff during construction would likely involve passive elements such as interceptor trenches and sumps. ESNW should be consulted during preliminary grading activities to evaluate seepage areas and provide recommendations to reduce the potential for seepage-related instability.

Finish grades should be designed to direct surface water away from structures and slopes. The grade adjacent to buildings should be sloped away from buildings at a gradient of at least 2 percent for a horizontal distance up to 10 feet, or the maximum allowed by adjacent structures. In our opinion, foundation drains should be installed along building perimeter footings. A typical foundation drain detail is provided on Plate 4.

Infiltration Feasibility

As indicated in the *Subsurface* section of this report, native soils encountered at depth during our fieldwork were characterized primarily as dense to very dense glacial till. Based upon the results of USDA textural analyses performed on representative soil samples, native soils may also be classified chiefly as gravelly sandy loam. Irrespective of gravel content, fines contents within the native soil were approximately 30 to 70 percent at the tested locations.

Native glacial till should not be considered an ideal geologic feature for accommodation of infiltration facilities, especially when encountered in a dense, compact state. In general, the glacial till was observed to become weakly cemented "hardpan" at depths approaching three feet bgs. As necessary, ESNW can provide further evaluation of, and recommendations for, stormwater flow control BMPs upon request.

SCDM On-site Stormwater Management

SCC 30.63A.525 requires implementation of on-site stormwater BMPs for proposed developments in accordance with specified thresholds, standards, and lists. The intent of BMP implementation is to infiltrate, disperse, and retain stormwater runoff on site to the extent feasible. We understand the proposed residential development intends to add over 5,000 square feet of new hard surface and therefore must comply with Minimum Requirements (MRs) 1 through 9, as outlined on Pages 15 through 22 of Volume I of the 2016 SCDM. MR 5 concerns on-site stormwater management, and the viability of specific BMPs are to be evaluated for each type of proposed surface. The table below summarizes our evaluation of the required BMPs for MR 5, as outlined in the 2016 SCDM, from a geotechnical standpoint. It is instructed in the 2016 SCDM that BMPs are to be considered in the order listed (from top to bottom) for each surface type, and the first BMP that is determined to be viable should be used. For completeness, however, we have evaluated each listed BMP for the proposed surface types.

BMP	Viable?	Limitations or Infeasibility Criteria
Lawns and Landscaped Areas		
T5.13: Post-construction soil quality and depth (Volume V, Chapter 5)	Yes	None. No steep slopes are present on the site.
Roofs		
T5.30: Full dispersion (Volume V, Chapter 5)	Yes*	No critical areas or steep slopes are present. No flooding or erosion impacts are anticipated. However, adequate vegetative flow paths are likely not available.
T5.10A: Downspout full infiltration systems (Volume III, Chapter 3)	No	Based on our review, depths to hardpan (or other low permeability layer) from final grade and/or bottom of facility elevation will not satisfy minimum specified by SCDM Volume III, 3.1.1.
T5.14A Rain Gardens and T5.14B, T7.30 Bioretention (Volume V, Chapter 7)	No	Based on our review, the minimum one foot of vertical separation from hardpan (impervious layer) would not be feasible per SCDM Volume V, 7.3.
T5.10B: Downspout dispersion systems (Volume III, Chapter 3)	Yes*	No flooding or erosion impacts are anticipated. However, adequate vegetative flow paths are likely not available.
T5.10C: Perforated stub-out connections (Volume III, Chapter 3)	Maybe	Per SCDM Volume III, 3.1.3, trench bottom must be at least one foot above seasonal water level; seasonal water level should be assumed as about one foot above unweathered till (hardpan).
Other Hard Surfaces		
T5.30: Full dispersion (Volume V, Chapter 5)	Yes*	No critical areas and/or buffers are present. No flooding or erosion impacts are anticipated. However, adequate vegetative flow paths are likely not available.
T5.15: Permeable pavement (Volume V, Chapter 5)	No	The unweathered till (hardpan) at depths approaching three feet (existing) would restrict vertical infiltration and create saturated conditions within upper soils. Upper soils should be considered unsuitable for supporting traffic loads unless compacted to a firm and unyielding condition which would effectively create a low-permeability condition for the upper soils.
T5.14A Rain Gardens and T5.14B, T7.30 Bioretention (Volume V, Chapter 7)	No	Based on our review, the minimum one foot of vertical separation from hardpan (impervious layer) would not be feasible per SCDM Volume V, 7.3.
T5.12: Sheet flow dispersion T5.11: Concentrated flow dispersion (Volume V, Chapter 5)	Yes*	No flooding or erosion impacts are anticipated. However, adequate vegetative flow paths are likely not available.

** Viability stated from a geotechnical standpoint and should be determined by site storm designer with respect to setbacks and flow paths*

Preliminary Detention Vault Design

A stormwater detention vault will be constructed along the northeastern property line. Cuts of approximately 4 to 12 feet will be necessary as part of the proposed construction. The vault foundations should be supported directly on very dense, competent glacial till. Should overexcavation(s) be necessary at the vault foundation subgrade elevations, as assessed by ESNW at the time of construction, quarry spalls should be used for grade restoration. The final vault designs must incorporate adequate buffer space from property boundaries such that temporary excavations to construct the vault structures may be successfully completed. Perimeter drains should be installed around the vaults and conveyed to appropriate discharge points. Perched groundwater seepage and related buoyancy influence is not expected to influence the vault design.

The following preliminary design parameters may be used for the vault:

• Allowable soil bearing capacity	5,000 psf (dense glacial till)
• Active earth pressure (unrestrained)	35 pcf
• Active earth pressure (unrestrained, hydrostatic)	80 pcf
• At-rest earth pressure (restrained)	50 pcf
• At-rest earth pressure (restrained, hydrostatic)	95 pcf
• Coefficient of friction	0.40
• Passive earth pressure	350 pcf
• Seismic surcharge	6H*

* *Where H equals the retained height (in feet)*

Vault retaining walls should be backfilled with free-draining material or suitable sheet drainage that extends along the height of the walls. The upper one foot of the wall backfill may consist of a less permeable soil, if desired. Perforated drainpipes should be placed along the bases of the walls and connected to an appropriate discharge location(s). If the elevations of the vault bottoms are such that gravity flow to an outlet is not possible, the portions of the vaults below the drains should be designed to include hydrostatic pressure.

ESNW should observe grading operations for the vault and confirm subgrade conditions prior to concrete forming and pouring. If the soil conditions encountered during construction differ from those anticipated, supplementary recommendations may be provided. ESNW should be contacted to review final vault designs to confirm that appropriate geotechnical parameters have been incorporated.

Preliminary Pavement Sections

Pavement performance is largely related to the condition of the underlying subgrade. To ensure adequate pavement performance, the subgrade should be in a firm and unyielding condition when subjected to proofrolling with a loaded dump truck. Structural fill in pavement areas should be compacted to the specifications previously detailed in this report. Soft, wet, or otherwise unsuitable subgrade areas may still exist after base grading activities. Areas containing unsuitable or yielding subgrade conditions will require remedial measures, such as overexcavation and/or placement of thicker crushed rock or structural fill sections, prior to pavement.

We anticipate new pavement sections will be subjected primarily to passenger vehicle traffic. For lightly loaded pavement areas subjected primarily to passenger vehicles, the following preliminary pavement sections may be considered:

- A minimum of two inches of hot mix asphalt (HMA) placed over four inches of crushed rock base (CRB), or;
- A minimum of two inches of HMA placed over three inches of asphalt treated base (ATB).

For relatively high volume, heavily loaded pavements areas subjected to occasional truck traffic, the following preliminary pavement sections may be considered:

- A minimum of three inches of HMA placed over six inches of CRB, or;
- A minimum of three inches of HMA placed over four inches of ATB.

The HMA, ATB and CRB materials should conform to WSDOT and/or City of Monroe and Snohomish County Road Standards specifications. All soil base material should be compacted to at least 95 percent of the maximum dry density. Final pavement design recommendations can be provided once final traffic loading has been determined. City of Monroe or Snohomish County road standards may supersede the recommendations provided in this report.

An ESNW representative should be requested to observe the subgrade conditions prior to placement of crushed rock or ATB. Supplemental recommendations for achieving subgrade stability and drainage can be provided, as necessary.

Utility Support and Trench Backfill

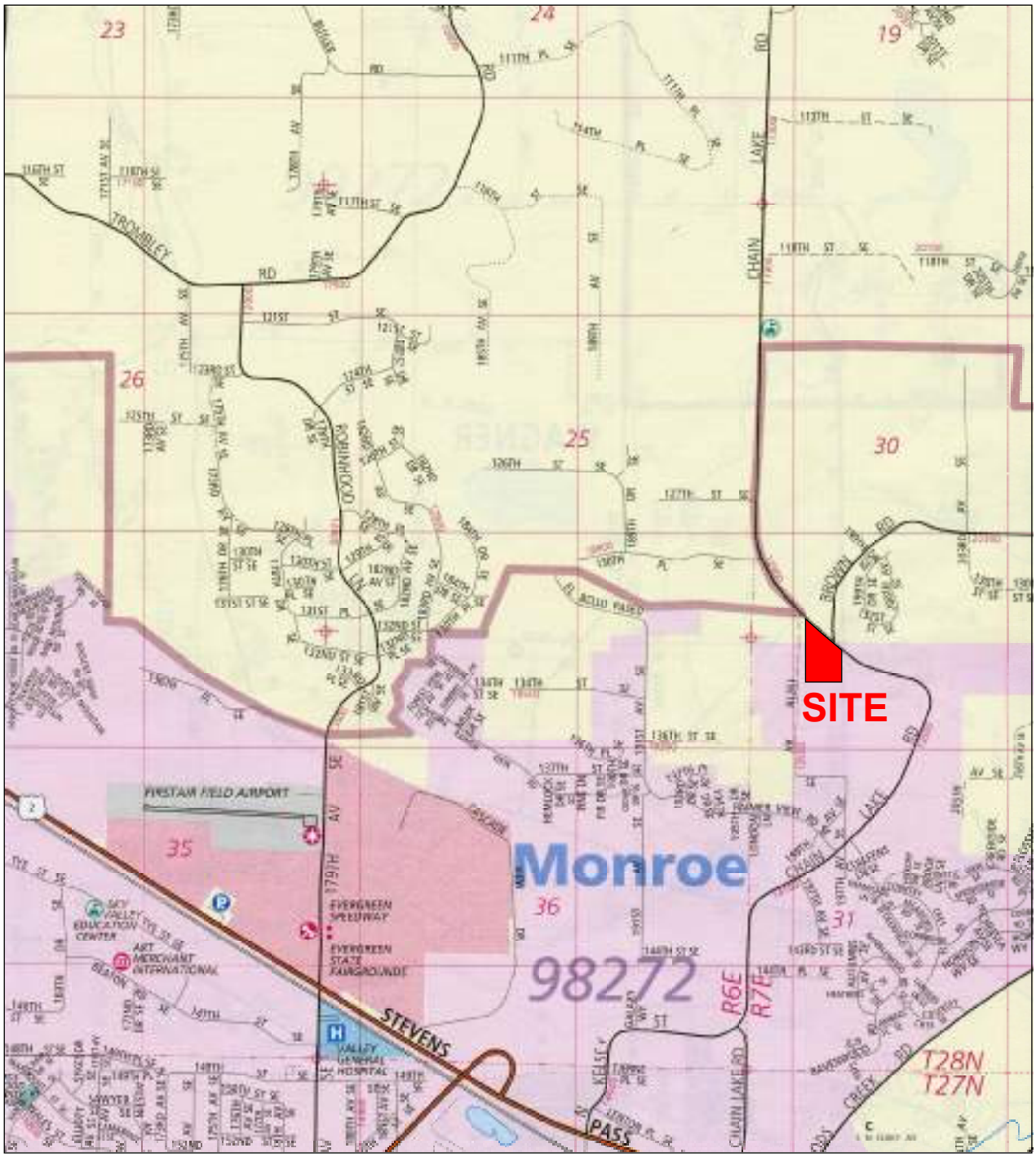
In our opinion, on-site soils will generally be suitable for support of utilities. On-site glacial till soils may be suitable for use as structural backfill throughout utility trench excavations, provided the soil is at (or slightly above) the optimum moisture content at the time of placement and compaction. Moisture conditioning of the soils may be necessary at some locations prior to use as structural fill. Each section of the utility lines must be adequately supported in the bedding material. Utility trench backfill should be placed and compacted to the specifications of structural fill as previously detailed in this report, or to the applicable specifications of the City of Monroe, Snohomish County, or other responsible jurisdiction or agency.

LIMITATIONS

The recommendations and conclusions provided in this study are professional opinions consistent with the level of care and skill that is typical of other members in the profession currently practicing under similar conditions in this area. A warranty is neither expressed nor implied. Variations in the soil and groundwater conditions observed at the test pit locations may exist and may not become evident until construction. ESNW should reevaluate the conclusions provided in this study if variations are encountered.

Additional Services

ESNW should have an opportunity to review final project plans with respect to the geotechnical recommendations provided in this report. ESNW should also be retained to provide testing and consultation services during construction.



Reference:
Snohomish County, Washington
Map 438
By The Thomas Guide
Rand McNally
32nd Edition

NORTH

NOTE: This plate may contain areas of color. ESNW cannot be responsible for any subsequent misinterpretation of the information resulting from black & white reproductions of this plate.

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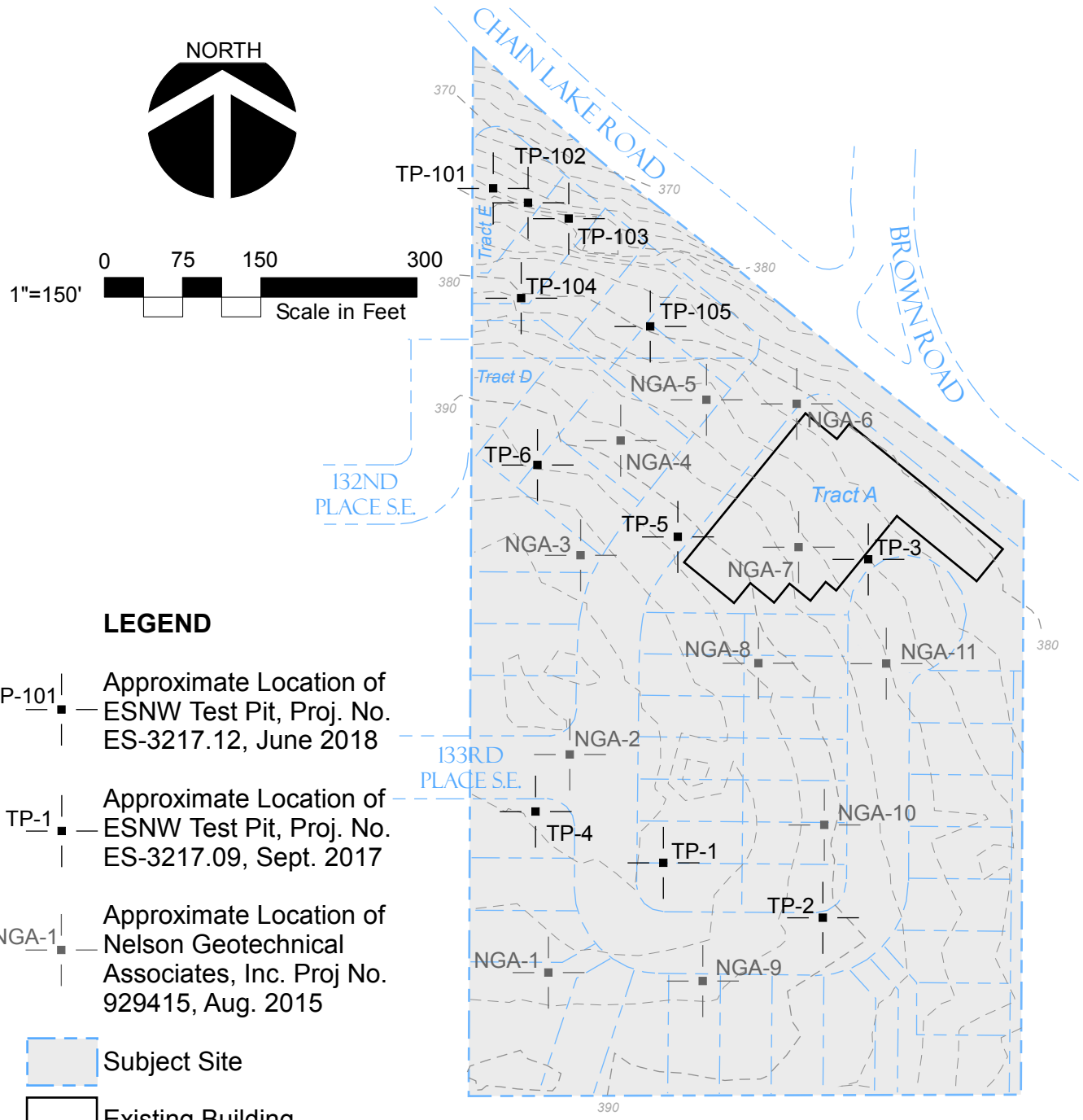
Geotechnical Engineering, Construction Observation/Testing and Environmental Services

Vicinity Map
Eaglemont 7 PRD
Monroe, Washington

Drwn. MRS	Date 07/23/2018	Proj. No. 3217.12
Checked BST	Date July 2018	Plate 1



LEGEND

TP-101 — Approximate Location of ESNW Test Pit, Proj. No. ES-3217.12, June 2018

TP-1 — Approximate Location of ESNW Test Pit, Proj. No. ES-3217.09, Sept. 2017

NGA-1 — Approximate Location of Nelson Geotechnical Associates, Inc. Proj No. 929415, Aug. 2015

Subject Site

Existing Building

NOTE: The graphics shown on this plate are not intended for design purposes or precise scale measurements, but only to illustrate the approximate test locations relative to the approximate locations of existing and / or proposed site features. The information illustrated is largely based on data provided by the client at the time of our study. ESNW cannot be responsible for subsequent design changes or interpretation of the data by others.

NOTE: This plate may contain areas of color. ESNW cannot be responsible for any subsequent misinterpretation of the information resulting from black & white reproductions of this plate.

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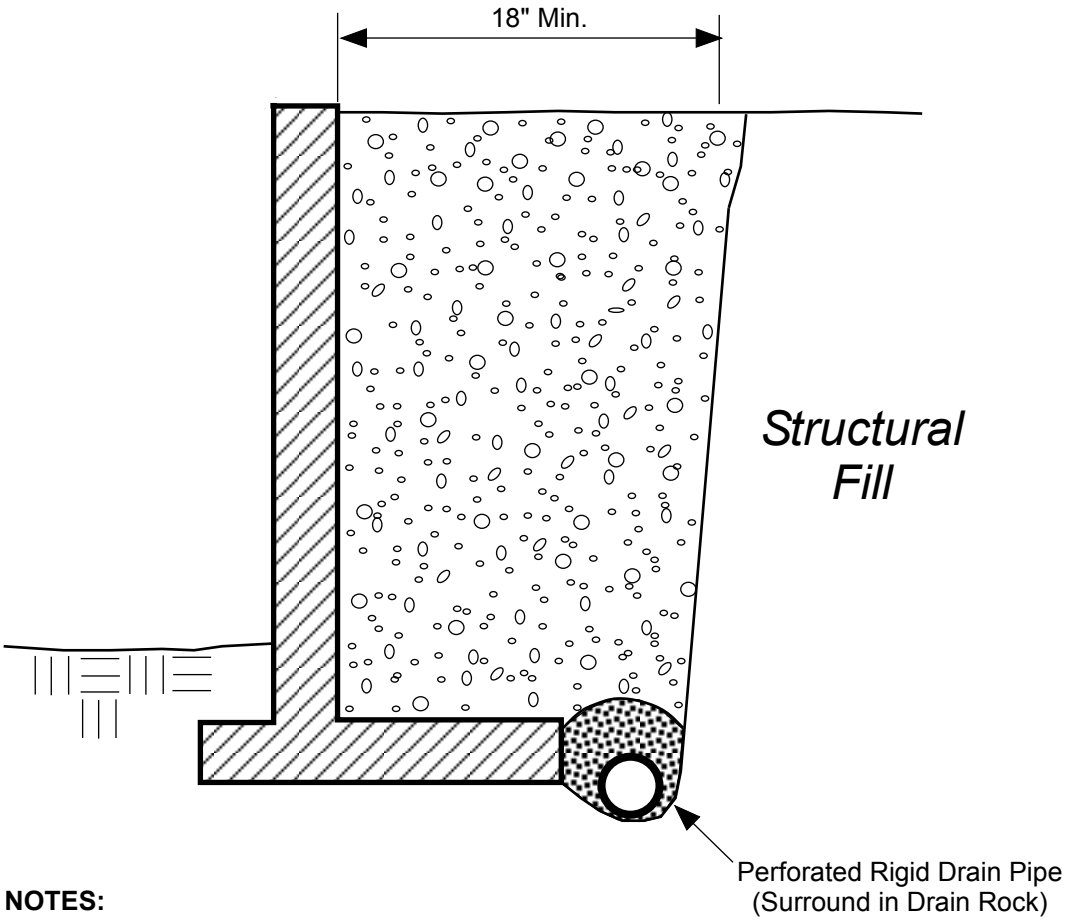
Geotechnical Engineering, Construction Observation/Testing and Environmental Services

Test Pit Location Plan
Eaglemont 7 PRD
Monroe, Washington

Drwn.	MRS	Date	07/24/2018	Proj. No.	3217.12
Checked	BST	Date	July 2018	Plate	2



NOTES:

- Free-draining Backfill should consist of soil having less than 5 percent fines. Percent passing No. 4 sieve should be 25 to 75 percent.
- Sheet Drain may be feasible in lieu of Free-draining Backfill, per ESNW recommendations.
- Drain Pipe should consist of perforated, rigid PVC Pipe surrounded with 1-inch Drain Rock.

SCHEMATIC ONLY - NOT TO SCALE
NOT A CONSTRUCTION DRAWING

LEGEND:

Free-draining Structural Backfill

1-inch Drain Rock

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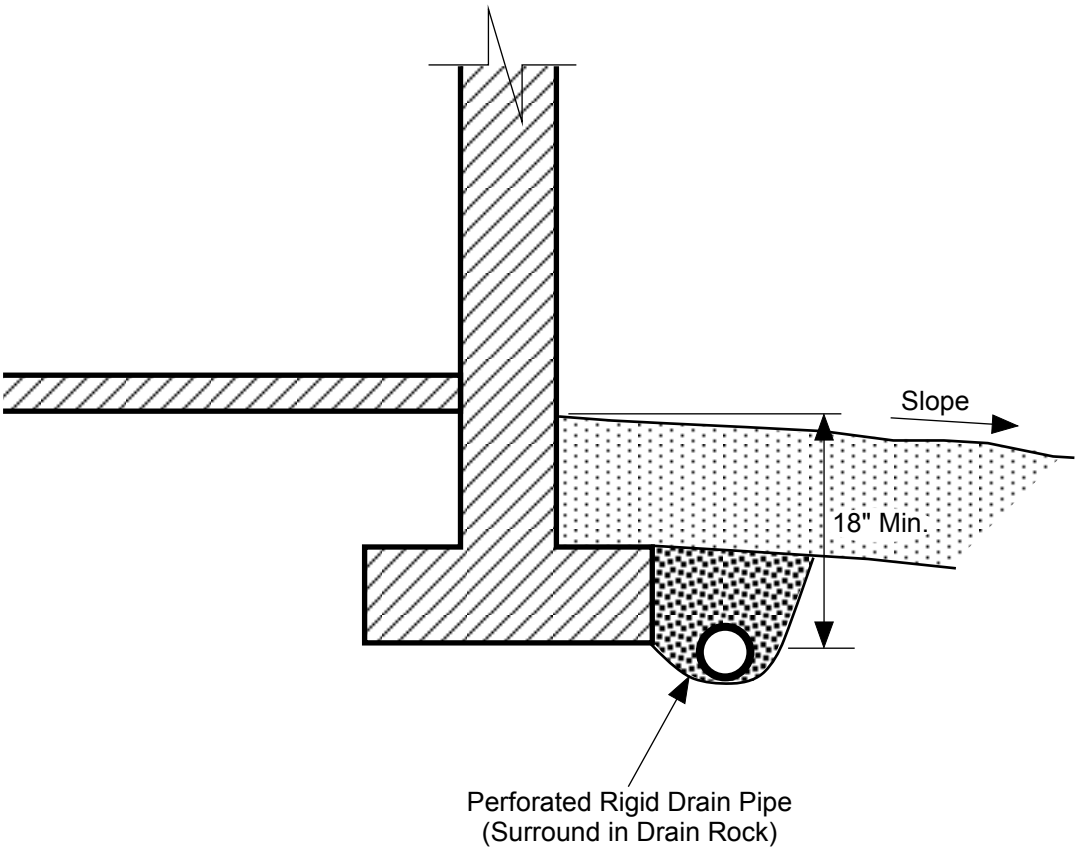
Retaining Wall Drainage Detail
Eaglemont 7 PRD
Monroe, Washington

Drwn. MRS	Date 07/23/2018	Proj. No. 3217.12
Checked BST	Date July 2018	Plate 3



NOTES:

- Do NOT tie roof downspouts to Footing Drain.
- Surface Seal to consist of 12" of less permeable, suitable soil. Slope away from building.

SCHEMATIC ONLY - NOT TO SCALE
NOT A CONSTRUCTION DRAWING

LEGEND:

Surface Seal: native soil or other low-permeability material.

1-inch Drain Rock

Earth Solutions NW LLC
Geotechnical Engineering, Construction Observation/Testing and Environmental Services

Footing Drain Detail
Eaglemont 7 PRD
Monroe, Washington

Drwn.	MRS	Date	07/23/2018	Proj. No.	3217.12
Checked	BST	Date	July 2018	Plate	4

Appendix A

Subsurface Exploration
Test Pit Logs by ESNW
Test Pit Logs by Others

ES-3217.12

Subsurface conditions at the subject site were explored on September 8, 2017 by excavating six test pits using a mini trackhoe and operator retained by our firm. We returned to the site on June 28, 2018 to explore subsurface conditions in the northern site area by excavating five test pits using a mini trackhoe and operator retained by the client. The approximate locations of the subsurface exploration test pits, as well as test pits previously completed by Nelson Geotechnical Associates, Inc., are illustrated on Plate 2 of this study. The subsurface test pit logs are provided in this Appendix. The test pits were advanced to a maximum depth of approximately seven feet bgs.

The final logs represent the interpretations of the field logs and the results of laboratory analyses. The stratification lines on the logs represent the approximate boundaries between soil types. In actuality, the transitions may be more gradual.

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SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

DUAL SYMBOLS are used to indicate borderline soil classifications.

The discussion in the text of this report is necessary for a proper understanding of the nature of the material presented in the attached logs.

Earth Solutions NW
1805 - 136th Place N.E., Suite 201
Bellevue, Washington 98005
Telephone: 425-449-4704
Fax: 425-449-4711

TEST PIT NUMBER TP-101

PROJECT NUMBER ES-3712.12 **PROJECT NAME** Eaglemont 7 PRD

DATE STARTED 6/28/18 **COMPLETED** 6/28/18 **GROUND ELEVATION** 366 ft **TEST PIT SIZE**

EXCAVATION CONTRACTOR Universal Land **GROUND WATER LEVELS:**

EXCAVATION METHOD **AT TIME OF EXCAVATION** ---

LOGGED BY BST **CHECKED BY** KDH **AT END OF EXCAVATION** ---

NOTES Surface Conditions: brambles **AFTER EXCAVATION** ---

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0					Dark brown silty SAND with gravel, loose to medium dense, moist (Fill)	
					-brick, concrete fragments	
					-glass fragments	
					-plastic bottles	
		MC = 23.90%	Fill		-increasing silt content, becomes gray	
		MC = 24.70%				
5				5.0	-relic topsoil horizon	361.0
					Brown sandy SILT with gravel, medium dense, moist	
					-scattered cobbles	
			ML		-becomes gray, dense, weakly cemented	
		MC = 39.70%		7.0	[USDA Classification: slightly gravelly LOAM]	359.0
		Fines = 69.10%			Test pit terminated at 7.0 feet below existing grade. No groundwater encountered during excavation. No caving observed.	
					Bottom of test pit at 7.0 feet.	

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TEST PIT NUMBER TP-102

PROJECT NUMBER ES-3712.12 **PROJECT NAME** Eaglemont 7 PRD

DATE STARTED 6/28/18 **COMPLETED** 6/28/18 **GROUND ELEVATION** 364 ft **TEST PIT SIZE**

EXCAVATION CONTRACTOR Universal Land **GROUND WATER LEVELS:**

EXCAVATION METHOD **AT TIME OF EXCAVATION** ---

LOGGED BY BST **CHECKED BY** KDH **AT END OF EXCAVATION** ---

NOTES Surface Conditions: brambles **AFTER EXCAVATION** ---

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0					Gray silty SAND with gravel, loose to medium dense, moist (Fill)	
					-recycled concrete, styrofoam	
					-asphalt fragments, tin can, glass fragments	
					-plastic sheeting	
			Fill			
				4.5	-relic topsoil horizon	359.5
5		MC = 23.60% MC = 19.90%	SM	5.0	Brown silty SAND with gravel, medium dense, moist -scattered cobbles	359.0

Test pit terminated at 5.0 feet below existing grade. No groundwater encountered during excavation. No caving observed.

Bottom of test pit at 5.0 feet.

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TEST PIT NUMBER TP-103

PROJECT NUMBER ES-3712.12 **PROJECT NAME** Eaglemont 7 PRD

DATE STARTED 6/28/18 **COMPLETED** 6/28/18 **GROUND ELEVATION** 364 ft **TEST PIT SIZE**

EXCAVATION CONTRACTOR Universal Land **GROUND WATER LEVELS:**

EXCAVATION METHOD **AT TIME OF EXCAVATION** ---

LOGGED BY BST **CHECKED BY** KDH **AT END OF EXCAVATION** ---

NOTES Surface Conditions: brambles **AFTER EXCAVATION** ---

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0					Brown silty SAND with gravel, loose to medium dense, moist (Fiil)	
					-scattered cobbles	
					-continuous concrete fragment	
		MC = 16.00%	Fill		-plastic sheeting	
				4.0	-relic topsoil horizon	360.0
					Brown silty SAND with gravel, medium dense, moist	
5					-scattered cobbles	
			SM			
		MC = 43.50%		6.5	-becomes gray, dense, weakly cemented	357.5
					Test pit terminated at 6.5 feet below existing grade. No groundwater encountered during excavation. No caving observed.	
					Bottom of test pit at 6.5 feet.	

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TEST PIT NUMBER TP-104

PROJECT NUMBER ES-3712.12 **PROJECT NAME** Eaglemont 7 PRD

DATE STARTED 6/28/18 **COMPLETED** 6/28/18 **GROUND ELEVATION** 380 ft **TEST PIT SIZE**

EXCAVATION CONTRACTOR Universal Land **GROUND WATER LEVELS:**

EXCAVATION METHOD **AT TIME OF EXCAVATION** ---

LOGGED BY BST **CHECKED BY** KDH **AT END OF EXCAVATION** ---

NOTES Depth of Topsoil & Sod 12": grass **AFTER EXCAVATION** ---

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0			TPSL		Dark brown TOPSOIL (Fill) -tin can, plastic bag, glass fragments	379.0
1.0			ML		Brown sandy SILT with gravel, medium dense, moist -scattered cobbles [USDA Classification: slightly gravelly LOAM] -becomes gray, dense to very dense, weakly cemented	375.5
4.5		MC = 27.40% Fines = 69.20% MC = 11.40%			Test pit terminated at 4.5 feet below existing grade. No groundwater encountered during excavation. No caving observed. Bottom of test pit at 4.5 feet.	

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TEST PIT NUMBER TP-105

PROJECT NUMBER ES-3712.12 **PROJECT NAME** Eaglemont 7 PRD

DATE STARTED 6/28/18 **COMPLETED** 6/28/18 **GROUND ELEVATION** 380 ft **TEST PIT SIZE**

EXCAVATION CONTRACTOR Universal Land **GROUND WATER LEVELS:**

EXCAVATION METHOD **AT TIME OF EXCAVATION** ---

LOGGED BY BST **CHECKED BY** KDH **AT END OF EXCAVATION** ---

NOTES Depth of Topsoil & Sod 18": grass **AFTER EXCAVATION** ---

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0						
			TPSL		Dark brown TOPSOIL (Fill) -glass fragments, aluminum cans -lens of silty gravel with sand -relic topsoil horizon	378.5
1.5						
		MC = 36.80%	SM		Brown silty SAND with gravel, medium dense, moist -scattered cobbles	
		MC = 21.50%			-becomes gray, dense to very dense, weakly cemented -light iron oxide staining	
5		MC = 11.30% Fines = 47.70%			[USDA Classification: gravelly LOAM]	375.0
5.0					Test pit terminated at 5.0 feet below existing grade. No groundwater encountered during excavation. No caving observed. Bottom of test pit at 5.0 feet.	

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TEST PIT NUMBER TP-1

CLIENT MainVue WA, LLC
PROJECT NAME Gilmartin Farms
PROJECT NUMBER ES-3217.09
PROJECT LOCATION Monroe, Washington
DATE STARTED 9/8/17 **COMPLETED** 9/8/17
GROUND ELEVATION 397 ft **TEST PIT SIZE**
EXCAVATION CONTRACTOR NW Excavating
GROUND WATER LEVELS:
EXCAVATION METHOD
AT TIME OF EXCAVATION ---
LOGGED BY BST **CHECKED BY** RAC
AT END OF EXCAVATION ---
NOTES Depth of Topsoil & Sod 4": brambles
AFTER EXCAVATION ---

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0			TPSL		0.4 Dark brown TOPSOIL, roots to 2'	396.6
			SM		Brown silty SAND with gravel, medium dense, damp (Weathered Till) -scattered cobbles to BOH 2.0	395.0
		MC = 13.60% MC = 4.60% Fines = 34.30% MC = 8.40%	GM		Gray silty GRAVEL with sand, very dense, moist (Unweathered Till) -weakly cemented [USDA Classification: very gravelly LOAM] 6.0	391.0
5		MC = 9.20%			Test pit terminated at 6.0 feet below existing grade. No groundwater encountered during excavation. No caving observed. Bottom of test pit at 6.5 feet.	

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Bellevue, Washington 98005
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Fax: 425-449-4711

TEST PIT NUMBER TP-2

CLIENT MainVue WA, LLC
PROJECT NAME Gilmartin Farms
PROJECT NUMBER ES-3217.09
PROJECT LOCATION Monroe, Washington
DATE STARTED 9/8/17 **COMPLETED** 9/8/17
GROUND ELEVATION 390 ft **TEST PIT SIZE**
EXCAVATION CONTRACTOR NW Excavating
GROUND WATER LEVELS:
EXCAVATION METHOD
AT TIME OF EXCAVATION ---
LOGGED BY BST **CHECKED BY** RAC
AT END OF EXCAVATION ---
NOTES Depth of Topsoil & Sod 12": grass
AFTER EXCAVATION ---

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0			TPSL		Dark brown TOPSOIL, roots to 2.5'	
1.0						389.0
		MC = 25.70%	SM		Brown silty SAND with gravel, medium dense, damp (Weathered Till) -scattered cobbles to BOH	
2.5						387.5
		MC = 6.60% MC = 12.60%	GM		Gray silty GRAVEL with sand, very dense, moist (Unweathered Till) -weakly cemented -light iron oxide staining	
4.0						386.0
					Test pit terminated at 4.0 feet below existing grade. No groundwater encountered during excavation. No caving observed. Bottom of test pit at 4.0 feet.	

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TEST PIT NUMBER TP-3

CLIENT MainVue WA, LLC
PROJECT NAME Gilmartin Farms
PROJECT NUMBER ES-3217.09
PROJECT LOCATION Monroe, Washington
DATE STARTED 9/8/17 **COMPLETED** 9/8/17
GROUND ELEVATION 384 ft **TEST PIT SIZE**
EXCAVATION CONTRACTOR NW Excavating
GROUND WATER LEVELS:
EXCAVATION METHOD
AT TIME OF EXCAVATION —
LOGGED BY BST **CHECKED BY** RAC
AT END OF EXCAVATION —
NOTES Depth of Topsoil & Sod 10": brambles
AFTER EXCAVATION —

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0			TPSL		Dark brown TOPSOIL, roots to 2'	
				0.8		383.2
			SM		Brown silty SAND with gravel, medium dense, damp (Weathered Till)	
		MC = 19.00%			-scattered cobbles to BOH	
		MC = 6.90%			-becomes gray, moist, weakly cemented -becomes dense to very dense (unweathered till)	
5					-increasing cobbles	
		MC = 8.80%			-becomes moderately cemented	
		MC = 9.10% Fines = 38.60%		7.0	[USDA Classification: gravelly sandy LOAM]	377.0
					Test pit terminated at 7.0 feet below existing grade. No groundwater encountered during excavation. No caving observed. Bottom of test pit at 7.0 feet.	

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TEST PIT NUMBER TP-4

CLIENT MainVue WA, LLC
PROJECT NAME Gilmartin Farms
PROJECT NUMBER ES-3217.09
PROJECT LOCATION Monroe, Washington
DATE STARTED 9/8/17 **COMPLETED** 9/8/17
GROUND ELEVATION 396 ft **TEST PIT SIZE**
EXCAVATION CONTRACTOR NW Excavating
GROUND WATER LEVELS:
EXCAVATION METHOD
AT TIME OF EXCAVATION ---
LOGGED BY BST **CHECKED BY** RAC
AT END OF EXCAVATION ---
NOTES Depth of Topsoil & Sod 8": grass
AFTER EXCAVATION —

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0			TPSL		Dark brown TOPSOIL, roots to 2.5'	
				0.6		395.4
			ML		Brown sandy SILT with gravel, medium dense, damp (Weathered Till)	
		MC = 16.30% Fines = 62.30%			-scattered cobbles to BOH [USDA Classification: gravelly LOAM]	
				2.5		393.5
		MC = 6.30%	GM		Gray silty GRAVEL with sand, very dense, moist (Unweathered Till) -weakly cemented	
5						
		MC = 7.80%		6.0		390.0
					Test pit terminated at 6.0 feet below existing grade. No groundwater encountered during excavation. No caving observed. Bottom of test pit at 6.0 feet.	

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TEST PIT NUMBER TP-5

CLIENT MainVue WA, LLC
PROJECT NAME Gilmartin Farms
PROJECT NUMBER ES-3217.09
PROJECT LOCATION Monroe, Washington
DATE STARTED 9/8/17 **COMPLETED** 9/8/17
GROUND ELEVATION 390 ft **TEST PIT SIZE**
EXCAVATION CONTRACTOR NW Excavating
GROUND WATER LEVELS:
EXCAVATION METHOD
AT TIME OF EXCAVATION ---
LOGGED BY BST **CHECKED BY** RAC
AT END OF EXCAVATION —
NOTES Depth of Topsoil & Sod 6": brambles
AFTER EXCAVATION —

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0			TPSL		0.5 Dark brown TOPSOIL, roots to 2.5'	389.5
		MC = 15.10%	SM		Brown silty SAND with gravel, medium dense, damp (Weathered Till) -scattered cobbles to BOH	
					2.5	387.5
		MC = 4.30% Fines = 32.40%	GM		Gray silty GRAVEL with sand, very dense, moist (Unweathered Till) -weakly cemented [USDA Classification: very gravelly LOAM]	
5					-becomes moderately cemented	
		MC = 3.60%			6.0	384.0
					Test pit terminated at 6.0 feet below existing grade. No groundwater encountered during excavation. No caving observed. Bottom of test pit at 6.0 feet.	

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TEST PIT NUMBER TP-6

CLIENT MainVue WA, LLC
PROJECT NAME Gilmartin Farms
PROJECT NUMBER ES-3217.09
PROJECT LOCATION Monroe, Washington
DATE STARTED 9/8/17 **COMPLETED** 9/8/17
GROUND ELEVATION 391 ft **TEST PIT SIZE**
EXCAVATION CONTRACTOR NW Excavating
GROUND WATER LEVELS:
EXCAVATION METHOD
AT TIME OF EXCAVATION —
LOGGED BY BST **CHECKED BY** RAC
AT END OF EXCAVATION —
NOTES Depth of Topsoil & Sod 10": brambles
AFTER EXCAVATION —

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0			TPSL		Dark brown TOPSOIL, roots to 2.5'	
				0.8		390.2
		MC = 12.50%	SM		Brown silty SAND with gravel, medium dense, damp (Weathered Till) -scattered cobbles to BOH	
		MC = 6.30%		2.5		388.5
			GM		Gray silty GRAVEL with sand, very dense, moist (Unweathered Till) -weakly cemented	
5					-becomes moderately cemented	
		MC = 8.80%		6.0		385.0
					Test pit terminated at 6.0 feet below existing grade. No groundwater encountered during excavation. No caving observed. Bottom of test pit at 6.0 feet.	

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOL	GROUP NAME
COARSE - GRAINED SOILS MORE THAN 50 % RETAINED ON NO. 200 SIEVE	GRAVEL MORE THAN 50 % OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVEL	GW	WELL-GRADED, FINE TO COARSE GRAVEL
			GP	POORLY-GRADED GRAVEL
		GRAVEL WITH FINES	GM	SILTY GRAVEL
			GC	CLAYEY GRAVEL
	SAND MORE THAN 50 % OF COARSE FRACTION PASSES NO. 4 SIEVE	CLEAN SAND	SW	WELL-GRADED SAND, FINE TO COARSE SAND
			SP	POORLY GRADED SAND
		SAND WITH FINES	SM	SILTY SAND
			SC	CLAYEY SAND
FINE - GRAINED SOILS MORE THAN 50 % PASSES NO. 200 SIEVE	SILT AND CLAY LIQUID LIMIT LESS THAN 50 %	INORGANIC	ML	SILT
			CL	CLAY
		ORGANIC	OL	ORGANIC SILT, ORGANIC CLAY
	SILT AND CLAY LIQUID LIMIT 50 % OR MORE	INORGANIC	MH	SILT OF HIGH PLASTICITY, ELASTIC SILT
			CH	CLAY OF HIGH PLASTICITY, FLAT CLAY
		ORGANIC	OH	ORGANIC CLAY, ORGANIC SILT
HIGHLY ORGANIC SOILS			PT	PEAT

NOTES:

1) Field classification is based on visual examination of soil in general accordance with ASTM D 2488-93.

2) Soil classification using laboratory tests is based on ASTM D 2488-93.

3) Descriptions of soil density or consistency are based on interpretation of blowcount data, visual appearance of soils, and/or test data.

SOIL MOISTURE MODIFIERS:

Dry - Absence of moisture, dusty, dry to the touch

Moist - Damp, but no visible water.

Wet - Visible free water or saturated, usually soil is obtained from below water table

Project Number 929415	Leighty Development Soil Classification Chart	NELSON GEOTECHNICAL ASSOCIATES, INC. NGA GEOTECHNICAL ENGINEERS & GEOLOGISTS	No.	Date	Revision	By	CK
Figure 3		17311-135th Ave. NE, A-500 Woodinville, WA 98072 (425) 486-1669 / Fax 481-2510; Snohomish County (425) 337-1669; Wenatchee/Chelan (509) 665-7698; www.nelsongeotech.com	1	8/5/15	Original	DPN	LSB

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LOG OF EXPLORATION

DEPTH (FEET)	USC	SOIL DESCRIPTION
TEST PIT ONE		
0.0 – 1.0		**TOPSOIL**
1.0 – 2.5	SM	BROWN-GRAY, SILTY FINE TO MEDIUM SAND WITH GRAVEL (MEDIUM DENSE TO DENSE, MOIST)
2.5 – 4.5	SM	GRAY, SILTY FINE TO MEDIUM SAND WITH GRAVEL AND COBBLES (VERY DENSE, MOIST)
		SAMPLE WAS COLLECTED AT 2.5 FEET GROUNDWATER SEEPAGE WAS NOT ENCOUNTERED TEST PIT CAVING WAS NOT ENCOUNTERED TEST PIT MET REFUSAL AT 4.5 FEET ON 7/27/15
TEST PIT TWO		
0.0 – 0.5		**TOPSOIL**
0.5 – 3.5	SM	BROWN-GRAY, SILTY FINE TO MEDIUM SAND WITH GRAVEL (MEDIUM DENSE TO DENSE, MOIST)
3.5 – 7.5	SM	GRAY, SILTY FINE TO MEDIUM SAND WITH GRAVEL (DENSE, MOIST)
		SAMPLES WERE COLLECTED AT 3.0, 3.5, AND 7.0 FEET GROUNDWATER SEEPAGE WAS NOT ENCOUNTERED TEST PIT CAVING WAS NOT ENCOUNTERED TEST PIT WAS COMPLETED AT 7.5 FEET ON 7/27/15
TEST PIT THREE		
0.0 – 0.5		**TOPSOIL**
0.5 – 3.0	SM	BROWN-GRAY, SILTY FINE TO MEDIUM SAND WITH GRAVEL (MEDIUM DENSE TO DENSE, MOIST)
3.0 – 6.0	SM	GRAY, SILTY FINE TO MEDIUM SAND WITH GRAVEL AND COBBLES (DENSE, MOIST)
		SAMPLE WAS COLLECTED AT 3.0 FEET GROUNDWATER SEEPAGE WAS NOT ENCOUNTERED TEST PIT CAVING WAS NOT ENCOUNTERED TEST PIT WAS COMPLETED AT 6.0 FEET ON 7/27/15
TEST PIT FOUR		
0.0 – 0.5		**TOPSOIL**
0.5 – 3.0	SM	BROWN-GRAY, SILTY FINE TO MEDIUM SAND WITH GRAVEL (MEDIUM DENSE TO DENSE, MOIST)
3.0 – 5.5	SM	GRAY, SILTY FINE TO MEDIUM SAND WITH GRAVEL AND COBBLES (DENSE TO VERY DENSE, MOIST)
		SAMPLE WAS COLLECTED AT 3.0 FEET GROUNDWATER SEEPAGE WAS NOT ENCOUNTERED TEST PIT CAVING WAS NOT ENCOUNTERED TEST PIT WAS COMPLETED AT 5.5 FEET ON 7/27/15
TEST PIT FIVE		
0.0 – 0.5		**TOPSOIL**
0.5 – 3.5	SM	BROWN-GRAY, SILTY FINE TO MEDIUM SAND WITH GRAVEL (MEDIUM DENSE TO DENSE, MOIST)
3.5 – 5.5	SM	GRAY, SILTY FINE TO MEDIUM SAND WITH GRAVEL AND COBBLES (DENSE TO VERY DENSE, MOIST)
		SAMPLE WAS COLLECTED AT 4.5 FEET GROUNDWATER SEEPAGE WAS NOT ENCOUNTERED TEST PIT CAVING WAS NOT ENCOUNTERED TEST PIT WAS COMPLETED AT 5.5 FEET ON 7/27/15

LOG OF EXPLORATION

DEPTH (FEET)	USC	SOIL DESCRIPTION
TEST PIT SIX		
0.0 – 1.0		**TOPSOIL**
1.0 – 3.5	SM	BROWN-GRAY, SILTY FINE TO MEDIUM SAND WITH GRAVEL (MEDIUM DENSE TO DENSE, MOIST)
3.5 – 8.0	SM	GRAY, SILTY FINE TO MEDIUM SAND WITH GRAVEL, COBBLES, AND IRON-OXIDE STAINING (DENSE TO VERY DENSE, MOIST)
		SAMPLES WERE COLLECTED AT 2.0, 4.5, 6.0, AND 7.5 FEET GROUNDWATER SEEPAGE WAS NOT ENCOUNTERED TEST PIT CAVING WAS NOT ENCOUNTERED TEST PIT WAS COMPLETED AT 8.0 FEET ON 7/27/15
TEST PIT SEVEN		
0.0 – 2.5		DARK BROWN, SILTY FINE TO MEDIUM SAND WITH GRAVEL, DEBRIS AND ORGANICS (LOOSE, MOIST) **(FILL)**
2.5 – 4.5	SM	BROWN-GRAY, SILTY FINE TO MEDIUM SAND WITH GRAVEL (MEDIUM DENSE TO DENSE, MOIST)
4.5 – 6.5	SM	GRAY, SILTY FINE TO MEDIUM SAND WITH GRAVEL AND COBBLES (DENSE TO VERY DENSE, MOIST)
		SAMPLE WAS COLLECTED AT 5.0 FEET GROUNDWATER SEEPAGE WAS NOT ENCOUNTERED TEST PIT CAVING WAS NOT ENCOUNTERED TEST PIT WAS COMPLETED AT 6.5 FEET ON 7/27/15
TEST PIT EIGHT		
0.0 – 1.0		**TOPSOIL**
1.0 – 3.0	SM	BROWN-GRAY, SILTY FINE TO MEDIUM SAND WITH GRAVEL (MEDIUM DENSE TO DENSE, MOIST)
3.0 – 6.5	SM	GRAY, SILTY FINE TO MEDIUM SAND WITH GRAVEL AND COBBLES (DENSE TO VERY DENSE, MOIST)
		SAMPLES WERE COLLECTED AT 2.0 AND 5.0FEET GROUNDWATER SEEPAGE WAS NOT ENCOUNTERED TEST PIT CAVING WAS NOT ENCOUNTERED TEST PIT WAS COMPLETED AT 6.5 FEET ON 7/27/15
TEST PIT NINE		
0.0 – 0.5		**TOPSOIL**
0.5 – 3.0	SM	BROWN-GRAY, SILTY FINE TO MEDIUM SAND WITH GRAVEL (MEDIUM DENSE TO DENSE, MOIST)
3.0 – 6.0	SM	GRAY, SILTY FINE TO MEDIUM SAND WITH GRAVEL AND COBBLES (DENSE TO VERY DENSE, MOIST)
		SAMPLE WAS COLLECTED AT 4.5 FEET GROUNDWATER SEEPAGE WAS NOT ENCOUNTERED TEST PIT CAVING WAS NOT ENCOUNTERED TEST PIT WAS COMPLETED AT 6.0 FEET ON 7/27/15

LOG OF EXPLORATION

DEPTH (FEET)	USC	SOIL DESCRIPTION
TEST PIT TEN		
0.0 – 0.5		**TOPSOIL**
0.5 – 2.5	SM	BROWN-GRAY, SILTY FINE TO MEDIUM SAND WITH GRAVEL (MEDIUM DENSE TO DENSE, MOIST)
2.5 – 6.0	SM	GRAY, SILTY FINE TO MEDIUM SAND WITH GRAVEL AND COBBLES (DENSE TO VERY DENSE, MOIST)
		SAMPLE WAS COLLECTED AT 5.5 FEET GROUNDWATER SEEPAGE WAS NOT ENCOUNTERED TEST PIT CAVING WAS NOT ENCOUNTERED TEST PIT WAS COMPLETED AT 6.0 FEET ON 7/27/15
TEST PIT ELEVEN		
0.0 – 0.5		**TOPSOIL**
0.5 – 2.5	SM	BROWN-GRAY, SILTY FINE TO MEDIUM SAND WITH GRAVEL (MEDIUM DENSE TO DENSE, MOIST)
2.5 – 6.0	SM	GRAY, SILTY FINE TO MEDIUM SAND WITH GRAVEL AND COBBLES (DENSE TO VERY DENSE, MOIST)
		SAMPLE WAS COLLECTED AT 4.0 FEET GROUNDWATER SEEPAGE WAS NOT ENCOUNTERED TEST PIT CAVING WAS NOT ENCOUNTERED TEST PIT WAS COMPLETED AT 6.0 FEET ON 7/27/15

Appendix B

Laboratory Test Results

ES-3217.12

Earth Solutions NW, LLC
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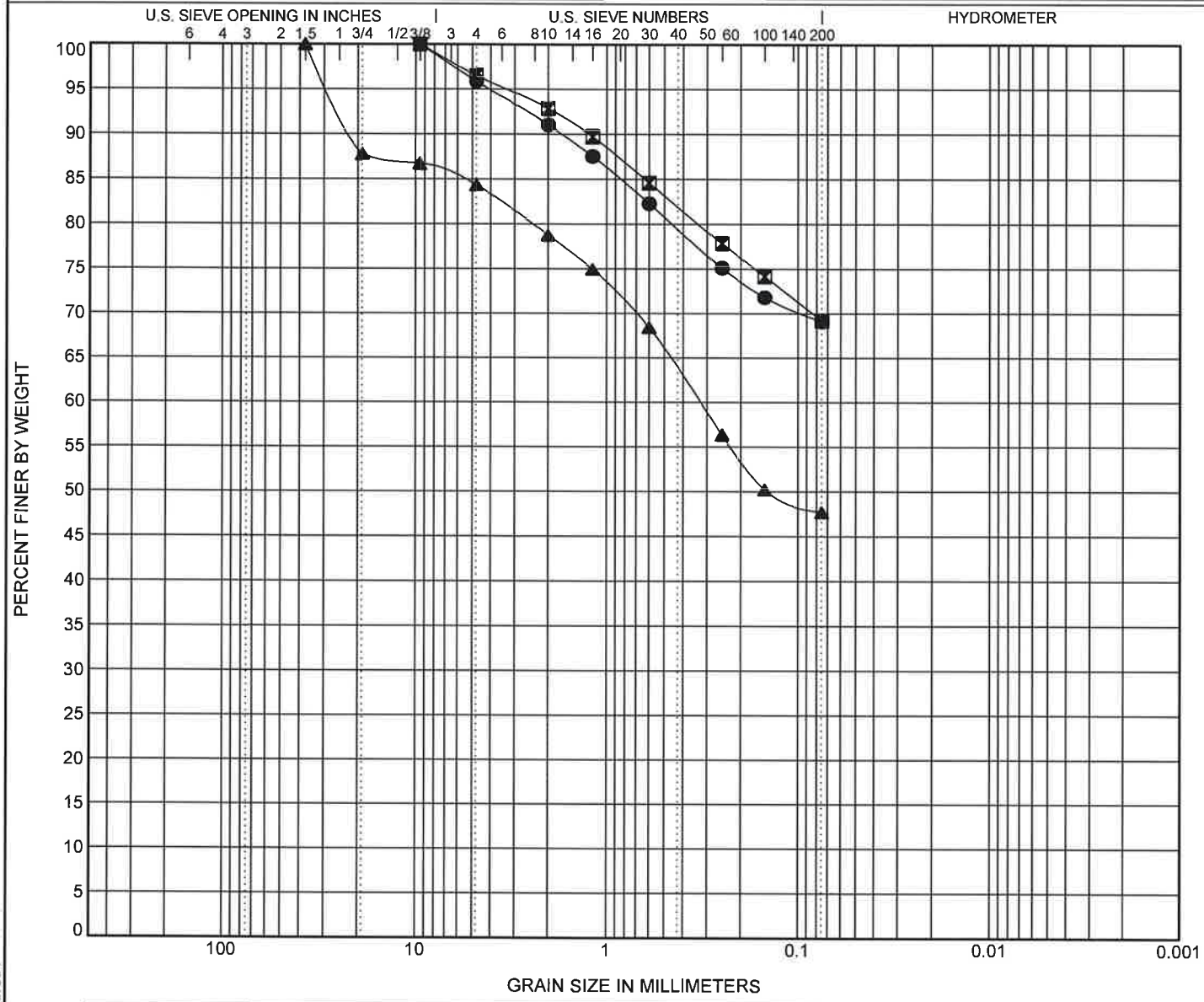
Bellevue, WA 98005
Telephone: 425-449-4704
Fax: 425-449-4711

GRAIN SIZE DISTRIBUTION

PROJECT NUMBER ES-3217.12 **PROJECT NAME** Eaglemont 7 PRD



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification			Classification	Cc	Cu
●	TP-101	7.00ft.	USDA: Gray Slightly Gravelly Loam. USCS: ML.		
⊠	TP-104	4.00ft.	USDA: Brown Slightly Gravelly Loam. USCS: ML.		
▲	TP-105	5.00ft.	USDA: Gray Gravelly Loam. USCS: SM with Gravel.		

Specimen Identification			D100	D60	D30	D10	LL	PL	PI	%Silt	%Clay
●	TP-101	7.0ft.	9.5							69.1	
⊠	TP-104	4.0ft.	9.5							69.2	
▲	TP-105	5.0ft.	37.5	0.327						47.7	

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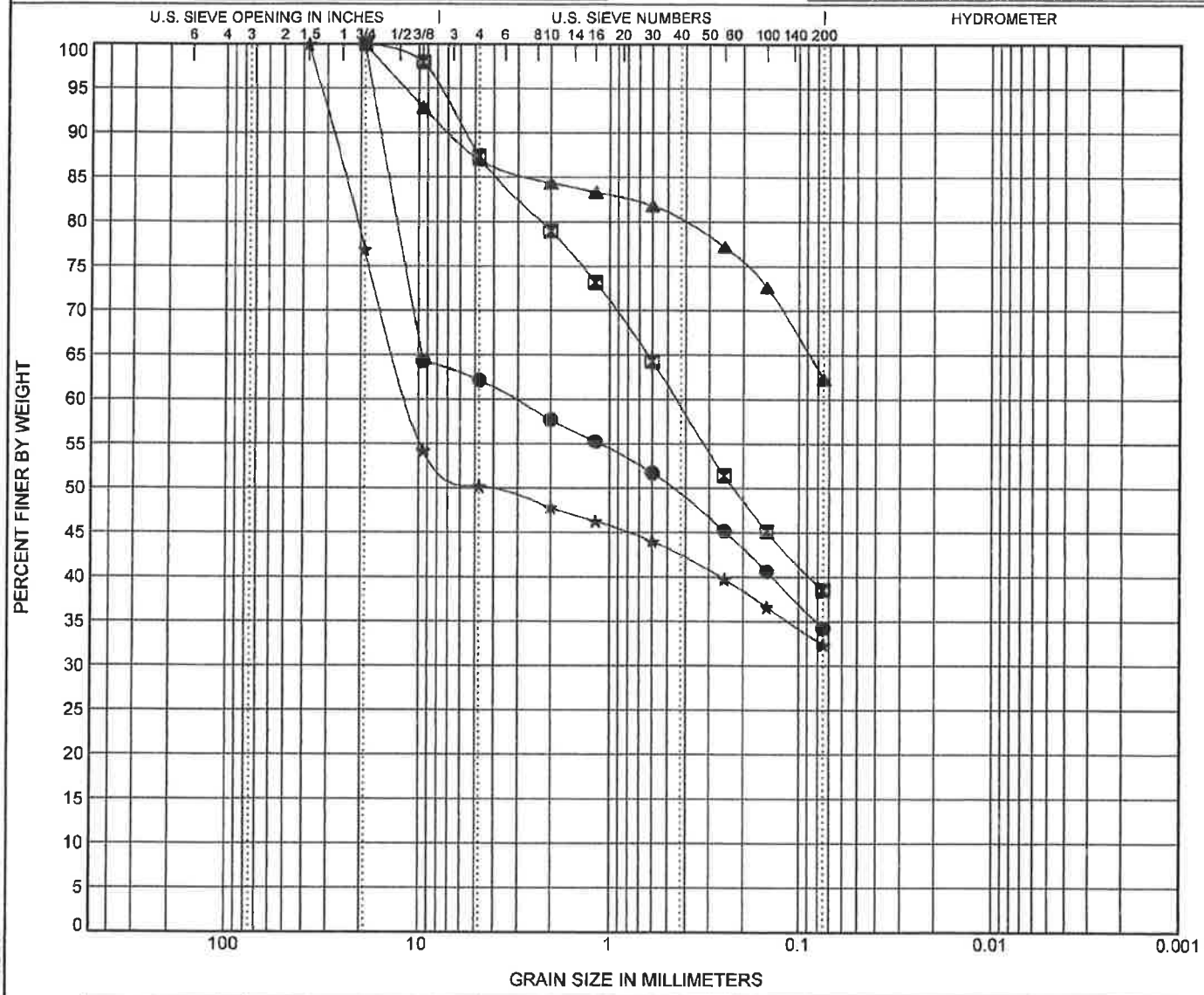
Bellevue, WA 98005
Telephone: 425-449-4704
Fax: 425-449-4711

GRAIN SIZE DISTRIBUTION

CLIENT MainVue WA, LLC **PROJECT NAME** Gilmartin Farms

PROJECT NUMBER ES-3217.09 **PROJECT LOCATION** Monroe, Washington



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	Cc	Cu
●	TP-1	2.00ft.	USDA: Brown Very Gravelly Loam. USCS: GM with Sand.		
⊠	TP-3	7.00ft.	USDA: Gray Gravelly Sandy Loam. USCS: SM.		
▲	TP-4	2.00ft.	USDA: Gray Gravelly Loam. USCS: Sandy ML.		
★	TP-5	4.00ft.	USDA: Gray Very Gravelly Loam. USCS: GM with Sand.		

	Specimen Identification		D100	D60	D30	D10	LL	PL	PI	%Silt	%Clay
●	TP-1	2.0ft.	19	3.106						34.3	
⊠	TP-3	7.0ft.	19	0.448						38.6	
▲	TP-4	2.0ft.	19							62.3	
★	TP-5	4.0ft.	37.5	11.343						32.4	

Report Distribution

ES-3217.12

EMAIL ONLY

MainVue WA, LLC
1110 – 112th Avenue Northeast, Suite 202
Bellevue, Washington 98004

Attention: Ms. Lisa Cavell
Ms. Mona Davis

Tab 8.0

8.0 OTHER PERMITS

This section contains the following information:

Tab 9.0

9.0 OPERATIONS AND MAINTENANCE MANUAL

An Operations and Maintenance Manual will be provided in this section during Final Engineering Review.

Tab 10.0

10.0 BOND QUANTITIES WORKSHEET

A bond quantities worksheet will be provided in this section during Final Engineering Review.