

Marysville 172 and 23

Preliminary (EC&G) Drainage Report

Prepared for

Marysville 172nd Development, LLC
c/o Intracorp NW, LLC

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3/07/22

March 2022

Job No: C21-147A

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APPENDICES

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SECTION 1.0: PROJECT OVERVIEW

The proposed Marysville 172nd Assemblage project is located on parcels 31052900201200, 31052900201900, 31052900201100, 31052900202600, and 31052900200800 near the southeastern corner of the intersection of 19th Ave NE and 172nd St NE in Marysville, WA. The proposal is to develop the site with 15 multi-family apartment buildings with associated utilities, drive aisles, and open spaces. This report has been prepared to address the early clearing and grading activities for the proposed future development. The project site lies within the NW ¼ of the SW ¼, Section 29, Township 31 N, Range 05 E within the City of Marysville. See Vicinity Map in Appendix 1 for relative location.

1.1 EXISTING SITE

The existing site is 18.96 acres located on parcels 31052900201200, 31052900201900, 31052900201100, 31052900202600, and 31052900200800. The site is currently developed with thirteen buildings across the five parcels consisting of sheds, trailers, and single-family homes. Land cover is primarily lawn. The site's topography is relatively flat with flat to gentle slopes to the west. The site is currently located in Mixed Use (MU) zoning.

A geotechnical report was completed by Terra Associates, Inc for the site. The report is dated March 2022. The evaluation concluded that site soil conditions show that widespread stormwater infiltration systems are mostly infeasible due to the high groundwater table across the site. The NCRS Soils Map lists the soils on site as 84.7% Custer fine sandy loam and 15.3% Kitsap silt loam, 0 to 8 percent slopes.

Per Habitat Assessment Memo provided by Soundview Consultants dated February 22, 2022, there are no streams and wetlands nor associated buffers impacting the site.

1.2 DOWNSTREAM ANALYSIS

A downstream analysis was performed on Tuesday March 1, 2022. Onsite access was not available. However, downstream flow path was discernable along the western side of the property down, flowing to the southeast. Refer to Section 3.0 of this report for more information.

1.3 PROPOSED DEVELOPMENT

The Maysville 172th Assemblage project will be developed with 15 multifamily apartment buildings, along with driveways, frontage improvements, utilities, stormwater facilities, and landscaping. The project will be constructed in two phases. Phase 1 will pertain to the eastern half of the site while Phase 2 pertains to the western half. Project development will disturb 18.96 acres in the Early Clearing and Grading phase.

All existing buildings and vegetation within the disturbed area will be cleared. Access to the lots will be from 172nd St NE on the north and 23rd Ave NE on the east.

1.4 PROPOSED FLOW CONTROL DESIGN

The proposed project is to be designed to the requirements of the 2014 Department of Ecology (DOE) Stormwater Management Manual for Western Washington. Due to more than 0.15 cfs increase in the undeveloped 100-year storm (based on 15 minute time step analysis, runoff from all new and replaced hard surfaces and converted vegetative areas are subject to the Minimum Requirement #7 set forth by the DOE Manual. Preliminary designs for future apartment complex development include conveying runoff from disturbed areas to new underground detention facilities located throughout the site with potentially some minor surface runoff in the eastern portion of the site also flowing through infiltration areas prior to detention. For early clearing and grading activities conducted on site, temporary flow control is to be provided through the installation of a new temporary sediment pond in addition to perimeter vegetation retention areas and silt fencing.

Temporary sediment pond calculations have been completed using WWHM2012. Future detention and infiltration areas related to the future apartment complex development to be prepared at a later date. See Section 4.0 for additional description and calculations concerning the proposed stormwater flow control measures.

1.5 PROPOSED WATER QUALITY TREATMENT DESIGN

The multifamily residential nature of the development requires "Enhanced" water quality treatment level. All water quality treatment designs will be performed in accordance with Volume 5 of the 2014 DOE Manual and included in the construction drainage report to be submitted at a later date.

1.6 EROSION/SEDIMENTATION CONTROL

Erosion control measures that will be utilized during construction will be provided in the SWPPP and TESC plan sheets. A summary can be found in Section 2.0 of this report.

1.7 MINIMUM REQUIREMENTS

Per the 2014 DOE Manual, Minimum Requirements 1-9 apply to all new and replaced hard surfaces and converted vegetative areas.

Minimum Requirement #1: Preparation of Stormwater Site Plans: This report along with the construction plans satisfies this minimum requirement.

Minimum Requirement #2: Construction Stormwater Pollution Prevention (SWPP): A Stormwater Pollution Prevention Plan (SWPPP) has been provided as a separate document.

Minimum Requirement #3: Source Control of Pollution: Permanent source control BMPs are not applicable for the subject site since the associated activities for the new residences as residential developments are not required to implement source control BMP's.

Minimum Requirement #4: Preservation of Natural Drainage Systems and Outfalls: The site contains one onsite discharge location that lies within a single threshold discharge basin. The site historically flows southward towards Quilceda Creek. In the developed condition, all onsite runoff will either be partially infiltrated or collected and routed to the proposed detention systems where it will be released into the existing stormwater system. All flow will eventually reach the Quilceda Creek thus maintaining historic flow paths.

Minimum Requirement #5: Onsite Stormwater Management: A geotechnical engineering report by Terra Associates, Inc. for the property concluded that widespread stormwater infiltration systems are not feasible due to high groundwater levels. For future apartment complex development, minor roof drain infiltration in the eastern portion of the site in addition to minor dispersion of roof runoff and perforated pipe stub out trenches area planned to meet Minimum Requirement #5.. See Section 4 for additional information.

Minimum Requirement #6: Runoff Treatment: The project requires “Enhanced” runoff treatment due to its multifamily residential land use. All water quality treatment designs will be performed in accordance with Volume 5 of the 2014 DOE Manual. A detailed description of the water quality treatment for the project will be provided in the construction drainage report, to be submitted at a later date.

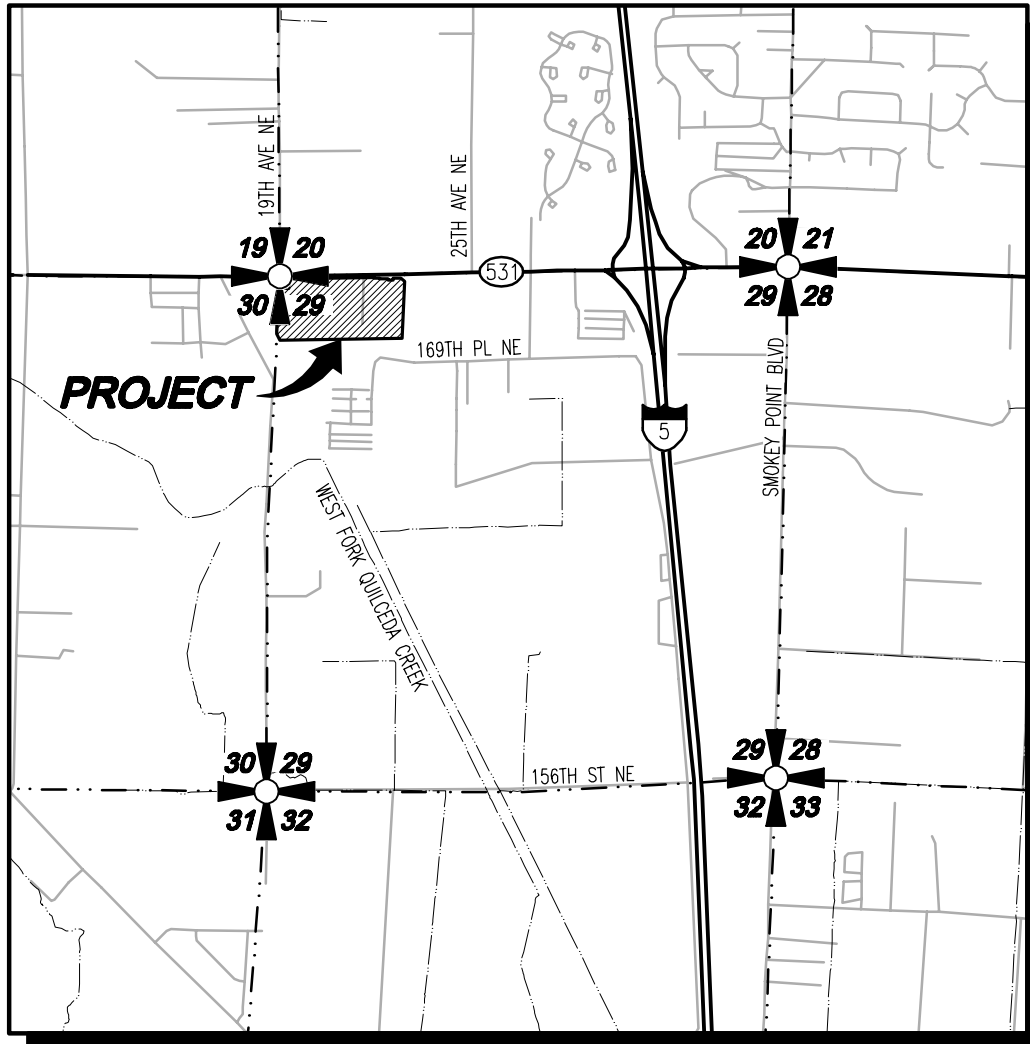
Minimum Requirement #7: Flow Control: A combination of minor infiltration areas in addition to new underground detention systems are planned to for developed condition flows. A detailed description of the flow control design for the project will be provided in the construction drainage report, to be submitted at a later date.

Minimum Requirement #8: Wetlands Protection: Per Habitat Assessment memo prepared by Soundview Consultants dated February 22, 2022, there are no stream, wetlands or associated buffers located on-site. Additionally, no evidence of site runoff flowing across downstream wetlands has been found.

Minimum Requirement #9: Operation and Maintenance: See Operations and Maintenance in Section 6.0 of this report.

Appendix 1: Project Overview

1. Figure 1.0 – Vicinity Map
2. Figure 2.0 – Existing Conditions Map



VICINITY MAP

SCALE: 1"=2000'

Drawing: P:\Civil\2021\C21-147A Marysville 172nd Assemblage\Drawings\Exhibits\C21147-EX-W.dwg Plotted: Feb 07, 2022 - 12:52pm

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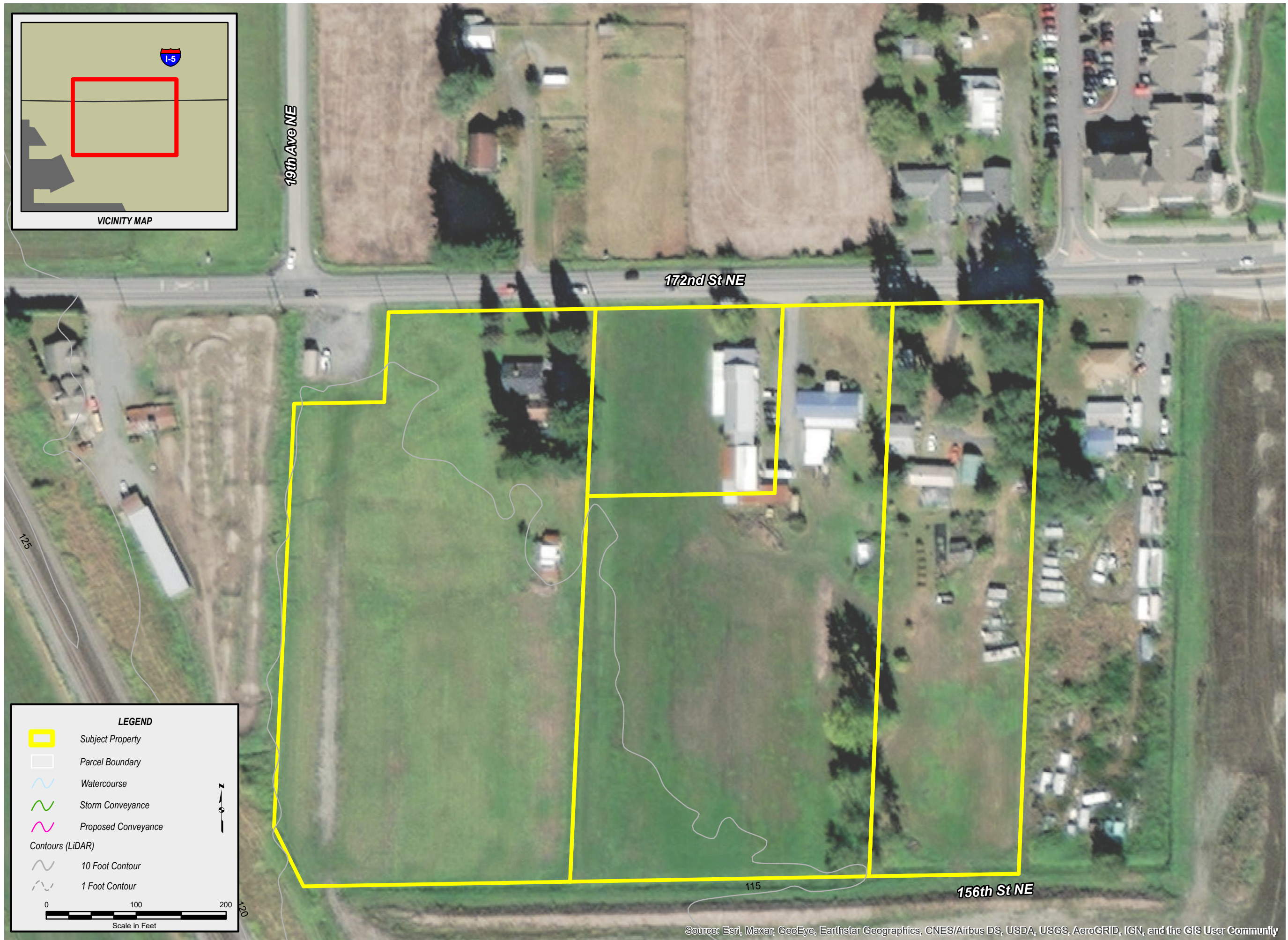
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INTRACORP HOMES

MARYSVILLE SATHER TOWNHOMES

VICINITY MAP



| SOURCE INFORMATION | |
|-----------------------|--|
| SOURCE AGENCY | DESCRIPTION |
| SNOWHOMISH COUNTY GIS | PARCEL BOUNDARY |
| SNOWHOMISH COUNTY GIS | CONTOURS GENERATED FROM BARE EARTH LIDAR (KING COUNTY). THIS DATA HAS A STATED VERTICAL ACCURACY OF APPROXIMATELY 1 FOOT. |
| | |
| | |

LDC | **Surveying Engineering Planning**

| | |
|--|---------------------------|
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INTRACORP
MARYSVILLE 172ND
ASSEMBLAGE
EXISTING CONDITIONS MAP

NAD 1983 HARN
STATEPLANE WASHINGTON

REVISION:
JOB NUMBER: C21-147
DRAWING NAME: C21-147-2.0
DESIGNER: FCAVADA
DRAWING BY: FCAVADA
DATE: 3/1/2022
SCALE: AS SHOWN
JURISDICTION: MARYSVILLE

FIGURE:
2.0

SECTION 2.0: RISK ASSESSMENT ANALYSIS AND TEMPORARY EROSION AND SEDIMENT CONTROL DESIGN

Temporary Erosion and Sediment Control

A Stormwater Pollution Prevention Plan (SWPPP) will be provided under separate document as part of the Early Clearing and Grading submittal package. The SWPPP report is modeled under the guidelines of Volume II, Section 3 of the 2014 Stormwater Management Manual for Western Washington.

Construction SWPPP Elements #1 through #13 are addressed below.

Element #1 – Mark Clearing Limits: All clearing limits will be delineated with high visibility plastic fence or silt fence. See sheets ER-01 and ER-02 of the plans for locations and details.

Element #2 – Establish Construction Access: Construction access will be installed as indicated on Sheets ER-01 of the plans.

Element #3 – Control Flow Rates: Flow control for construction period runoff will be accomplished using a system of interceptor swales and check dams which will route flows to a temporary sediment pond, located in the southwest corner of the site. See Sheets ER-01 and ER-02 of the Early Clearing and Grading Plans for locations and details of the temporary sediment ponds and associated sediment control BMP's.

A proposed sediment pond has been sized to provide adequate residence time and temporary flow control for the full 10-year unmitigated peak flow rate (WWHM2012) associated with the temporarily disturbed areas on site. Sizing calculations associated with proposed temporary sediment pond is provided in Appendix 2.

Element #4 – Install Sediment Controls: Silt fence, temporary interceptor swales, check dams, and temporary sediment pond will be utilized to contain sediments within the project's clearing limits. See sheets ER-01 and ER-02 of the plans for locations and details.

Element #5 – Stabilize Soils: Exposed soils will be stabilized as specified in the Erosion and Sediment Control Notes. See sheet ER-02 of the plans for notes.

Element #6 – Protect Slopes: Slopes range from flat to moderate across the site. Slopes shall be protected as specified under Element #5.

Element #7 – Protect Drain Inlets: Storm drain inlet protection will be utilized to contain sediments within and immediately adjacent to the project's clearing limits. See sheets ER-01 and ER-02 of the plans for locations and details.

Element #8 – Stabilize Channels and Outlets: Check dams will be provided within temporary interceptor swales for stabilization purposes. Additionally, riprap pads and gravel-lined overflows will be provided to stabilize all pond outlets. See Sheets ER-01 and ER-02 of the plans.

Element #9 – Control Pollutants: Pollutants shall be controlled as specified in the Pollutant Control Notes. See sheet ER-02 of the plans.

Element #10 – Control De-Watering: Disposal options for de-watering water are as specified in the De-Watering Control Notes. See sheet ER-02 of the plans.

Element #11 – Maintain BMPs: Maintenance of the BMPs is specified within the Construction Sequence and Erosion and Sediment Control Notes. See sheets ER-02 of the Early Clearing and Grading Plans.

Element #12: Manage the Project: The Erosion and Sediment Control Notes specify seasonal work limitations and maintenance of specified TESC BMP's. See Sheets ER-02 of the Early Clearing and Grading Plans.

Element #13: Protect Low Impact Development BMPs: Low impact BMP's are not proposed as part of this project due to the scale/density of proposed development activities and lack of favorable soils onsite to support infiltration activities.

Appendix 2: TESC Facility Analysis

1. TESC Pond – Sizing Calculations

**WWHM2012
PROJECT REPORT**

Project Name: 172nd EC&G
Site Name: Marysville 172nd EC&G
Site Address: 20XX 172nd St NE
City : Marysville, WA
Report Date: 2/28/2022
Gage : Everett
Data Start : 1948/10/01
Data End : 2009/09/30
Precip Scale: 1.20
Version Date: 2019/09/13
Version : 4.2.17

Low Flow Threshold for POC 1 : 50 Percent of the 2 Year

High Flow Threshold for POC 1: 50 year

PREDEVELOPED LAND USE

Name : Undeveloped

| | |
|----------------------------|--------------|
| <u>Pervious Land Use</u> | <u>acre</u> |
| C, Forest, Flat | 18.96 |
| Pervious Total | 18.96 |
| <u>Impervious Land Use</u> | <u>acre</u> |
| Impervious Total | 0 |
| Basin Total | 18.96 |

| | | |
|--------------------------|------------------|--------------------|
| Element Flows To: | | |
| Surface | Interflow | Groundwater |

MITIGATED LAND USE

Name : Cleared Site Prior to Detention

| | |
|----------------------------|--------------|
| <u>Pervious Land Use</u> | <u>acre</u> |
| C, Lawn, Flat | 18.96 |
| Pervious Total | 18.96 |
| <u>Impervious Land Use</u> | <u>acre</u> |
| Impervious Total | 0 |
| Basin Total | 18.96 |

Element Flows To:**Surface****Interflow****Groundwater**

ANALYSIS RESULTS**Stream Protection Duration**

Predeveloped Landuse Totals for POC #1**Total Pervious Area:18.96****Total Impervious Area:0**

Mitigated Landuse Totals for POC #1**Total Pervious Area:18.96****Total Impervious Area:0**

Flow Frequency Return Periods for Predeveloped. POC #1

| <u>Return Period</u> | <u>Flow(cfs)</u> |
|----------------------|------------------|
| 2 year | 0.637063 |
| 5 year | 0.977275 |
| 10 year | 1.239655 |
| 25 year | 1.615048 |
| 50 year | 1.927692 |
| 100 year | 2.269609 |

Flow Frequency Return Periods for Mitigated. POC #1

| <u>Return Period</u> | <u>Flow(cfs)</u> |
|----------------------|------------------|
| 2 year | 2.967762 |
| 5 year | 5.369797 |
| 10 year | 7.321042 |
| 25 year | 10.188867 |
| 50 year | 12.614202 |
| 100 year | 15.285272 |

| | | |
|---|--|--|
| Temporary Sediment Pond Sizing Calculations | Land Development Consultants, Inc. | |
| | 20210 142nd Avenue NE Woodinville, WA 98072 | Tel: (425) 806-1869 Fax: (425) 482-2893 |

Project Name: Marysville 172nd
Description: Temporary Sediment Pond

Project No. C21-147
Date: 3/1/2022
Calc. By: AM

Facility Description: Temporary Sediment Pond

Obtain the discharge from the hydrologic calculations of the peak flow for the 2-year runoff event. The 10-year peak flow shall be used if the project size, expected timing and duration of construction, or downstream conditions warrant a higher level of protection.

10 - yr peak flow = 5.37 cfs
- based WWHM 701 data series

Determine the required surface area as follows:

$$SA = 2 \times \frac{10 \text{ - yr peak flow}}{0.00096}$$

$$SA = 11,188 \text{ s.f.}$$

Determine the required orifice area as follows:

| | |
|-------------------------------------|------------------|
| A_s = Provided surface area = | 12,000 s.f. |
| h = Head of water above orifice = | <u>3.5</u> ft. |
| T = dewatering time = | <u>24</u> hrs. |
| g = acceleration of gravity = | <u>32.2</u> ft/s |

$$A_o = \frac{A_s (2h)^{0.5}}{0.6 \times 3600 T g^{0.5}} = \underline{0.108 \text{ s.f.}}$$

Convert the required orifice area to the required orifice diameter:

$$D = 13.54 \times A_o^{0.5} = 4.448 \text{ in}$$

$$\text{Required orifice diameter} = \underline{4 \frac{1}{2} \text{ in}}$$

SECTION 3.0: DOWNSTREAM ANALYSIS REPORT

Task 1. Study Area Definition and Maps

Snohomish County Bare Earth LiDAR, survey, and 2009 aerial photography were the best topographical references available for the area containing the site.

Task 2. Resource Review

The resources below have been reviewed for existing and potential issues near the project site:

- **Adopted Basin Plans**

No Adopted Basin Plans were located that include the project site.

- **Drainage Basin**

This site is located within the West Fork Quilceda Creek basin. Discharge from the proposed development will travel through the West Fork Quilceda Creek, followed by Quilceda Creek which feeds into the Ebey Slough.

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

According to FEMA floodplain mapping, the subject property is not within a floodplain. Reference the FEMA Firmette study in Appendix 3 as necessary.

- **Critical Areas Map**

Discharge from the proposed development will travel through the West Fork Quilceda Creek, followed by Quilceda Creek which feeds into the Ebey Slough.

- **Drainage Complaints**

Per City of Marysville records, drainage complaints in the area are mainly the result of Winter high tide events happening at the same time as heavy rainfall events. These events generally push groundwater levels up, specifically along the western boundary of the site, blocking surface from naturally flowing to the south.

- **Road Drainage Problems**

No issues were identified near the proposed site. Per City of Marysville records, drainage complaints have been filed outlining stormwater issues located at the intersection of 172nd Street NE and 19th Ave NE located near the northwest corner of the site. These issues are mainly the result of Winter high tide events happening at the same time as heavy rainfall events. These events generally push groundwater levels up, specifically along the western boundary of the site, blocking surface from naturally flowing to the south.

- **Soil Survey**

The NCRS Soils Map lists the soils on site as 84.7% Custer fine sandy loam and 15.3% Kitsap silt loam, 0 to 8 percent slopes.

- **Migrating River Studies**

Migrating River Studies are not applicable to the proposed site development.

- **Section 303d List of Polluted Waters**

Washington State Department of Ecology's Water Quality Assessment does not contain any listings within a quarter mile downstream of the project site.

- **Stormwater Compliance Plans**

Not applicable to the proposed project.

Task 3. Field Inspection/Downstream Analysis

On Tuesday March 1, 2022, a Downstream Analysis was performed at the site. The weather conditions were 55 degrees with light rain. The following observations were gathered during the site visit:

Upstream Observation:

There are two upstream areas observed during the downstream analysis. There is a large upstream area to the northeast of the site that conveys flow along the eastern and southern sides of the property through a swale. This area consists mostly of developed land. Per visual analysis of flows entering the site from 172nd Street, there did not appear to be any evidence of erosion or drainage impacts.

The second upstream area is to the northwest of the site and conveys flow along a swale on the western boundary of the site. This area consists mostly of undeveloped land along 19th Ave NE and discharges via a culvert into the swale. Per visual analysis of a 24" culvert outlet located at the south side of the 172nd Street 19th Ave intersection, it appears that some of the rock adjacent to the culvert outlet has been eroded away. This is most likely due to high groundwater temporarily blocking culvert outflows resulting in temporary ponding eroding away the surrounding rock and open ditch bank.

Both swales for the upstream areas converge at the southwestern corner of the site and continue south.

Downstream Observation:

Flow across the site travels south, southwest, and westerly to existing swales located along the southern and western boundaries of the site. These two swales converge at the southwest corner of the site. From the southwestern corner of the site, the swale bends and continues flowing to the southeast along a railroad through the extent of the quarter-mile boundary of analysis. The swale flows to NW corner of parcel 31052900303100. From the NW corner of this parcel, City map notes documented stream which travels south for approximately 600' where it turns west, crosses under BNRR and drains into W. Fork of Quilceda Creek.

Task 4. Drainage System Description and Problem Descriptions

Based on the information and all the resources available including visual inspection of the downstream flow path, there is no evidence of existing or anticipated downstream drainage problems. All flows are adequately dispersed along existing flow paths.

Task 5. Mitigation of Existing or Potential Drainage Problems (not applicable for Level 1 Analysis)

As noted in section 3 of this report, medium to large storm events happening during seasonal high ground water events often results in drainage problems for the area. In order to lessen these problems, the proposed site and new road improvements are to be raised in elevation to provide better separation between surface water and ground water. Note that due to 172nd Street NE already existing as a road, raising up this intersection is not feasible at this time.

Appendix 3: Resource Review

1. Figure 3.0 – Downstream Analysis Map
2. Downstream Images
3. FEMA Floodplain Map #53061C0390F
4. USGS Soils Map
5. USGS Soils Description

Downstream Images



Image 1- Facing to the south from the northwest corner of the site on the southern side of 172nd St NE. This swale corresponds to the upstream area near 19th Ave NE Blue arrow shows the direction of flow.



Image 2- Facing to the south from the northeast corner of the site on the southern side of 172nd St NE. This swale corresponds to the upstream area northeast of the site. Blue arrow shows the direction of flow.



Image 3- Facing to the southeast approximately 400 ft from the southwest corner of the site. This image shows the continuation of the swale along the Bellingham Subdivision. The swale continues in this general flow pattern past the quarter mile boundary of analysis.

National Flood Hazard Layer FIRMette



122°12'28"W 48°9'15"N



0 250 500 1,000 1,500 2,000 Feet 1:6,000

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

Legend

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

| | | |
|-----------------------------|--|---|
| SPECIAL FLOOD HAZARD AREAS | | Without Base Flood Elevation (BFE) Zone A, V, A99 |
| | | With BFE or Depth Zone AE, AO, AH, VE, AR |
| | | Regulatory Floodway |
| OTHER AREAS OF FLOOD HAZARD | | 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X |
| | | Future Conditions 1% Annual Chance Flood Hazard Zone X |
| | | Area with Reduced Flood Risk due to Levee. See Notes. Zone X |
| | | Area with Flood Risk due to Levee Zone D |
| OTHER AREAS | | NO SCREEN Area of Minimal Flood Hazard Zone X |
| | | Effective LOMRs |
| | | Area of Undetermined Flood Hazard Zone D |
| GENERAL STRUCTURES | | Channel, Culvert, or Storm Sewer |
| | | Levee, Dike, or Floodwall |
| OTHER FEATURES | | 20.2 Cross Sections with 1% Annual Chance Water Surface Elevation |
| | | 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation |
| | | Coastal Transect |
| | | Base Flood Elevation Line (BFE) |
| | | Limit of Study |
| | | Jurisdiction Boundary |
| | | Coastal Transect Baseline |
| MAP PANELS | | Digital Data Available |
| | | No Digital Data Available |
| | | Unmapped |



The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **1/28/2022 at 3:33 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Soil Map—Snohomish County Area, Washington



**Natural Resources
Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

1/28/2022
Page 1 of 3

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

Water Features



Streams and Canals

Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

Background



Aerial Photography

MAP INFORMATION

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

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

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

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

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Snohomish County Area, Washington

Survey Area Data: Version 23, Aug 31, 2021

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

Date(s) aerial images were photographed: Sep 2, 2018—Sep 25, 2018

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

Map Unit Legend

| Map Unit Symbol | Map Unit Name | Acres in AOI | Percent of AOI |
|------------------------------------|---|--------------|----------------|
| 13 | Custer fine sandy loam | 10.3 | 84.7% |
| 27 | Kitsap silt loam, 0 to 8 percent slopes | 1.9 | 15.3% |
| Totals for Area of Interest | | 12.2 | 100.0% |

SECTION 4.0: FLOW CONTROL AND WATER QUALITY FACILITY ANALYSIS AND DESIGN

Preliminary designs for the Marysville 172nd Assemblage project include conveying runoff from disturbed areas to new underground detention facilities located throughout the site. Potentially, some minor surface runoff on the eastern portion of the site may flow through infiltration areas prior to detention. Further information regarding the proposed detention and infiltration facilities will be provided in the construction report to be submitted at a later date.

For the early clearing and grading activities conducted on site, temporary flow control is to be provided through the installation of a new temporary sediment pond in addition to perimeter vegetation retention areas and silt fencing. WWHM2012 and pond sizing calculations for this pond can be found in Appendix 2.

SECTION 5.0: OPERATIONS AND MAINTENANCE MANUAL

The proposed storm drainage system consists of buried pipes, catch basins, infiltration trenches and a detention vault. These facilities will require periodic maintenance and inspection. The City would take responsibility for any operation and maintenance tasks within the ROW, including annual inspections. Inspection and maintenance procedures will be included in the construction drainage report, to be submitted at a later date.

SECTION 6.0: SPECIAL REPORTS AND STUDIES

The following reports have been conducted with reference to this project or adjacent projects:

- Geotechnical Report for Marysville Intracorp - 172nd Street Northeast and 19th Ave Northeast, Terra Associates, Inc, dated March, 2022