3J CONSULTING

CIVIL ENGINEERING | WATER RESOURCES | COMMUNITY PLANNING

PRELIMINARY STORMWATER MANAGEMENT REPORT

SW IBACH ST SUBDIVISION
10150 SW IBACH STREET
Tualatin, OR 97062

September 11th, 2025

Prepared For:

DEZ DEVELOPMENT LLC
15950 SE 82ND DRIVE
CLACKAMAS, OR 97015

Prepared By:

3J Consulting, Inc.
9600 SW Nimbus Avenue, Suite 100
Beaverton, Oregon 97008
Project No: 25008
JJS

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DESIGNER'S CERTIFICATION & STATEMENT

I hereby certify that this Stormwater Management Report for the SW Ibach St Subdivision in Tualatin, Oregon has been prepared by me or under my supervision and meets minimum standards of the City of Tualatin, Clean Water Services and normal standards of engineering practice. I hereby acknowledge and agree that the jurisdiction does not and will not assume liability for the sufficiency, suitability, or performance of drainage facilities designed by me.

EXECUTIVE SUMMARY

The SW Ibach St Subdivision proposes attached single-family dwellings, roadways, other hardscaping, landscaping, and utility improvements.

The property has an area of 1.90 ac; however, the total area of analysis (project site) is approximately 2.16 ac to include frontage improvements and existing frontage. Due to amount of new impervious area generated, this project is proposing to include stormwater management facilities prior to discharging offsite. All runoff eventually outfalls to Hedges Creek to the north of the project site.

The design criteria for stormwater management facilities will be proposed in accordance with CWS' Design & Construction Standards (CWS D&C; December 2019).

The proposed stormwater management facilities include:

- Extended Dry-Basin – An extended dry basin will treat and manage the contributing post-developed runoff and will be located within the Detention Pond. Two Pretreatment Manholes are proposed upstream of the extended dry basin. Outflows are controlled by a proposed Flow Control Manhole.

A Downstream Analysis was performed which determined that the contributing flows represent a small portion of the overall flows in Hedges Creek. The existing conveyance system has capacity issues through the 25-year storm event.

The purpose of this report is to accomplish the following:

- Describe existing and post-developed basins and drainage;
- Describe the design and analysis of the proposed stormwater management facilities; and,
- Demonstrate compliance with City of Tualatin and Clean Water Services Standards

PROJECT DESCRIPTION

The Sw Ibach St Subdivision is a 27-lot residential subdivision that proposes surface and utility improvements for the existing property located at 10150 Sw Ibach St in Tualatin, Oregon (tax lot 2S135BB 2100). This project falls within the jurisdictions of the City of Tualatin and Clean Water Services (CWS).

The property has an area of 1.90 ac; however, the total area of analysis (project site) is approximately 2.16 ac to include frontage improvements and existing frontage. The property contains one existing house with associated driveway that makes up approximately 6,689 SF of impervious area. The site ultimately discharges to Hedges Creek, which is located north of the site. In existing conditions, the project site discharges to the existing stormwater system in SW 103rd Avenue.

The project is expected to increase stormwater runoff to public storm drain facilities under CWS jurisdiction; therefore, water quality and quantity approaches are proposed in accordance with CWS' Design & Construction Standards (CWS D&C; December 2019).

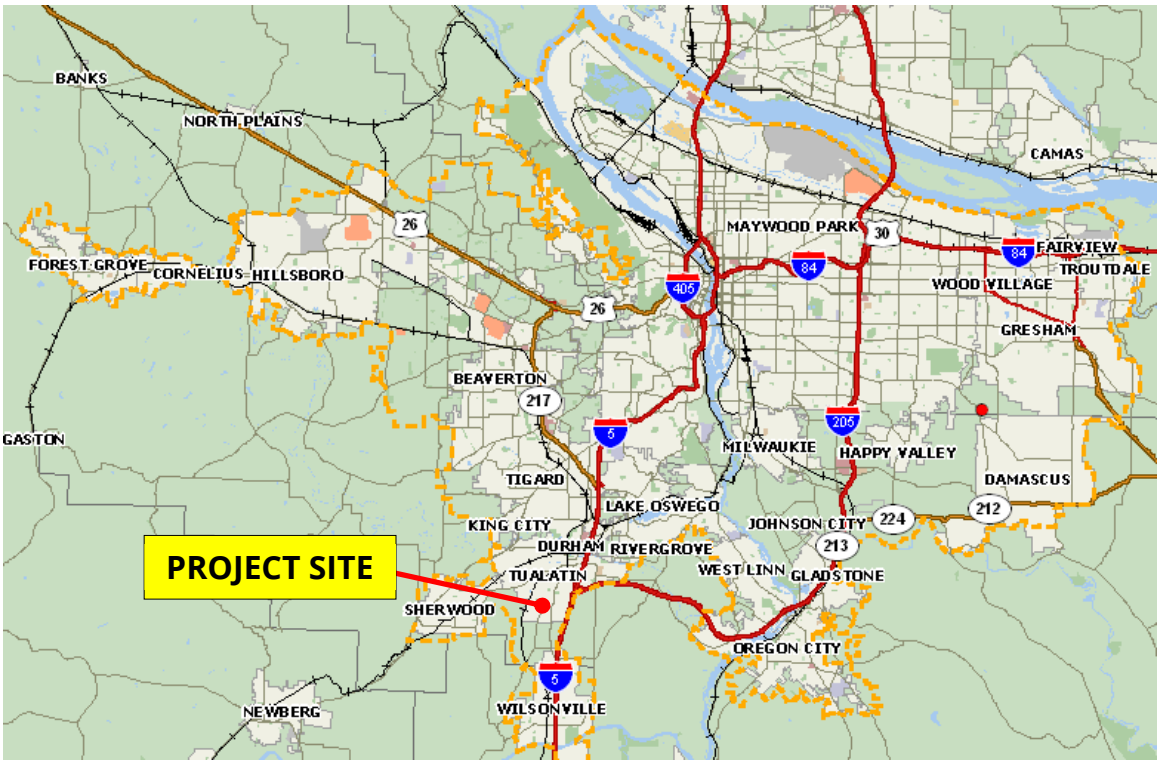


Figure 1 - Vicinity Map

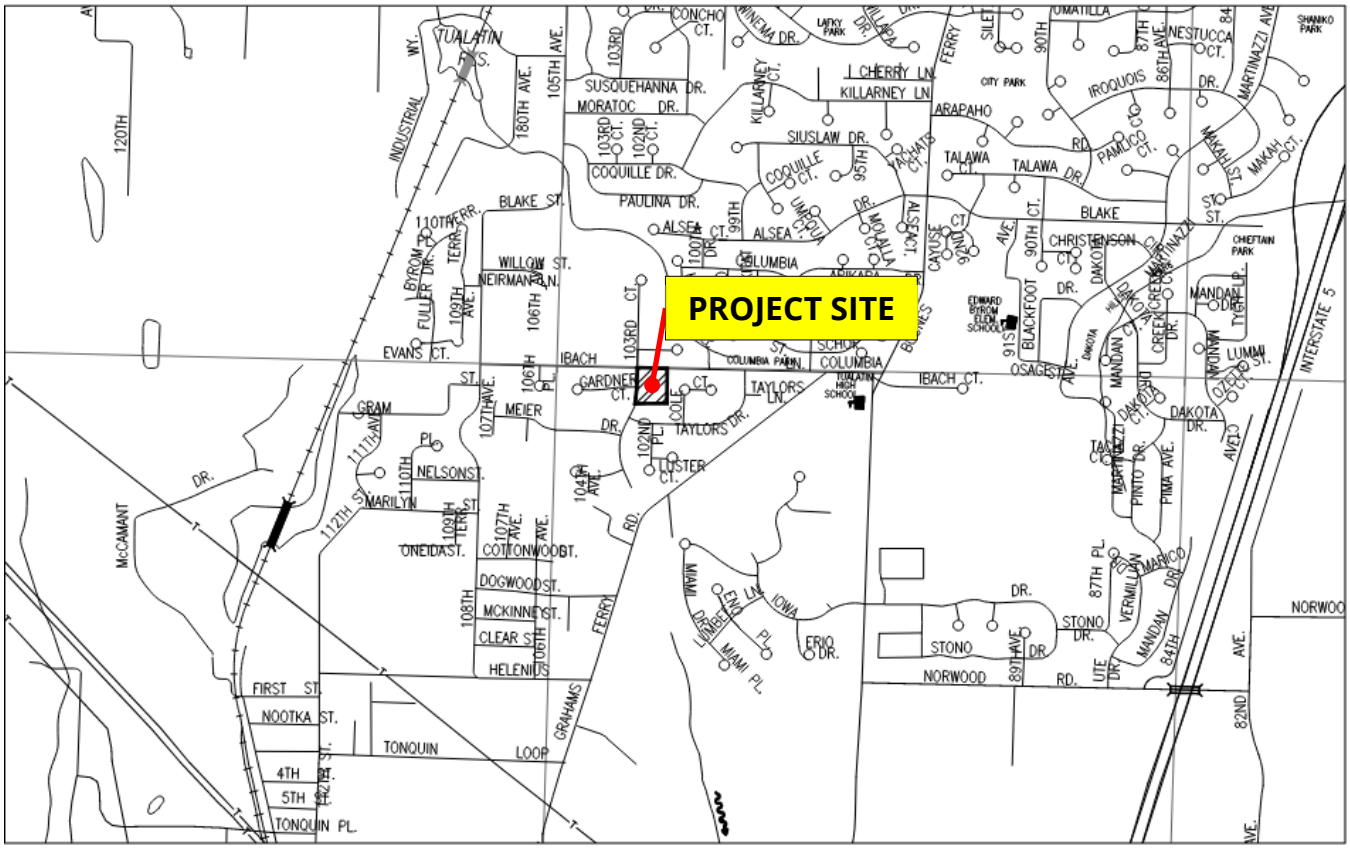


Figure 2 - Site Location

EXISTING CONDITIONS

Existing Site

The existing site contains one existing home along with an associated driveway. Hedges Creek is located north of the property.

Flood Map

The site is located within Zone X (unshaded) per flood insurance rate map (FIRM) community-panel number 41067C0606F (See Technical Appendix: Exhibits – National Flood Hazard Layer FIRMette). FEMA's definition of Zone X (un-shaded) is an area of minimal flood hazard.

Site Geology

The soil types as classified by the United States Department of Agriculture Soil Survey of Washington County are identified in Table 1 (See Technical Appendix: Exhibits – Hydrologic Soil Group).

Soil Type	Hydrologic Soil Group	Site Coverage (%)
Quatama Loam	C	98.8%
Dayton Silt Loam	D	1.2%

Table 1 - Soil Characteristics

Existing Drainage

In existing conditions, the site is relatively steep with elevations ranging from 265 feet at the southeast corner of the site to 244 feet at the northwest corner of the site. A majority of the site drains to the northwest towards the existing stormwater system in SW 103rd Avenue, eventually discharging to Hedges Creek.

Existing Basin Areas

Table 2 outlines the impervious and pervious areas for the existing onsite basin (See Technical Appendix: Exhibits – Existing Conditions).

Existing Onsite Basin Areas	Area (sf)	Area (ac)
Impervious Areas	6,689	0.15
Pervious Areas	76,050	1.75
Total Onsite Area	82,739	1.90

Table 2 – Existing Onsite Basin Areas

The modified impervious area is the same areas as the existing onsite impervious area.

Table 3 outlines the impervious and pervious areas for the existing public basin (See Technical Appendix: Exhibits – Existing Conditions).

Existing Public Basin Areas	Area (sf)	Area (ac)
Impervious Areas	11,447	0.26
Pervious Areas	0	0.00
Total Public Area	11,447	0.26

Table 3 – Existing Public Basin Areas

POST-DEVELOPED CONDITIONS

Post-Developed Site

The project proposes 27 new attached single-family homes with associated driveways, utilities, hardscaping and landscaping onsite. The project is expected to increase impervious area resulting in increased stormwater runoff. In accordance with the CWS D&C, stormwater BMPs are proposed to treat and detain runoff from the project site; the design and analysis of the BMPs will be discussed in a later section.

Post-Developed Drainage

The post-developed basin consists of the proposed lots along with runoff from the proposed street and will discharge to an on-site public storm pond. This basin includes the existing frontage that is proposed to drain to the proposed on-site storm system.

Post-Developed Basin Areas

Per Section 4.08.1(a) of the CWS D&C, the impervious area per lot is 2,640 sf unless the lot size is below 3,000 sf. The actual new and modified impervious area may be used for lot sizes below 3,000 sf. All lot sizes on the project site are smaller than 3,000 sf; therefore, the actual new and modified impervious area was used for the impervious area per lot.

Table 4 outlines the impervious and pervious areas for the post-developed onsite basin (See Technical Appendix: Exhibits – Post-Developed Conditions).

Post-Dev. Onsite Basin Areas	Area (sf)	Area (ac)
Impervious Areas	54,976	1.26
Pervious Areas	27,763	0.64
Total Onsite Area	82,739	1.90

Table 4 – Post-Developed Onsite Basin Areas

Table 5 outlines the impervious and pervious areas for the post-developed public basin (See Technical Appendix: Exhibits – Post-Developed Conditions).

Post-Dev. Public Basin Areas	Area (sf)	Area (ac)
Impervious Areas	11,447	0.26
Pervious Areas	0	0.00
Total Public Area	11,447	0.26

Table 5 – Post-Developed Public Basin Areas

The new impervious area for the post-developed basin is 48,287 sf, which is the total post-development impervious area minus the existing impervious area.

HYDROLOGIC ANALYSIS

Design Guidelines

Stormwater BMPs will be proposed on private property and in the CWS ROW, under the jurisdictions of the City of Tualatin and Clean Water Services. The hydrologic guidelines used for this project reflect current Clean Water Services Design & Construction Standards (CWS D&C), issued in December 2019.

Methodology

Naturally occurring rainstorms dissipate over long periods of time. An effective way of analyzing the rainfall-runoff behavior of a basin is by applying a unit hydrograph method, such as the Santa Barbara Urban Hydrograph (SBUH) method. In accordance with the CWS D&C, the SBUH method was performed via the computer software Infodrainage in conjunction with TR-55 methods and applying an NRCS Type IA rainfall distribution. Hydrologic models were developed for both predeveloped and post-developed conditions to evaluate the change in runoff behavior due to the project.

Design Storms

The rainfall distribution to be used for this area is the design storm of 24-hour duration based on the standard Type IA rainfall distribution. Table 6 shows total precipitation depths for the storm events used in the analysis, which were used as multipliers for the Type 1A 24-hour rainfall distribution.

Recurrence Interval (yr)	Precipitation Depth (in)
2	2.50
5	3.10
10	3.45
25	3.90

Table 6 - Design Storms

Curve Number

The major factors for determining the runoff curve numbers (CN) are hydrologic soil group, cover type, treatment, hydrologic condition, and antecedent runoff condition. The curve number represents runoff

potential from the ground. Table 2-2a from the TR-55 Urban Hydrology for Small Watersheds was used to determine the appropriate curve numbers (See Technical Appendix: Exhibits – Curve Numbers). As indicated previously, the site is assumed to be underlain by soil types C and D.

In predeveloped conditions, pervious areas were modeled with a composite CN of 73, which is associated with a cover type of woods in good condition.

In post-developed conditions, pervious areas were modeled with a composite CN of 75, which is associated with a cover type of lawn in good condition. Impervious areas were modeled with a composite CN of 98.

Time of Concentration

In accordance with the CWS D&C, the predeveloped time of concentration for the onsite basin was evaluated per the USDA TR-55 manual.

In predeveloped conditions, the time of concentration was evaluated to be 11 minutes, (See Technical Appendix: Calculations). The post-developed time of concentration was assumed to be 5 minutes.

Infiltration

Based on the existing soil types present on-site, infiltration rates are expected to be very low and close to zero. Thus, potential infiltration was not accounted for as part of the design parameters of the proposed detention system.

Runoff Rates

The pre- and post-developed runoff rates for the site are shown in Table 7 below (See Technical Appendix: Hydrographs – Existing vs Proposed Runoff Rates).

Recurrence Interval (yr)	Predeveloped Runoff Rate (cfs)	Post-Developed Runoff Rate (cfs)	Runoff Rate Increase (cfs)
2	0.265	0.882	0.617
5	0.472	1.199	0.727
10	0.607	1.387	0.780
25	0.791	1.631	0.840

Table 7 - Runoff Rates

WATER QUALITY TREATMENT

LIDA Feasibility

Per Section 4.05 of the CWS D&C, new development shall reduce its hydrologic impacts through Low Impact Development Approaches unless the criteria in 4.05.2 apply. Every effort has been made to provide LIDA BMPs for each basin.

The runoff from the project site will be collected, treated, and detained in an extended dry basin prior to being discharged.

Required Treatment Area

Per the CWS D&C, the impervious area requiring water quality treatment is evaluated as the new impervious area plus three times the modified impervious area. The following calculation was performed to determine the required treatment area.

Treatment Area = New Impervious Area + 3 x (Modified Imp. Area – Removed Imp. Area)

Table 8 outlines the post-developed treatment areas for the project site.

	Area	
	(sf)	(ac)
New Imp. Area	48,287	1.11
Modified Imp. Area	6,689	0.15
Total Imp. Area	68,357	1.57
Treatment Area	54,976	1.26

Table 8 – Post-Developed Treatment Areas

Treatment will not exceed the post-developed impervious area regardless if the treatment area is larger.

Design Guidelines

Per the CWS D&C, water quality treatment facilities are required to be designed to treat the rainfall of 0.36" over a 4-hour period with a return period of 96-hours. The following equation is used in determining the design flow rate for water quality treatment facilities.

$$\text{Water Quality Volume (WQV)} = \frac{\text{Treatment Area (sf) X 0.36 (in)}}{\text{12 (in/ft)}}$$

$$\text{Water Quality Flow (WQF)} = \frac{\text{WQV}}{\text{14,400 (sec)}}$$

Water Quality Approaches

To meet CWS water quality standards, the project proposes to utilize a combination of sumped catch basins, two Water Quality manholes and an Extended Dry Basin to treat the post-developed impervious area for the project site. The Extended Dry Basin is designed to hold the entire Water Quality Volume in the lower 1.5' of the basin with an outlet structure and orifice sized to meet the 48-hour water quality drawdown time requirement. The Basin will also include a permanent pool depth of 0.25' in the bottom of the basin below the water quality volume.

Flow does not bypass the pretreatment manholes; therefore, the pretreatment manholes were sized using the 25-year peak flow. Table 9 details the sizing for the pretreatment manholes proposed upstream of the Extended Dry Basin.

Post-Dev. 25-yr Peak Flow (cfs)	Required Sump Volume (cf)	Min Diameter (in)	Required Depth (in)	Proposed Depth (in)
1.63	32.6	60	19.9	36

Table 9 - Pretreatment Manhole Sizing

HYDROMODIFICATION MANAGEMENT

Hydromodification Assessment

Per the CWS D&C, a Hydromodification Assessment was performed to determine the Project Category of the project site (See Technical Appendix: Exhibits – Hydromodification Planning Tool). The project site eventually discharges into Hedges Creek north of the site.

Reach-Specific Risk Level

The CWS Hydromodification Planning Tool indicates that Hedges Creek has a "Moderate" Risk Level.

Development Class

The CWS Hydromodification Planning Tool indicates that the entire project site has a Development Class of "Developed".

Project Size

Project Size is based on the new & modified impervious areas created by the project. The total new and modified impervious area created by this project is 54,976 sf; this indicates a "Medium" Project Size.

Project Category

Based on the Risk Level, Development Class and Project Size indicated above, this project is considered to be Category 2.

Hydromodification Approaches

As mentioned previously, the existing soil types concluded that infiltration is not recommended; therefore, Infiltration LIDA is not feasible as a hydromodification approach for this project. Surface detention facilities are proposed to accomplish Peak Flow Matching Detention. The following section will discuss if required water quantity management will include attenuation of the 25-yr peak flow.

DOWNSTREAM ANALYSIS

Design Guidelines

CWS requires a downstream analysis when a project proposes new impervious area of 5,280 sf or greater. Per section 2.04.2(m.3(A)) of the CWS D&C, the analysis must demonstrate capacity in the downstream system for the additional volume of water generated by the development. The analysis shall extend downstream to a point where the drainage from the proposed development contributes less than 10% of total flow. When the flow drops below the 10% threshold the analysis must continue for ¼ of a mile or until the additional flow is less than 5% of total drainage flow.

Design Considerations

The proposed project discharges ultimately to Hedges Creek, which is north of the site. Based on the USGS Stream Stats for this location, the upstream basin for Hedges Creek at this location is approximately 0.45 Square Miles (See Technical Appendix: Exhibits – StreamStats Report). The basin size for this project represents approximately 0.75% of the total contributing area at the outfall.

Downstream deficiencies were found in the downstream drainage system. The CWS Sanitary Sewer & Storm Sewer Map calls out a pipe approximately 440' downstream of the project site and prior to the discharge pipe into Hedges Creek as a 12" pipe. Both the discharge pipe and the pipe prior to this 12" pipe are called out as 30" pipes. Therefore, it was determined that the downstream system likely does not have the capacity to release the post-developed 25-year storm event without detention.

Considering that there are observed downstream deficiencies, the project is required to meet the hydromodification detention requirements and include attenuation for the 25-year peak flow.

WATER QUANTITY MANAGEMENT

Design Guidelines

Based on the findings from the Hydromodification Assessment and the Downstream Analysis, the following criteria for Peak Flow Matching Detention must be met (all storms have a 24-hr duration), in accordance with the CWS D&C.

- The post-developed 2-yr runoff rate must be mitigated to 50% of the predeveloped 2-yr runoff rate.
- The post-developed 5-yr runoff rate must be mitigated to the predeveloped 5-yr runoff rate.
- The post-developed 10-yr runoff rate must be mitigated to the predeveloped 10-yr runoff rate.
- The post-developed 25-yr runoff rate must be mitigated to the predeveloped 25-yr runoff rate.

Water Quantity Approaches

The post-developed released runoff rates will be controlled by a detention pond and outlet flow control manhole. The flow control manhole will utilize a 0.625" orifice to manage the 48-hour drawn down for the Water Quality Volume and an additional orifice and overflow weir set above the height of the Water Quality Volume to limit the release rates to the required peak rates. The pond is designed to have 1' of freeboard above the 25-year storm.

Table 10 outlines the required release rates for the post-developed basin as well as the actual release rates as designed (See Technical Appendix: Hydrographs).

Recurrence Interval (yr)	Predeveloped Runoff Rate (cfs)	Required Release Rate (cfs)	Actual Release Rate (cfs)
2	0.265	0.133	0.130
5	0.472	0.472	0.278
10	0.607	0.607	0.423
25	0.791	0.791	0.653

Table 10 – Required Release Rates

SUMMARY

This report proposes stormwater management BMPs for the Sw Ibach St Subdivision in accordance with the City of Tualatin and Clean Water Services standards.

The project is proposing to utilize an extended dry basin to meet the water quality and quantity requirements for the developed area.

A Downstream Analysis was performed to demonstrate that the contributing flows represent a small portion of the overall flows in Hedges Creek where the project ultimately outfalls. The existing conveyance system has capacity issues through the 25-year storm event.

REFERENCES

1. *Design & Construction Standards for Sanitary Sewer & Surface Water Management*. December 2019, Clean Water Services
2. *Urban Hydrology for Small Watersheds (Technical Release 55)*. June 1986, U.S. Department of Agriculture

TECHNICAL APPENDIX

Exhibits

- National Flood Hazard Layer FIRMette
- Hydrologic Soil Group – Washington County
- Curve Numbers
- Hydromodification Planning Tool
- Existing Conditions
- Post-Developed Conditions

Calculations

- Time of Concentration – Predeveloped Basin

Hydrographs

- Existing vs Proposed Runoff Rates
- Existing vs Proposed Release Rates

Downstream Analysis

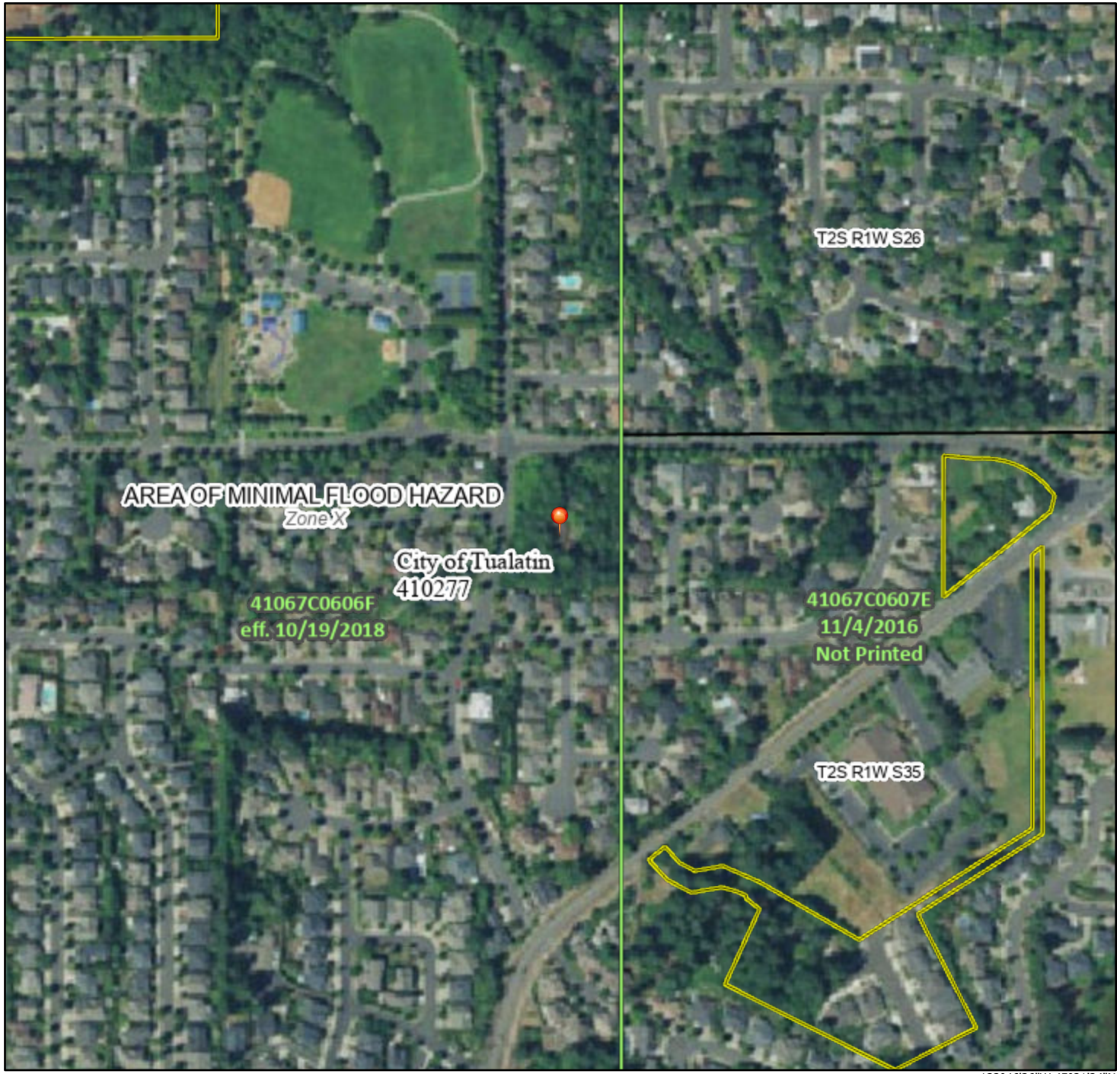
- StreamStats Upstream Basin Exhibit

EXHIBITS

National Flood Hazard Layer FIRMette

FEMA

122°47'13"W 45°21'49"N



Feet

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

1:6,000

122°46'36"W 45°21'24"N

Basemap Imagery Source: USGS National Map 2023

Legend

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

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

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

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

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

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

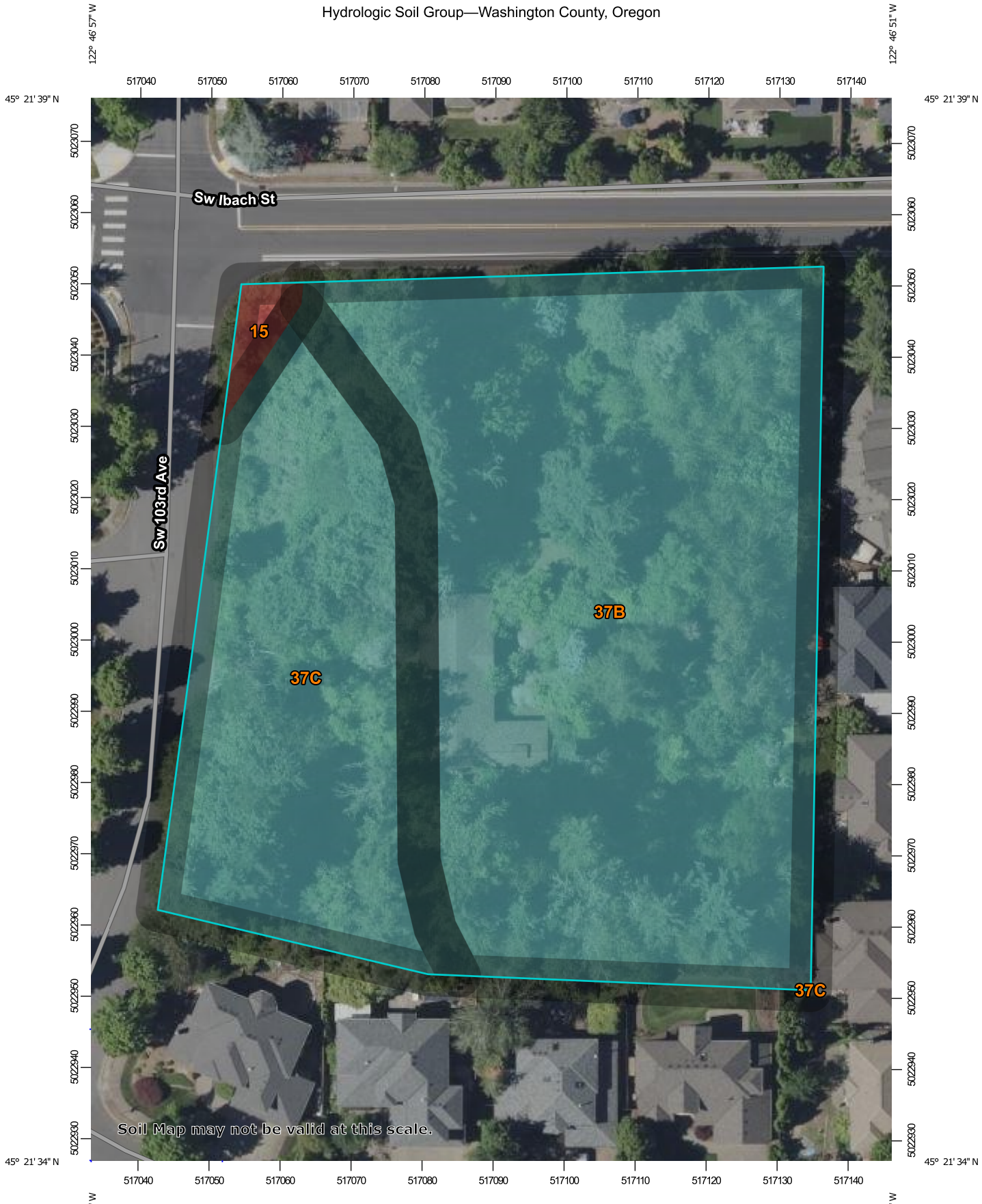
N

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

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 5/27/2025 at 10:45 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.



Map Scale: 1:726 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 10 20 40 60

Feet
0 35 70 140 210

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

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

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 1:20,000.

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: Washington County, Oregon
Survey Area Data: Version 24, Aug 28, 2024

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

Date(s) aerial images were photographed: Mar 1, 2024—Jul 1, 2024

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
15	Dayton silt loam	D	0.0	1.2%
37B	Quatama loam, 3 to 7 percent slopes	C	1.4	68.6%
37C	Quatama loam, 7 to 12 percent slopes	C	0.6	30.2%
Totals for Area of Interest			**2.1**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Table 2-2a Runoff curve numbers for urban areas [1/]

Cover description		Curve numbers for hydrologic soil group			
Cover type and hydrologic condition	Average percent impervious area [2/]	A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) [3/]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4/]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) [5/]		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

For Onsite Basins

1 Average runoff condition, and $I_a = 0.2S$.

2 The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.

3 CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

4 Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

5 Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Table 2-2c Runoff curve numbers for other agricultural lands [1/]

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition	A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. [2/]	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.	—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element. [3/]	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30 [4/]	48	65	73
Woods—grass combination (orchard or tree farm). [5/]	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods. [6/]	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30 [4/]	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.	—	59	74	82	86

For Predeveloped

1 Average runoff condition, and $I_a = 0.2S$.

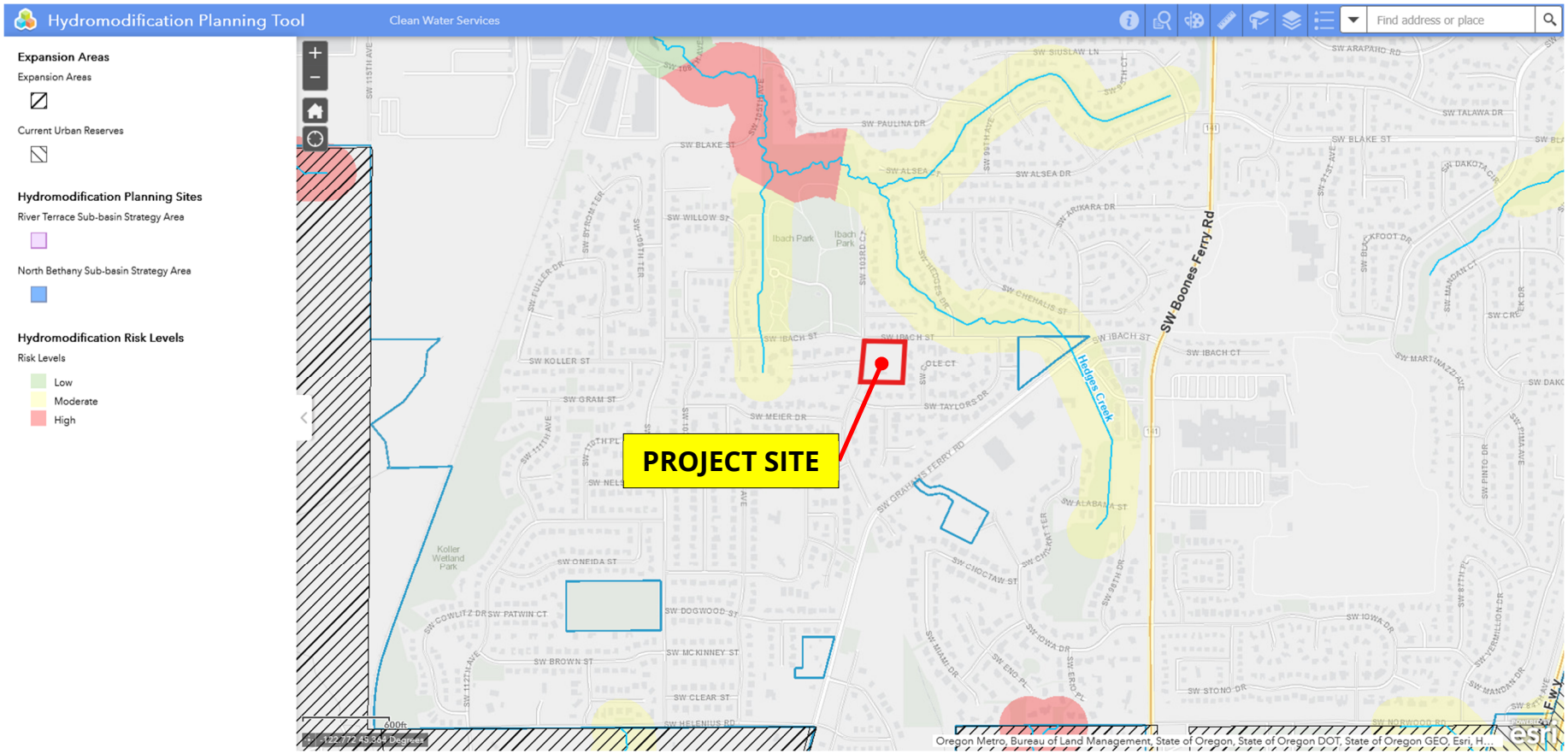
2 *Poor:* <50%) ground cover or heavily grazed with no mulch.
Fair: 50 to 75% ground cover and not heavily grazed.
Good: > 75% ground cover and lightly or only occasionally grazed.

3 *Poor:* <50% ground cover.
Fair: 50 to 75% ground cover.
Good: >75% ground cover.

4 Actual curve number is less than 30; use CN = 30 for runoff computations.

5 CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.

6 *Poor:* Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.


Hydromodification Planning Tool
Clean Water Services
Find address or place
Expansion Areas
Expansion Areas
Current Urban Reserves
Hydromodification Planning Sites
River Terrace Sub-basin Strategy Area
North Bethany Sub-basin Strategy Area
Hydromodification Risk Levels
Risk Levels
Low
Moderate
High
PROJECT SITE
SW Boones Ferry Rd
Hedges Creek
Ibach Park
Koller Wetland Park
SW PAULINA DR
SW BLAKE ST
SW ALSEA DR
SW WILLOW ST
SW IBACH ST
SW KOLLER ST
SW GRAM ST
SW MEIER DR
SW TAYLORS DR
SW GRAHAM FERRY RD
SW ALABAMA ST
SW ONEIDA ST
SW DOGWOOD ST
SW MCKINNEY ST
SW BROWN ST
SW CLEAR ST
SW HELENIUS RD
SW IOWA DR
SW STONO DR
SW NORWOOD RD
600ft
Oregon Metro, Bureau of Land Management, State of Oregon, State of Oregon DOT, State of Oregon GEO, Esri, H...
esri

LEGEND

- BASIN BOUNDARY
- EXISTING IMPERVIOUS AREA
- MODIFIED (ONSITE) IMPERVIOUS AREA
- TIME OF CONCENTRATION FLOW LINE
- SURFACE FLOW DIRECTION

EXISTING BASIN AREAS

PROJECT SITE AREA = 94,186 SF (2.16 AC)

ONSITE IMPERVIOUS AREA = 6,689 SF (0.15 AC)
ONSITE PERVIOUS AREA = 76,050 SF (1.75 AC)

PUBLIC IMPERVIOUS AREA = 11,447 SF (0.26 AC)
PUBLIC PERVIOUS AREA = 0 SF (0.00 AC)

N
W E
S

SCALE: 1" = 40'
0 40 FT

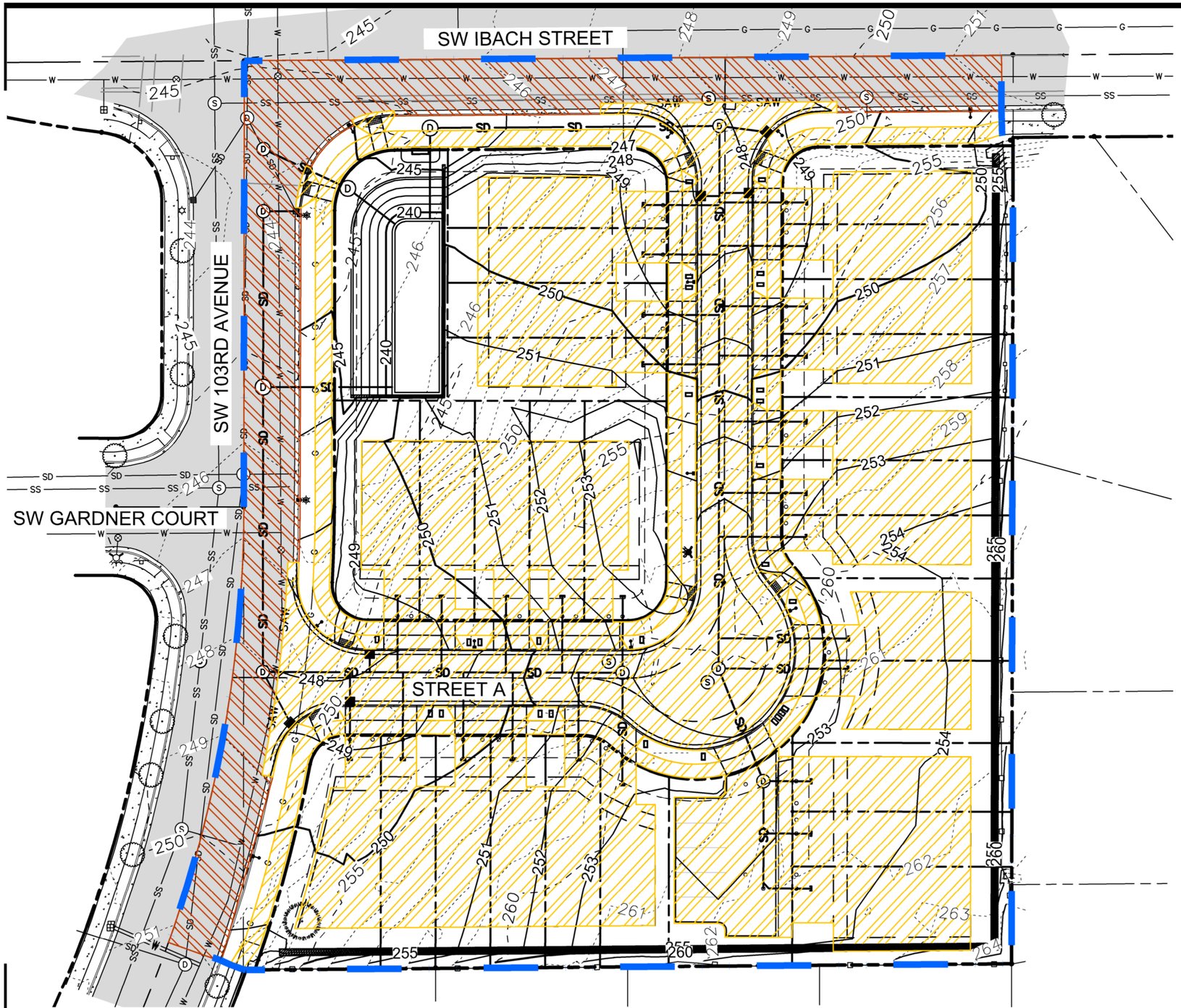
SW IBACH ST SUBDIVISION

SEPTEMBER 2025

DEZ DEVELOPMENT LLC

EXISTING CONDITIONS

3J CONSULTING
CIVIL ENGINEERING . WATER RESOURCES . COMMUNITY PLANNING



LEGEND

- BASIN BOUNDARY
- EXISTING (PUBLIC) IMPERVIOUS AREA
- PROPOSED (ONSITE) IMPERVIOUS AREA

POST-DEVELOPED BASIN AREAS

PROJECT SITE AREA = 94,186 SF (2.16 AC)

ONSITE IMPERVIOUS AREA = 54,976 SF (1.26 AC)
ONSITE PERVIOUS AREA = 27,763 SF (0.64 AC)

PUBLIC IMPERVIOUS AREA = 11,447 SF (0.26 AC)
PUBLIC PERVIOUS AREA = 0 SF (0.00 AC)

N
W E
S

SCALE: 1" = 40'
0 40 FT

SW IBACH ST SUBDIVISION

SEPTEMBER 2025

DEZ DEVELOPMENT LLC

POST-DEVELOPED CONDITIONS

3J CONSULTING
CIVIL ENGINEERING . WATER RESOURCES . COMMUNITY PLANNING

CALCULATIONS

PREDEVELOPED TIMES OF CONCENTRATION

PROJECT NO. 25008	BY JJS	DATE 7/28/2025

SHEET FLOW			
INPUT	**Basin 1**		
Surface Description	**Type 9 Woods (light_underbrush)**		
Manning's "n"	**0.4**		
Flow Length, L	**50** ft		
2-Yr 24 Hour Rainfall, P_2	**2.5** in		
Land Slope, s	**0.055** ft/ft		
OUTPUT			
Travel Time	0.16 hr		

SHALLOW CONCENTRATED FLOW			
INPUT	**VALUE**		
Surface Description	**Unpaved**		
Flow Length, L	**220** ft		
Watercourse Slope*, s	**0.050** ft/ft		
OUTPUT			
Average Velocity, V	3.61 ft/s		
Travel Time	0.017 hr		

CHANNEL FLOW			
INPUT	**VALUE**		
Cross Sectional Flow Area, a	**0** ft^2		
Wetted Perimeter, P_w	**2** ft		
Channel Slope, s	**0** ft/ft		
Manning's "n"	**0.013**		
Flow Length, L	**200** ft		
OUTPUT			
Average Velocity	3.46 ft/s		
Hydraulic Radius, r = a / P_w	0.08 ft		
Travel Time	0.02 hr		
Watershed or Subarea T_c =	**0.19 hr**		
Watershed or Subarea T_c =	**11 minutes**		

HYDROGRAPHS

Project:	Date: 06/03/2025		
	Designed by: kimis	Checked by:	Approved By:
Report Title: Ex vs Proposed Runoff	Company Address:		

ARI: 2 years: Type IA: 2.5 in

Phase	Item Label	Max. Inflow (ft³/s)
PROPOSED	Project Site	0.882
EXISTING	Project Site	0.265

ARI: 5 years: Type IA: 3.1 in

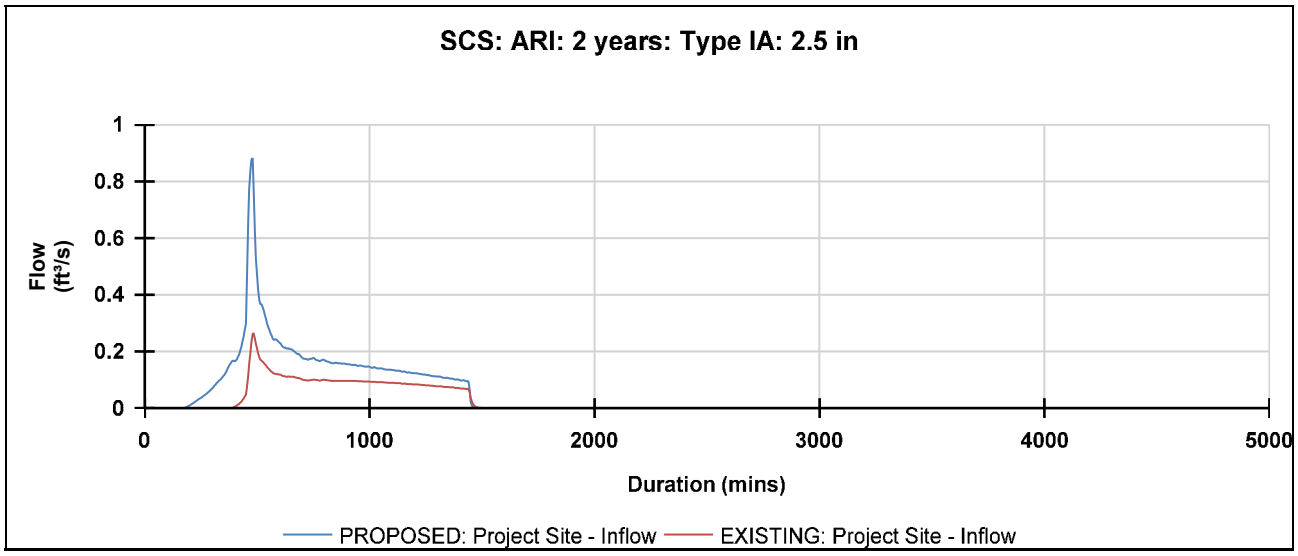
Phase	Item Label	Max. Inflow (ft³/s)
PROPOSED	Project Site	1.199
EXISTING	Project Site	0.472

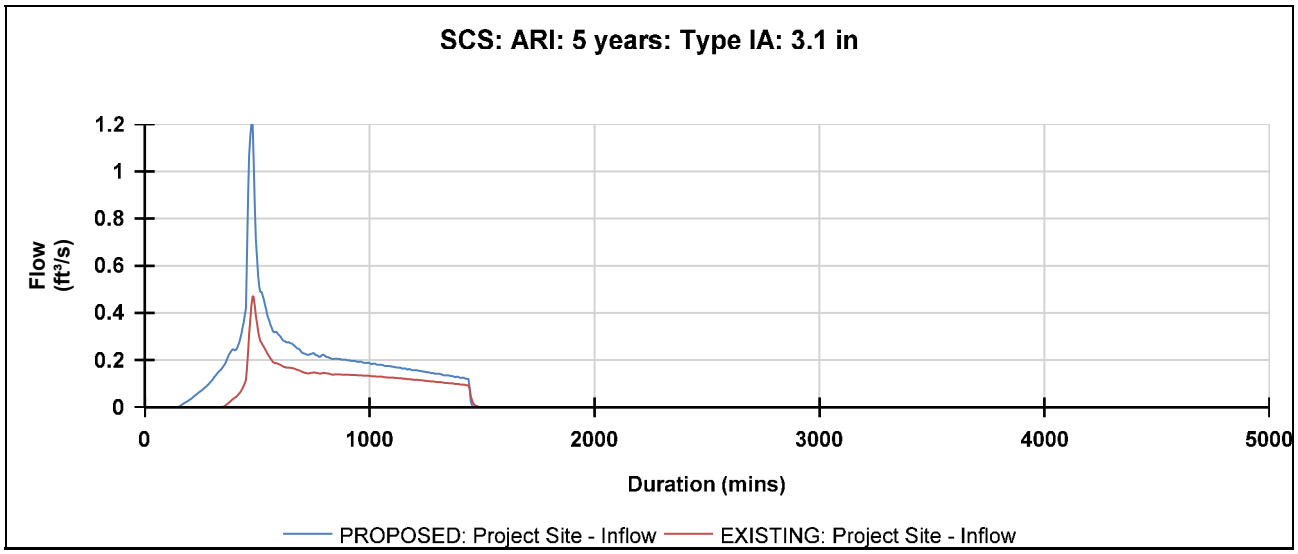
ARI: 10 years: Type IA: 3.45 in

Phase	Item Label	Max. Inflow (ft³/s)
PROPOSED	Project Site	1.387
EXISTING	Project Site	0.607

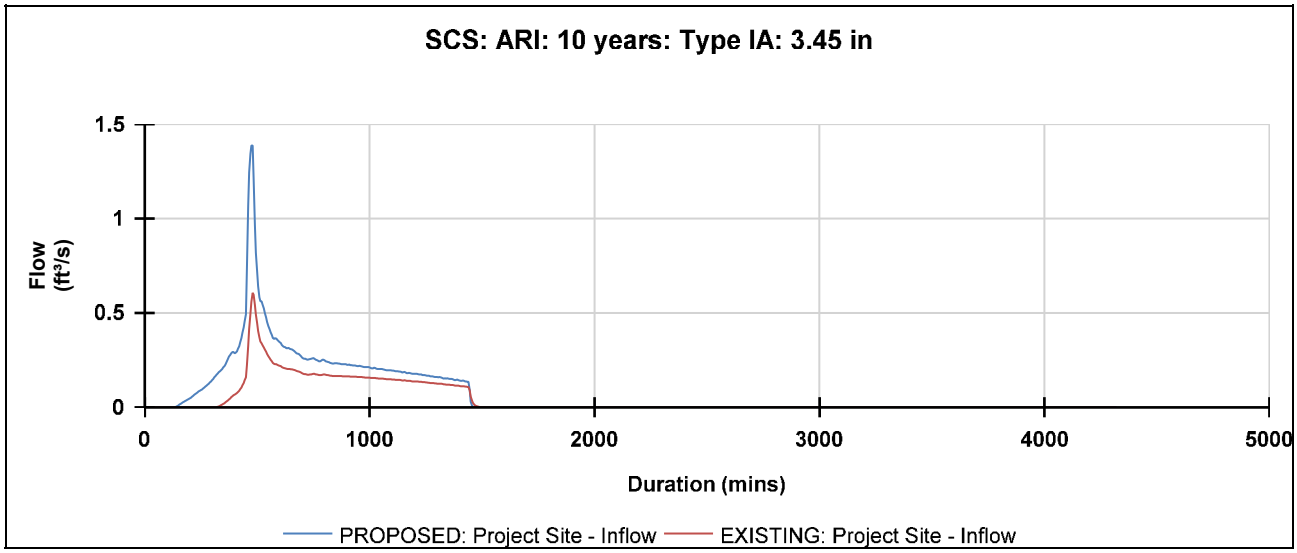
ARI: 25 years: Type IA: 3.9 in

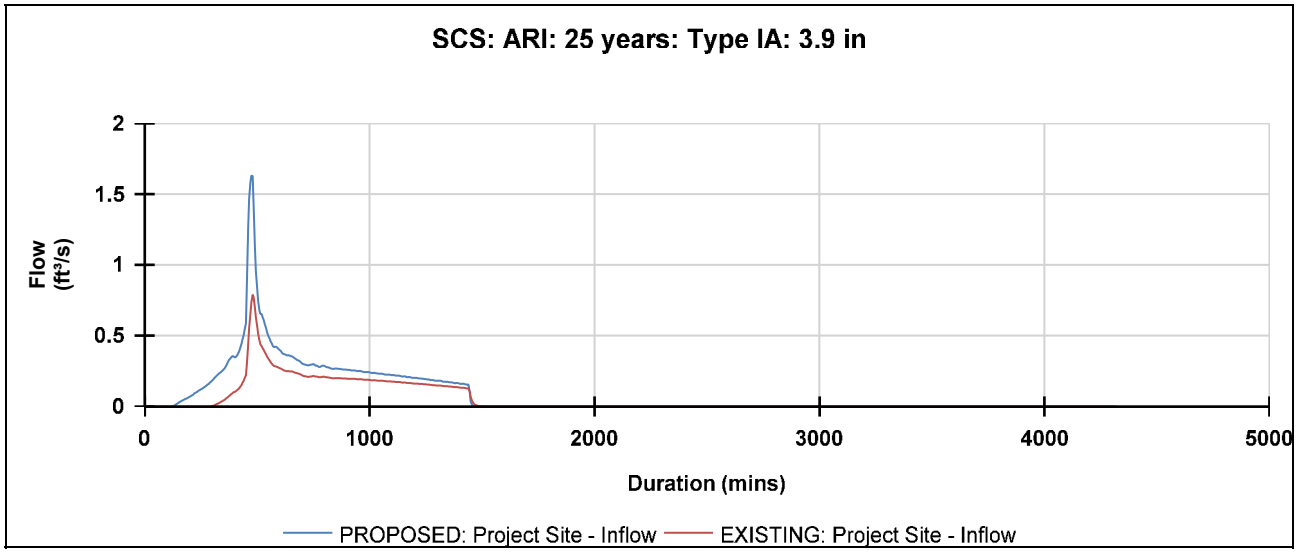
Phase	Item Label	Max. Inflow (ft³/s)
PROPOSED	Project Site	1.631
EXISTING	Project Site	0.791





Project:	Date: 06/03/2025		
	Designed by: kimis	Checked by:	Approved By:
Report Title: Ex vs Proposed Runoff	Company Address:		





Project:	Date: 06/03/2025		
	Designed by: kimis	Checked by:	Approved By:
Report Title: Ex vs Proposed Runoff	Company Address:		

ARI: 2 years: Type IA: 2.5 in

Phase	Item Label	Max. Outflow (ft³/s)
PROPOSED	FC MH OUTLET	0.130
EXISTING	FLOW OUT	0.265

ARI: 5 years: Type IA: 3.1 in

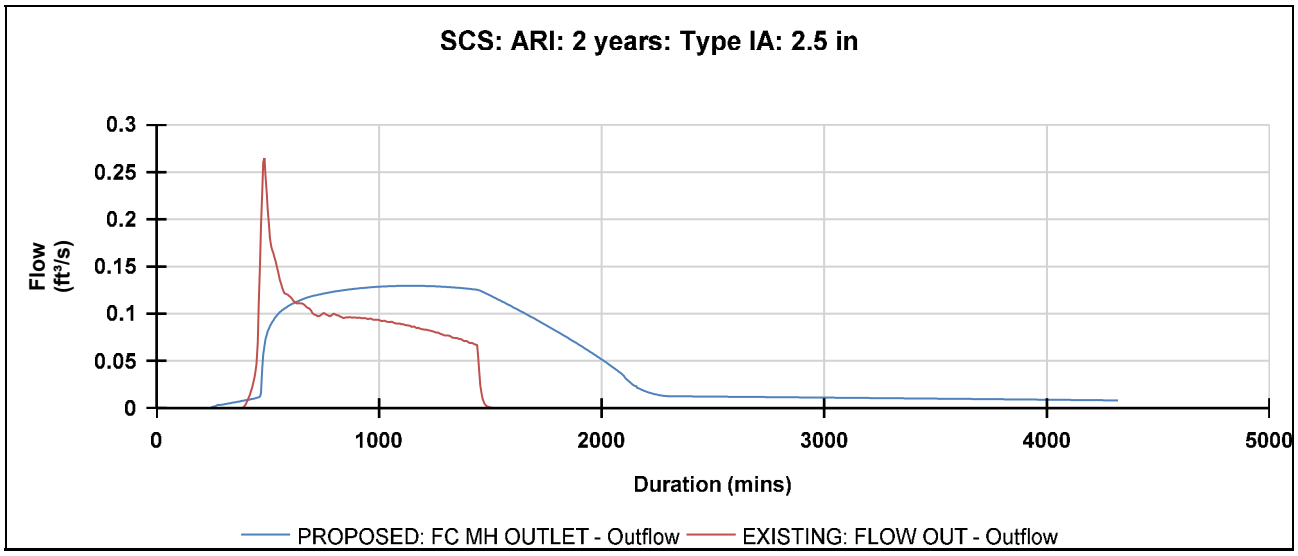
Phase	Item Label	Max. Outflow (ft³/s)
PROPOSED	FC MH OUTLET	0.278
EXISTING	FLOW OUT	0.470

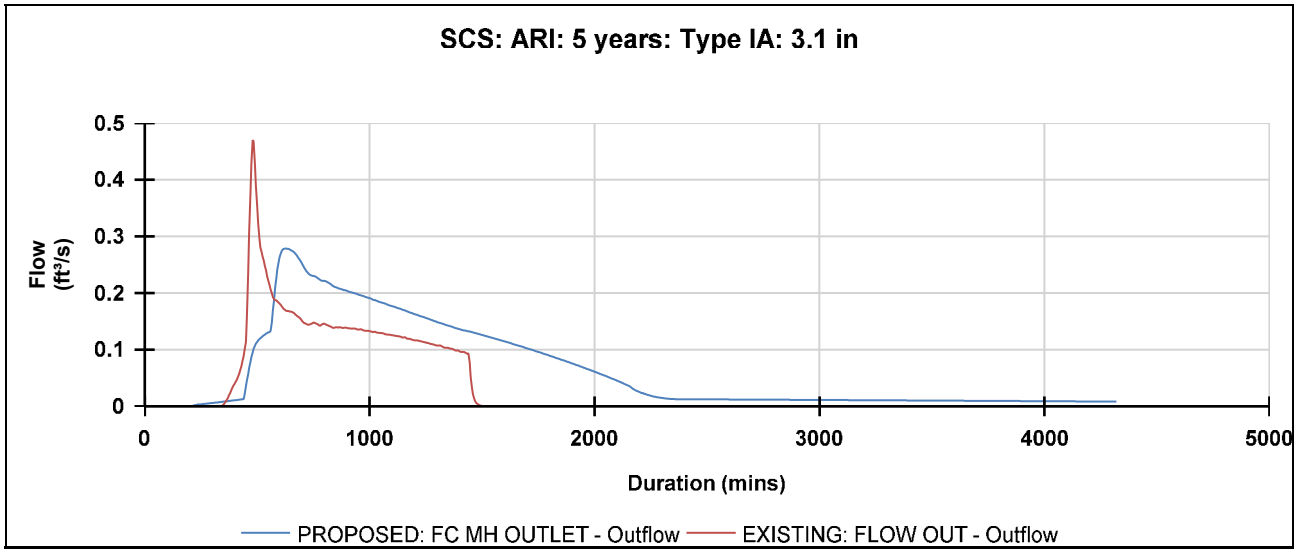
ARI: 10 years: Type IA: 3.45 in

Phase	Item Label	Max. Outflow (ft³/s)
PROPOSED	FC MH OUTLET	0.423
EXISTING	FLOW OUT	0.605

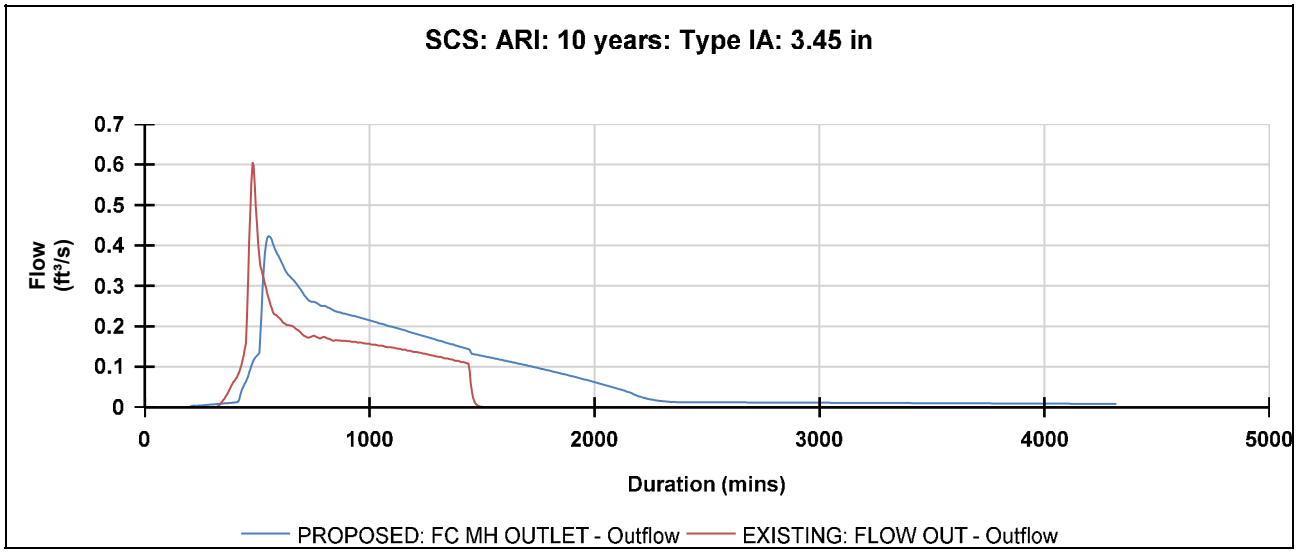
ARI: 25 years: Type IA: 3.9 in

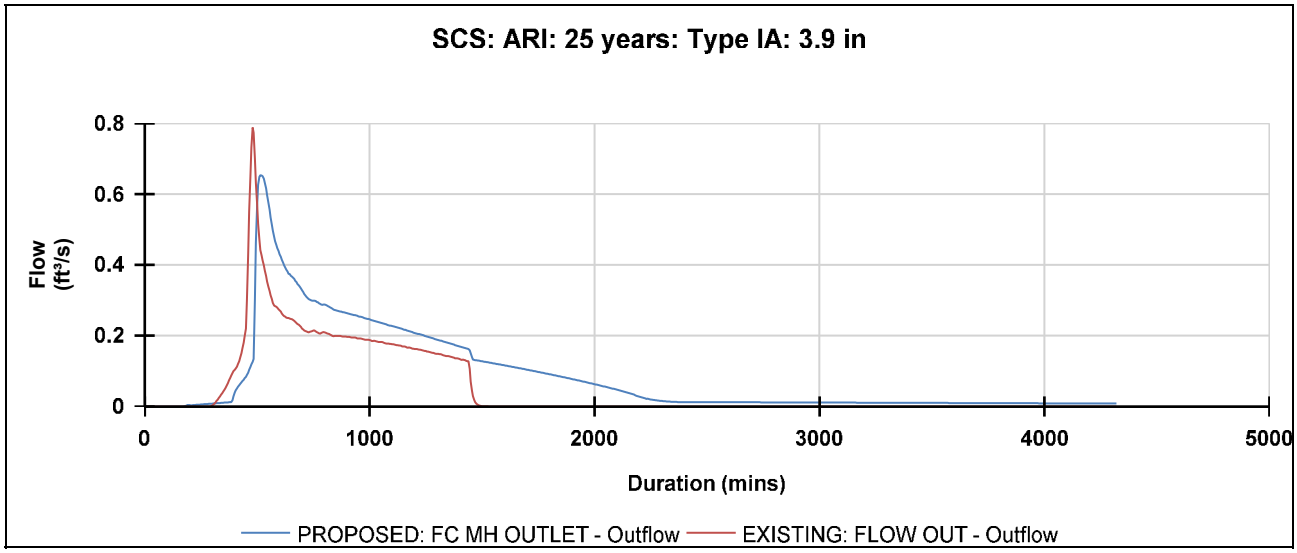
Phase	Item Label	Max. Outflow (ft³/s)
PROPOSED	FC MH OUTLET	0.653
EXISTING	FLOW OUT	0.788





Project:	Date: 06/03/2025		
	Designed by: kimis	Checked by:	Approved By:
Report Title: Ex vs Proposed Runoff	Company Address:		

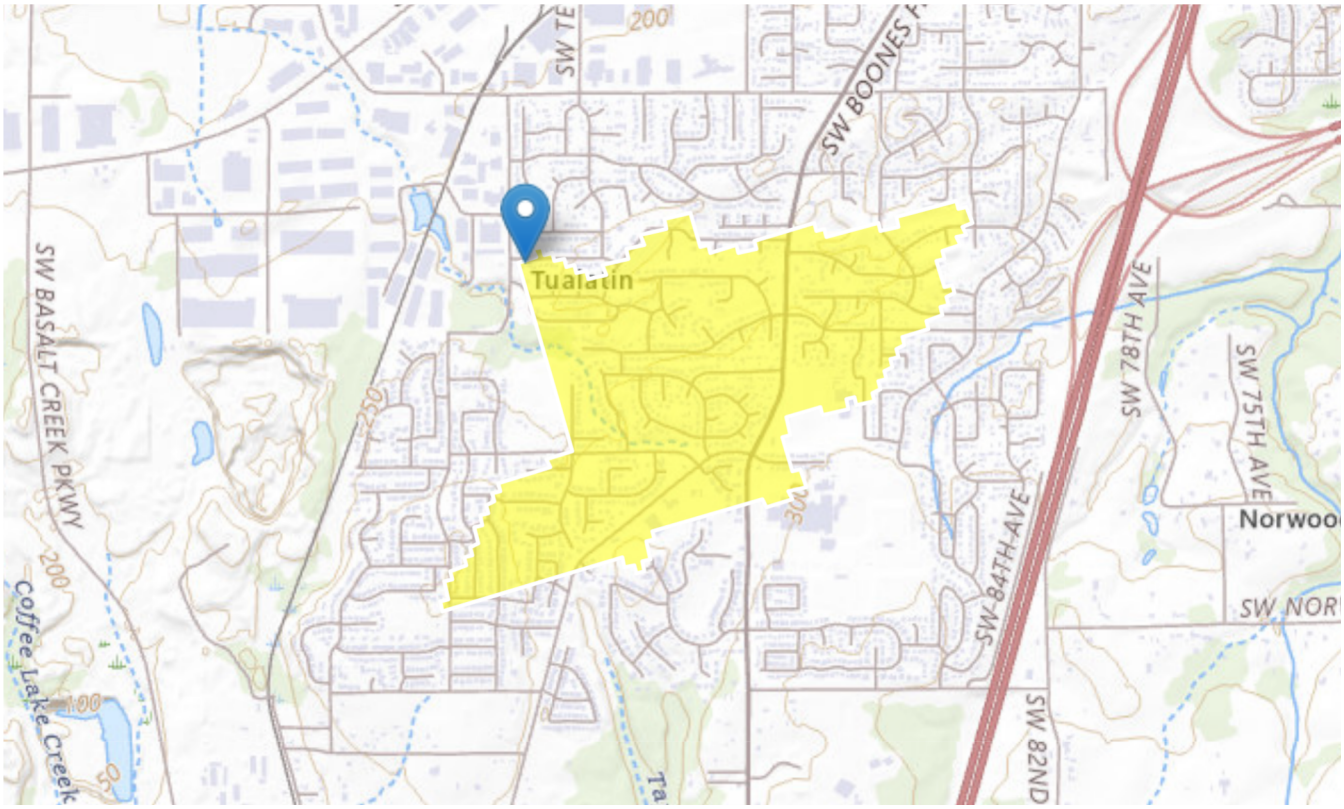




DOWNSTREAM ANALYSIS

StreamStats Report - Hedges Creek at SW Ibach St

Region ID: OR
Workspace ID: OR20250729203733893000
Clicked Point (Latitude, Longitude): 45.36641, -122.78440
Time: 2025-07-29 13:38:01 -0700



Collapse All

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.45	square miles

Application Version: 4.29.2

StreamStats Services Version: 1.2.22

NSS Services Version: 2.2.1