DEERFIELD
BONNER COUNTY, IDAHO

Stormwater Management & Erosion Control Plan

Prepared by:

August 2025

476864 Highway 95, Suite 3
Ponderay, ID 83852

Introduction

This report documents that the proposed Deerfield Grading/Stormwater Management Plan complies with Bonner County Code. The plan has been developed to provide natural site treatment of stormwater and minimize erosion and sediment transport.

The conclusions and recommendations contained within this report are based on site inspection, lidar, topographical survey, Natural Resources Conservation Service (NRCS) soil survey data, the wetland delineation report, and best management practices.

Existing Site Conditions

Deerfield is a 32.820-acre parcel (RP57N02W164952A) located just west of the City of Sandpoint in Bonner County, Idaho. The property is zoned Suburban (S) and is bounded by Baldy Mountain Road to the north, large single-family parcels to the east and west, and Syringa Creek to the south.

The majority of the site is relatively flat with a 1% slope towards the southwest with steeper areas along the northeastern and southern boundaries. Multiple wide and shallow drainage ways exist within this parcel originating both on and off site. Regional topography generally slopes towards Syringa Creek to the south of the property. The site is primarily covered in grass with scattered trees on the north end and dense forest on the south end. No existing utilities are known to be present at the site. Gas, potable water, overhead power, and telecommunications exist within Baldy Mountain Road to the north.

An aquatic resources delineation report completed by FACET for the development is included in **Appendix D**. This report identified a wetland area located along the southern property boundary.

Proposed Improvements

Deerfield includes the development of 24 residential lots with a maximum impervious area allocation of 5,000 SF each. The subdivision will be accessed from Baldy Mountain Road, a Bonner County owned and maintained roadway. A regional stormwater tract will be created to store and treat runoff generated from the development while maintaining the majority of existing drainage ways. Two natural drainageways will be rerouted on the boundaries of western lots 4, 5, and 6 to accommodate drain field setbacks. The project includes dedication of a 60-foot-wide public right-of-way, Deerfield Drive, designed with a rural street section consisting of a 24-foot-wide paved street with roadside ditches. The new roads will be publicly owned and privately maintained. Public water service will be provided by Syringa Heights Water District (SHWD). All lots are anticipated to be served via onsite septic systems.

Site Soils

An NRCS soil survey report for the site is included in **Appendix B**. The NRCS Soil Survey indicates the site soil mainly consists of Mission silt loam (91.9%). Mission silt loam is classified as a Hydrologic Soil Group D soil. Group D soils exhibit a very slow infiltration rate and shallow groundwater table generally ranging from 0.5 foot to 1.5 feet. Per NRCS, infiltration rates for this soil group are low to moderately low (0.00 to 0.06 IN/HR).

Rainfall

Rainfall intensities were calculated from the SCS Type II 24-hr cumulative storm distributions. The rainfall distribution map and associated isopluvial maps can be found in **Appendix A**.

Stormwater Management

The stormwater system was sized to accommodate stormwater runoff for a 25-YR, 24-HR rain event and provide treatment for the first one-half inch (1/2 IN) of runoff from impervious surfaces in accordance with Bonner County Code 12-726. Bentley's CivilStorm was utilized to complete hydrologic and hydraulic analyses using SCS TR-55 methodology. A CivilStorm model inputs and results summary can be seen in **Appendix E**. To develop curve numbers and times of concentration, each basin was analyzed using CivilStorm and Civil 3D, for both pre and post development conditions. Civil 3D was utilized to measure the longest flow path and surface slopes. An impervious area of 5,000 SF per lot was assumed consisting of: 750 SF driveway, 1,250 SF shop/garage, and 3,000 SF residence footprint.

Collection and Conveyance System: Residential lots will be graded by future builder(s) to direct runoff towards Deerfield Drive. Runoff generated from new impervious surfaces will be collected and conveyed through roadside ditches and driveway culverts to a regional stormwater treatment facility. Offsite flows and runoff generated from existing and undisturbed surfaces will be conveyed through existing and rerouted drainage ways via new cross-culverts.

The system was evaluated utilizing CivilStorm to ensure the ditches and culverts were sufficiently sized to convey runoff through the existing and rerouted drainage ways and to the stormwater treatment and disposal system; for more details, see the stormwater plan sheets. The evaluation also confirmed that runoff would not overtop the roadway during a 25-year, 24-hour runoff event. To ensure this is achieved, tandem 12 IN diameter driveway culverts will be required to be installed by the future builder(s) at driveway approaches to lots 6-9, 15-18, and 24. A single 12 IN diameter driveway culvert is sufficient at all other driveway approaches.

Treatment and Disposal System: The collection and conveyance system will route runoff to the treatment and disposal system, preserving existing drainage ways and incorporating two rerouted channels on the boundaries of western lots 4, 5, and 6. The two rerouted channels were designed using HEC-23 (Vol. 2) with a FHWA riprap class I and a thickness of two times the D50 with geotextile fabric underlayment. A regional stormwater detention basin was sized to sufficiently capture the 25-year, 24-hour runoff event and treat the first one-half inch of stormwater from impervious surfaces in accordance with Bonner County Code. The design of the pond outlet ensures that the post-development peak flow rate will not exceed the pre-development conditions for the design storm. Once sufficient detention is achieved, runoff will discharge into the riprap armored channel and into Syringa Creek via outlet weir. The riprap armored channel was designed using HEC-23 (Vol. 2) with a FHWA riprap class III and a thickness of two times the D50 with geotextile fabric underlayment. An infiltration trench with a perforated pipe to drain the detention basin is recommended to reduce the prevalence of stagnant water.

Pre-Development Land Cover: See Plan Sheets, **Appendix C**.

Subbasin	Area, ACRES	Curve Number	Time of Concentration, HRS	Peak Runoff Rate, CFS
Basin 1	16.3	79	0.78	11.3
Basin 2	13.2	79	0.80	9.0
Basin 3	5.7	77	0.78	3.5
Basin 4	10.2	77	0.59	7.7

Post-Development Land Cover: See Plan Sheets, **Appendix C**.

Subbasin	Area, ACRES	Curve Number	Time of Concentration, HRS	Peak Runoff Rate, CFS
BASIN-1A	5.5	79	0.69	4.2
BASIN-1B	7.7	80	0.69	6.2
BASIN-2A	1.0	77	0.23	1.3
BASIN-2B	11.4	79	0.75	8.2
BASIN-3A	1.5	77	0.39	1.5
BASIN-3B	2.0	77	0.61	1.5
BASIN-4A	0.8	77	0.27	0.9
BASIN-4B	0.5	77	0.47	0.5
BASIN-5A	2.5	77	0.39	2.5
BASIN-5B	1.0	77	0.48	0.8
BASIN-5C	1.0	77	0.45	0.9
BASIN-5D-EAST	2.3	82	0.41	2.9
BASIN-5D-NW	1.2	91	0.08	3.8
BASIN-5D-SW	1.6	91	0.08	5.1
BASIN-5E-EAST	1.1	85	0.41	1.6
BASIN-5E-NW	1.1	90	0.08	3.4
BASIN-5E-SW	1.5	90	0.08	4.5
BASIN-6A	0.2	77	0.44	0.2
BASIN-7A	0.7	77	0.34	0.8
BASIN-8A	0.7	77	0.44	0.6

Discharge: See Plan Sheets, **Appendix C**, for locations.

Location	Pre-Development, CFS	Post-Development, CFS	Difference, CFS
Outfall 1	11.3	10.3	-1.0
Outfall 2	9.0	8.4	-0.6
Outfall 3	3.5	2.7	-0.8
Outfall 4	7.7	7.7	0.0

Treatment: This table lists the storage volumes required to meet County Code 12-726.

Location	½ IN Impervious Volume Required, CF	Pre vs Post Volume Required, CF
Regional Storage	8,300	*28,340

* This volume represents the storage area above the weir crest but below the top of the pond.

The pre- and post-development storage requirements were calculated using routing within Bentley's CivilStorm modeling software. Impervious runoff volumes were calculated by applying a ½ IN rainfall depth over the total impervious area.

Erosion Control Plan

All temporary and permanent BMPs shall generally conform to the Idaho Catalog of Stormwater Best Management Practices (IDEQ, 2020).

The Owner and Contractor shall file for permit coverage under the Idaho Department of Environmental Quality (IDEQ) Idaho Pollutant Discharge Elimination System Program (IPDES) through the IPDES e-permitting system. A copy of the approved Stormwater Pollution Prevention Plan (SWPPP) shall be kept on site at all times.

Temporary erosion control during construction is the responsibility of the Contractor and shall be achieved by use of the following:

1. Minimize Land Disturbance (BMP 1): Site disturbance will be minimized to the extent possible. A vegetated buffer will be maintained, where possible, to filter runoff and ensure sediment does not leave the project area.
2. Construction Timing (BMP 36): The Contractor will schedule construction activities to minimize the extent and duration of disturbance (to the extent possible).
3. Staging Areas (BMP 37): Equipment, materials, stockpiles, etc. will be located, constructed and maintained to prevent the discharge of sediment, dust, trash or debris from the site.
4. Vehicle Sediment Control (BMP 40): Stabilized rock construction entrance(s) will be constructed and maintained to mitigate any sediment and/or debris from leaving the site.
5. Dust Control (BMP 43): Dust control during construction will be managed with a water truck at a frequency necessary to mitigate dust from entering the air.
6. Stockpile Management (BMP 44): Material stockpiles will be placed away from drainage inlets and be covered by plastic sheeting as necessary to prevent stormwater runoff.
7. Sanitary and Septic Waste Management (BMP 50): Contractor will provide portable sanitary facilities for workers at a location where it can be regularly serviced.
8. Silt Fence (BMP 65): Silt fencing will be placed down-gradient, at the perimeter of the construction area and maintained according to best management practices.
9. Dewatering (BMP 73): If necessary, construction dewatering shall be performed by the Contractor in accordance with the requirements of the agencies having jurisdiction.
10. Street Sweeping (BMP 75): Any sediment or debris that is tracked off site will be swept during that same work shift.

Temporary erosion control measures, to include silt fencing, shall only be removed once all disturbed areas have been re-vegetated.

Maintenance of permanent erosion control is the responsibility of the homeowner's association and is achieved by way of the following design features/best management practices:

1. Infiltration Trench (BMP 17): An infiltration trench with a perforated pipe should be installed inside the extended detention basin; this will drastically reduce the duration of standing water and its associated issues.
2. Extended Detention Basin (BMP 23): An extended detention basin will provide permanent stormwater retention and treatment for the subdivision and new public roadways by attenuating runoff and allowing particles and associated pollutants to settle.
3. Landscaping (BMP 32): Individual lots will be landscaped, post-subdivision development, by way of seeding, sodding and/or planting of trees and shrubs. This will aid in reducing runoff and minimizing invasive species through infiltration and long-term biofiltration.

Construction Schedule

To ensure proper stormwater management during construction, Contractor shall adhere to the following sequence for construction activities:

1. May 2025 - Installation of temporary erosion controls.
2. May 2025 - Construct stabilized gravel construction entrance(s).
3. June 2025 - Rough-in detention basin.
4. June 2025 – Clearing and grubbing within right-of-way and stormwater treatment facility.
5. June/July 2025 - Install utilities.
6. July/August 2025 - Construct roadway embankments for Deerfield Drive.
7. September 2025 - Pave Deerfield Drive.
8. September 2025 - Final grading and seeding of detention basin.
9. October 2025 - Removal of temporary erosion controls.
10. October 2025 – October2027 – Lot development/stabilization

During construction, in addition to the inspections that may be required by IDEQ the temporary erosion control devices shall be inspected at a minimum of once per week and after any storm event of 0.25 IN or greater.

Operation and Maintenance Plan

The landowner or homeowner's association shall be responsible for operation and maintenance of the stormwater system upon completion and recording of the final plat.

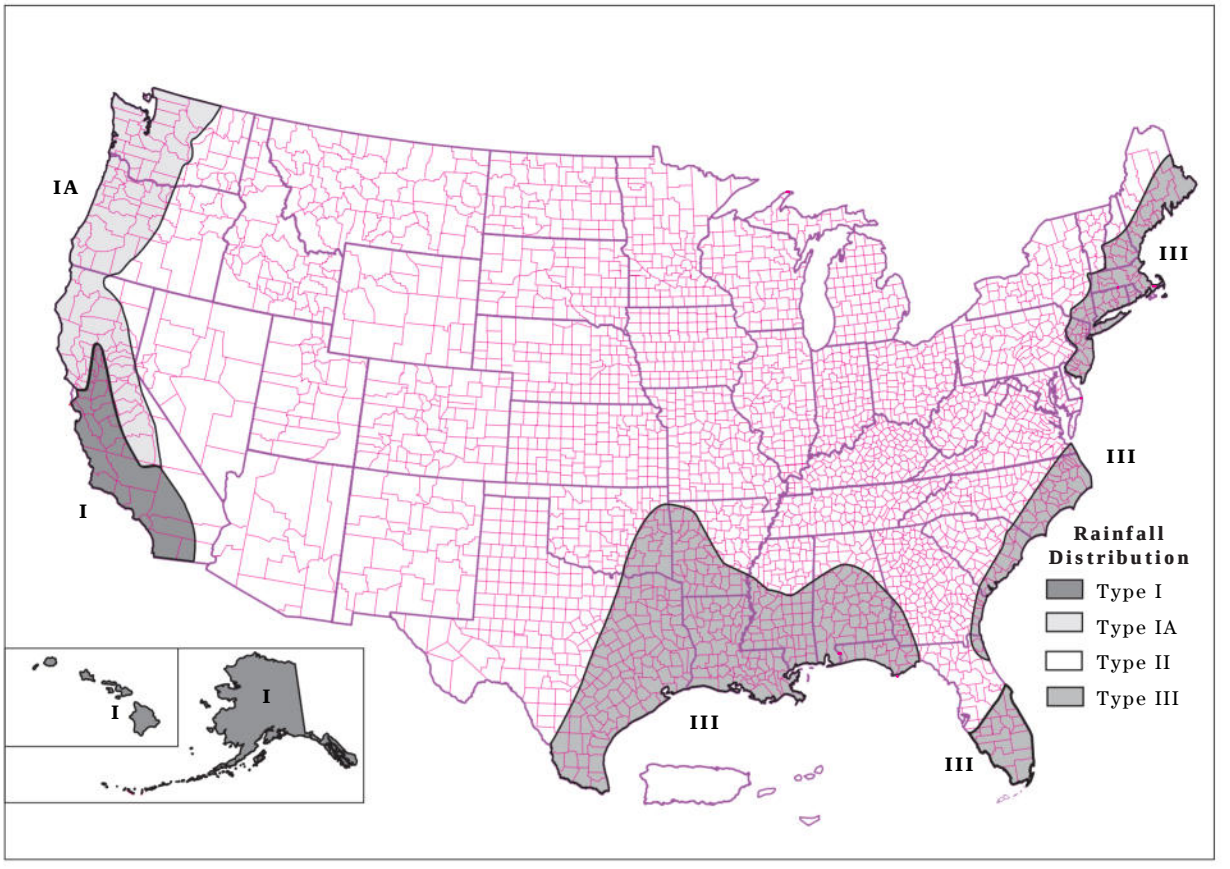
Operations and maintenance shall include, but are not limited to:

1. Mow and remove sediment and debris from roadside ditches and the extended detention basin.
2. Repair any areas damaged by excessive erosion by re-seeding as necessary.
3. Remove any sediment and debris from culverts.
4. Remove debris and check for signs of excessive erosion around weir structure.

Swales, culverts, and the extended detention basin and its outlet structures shall be inspected quarterly and after major rain events. Contact the homeowner's association if culverts are full of sediment and/or debris. Inspections may be suspended when runoff is unlikely due to winter conditions.

Appendix A

Figure B-2 Approximate geographic boundaries for NRCS (SCS) rainfall distributions



Rainfall data sources

This section lists the most current 24-hour rainfall data published by the National Weather Service (NWS) for various parts of the country. Because NWS Technical Paper 40 (TP-40) is out of print, the 24-hour rainfall maps for areas east of the 105th meridian are included here as figures B-3 through B-8. For the area generally west of the 105th meridian, TP-40 has been superseded by NOAA Atlas 2, the Precipitation-Frequency Atlas of the Western United States, published by the National Ocean and Atmospheric Administration.

East of 105th meridian

Hershfield, D.M. 1961. Rainfall frequency atlas of the United States for durations from 30 minutes to 24 hours and return periods from 1 to 100 years. U.S. Dept. Commerce, Weather Bur. Tech. Pap. No. 40. Washington, DC. 155 p.

West of 105th meridian

Miller, J.F., R.H. Frederick, and R.J. Tracey. 1973. Precipitation-frequency atlas of the Western United States. Vol. I Montana; Vol. II, Wyoming; Vol III, Colorado; Vol. IV, New Mexico; Vol V, Idaho; Vol. VI, Utah; Vol. VII, Nevada; Vol. VIII, Arizona; Vol. IX, Washington; Vol. X, Oregon; Vol. XI, California. U.S. Dept. of Commerce, National Weather Service, NOAA Atlas 2. Silver Spring, MD.

Alaska

Miller, John F. 1963. Probable maximum precipitation and rainfall-frequency data for Alaska for areas to 400 square miles, durations to 24 hours and return periods from 1 to 100 years. U.S. Dept. of Commerce, Weather Bur. Tech. Pap. No. 47. Washington, DC. 69 p.

Hawaii

Weather Bureau. 1962. Rainfall-frequency atlas of the Hawaiian Islands for areas to 200 square miles, durations to 24 hours and return periods from 1 to 100 years. U.S. Dept. Commerce, Weather Bur. Tech. Pap. No. 43. Washington, DC. 60 p.

Puerto Rico and Virgin Islands

Weather Bureau. 1961. Generalized estimates of probable maximum precipitation and rainfall-frequency data for Puerto Rico and Virgin Islands for areas to 400 square miles, durations to 24 hours, and return periods from 1 to 100 years. U.S. Dept. Commerce, Weather Bur. Tech. Pap. No. 42. Washington, DC. 94 P.

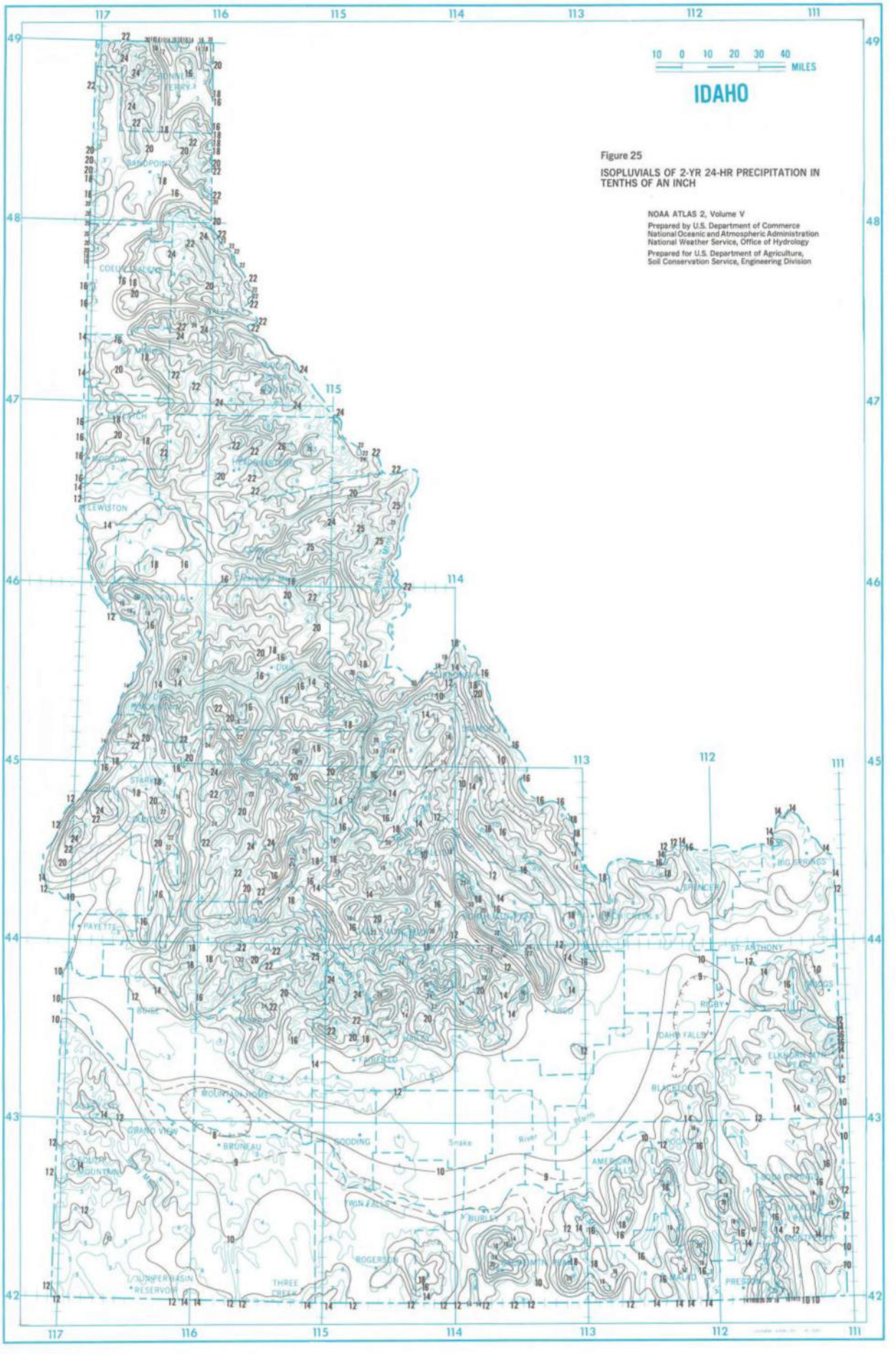


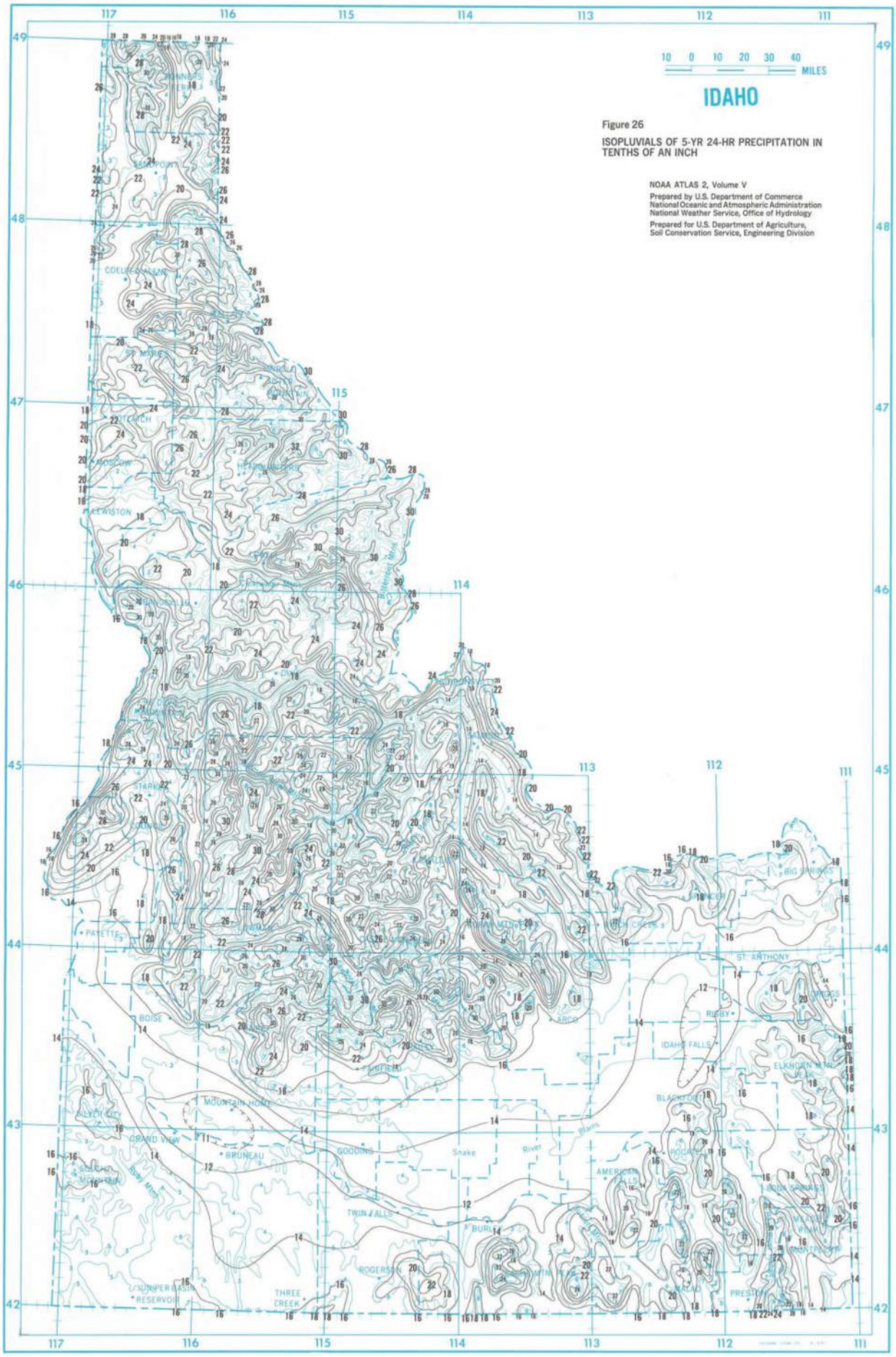
Figure 25

ISOPLUVIALS OF 2-YR 24-HR PRECIPITATION IN TENTHS OF AN INCH

NOAA ATLAS 2, Volume V

Prepared by U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service, Office of Hydrology

Prepared for U.S. Department of Agriculture,
Soil Conservation Service, Engineering Division



IDAHO

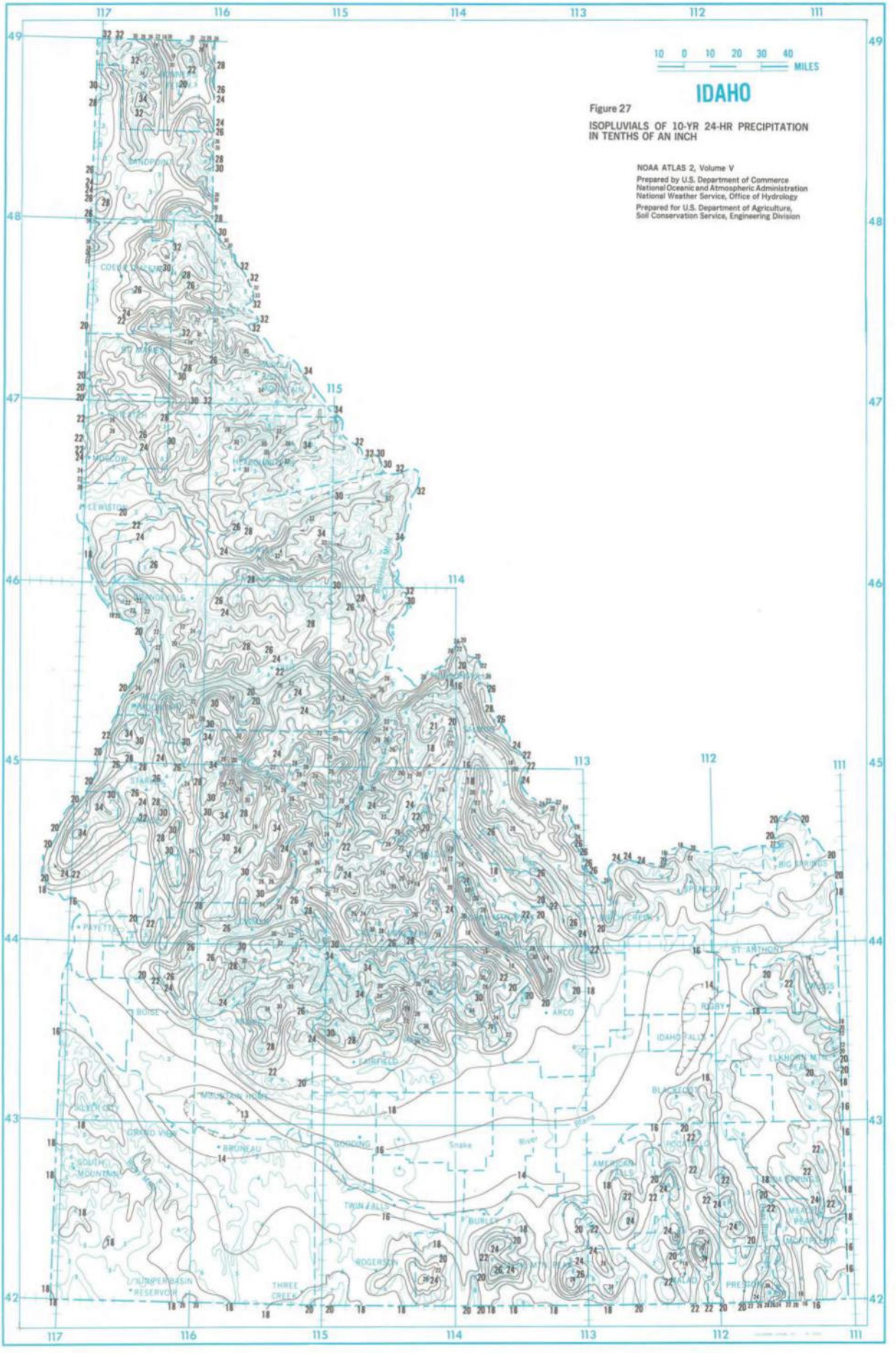
Figure 26

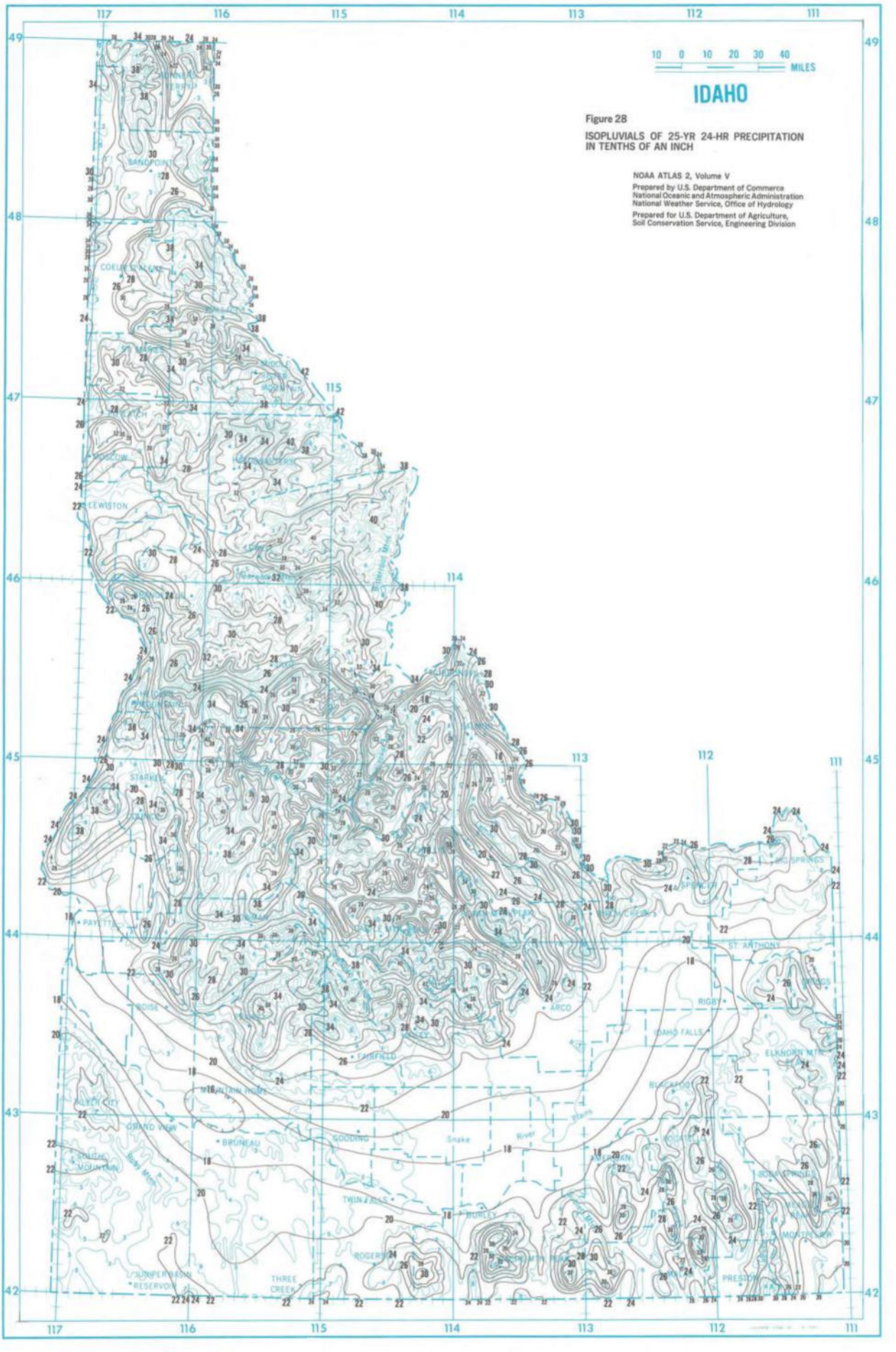
ISOPLUVIALS OF 5-YR 24-HR PRECIPITATION IN TENTHS OF AN INCH

NOAA ATLAS 2, Volume V

Prepared by U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service, Office of Hydrology

Prepared for U.S. Department of Agriculture,
Soil Conservation Service, Engineering Division


10 0 10 20 30 40
MILES
IDAHO
Figure 27
ISOPLUVIALS OF 10-YR 24-HR PRECIPITATION
IN TENTHS OF AN INCH
NOAA ATLAS 2, Volume V
Prepared by U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service, Office of Hydrology
Prepared for U.S. Department of Agriculture,
Soil Conservation Service, Engineering Division



IDAHO

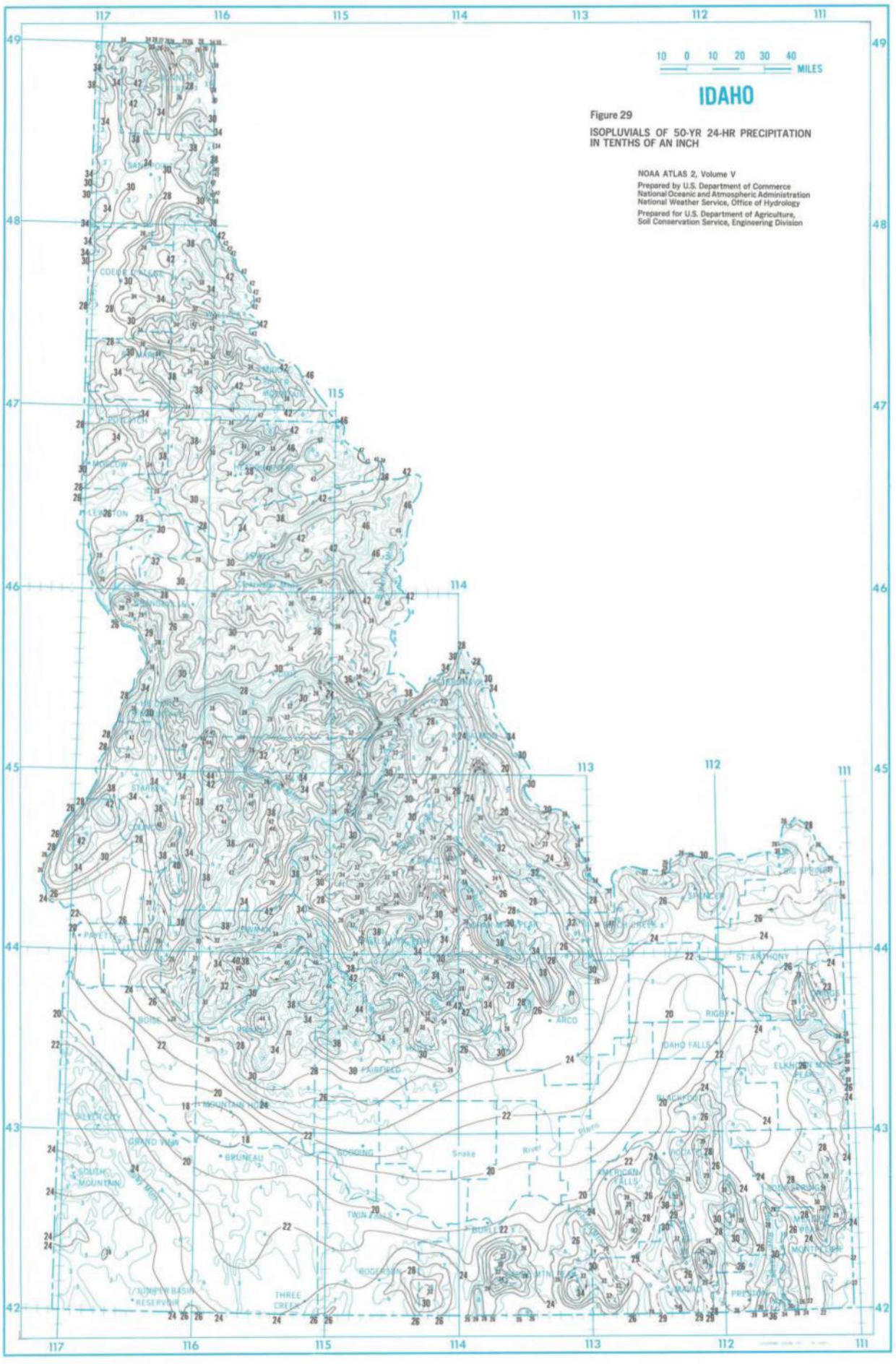
Figure 28

ISOPLUVIALS OF 25-YR 24-HR PRECIPITATION IN TENTHS OF AN INCH

NOAA ATLAS 2, Volume V

Prepared by U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service, Office of Hydrology

Prepared for U.S. Department of Agriculture,
Soil Conservation Service, Engineering Division


10 0 10 20 30 40
MILES
IDAHO
Figure 29
ISOPLUVIALS OF 50-YR 24-HR PRECIPITATION IN TENTHS OF AN INCH
NOAA ATLAS 2, Volume V
Prepared by U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service, Office of Hydrology
Prepared for U.S. Department of Agriculture,
Soil Conservation Service, Engineering Division

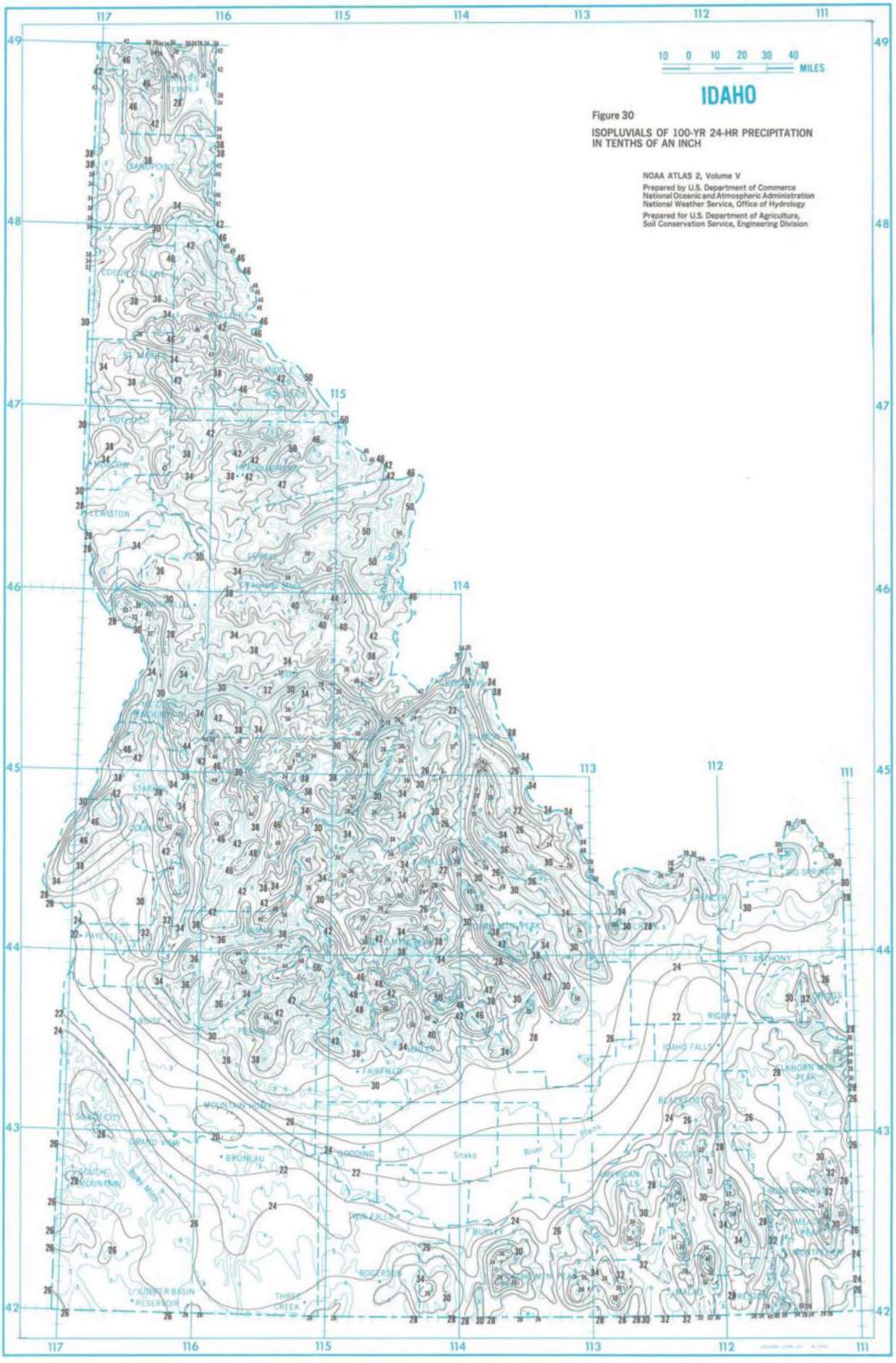


Figure 30

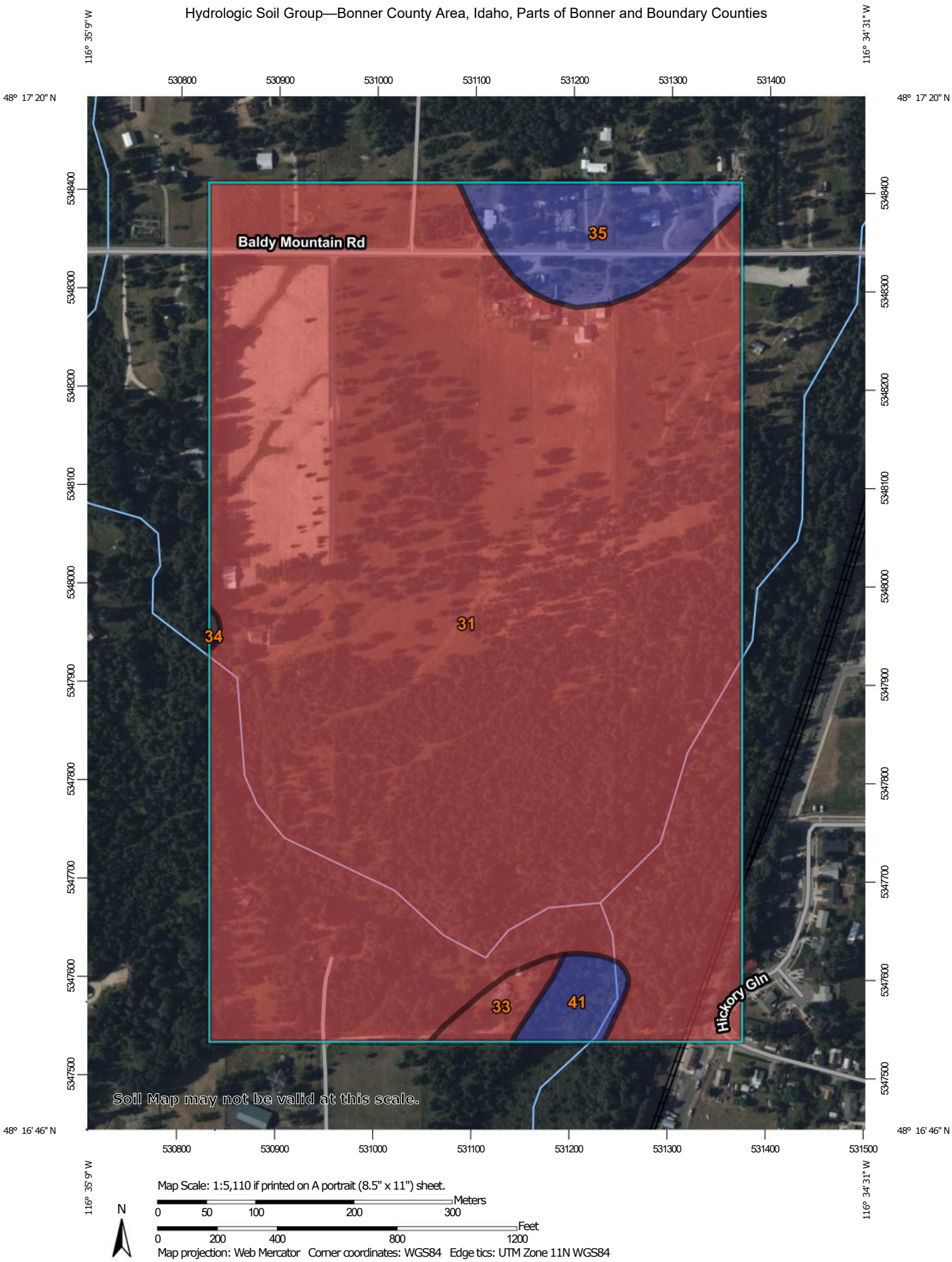
ISOPLUVIALS OF 100-YR 24-HR PRECIPITATION IN TENTHS OF AN INCH

NOAA ATLAS 2, Volume V

Prepared by U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service, Office of Hydrology

Prepared for U.S. Department of Agriculture,
Soil Conservation Service, Engineering Division

Appendix B


116° 35' 9" W
116° 34' 31" W
48° 17' 20" N
48° 16' 46" N
530800
530900
531000
531100
531200
531300
531400
531500
5348400
5348300
5348200
5348100
5348000
5347900
5347800
5347700
5347600
5347500
Baldy Mountain Rd
35
31
34
33
41
Hickory Gln
Soil Map may not be valid at this scale.
Map Scale: 1:5,110 if printed on A portrait (8.5" x 11") sheet.
N
Meters
0 50 100 200 300
Feet
0 200 400 800 1200
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N 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 1:24,000.

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: Bonner County Area, Idaho, Parts of Bonner and Boundary Counties
Survey Area Data: Version 20, Aug 22, 2024

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

Date(s) aerial images were photographed: Jul 14, 2023—Aug 13, 2023

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
31	Mission silt loam, 0 to 2 percent slopes	D	108.2	91.9%
33	Mission silt loam, 12 to 30 percent slopes	D	1.3	1.1%
34	Odenson silt loam, 0 to 2 percent slopes	B/D	0.1	0.1%
35	Pend Oreille silt loam, 5 to 45 percent slopes	B	6.4	5.4%
41	Pywell muck, 0 to 1 percent slopes, occasionally flooded	B	1.8	1.5%
Totals for Area of Interest			**117.7**	**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.

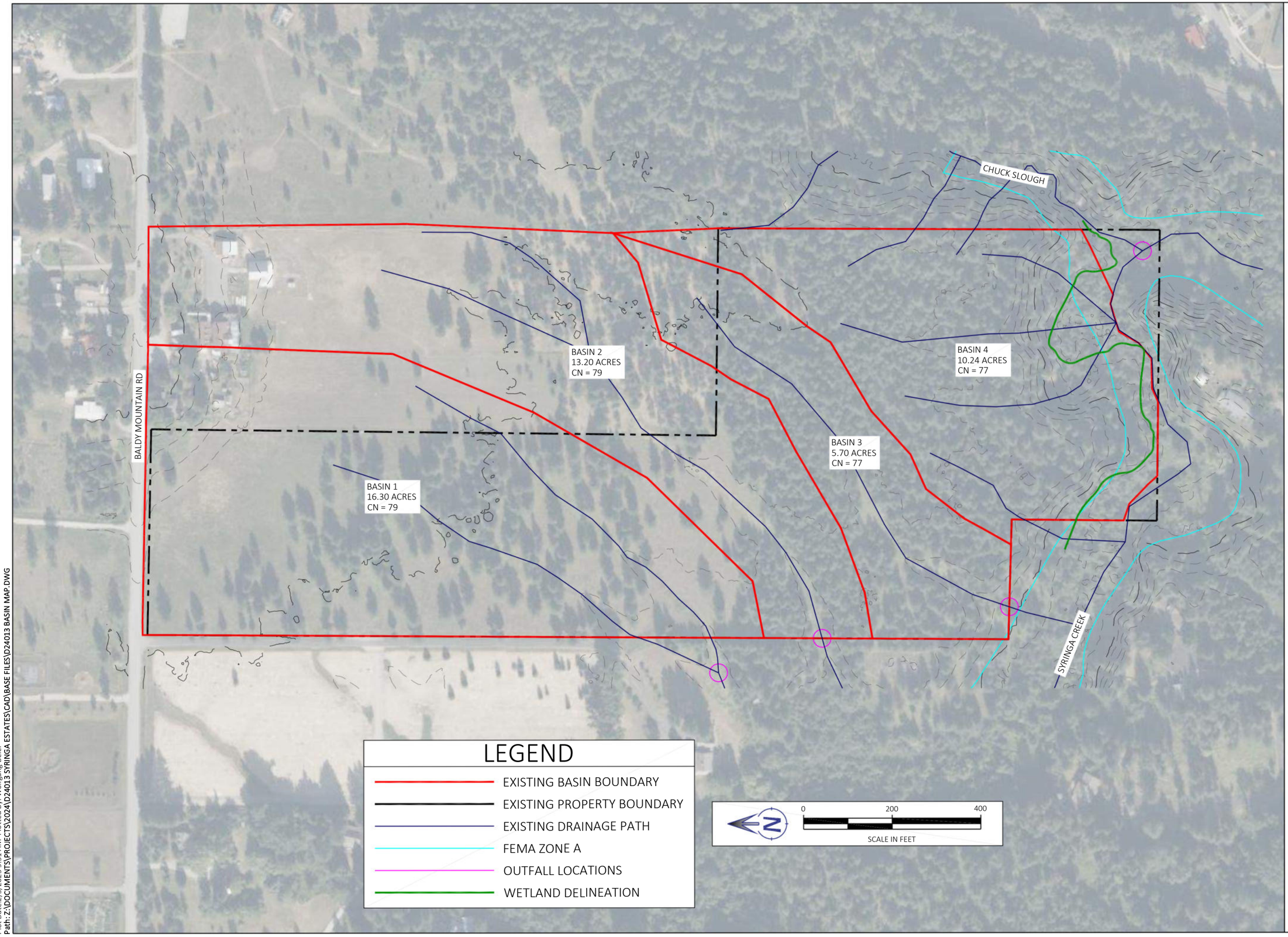
Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Appendix C



HMH engineering
476864 Highway 95, Suite 3
Ponderay, ID 83852
(208) 635-5825

DEERFIELD
BONNER COUNTY, ID

EXISTING DRAINAGE

NOT APPROVED
PRELIMINARY
FOR CONSTRUCTION

CONSTRUCTION DOCUMENTS

1"
SCALE: (11X17 ONLY)

DWG:	Basin Map
PROJECT NO:	D24013
DRAWN BY:	W. Beier
CHECKED BY:	
DATE:	02/03/2025

REVISIONS

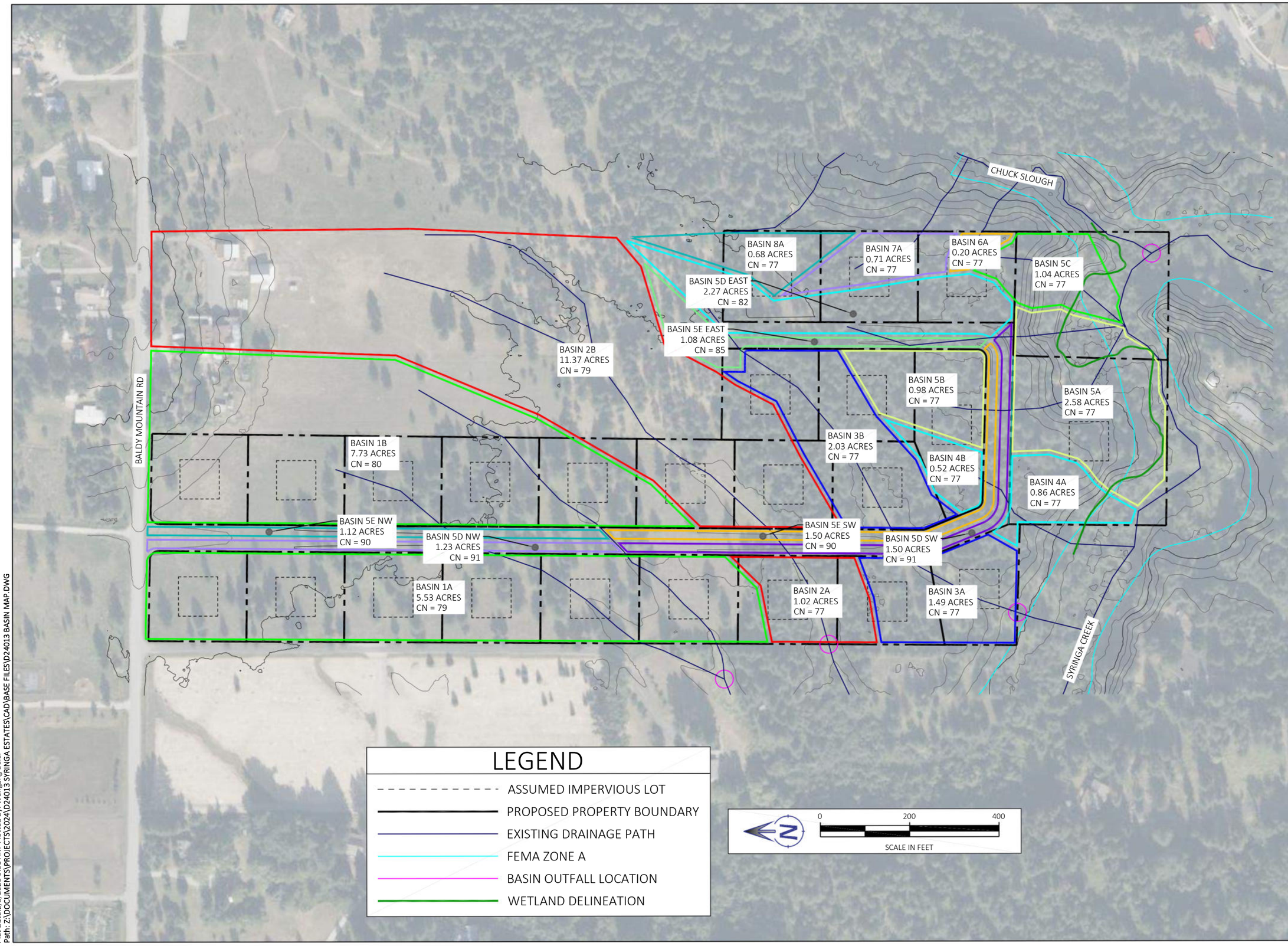
NO.	DATE	BY	DESCRIPTION

DRAINAGE

DRAWING:

SHEET:1 OF 2

Plot Date:2/3/2025 9:51 AM Plotted By: Wolfgang Beier
Path: Z:\DOCUMENTS\PROJECTS\2024\D24013 SYRINGA ESTATES\CAD\BASE FILES\D24013 BASIN MAP.DWG



HMH engineering
476864 Highway 95, Suite 3
Ponderay, ID 83852
(208) 635-5825

DEERFIELD
BONNER COUNTY, ID

PROPOSED DRAINAGE

NOT APPROVED
PRELIMINARY
FOR CONSTRUCTION

CONSTRUCTION DOCUMENTS

1"
SCALE: (11X17 ONLY)

DWG: Basin Map
PROJECT NO: D24013
DRAWN BY: W. Beier
CHECKED BY:
DATE: 02/03/2025

REVISIONS

NO.	DATE	BY	DESCRIPTION

DRAINAGE

DRAWING:

SHEET:2 OF 2

Plot Date:2/3/2025 9:51 AM Plotted By: Wolfgang Beier
Path: Z:\DOCUMENTS\PROJECTS\2024\D24013 SYRINGA ESTATES\CAD\BASE FILES\D24013 BASIN MAP.DWG

Appendix D

FACET

Formerly DCG/Watershed

September 20, 2024

Garry Schickedanz
8144 W Okeechobee Blvd, Suite B
West Palm Beach, FL 33411

Wetland and Stream Delineation Report

Facet Number: 2408.0360.00

Dear Garry:

We are pleased to present the findings of a wetland and stream delineation study at the property, located off of Baldy Mountain Road in unincorporated Bonner County near Sandpoint, Idaho (parcel #RP57N02W164952A). The study was completed based upon the Scope of Work approved on September 5, 2024. The enclosed report describes our study methods, findings, and regulatory implications. Site photos, a delineation sketch, wetland delineation data forms, and wetland rating forms and figures are also included.

Please reach out if you have any questions.

Sincerely,

Tami Camper, M.S.
Environmental Planner

Enclosures

Wetland and Stream Delineation Report

FACET

Wetland and Stream Delineation Report

Baldy Mountain Road
Facet Number: 2408.0360.00
September 20, 2024

Introduction

This report outlines the methods, findings, and regulatory implications of the delineation study completed within the study area off of Baldy Mountain Road, in unincorporated Bonner County, near Sandpoint, Idaho (parcel #RP57N02W164952A).

Field investigation for the delineation study were conducted on September 13, 2024, by ecologist Tami Camper.

Table 1 summarizes delineation study findings, including wetland and stream classifications and buffer widths.

Table 1. Summary of wetlands, streams, and required buffer widths.

Feature Name	Category/Type	Buffer (ft)
Wetland A	Seasonal PSS1C-Freshwater Forested/Shrub Wetland	40
Syringa Creek	Perennial-fish bearing	75

STUDY AREA

The study area was defined as the southern portion of parcel RP57N02W164952A, near Syringa Creek and is approximately 33 acres in size (Figure 1). Adjacent public or private property within 200 feet was screened from the edge of parcel or nearest publicly accessible area; no private property was accessed without permission. It is situated within Section 16 of Township 57 North, Range 02 West.

ENVIRONMENTAL SETTING

The study area is in the Carr Creek-Pend Oreille River subwatershed (HUC 170102140302) of the Pend Oreille Lake watershed. It is located East of Sandpoint Idaho. Site topography is generally flat but slopes south towards Syringa Creek.

The subject property is currently undeveloped. Vegetation on the property is a mosaic of open grassland, shrubs and scattered trees including conifer and deciduous trees. The southern portion of the property near Syringa Creek is more heavily dominated by deciduous species such as alder (*Alnus* sp.) and maples (*Acer* sp.). The northern portion is dominated by conifers including pine (*Pinus* sp.), fir (*Abies* sp.) and Douglas-fir (*Pseudotsuga menziesii*).

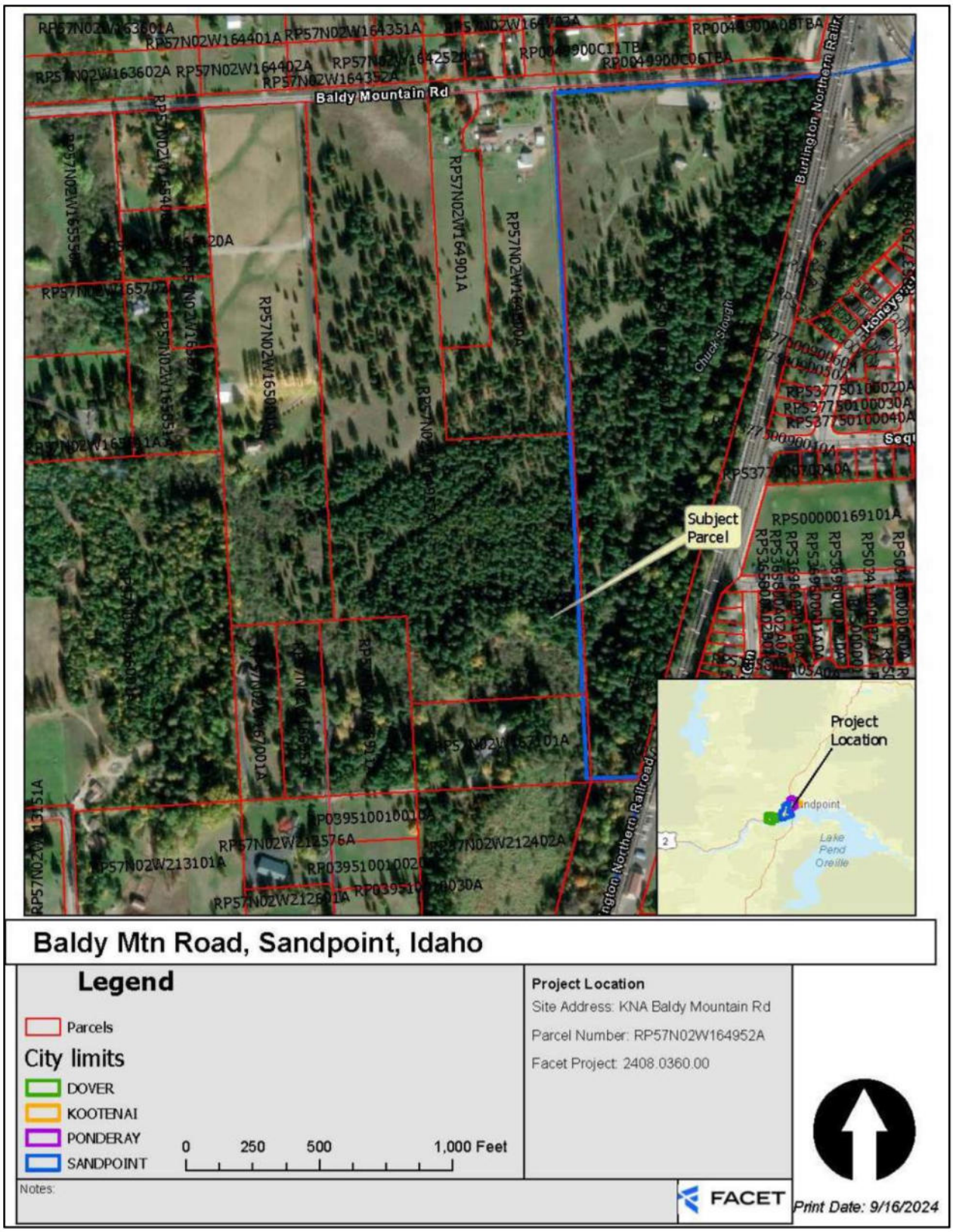


Figure 1. Study area map.

Methods

The study area was evaluated for wetlands using methodology from the *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region Version 2.0* (U.S. Army Corps of Engineers 2010). The presence or absence of wetlands was determined based on an examination of vegetation, soils, and hydrology. These parameters were sampled at several locations along the wetland boundary to determine the approximate wetland edge.

Characterization of weather conditions for precipitation in the Wetland Determination Data Forms were determined using the WETS table methodology (USDA, NRCS 2015). The "Sandpoint Exp " station from 2000-2024 was used as a source for precipitation data (http://agacis.rcc-acis.org/). The WETS table methodology uses climate data from the three months prior to the site visit month to determine if normal conditions are present in the study area region.

The study area was evaluated for streams based on the presence or absence of an ordinary high water mark (OHWM) as defined by Section 404 of the Clean Water Act and guidance documents including *National Ordinary High Water Mark Field Delineation Manual for Rivers and Streams: Interim Version* (David et. al. 2023) in the *A Guide to Ordinary High Water Mark (OHWM) Delineation for Non-Perennial Streams in the Western Mountains, Valleys, and Coast Region of the United States* (Mersel and Lichvar 2014).

Data pits were placed along transects from wetland to upland in three locations. Two pits were excavated to at least 16" on each transect. Data pit locations were recorded using Avenza and exported into ArcPro. The wetland boundary was determined based on both visible hydrology indicators and changes in vegetation. In general, the wetland boundary was easily observable based on topography with the southern side coinciding with the OHWM and the northern side coinciding with the toe of the slope and a fairly sharp transition from hydrophytic vegetation to upland vegetation. Error ranged from 5-20 feet and due to this, survey lines were used to establish the wetland boundary and OHWM in ArcPro. Area calculations were determined using ArcPro. Delineated wetland boundary points are marked with pink- and black-striped flagging. Wetland determination data points are marked pink pin flags. Stream OHWM points were mapped using GIS.

Public-domain information on the subject properties was reviewed for this delineation study. Resources and review findings are presented in Table 2.

Table 2. Summary of online mapping and inventory resources.

Resource	Summary
USDA NRCS: Web Soil Survey	Mission silt loam, 0-2% slopes;
USFWS: NWI Wetland Mapper	PSS1C-Freshwater Forested/Shrub Wetland
Bonner County GIS Portal	Flood Zone A, Freshwater Forested Shrub Wetland
WETS Climatic Condition	Below mean monthly precipitation 1.54"

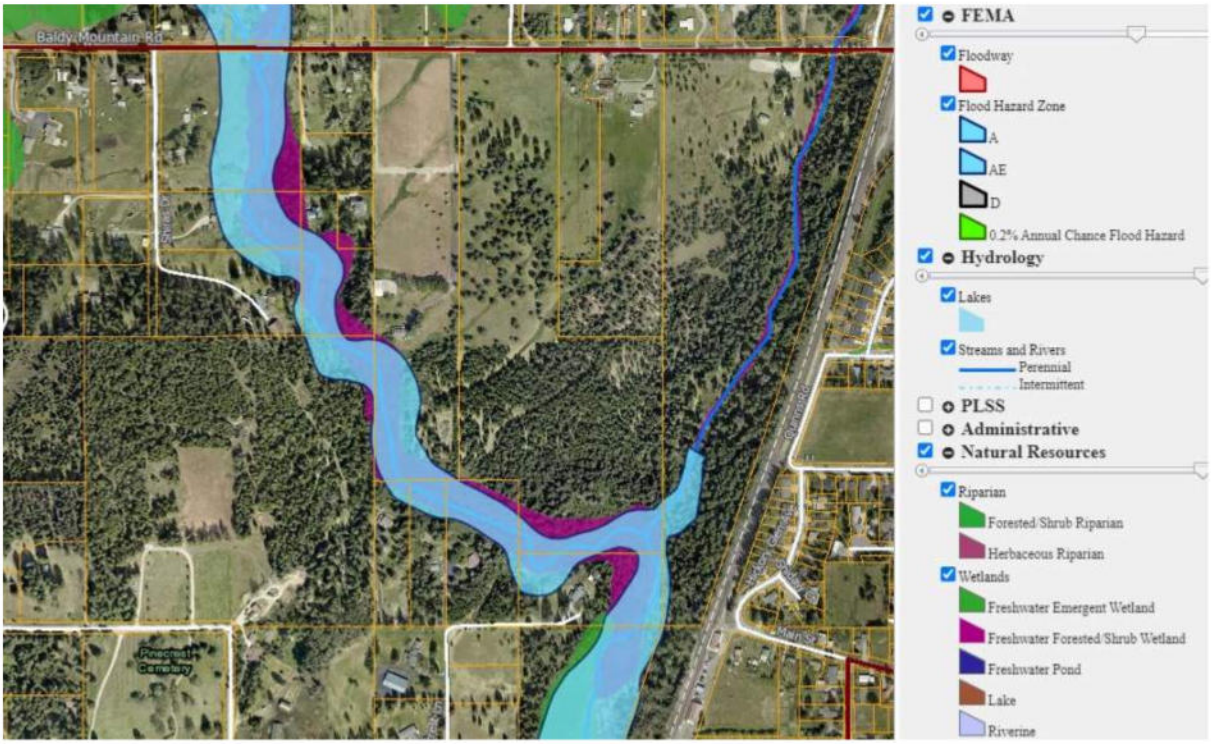


Figure 2. FEMA flood hazard zone and wetland mapping Bonner County GIS Portal[1].

Findings

WETLANDS

One wetland (Wetland A) was delineated and flagged in the study area and is summarized in Table 3. Wetland A is a continuous wetland that encompasses the floodplain of Syringa Creek from its OHWM to the toe of slope. Wetland A is a palustrine shrub/scrub wetland with scattered patches of palustrine emergent (PEM) and palustrine forested (PFO) components. It is primarily dominated by Sitka alder (*Alnus viridis*) in the tree layer, tall snowberry (*Symphoricarpos albus*) in the shrub layer and reed canarygrass in the herbaceous layer.

[1] https://cloudgisapps.bonnercountyid.gov/public/

Wetland A functions as the floodplain for Syringa creek and also provides habitat. Over twenty species of migratory birds were observed during the survey as well as scat and tracks of deer and other wildlife. The wetland is primarily native with very little disturbance aside from development south of the study area and a large number of golf balls, presumably from adjacent property.

STREAMS

Syringa Creek is located in the study area. The OHWM was delineated and mapped. The stream ranges from 8-20 feet across and 1-3 feet deep. The bed is primarily cobble and fine silts. Only the northern OHWM was delineated since development is not proposed to the south. OHWM indicators include bank erosion, water stains on vegetation and rack (deposited leaves and other matter on shrubs and trees).

Small fish were observed in one pond of the stream (not identifiable) and numerous aquatic insects were observed during the study.

Table 3. Wetland A assessment summary.

WETLAND A		
Location:	North of Syringa Creek	
		
	Buffer Width	40
	Wetland Size:	1.05 acres (within parcel)
	Cowardin Classification(s):	PSSC1 (mosaic with POF/PEM patches)
	Wetland Data Sheet(s):	D1, D3, D5
	Non-wetland Data Sheet(s):	D2, D4, D6
	Flag Color:	Pink/Black
	Flag Numbers:	N/A
Vegetation	Tree stratum:	*Alnus viridis*
	Shrub stratum:	*Alnus viridis, Symphoricarpos albus*
	Herb stratum:	*Phalaris arundinaceae, Ranunculus repens, Cirsium arvense, Agrostis stolonifera*
Soils	Soil survey:	Mission Silt Loam 0-2% Slopes
	Field data:	7.5YR 2.5/1, 10YR, 5/2, 10YR 2/1 (matrix) 5YR 5/6, 10YR 4/2, 10YR 5/2 (concentrations),
Hydrology	Source:	Syringa Creek
	Field data:	Surface water, Inundation, Saturation, Geomorphic Position, Oxidized Rhizospheres, Drainage Patterns, FAC-neutral test
Wetland Functions		
Floodplain of Syringa Creek, Wildlife Habitat		
Description and Comments		
Mosaic wetland in floodplain of Syringa Creek. Continuous from OHWM to toe of slope. Primarily Palustrine Shrub/Scrub with Palustrine Forest and Palustrine Emergent wetlands		

Local Regulations

Wetland regulations: Bonner County Code Subchapter 7.3-Wetlands states that Building setbacks to wetlands of a minimum of forty feet (40'), unless it can be demonstrated by the wetlands professional that the wetlands are of a low quality, have low levels of function as wetlands and are heavily disturbed, as determined by the U.S. Army Corps of Engineers or the applicant's certified wetland delineator. Setbacks to low quality wetlands may be reduced to not less than twenty feet (20'). Wetland A is not low-functioning or heavily disturbed.

Stream regulations:: Bonner County Code Subchapter 7.1-Shoreline setbacks states the no structure shall be located closer than 75 feet , measured horizontally from the OHWM of any stream shown on the National Hydrology Dataset (NHD) published by the Unites States Geological Survey or by actual field inspection. It further states that to maintain water quality and reduce potential for nutrients entering waterways, vegetation buffer management areas include all lands within 40 feet of shorelines and that noninvasive vegetation shall be left intact. It further specifies that standing trees , including conifers, hardwoods and snags be left within 40 feet of the OHWM on each side of perennial streams.

State and Federal Regulations

Idaho Department of Fish and Game (IDFG)

Wetlands in Idaho are also under the jurisdiction of the Idaho Department of Fish and Game. The Idaho Wetland Conservation Plan (2005) outlines conservation strategies for wetlands in Idaho and utilizes the National Wetlands Priority Conservation Plan (NWPCP) of 1991. The NWPCP was prepared for the U.S. Fish and Wildlife Department (USFW) and provides a process that identifies wetlands that should receive priority attention for federal and state acquisition based upon wetland values. The NWPCP considers specific factors such as rarity of wetland type, wetlands subject to degradation and wetlands with important or diverse functions and values.

Federal Agencies

Many wetlands and streams are regulated by the U.S. Army Corps of Engineers (Corps) under Section 404 of the Clean Water Act. Any proposed filling or other direct impacts to Waters of the U.S., including wetlands (except isolated wetlands), would require preconstruction notification and permit authorization from the Corps. Wetland A is not isolated as it is hydrologically connected to Syringa Creek. Unavoidable impacts to jurisdictional wetlands are typically required to be compensated through implementation of an approved mitigation plan. If activities requiring a Corps permit are proposed, a Joint Aquatic Resource Permit Application (JARPA) could be submitted to obtain authorization.

Federally permitted actions that could affect endangered species may also require a biological assessment study and consultation with the U.S. Fish and Wildlife Service and/or the National Marine Fisheries Service. Compliance with the Endangered Species Act must be demonstrated for activities within jurisdictional streams, wetlands, and the 100-year floodplain. Application for Corps permits may also require an individual Section 401 Water Quality Certification and Coastal Zone Management

Consistency determination from Ecology and a cultural resource study in accordance with Section 106 of the National Historic Preservation Act.

Disclaimer

The information contained in this report is based on the application of technical guidelines currently accepted as the best available science and in conjunction with the referenced manuals and criteria. All discussions, conclusions and recommendations reflect the best professional judgment of the author(s) and are based upon information available at the time the study was conducted. All work was completed within the constraints of budget, scope, and timing. The findings of this report are subject to verification and agreement by the appropriate local, state, and federal regulatory authorities. No other warranty, expressed or implied, is made.

References

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U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS). 2015. National Engineering Handbook, Part 650 Engineering Field Handbook, Chapter 19 Hydrology Tools for Wetland Identification and Analysis. ed. R. A. Weber. 210-VI-NEH, Amend. 75. Washington, DC.

Site Photos

Photo 1. Upland area above slope looking north.

Photo 2. Upland wetland boundary and flagging looking west.

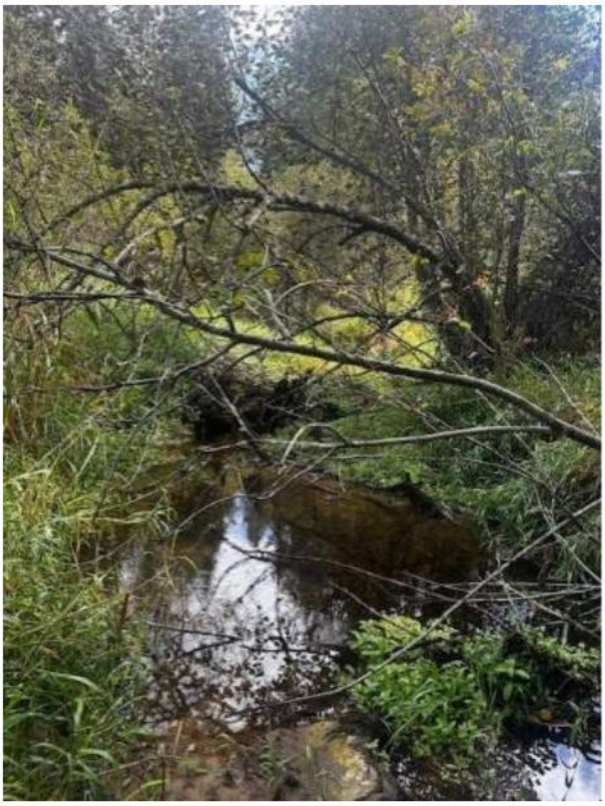


Photo 3. Syringa Creek.

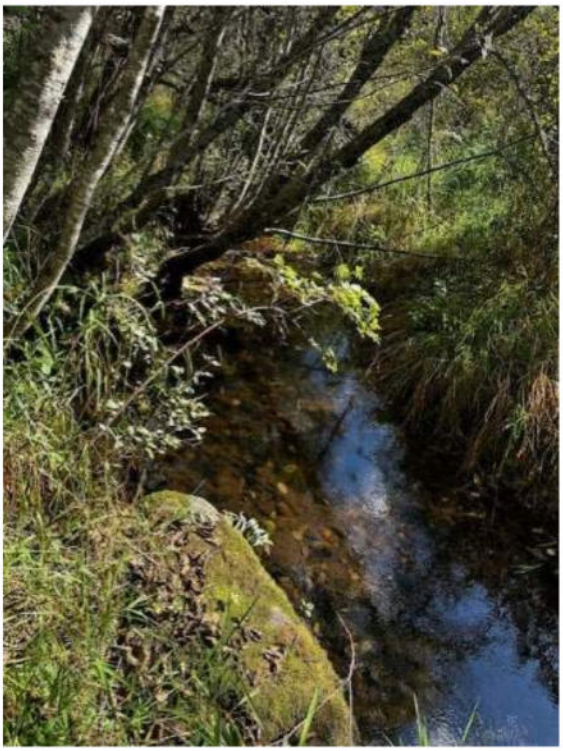


Photo 4. Syringa Creek.

Photo 5. DP 1 Soil profile.

Photo 6. DP 2 Soil profile.

Photo 7. DP 3 and Wetland A looking east.

Photo 8. DP 4 Soil profile.

Photo 9. Upland/wetland boundary and DP 6 looking south.

Delineation Sketch

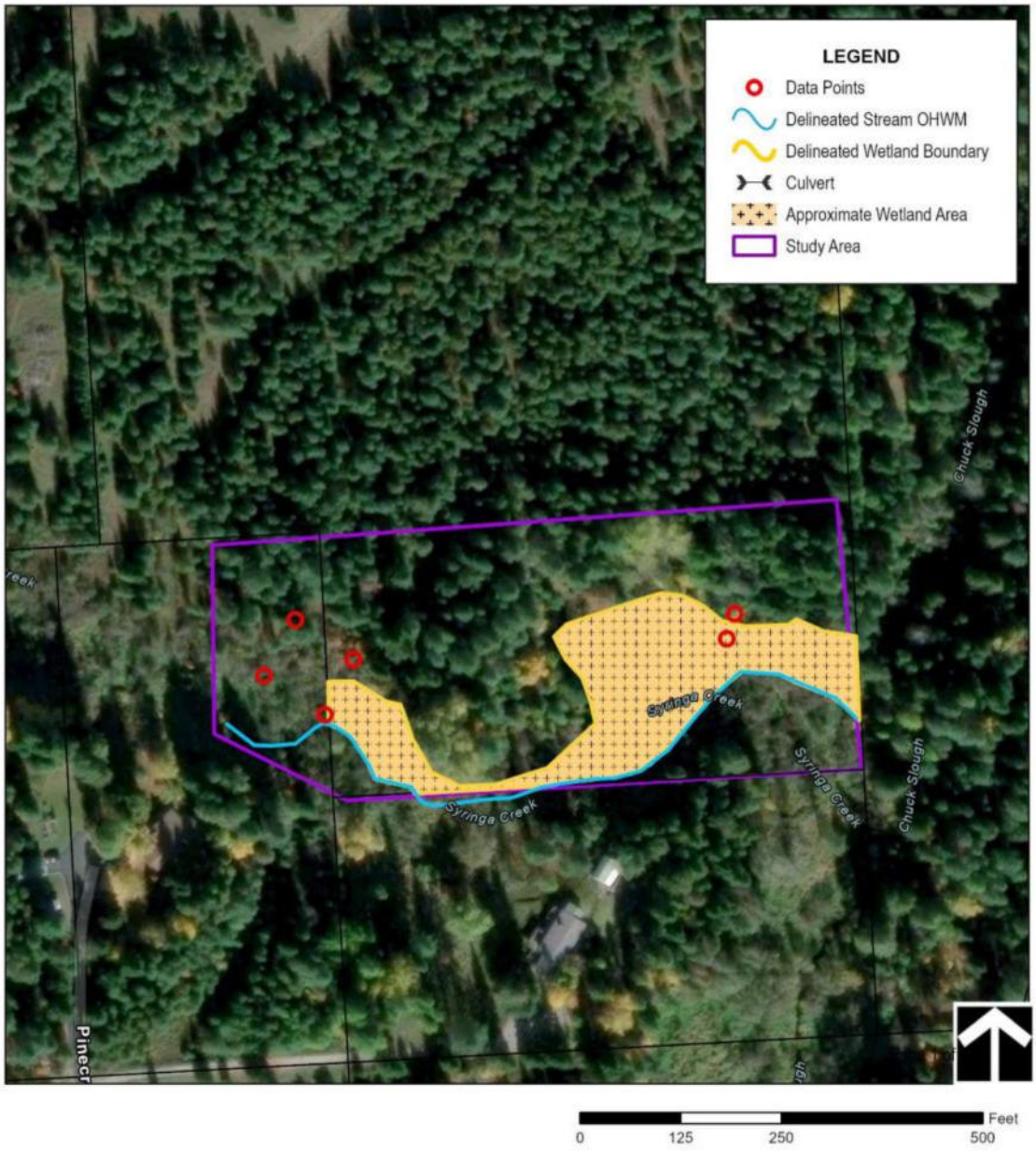
FACET

601 W. Main Street, Suite 610
Spokane, WA 99201
Phone: (509) 606-3600

Wetland and Stream Delineation Sketch

Site Address: Baldy Mtn Road, Sandpoint, ID
Parcel Number RP57N02W164952A
Site Visit Date: 09/13/2024

Jurisdiction: Bonner County
Prepared for: Gary Schickedenz
TWC Reference Number: 2408.0360.00



Note: Geospatial data was collected in the field using a GPS-enabled tablet and data collection software. GPS data is believed reliable for general planning and most regulatory purposes. However, accuracy is variable and should not be considered equivalent to a professional land survey. No warranty is expressed or implied. Wetland boundary is marked with pink and black striped flags. Data points are marked with pink pin flags.

Wetland Determination Data Forms

Appendix E

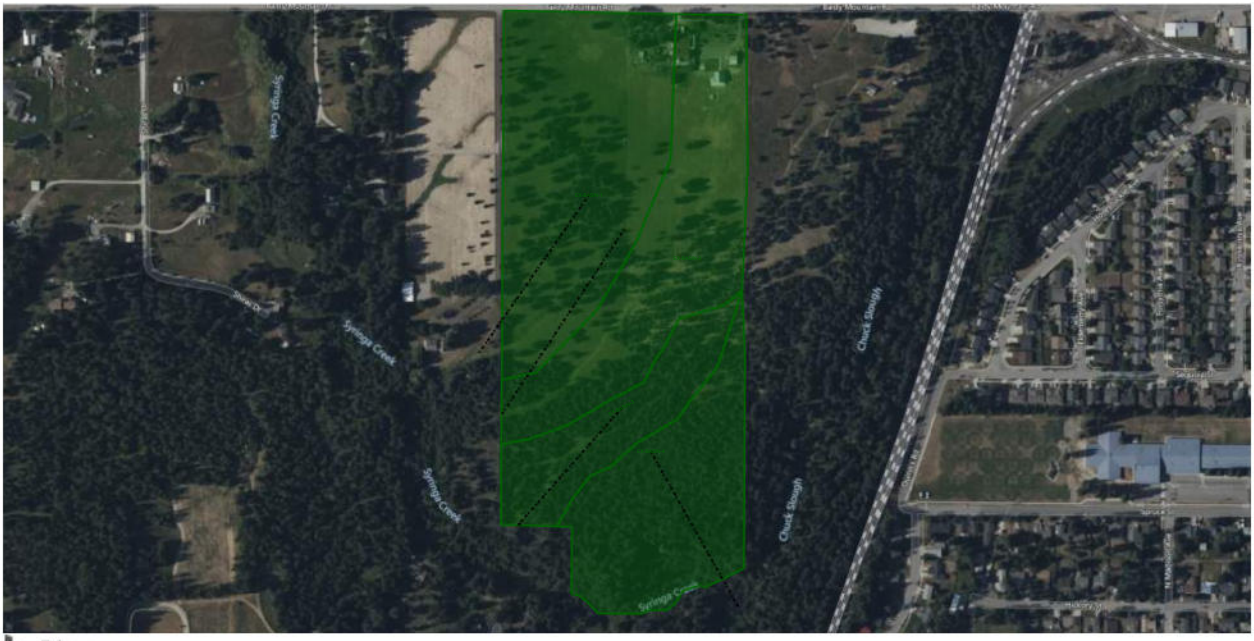
CivilStorm Model Summary

Hydraulic Model Properties

Title	Deerfield
Engineer	Wolfgang Beier, EI
Company	HMH Engineering
Date	2/3/2025
Notes	

Pre-Development Map

Main - Time: 0.00 hours



Pre-Development Conditions 10 Year

Catchment Table - Time: 0.00 hours

Label	Area (User Defined) (acres)	Runoff Method	Unit Hydrograph Method	Loss Method	SCS CN	Time of Concentration (hours)	Flow (Maximum) (cfs)
EX-BASIN-1	16.300	Unit Hydrograph	SCS Unit Hydrograph	SCS CN	79	0.782	8.72
EX-BASIN-2	13.200	Unit Hydrograph	SCS Unit Hydrograph	SCS CN	79	0.801	6.92
EX-BASIN-3	5.700	Unit Hydrograph	SCS Unit Hydrograph	SCS CN			
EX-BASIN-4	10.240	Unit Hydrograph	SCS Unit Hydrograph	SCS CN			

CivilStorm Model Summary

Pre-Development Conditions 10 Year

Catchment Table - Time: 0.00 hours

SCS CN	Time of Concentration (hours)	Flow (Maximum) (cfs)
77	0.778	2.62
77	0.585	5.82

Outfall Table - Time: 0.00 hours

Label	Elevation (Ground) (ft)	Elevation (Invert) (ft)	Boundary Condition Type	Flow (Out to Links Maximum) (cfs)
O-1	2,115.00	0.00	Free Outfall	(N/A)
O-2	2,112.91	0.00	Free Outfall	(N/A)
O-3	2,105.40	0.00	Free Outfall	(N/A)
O-4	2,084.00	0.00	Free Outfall	(N/A)

Pre-Development Conditions 25 Year

Catchment Table - Time: 0.00 hours

Label	Area (User Defined) (acres)	Runoff Method	Unit Hydrograph Method	Loss Method
EX-BASIN-1	16.300	Unit Hydrograph	SCS Unit Hydrograph	SCS CN
EX-BASIN-2	13.200	Unit Hydrograph	SCS Unit Hydrograph	SCS CN
EX-BASIN-3	5.700	Unit Hydrograph	SCS Unit Hydrograph	SCS CN
EX-BASIN-4	10.240	Unit Hydrograph	SCS Unit Hydrograph	SCS CN

SCS CN	Time of Concentration (hours)	Flow (Maximum) (cfs)
79	0.782	11.34
79	0.801	9.01
77	0.778	3.50
77	0.585	7.74

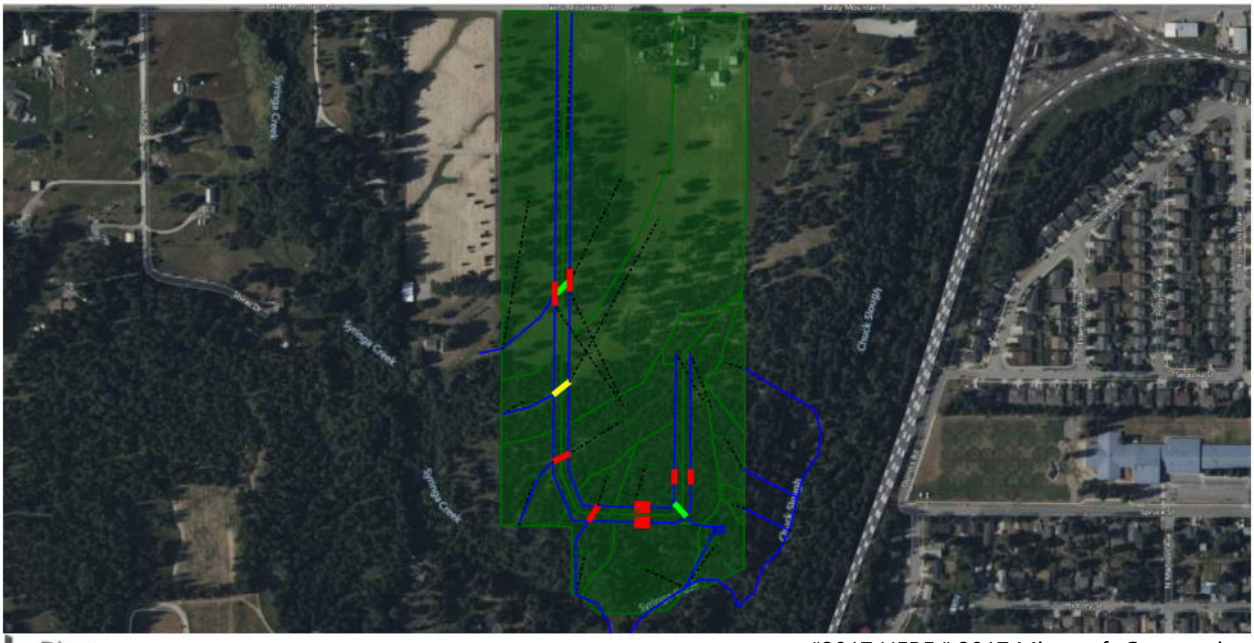
Outfall Table - Time: 0.00 hours

Label	Elevation (Ground) (ft)	Elevation (Invert) (ft)	Boundary Condition Type	Flow (Out to Links Maximum) (cfs)
O-1	2,115.00	0.00	Free Outfall	(N/A)
O-2	2,112.91	0.00	Free Outfall	(N/A)
O-3	2,105.40	0.00	Free Outfall	(N/A)
O-4	2,084.00	0.00	Free Outfall	(N/A)

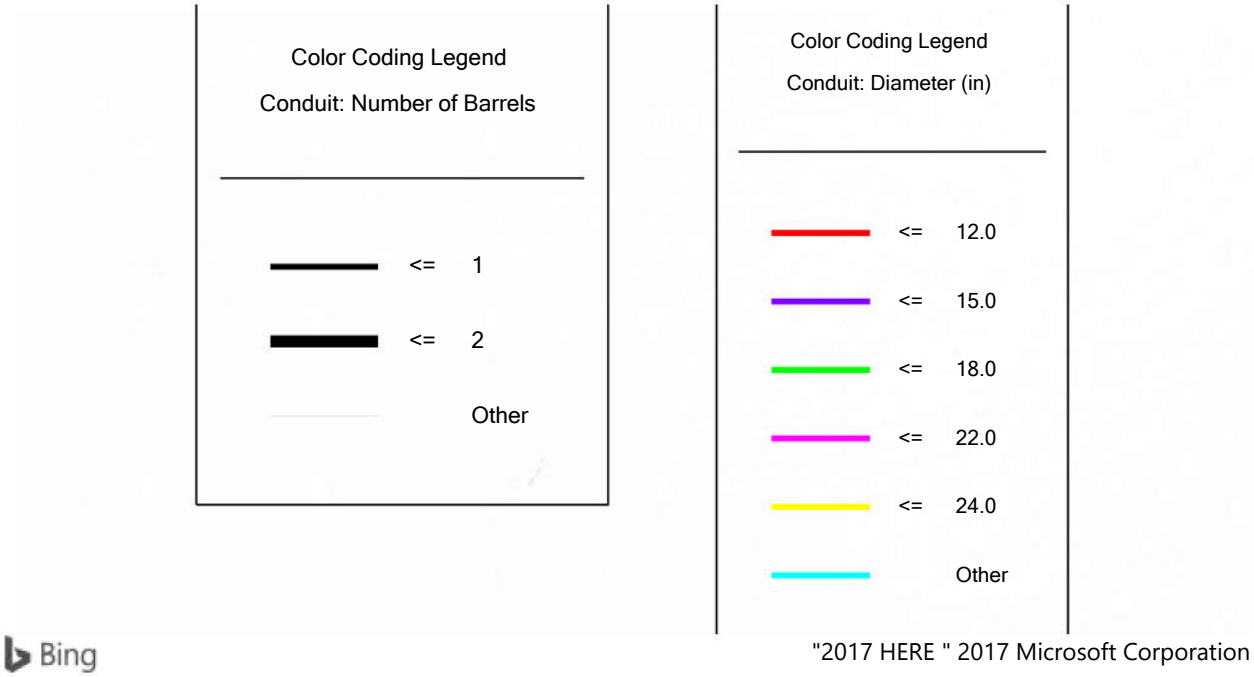
CivilStorm Model Summary

Post-Development Map

Main - Time: 0.00 hours



Legend - Time: 0.00 hours



Post-Development Conditions 10 Year

CivilStorm Model Summary

Post-Development Conditions 10 Year

Catchment Table - Time: 0.00 hours

Label	Area (User Defined) (acres)	Runoff Method	Unit Hydrograph Method	Loss Method	SCS CN	Time of Concentration (hours)	Flow (Maximum) (cfs)
BASIN-1A	5.530	Unit Hydrograph	SCS Unit Hydrograph	SCS CN	79	0.694	3.21
BASIN-1B	7.730	Unit Hydrograph	SCS Unit Hydrograph	SCS CN	80	0.689	4.83
BASIN-2A	1.020	Unit Hydrograph	SCS Unit Hydrograph	SCS CN	77	0.229	0.98
BASIN-2B	11.370	Unit Hydrograph	SCS Unit Hydrograph	SCS CN	79	0.749	6.27
BASIN-3A	1.490	Unit Hydrograph	SCS Unit Hydrograph	SCS CN	77	0.390	1.09
BASIN-3B	2.030	Unit Hydrograph	SCS Unit Hydrograph	SCS CN			
BASIN-4A	0.860	Unit Hydrograph	SCS Unit Hydrograph	SCS CN			
BASIN-4B	0.520	Unit Hydrograph	SCS Unit Hydrograph	SCS CN			
BASIN-5A	2.530	Unit Hydrograph	SCS Unit Hydrograph	SCS CN			
BASIN-5B	0.980	Unit Hydrograph	SCS Unit Hydrograph	SCS CN			
BASIN-5C	1.040	Unit Hydrograph	SCS Unit Hydrograph	SCS CN			
BASIN-5D-EAST	2.270	Unit Hydrograph	SCS Unit Hydrograph	SCS CN			
BASIN-5D-NW	1.230	Unit Hydrograph	SCS Unit Hydrograph	SCS CN			
BASIN-5D-SW	1.500	Unit Hydrograph	SCS Unit Hydrograph	SCS CN			
BASIN-5E-EAST	1.080	Unit Hydrograph	SCS Unit Hydrograph	SCS CN			
BASIN-5E-NW	1.120	Unit Hydrograph	SCS Unit Hydrograph	SCS CN			
BASIN-5E-SW	1.500	Unit Hydrograph	SCS Unit Hydrograph	SCS CN			
BASIN-6A	0.200	Unit Hydrograph	SCS Unit Hydrograph	SCS CN			
BASIN-7A	0.710	Unit Hydrograph	SCS Unit Hydrograph	SCS CN			
BASIN-8A	0.680	Unit Hydrograph	SCS Unit Hydrograph	SCS CN			

CivilStorm Model Summary

Post-Development Conditions 10 Year

Catchment Table - Time: 0.00 hours

SCS CN	Time of Concentration (hours)	Flow (Maximum) (cfs)
77	0.611	1.11
77	0.265	0.78
77	0.470	0.34
77	0.386	1.87
77	0.478	0.63
77	0.446	0.70
82	0.414	2.26
91	0.083	3.25
91	0.083	3.97
85	0.414	1.28
90	0.083	2.84
90	0.083	3.80
77	0.440	0.14
77	0.338	0.57
77	0.440	0.46

Combined Pipe/Node Report - Time: 0.00 hours

Label	Start Node	Stop Node	Length (Unified) (ft)	Rise (Unified) (ft)	Capacity (Full Flow) (cfs)	Velocity (ft/s)	Invert (Start) (ft)	Invert (Stop) (ft)	Slope (Calculated) (ft/ft)
CO-1	H-1B	H-1A	89.6	1.50	9.69	0.00	2,120.05	2,119.40	0.007
CO-2	H-2B	H-2A	81.6	2.00	21.02	0.00	2,117.38	2,116.78	0.007
CO-3	H-3B	H-3A	72.8	1.00	3.20	0.00	2,116.72	2,116.22	0.007
CO-4	H-4B	H-4A	73.1	1.00	3.19	0.00	2,115.27	2,114.77	0.007
CO-5-IMP	H-5E	H-5D	69.4	1.50	6.11	0.00	2,115.04	2,114.84	0.003
CO-5D-DS	H-5D-DS	H-5D-DS(2)	60.0	1.00	5.46	0.00	2,116.21	2,115.91	0.005
CO-5D-US	H-5D-US	H-5D-US(2)	60.0	1.00	2.73	0.00	2,123.91	2,123.61	0.005
CO-5E-DS	H-5E-DS	H-5E-DS(2)	60.0	1.00	3.86	0.00	2,115.99	2,115.84	0.002
CO-5E-US	H-5E-US	H-5E-US(2)	60.0	1.00	2.73	0.00	2,123.92	2,123.62	0.005
CO-6D-EAST	H-6D-EAST	H-6D-EAST(2)	60.0	1.00	4.05	0.00	2,116.71	2,116.05	0.011
CO-6E-EAST	H-6E-EAST	H-6E-EAST(2)	60.0	1.00	4.05	0.00	2,116.38	2,115.72	0.011

CivilStorm Model Summary

Post-Development Conditions 10 Year

Channel Table - Time: 0.00 hours

Label	Flow (Maximum) (cfs)	Slope (Calculated) (ft/ft)	Velocity (Maximum Calculated) (ft/s)
CH-1	4.82	0.019	2.06
CH-1-OUT	7.99	0.026	2.08
CH-2	6.25	0.028	2.60
CH-3	1.11	0.047	1.44
CH-4	0.37	0.095	2.34
CH-4-OUT	1.39	0.011	0.81
CH-5-OUT	3.81	0.004	0.86
CH-5D-WEST	3.04	0.007	1.82
CH-5D-WEST (2)	5.37	0.007	2.16
CH-5D-WEST (3)	5.11	0.007	2.16
CH-5E-WEST	2.65	0.007	1.77
CH-5E-WEST (2)	5.05	0.007	2.18
CH-5E-WEST (3)	4.90	0.008	0.67
CH-6	0.14	0.175	0.79
CH-6-OUT	1.04	0.011	0.73
CH-6D-EAST	2.23	0.011	1.95
CH-6D-EAST (2)	2.16	0.010	1.83
CH-6E-EAST	1.26	0.012	1.63
CH-6E-EAST (2)	1.28	0.010	0.16
CH-7	0.57	0.140	1.02
CH-7-OUT	0.92	0.016	0.75
CH-8	0.47	0.101	0.83
CH-8-OUT	0.46	0.017	0.54
CH-POND	12.17	0.500	10.32
CH-POND-OUT	2.53	0.399	5.69
CH-POND-OUT (2)	2.53	0.500	4.09

Cross Section Table - Time: 0.00 hours

Label	Elevation (Invert) (ft)	Bottom Width (ft)	Height (ft)	Slope (Left Side) (H:V)	Slope (Right Side) (H:V)	Manning's n
CS-1	2,114.13	10.0	2.00	8.000	8.000	0.045
CS-4	2,087.25	10.0	2.00	8.000	8.000	0.045
CS-5	2,081.00	10.0	2.00	8.000	8.000	0.045
CS-5D-WEST	2,131.00	3.0	2.00	3.000	3.000	0.030
CS-5E-WEST	2,131.00	3.0	2.00	3.000	3.000	0.030
CS-6	2,118.23	10.0	2.00	8.000	8.000	0.045

CivilStorm Model Summary

Post-Development Conditions 10 Year

Cross Section Table - Time: 0.00 hours

Label	Elevation (Invert) (ft)	Bottom Width (ft)	Height (ft)	Slope (Left Side) (H:V)	Slope (Right Side) (H:V)	Manning's n	Hydraulic Grade (ft)
CS-6-OUT	2,084.13	10.0	2.00	8.000	8.000	0.045	2,114.13
CS-6D-EAST	2,121.76	3.0	2.00	3.000	3.000	0.030	2,087.25
CS-6E-EAST	2,121.76	3.0	2.00	3.000	3.000	0.030	2,081.00
CS-7	2,118.74	10.0	2.00	8.000	8.000	0.045	2,131.00
CS-7-OUT	2,086.14	10.0	2.00	8.000	8.000	0.045	2,131.00
CS-8	2,123.33	10.0	2.00	8.000	8.000	0.045	2,118.23
CS-8-OUT	2,092.35	10.0	2.00	8.000	8.000	0.045	2,084.13
CS-POND-OUT	2,087.02	3.0	1.00	3.000	3.000	0.030	2,121.76
							2,121.76
							2,118.74
							2,086.14
							2,123.33
							2,092.35
							2,087.02

Pond Table - Time: 0.00 hours

Label	Storage (Maximum) (gal)	Hydraulic Grade (Maximum) (ft)	Flow (Out to Links Maximum) (cfs)	Flow (Overflow Maximum) (cfs)
PO-1	194,392.9	2,089.37	2.53	0.00

Outfall Table - Time: 0.00 hours

Label	Elevation (Ground) (ft)	Elevation (Invert) (ft)	Boundary Condition Type	Flow (Out to Links Maximum) (cfs)
O-1	2,115.00	2,111.73	Free Outfall	8.00
O-2	2,112.91	2,110.91	Free Outfall	6.49
O-3	2,105.40	2,103.40	Free Outfall	2.02
O-4	2,084.00	2,080.00	Free Outfall	4.75
O-POND	2,094.00	2,086.00	Boundary Element	(N/A)

CivilStorm Model Summary

Post-Development Conditions 25 Year

Catchment Table - Time: 0.00 hours

Label	Area (User Defined) (acres)	Runoff Method	Unit Hydrograph Method	Loss Method	SCS CN	Time of Concentration (hours)	Flow (Maximum) (cfs)
BASIN-1A	5.530	Unit Hydrograph	SCS Unit Hydrograph	SCS CN	79	0.694	4.18
BASIN-1B	7.730	Unit Hydrograph	SCS Unit Hydrograph	SCS CN	80	0.689	6.22
BASIN-2A	1.020	Unit Hydrograph	SCS Unit Hydrograph	SCS CN	77	0.229	1.29
BASIN-2B	11.370	Unit Hydrograph	SCS Unit Hydrograph	SCS CN	79	0.749	8.15
BASIN-3A	1.490	Unit Hydrograph	SCS Unit Hydrograph	SCS CN	77	0.390	1.45
BASIN-3B	2.030	Unit Hydrograph	SCS Unit Hydrograph	SCS CN			
BASIN-4A	0.860	Unit Hydrograph	SCS Unit Hydrograph	SCS CN			
BASIN-4B	0.520	Unit Hydrograph	SCS Unit Hydrograph	SCS CN			
BASIN-5A	2.530	Unit Hydrograph	SCS Unit Hydrograph	SCS CN			
BASIN-5B	0.980	Unit Hydrograph	SCS Unit Hydrograph	SCS CN			
BASIN-5C	1.040	Unit Hydrograph	SCS Unit Hydrograph	SCS CN			
BASIN-5D-EAST	2.270	Unit Hydrograph	SCS Unit Hydrograph	SCS CN			
BASIN-5D-NW	1.230	Unit Hydrograph	SCS Unit Hydrograph	SCS CN			
BASIN-5D-SW	1.500	Unit Hydrograph	SCS Unit Hydrograph	SCS CN			
BASIN-5E-EAST	1.080	Unit Hydrograph	SCS Unit Hydrograph	SCS CN			
BASIN-5E-NW	1.120	Unit Hydrograph	SCS Unit Hydrograph	SCS CN			
BASIN-5E-SW	1.500	Unit Hydrograph	SCS Unit Hydrograph	SCS CN			
BASIN-6A	0.200	Unit Hydrograph	SCS Unit Hydrograph	SCS CN			
BASIN-7A	0.710	Unit Hydrograph	SCS Unit Hydrograph	SCS CN			
BASIN-8A	0.680	Unit Hydrograph	SCS Unit Hydrograph	SCS CN			

CivilStorm Model Summary

Post-Development Conditions 25 Year

Catchment Table - Time: 0.00 hours

SCS CN	Time of Concentration (hours)	Flow (Maximum) (cfs)
77	0.611	1.47
77	0.265	1.02
77	0.470	0.45
77	0.386	2.47
77	0.478	0.84
77	0.446	0.93
82	0.414	2.85
91	0.083	3.84
91	0.083	4.69
85	0.414	1.58
90	0.083	3.37
90	0.083	4.52
77	0.440	0.18
77	0.338	0.75
77	0.440	0.61

Combined Pipe/Node Report - Time: 0.00 hours

Label	Start Node	Stop Node	Length (Unified) (ft)	Rise (Unified) (ft)	Capacity (Full Flow) (cfs)	Velocity (ft/s)	Invert (Start) (ft)	Invert (Stop) (ft)	Slope (Calculated) (ft/ft)
CO-1	H-1B	H-1A	89.6	1.50	9.69	0.00	2,120.05	2,119.40	0.007
CO-2	H-2B	H-2A	81.6	2.00	21.02	0.00	2,117.38	2,116.78	0.007
CO-3	H-3B	H-3A	72.8	1.00	3.20	0.00	2,116.72	2,116.22	0.007
CO-4	H-4B	H-4A	73.1	1.00	3.19	0.00	2,115.27	2,114.77	0.007
CO-5-IMP	H-5E	H-5D	69.4	1.50	6.11	0.00	2,115.04	2,114.84	0.003
CO-5D-DS	H-5D-DS	H-5D-DS(2)	60.0	1.00	5.46	0.00	2,116.21	2,115.91	0.005
CO-5D-US	H-5D-US	H-5D-US(2)	60.0	1.00	2.73	0.00	2,123.91	2,123.61	0.005
CO-5E-DS	H-5E-DS	H-5E-DS(2)	60.0	1.00	3.86	0.00	2,115.99	2,115.84	0.002
CO-5E-US	H-5E-US	H-5E-US(2)	60.0	1.00	2.73	0.00	2,123.92	2,123.62	0.005
CO-6D-EAST	H-6D-EAST	H-6D-EAST(2)	60.0	1.00	4.05	0.00	2,116.71	2,116.05	0.011
CO-6E-EAST	H-6E-EAST	H-6E-EAST(2)	60.0	1.00	4.05	0.00	2,116.38	2,115.72	0.011

CivilStorm Model Summary

Post-Development Conditions 25 Year

Channel Table - Time: 0.00 hours

Label	Flow (Maximum) (cfs)	Slope (Calculated) (ft/ft)	Velocity (Maximum Calculated) (ft/s)
CH-1	6.21	0.019	2.26
CH-1-OUT	10.36	0.026	2.27
CH-2	8.14	0.028	2.85
CH-3	1.47	0.047	1.67
CH-4	0.47	0.095	2.84
CH-4-OUT	1.73	0.011	0.89
CH-5-OUT	7.12	0.004	1.05
CH-5D-WEST	3.60	0.007	1.91
CH-5D-WEST (2)	6.36	0.007	2.27
CH-5D-WEST (3)	5.92	0.007	2.26
CH-5E-WEST	3.17	0.007	1.87
CH-5E-WEST (2)	6.04	0.007	2.30
CH-5E-WEST (3)	5.67	0.008	0.67
CH-6	0.18	0.175	1.06
CH-6-OUT	1.37	0.011	0.83
CH-6D-EAST	2.82	0.011	2.11
CH-6D-EAST (2)	2.70	0.010	1.97
CH-6E-EAST	1.56	0.012	1.76
CH-6E-EAST (2)	1.54	0.010	0.15
CH-7	0.75	0.140	1.10
CH-7-OUT	1.20	0.016	0.85
CH-8	0.61	0.101	0.91
CH-8-OUT	0.61	0.017	0.62
CH-POND	14.34	0.500	10.77
CH-POND-OUT	5.39	0.399	7.55
CH-POND-OUT (2)	5.39	0.500	5.69

Cross Section Table - Time: 0.00 hours

Label	Elevation (Invert) (ft)	Bottom Width (ft)	Height (ft)	Slope (Left Side) (H:V)	Slope (Right Side) (H:V)	Manning's n
CS-1	2,114.13	10.0	2.00	8.000	8.000	0.045
CS-4	2,087.25	10.0	2.00	8.000	8.000	0.045
CS-5	2,081.00	10.0	2.00	8.000	8.000	0.045
CS-5D-WEST	2,131.00	3.0	2.00	3.000	3.000	0.030
CS-5E-WEST	2,131.00	3.0	2.00	3.000	3.000	0.030
CS-6	2,118.23	10.0	2.00	8.000	8.000	0.045

CivilStorm Model Summary

Post-Development Conditions 25 Year

Cross Section Table - Time: 0.00 hours

Label	Elevation (Invert) (ft)	Bottom Width (ft)	Height (ft)	Slope (Left Side) (H:V)	Slope (Right Side) (H:V)	Manning's n	Hydraulic Grade (ft)
CS-6-OUT	2,084.13	10.0	2.00	8.000	8.000	0.045	2,114.13
CS-6D-EAST	2,121.76	3.0	2.00	3.000	3.000	0.030	2,087.25
CS-6E-EAST	2,121.76	3.0	2.00	3.000	3.000	0.030	2,081.00
CS-7	2,118.74	10.0	2.00	8.000	8.000	0.045	2,131.00
CS-7-OUT	2,086.14	10.0	2.00	8.000	8.000	0.045	2,131.00
CS-8	2,123.33	10.0	2.00	8.000	8.000	0.045	2,118.23
CS-8-OUT	2,092.35	10.0	2.00	8.000	8.000	0.045	2,084.13
CS-POND-OUT	2,087.02	3.0	1.00	3.000	3.000	0.030	2,121.76
							2,121.76
							2,118.74
							2,086.14
							2,123.33
							2,092.35
							2,087.02

Pond Table - Time: 0.00 hours

Label	Storage (Maximum) (gal)	Hydraulic Grade (Maximum) (ft)	Flow (Out to Links Maximum) (cfs)	Flow (Overflow Maximum) (cfs)
PO-1	211,951.6	2,089.59	5.39	0.00

Outfall Table - Time: 0.00 hours

Label	Elevation (Ground) (ft)	Elevation (Invert) (ft)	Boundary Condition Type	Flow (Out to Links Maximum) (cfs)
O-1	2,115.00	2,111.73	Free Outfall	10.34
O-2	2,112.91	2,110.91	Free Outfall	8.44
O-3	2,105.40	2,103.40	Free Outfall	2.69
O-4	2,084.00	2,080.00	Free Outfall	7.76
O-POND	2,094.00	2,086.00	Boundary Element	(N/A)