APPENDIX K

WATER RESOURCES

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K.3 SURFACE WATERS ANALYSIS

<u>*APPENDIX K.1*</u>

WATER RESOURCES BACKGROUND

K.1 Water Resources Background

For regulatory purposes under the Clean Water Act (CWA), wetlands are "areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."[1]

K.1.1 Affected Environment

K.1.1.1 Wetlands

The National Wetlands Inventory (NWI) shows that wetlands in the Project Construction Area include the New York Canal running through the western edge of the Project Construction Area and an unnamed riverine through the southeastern portion of the Project Construction Area (see **Figure K-1**).[2] However, the NWI information is outdated because the Project Construction Area has been previously cleared and is heavily disturbed from Boise Airport (Airport) development. In fact, existing Taxilane S, Navigational Aids (NAVAIDs), a stormwater retention pond, and several on-Airport roadways are in the same location as the unnamed riverine depicted on the NWI. In addition, the unnamed riverine is not identified as a wetland in either the 2019 Master Plan Update (2019 MPU)[3] or the Airport's Wildlife Hazard Management Plan (WHMP).[4] Given the level of existing pavement and development where the unnamed riverine is shown, as well as the fact that no jurisdictional wetlands have been identified on the Airport, no evidence of the unnamed riverine has been found in the Project Construction Area. The Approach Lighting System with Sequenced Flashing Lights (ALSF-2) bridge currently spans over the New York Canal.

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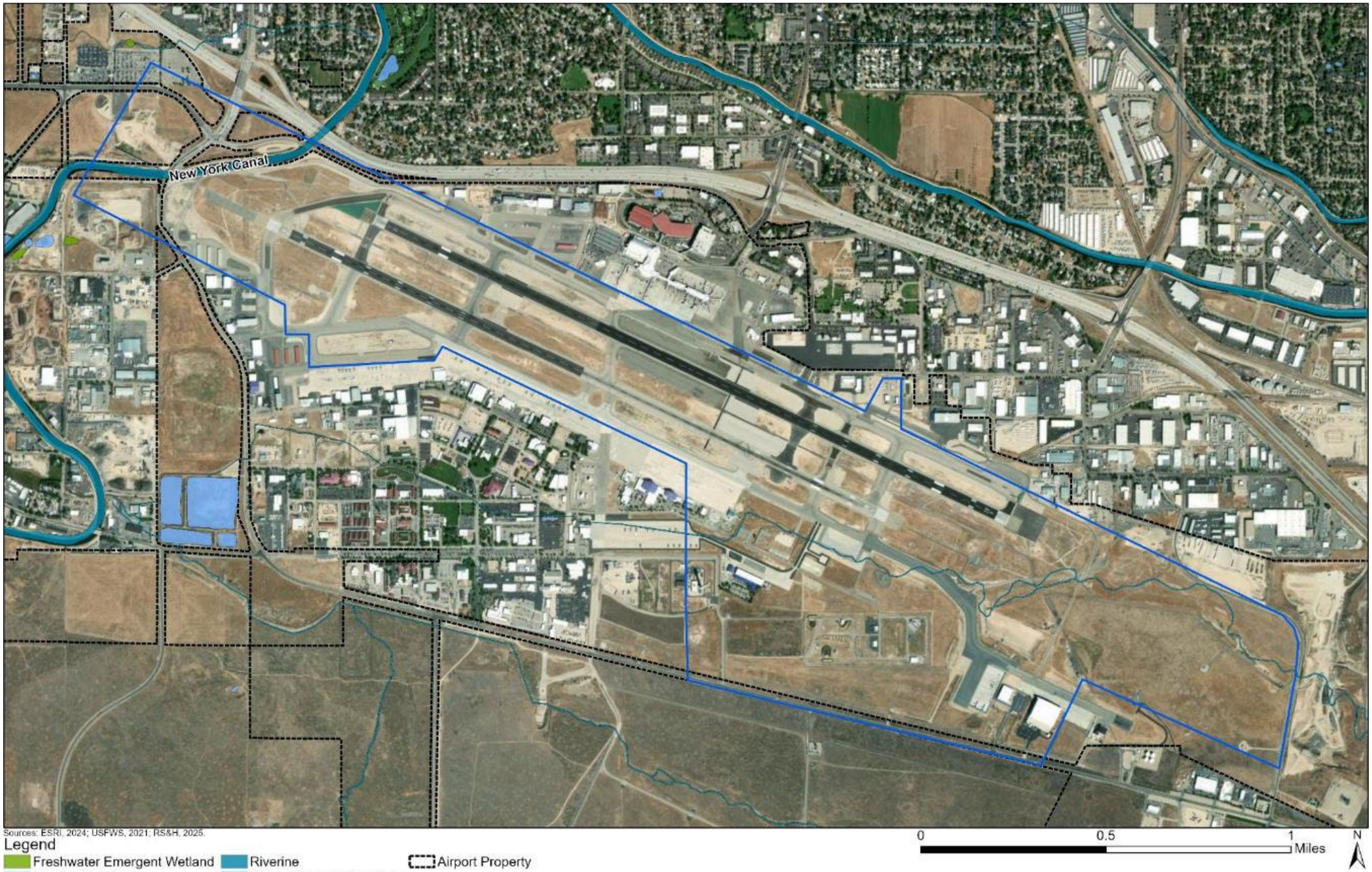
1 U.S Army Corps of Engineers (USACE). (1987, January). *Wetlands Delineation Manual*. Retrieved September 2021, from USACE: https://usace.contentdm.oclc.org/digital/collection/p266001coll1/id/4530.

2 U.S. Fish and Wildlife Service (USFWS). (2021). National Wetlands Inventory. Retrieved September 2021, from USFWS: https://www.fws.gov/wetlands/data/mapper.HTML.

3 Ricondo. (2019, December). Boise Airport Master Plan Update.

4 Boise Airport. (2017, July 24). Wildlife Hazard Management Plan, Exhibit 11.

Figure K-1
NWI of the Project Construction Area



Sources: ESRI, 2024; USFWS, 2021; RS&H, 2025.

Legend
Freshwater Emergent Wetland
Freshwater Pond
Riverine
Project Construction Area
Airport Property

K.1.1.2 Surface Waters

The Project Construction Area is within the Five Mile Creek watershed (Hydrologic Unit Code (HUC): 170501140202).[5] The New York Canal runs through the western edge of the Project Construction Area, which has seasonal flow during the spring and summer[6] and is the main source of irrigation water for agricultural lands west and north of the Airport.[7] Flow from the New York Canal discharges into Five Mile Creek, which is listed by the Idaho Department of Environmental Quality (IDEQ) as impaired for “suspected nutrient loading.”[8] Stormwater runoff generated from airside portions of the Project Construction Area is retained on-site and does not enter the canal.[9]

Stormwater runoff from the Project Construction Area generally sheet flows off airfield pavements into vegetated infields and ditches. Stormwater runoff is then collected in underground storm sewers and conveyed to a series of stormwater retention ponds, which retain stormwater runoff and do not discharge to surface waters under most runoff-producing precipitation events (see **Figure K-2**).[10] Water quality treatment is also provided in these stormwater retention ponds. During extreme precipitation events, overflow structures may convey stormwater runoff off Airport property.[11] There are four stormwater retention ponds located within or immediately adjacent to the Project Construction Area and two outside the Project Construction Area that receive stormwater runoff from Project Construction Area (see **Figure K-2**).

Stormwater runoff within the Project Construction Area is expected to contain pollutants commonly found in runoff from airport sites. These pollutants include glycol, jet fuel, engine oil, lubricants, hydraulic fluid, lavatory waste, chemical solvents, and materials removed from the runway surface during maintenance activities.[12] To manage pollutants in stormwater runoff from activities such as, maintenance, fuel storage, and deicing at the Airport, the City of Boise (Airport Sponsor) adheres to its Idaho Pollutant Discharge Elimination System (IPDES) industrial stormwater permit (Permit Number IDR053107). Additionally, a Spill Prevention Control and Countermeasure (SPCC) plan is in place at the Airport to define procedures to prevent and minimize effects on stormwater runoff from an oil spill.[13]

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[5] U.S. Geological Survey (USGS). (2021). Watershed Boundary Dataset. Retrieved September 2021, from U.S. Geological Survey: https://apps.nationalmap.gov/viewer/.

[6] IDWR. (n.d.). New York Canal 6-Mile Rehabilitation Project.

[7] Ricondo. (2019, December). Boise Airport Master Plan Update.

[8] Idaho Department of Environmental Quality (IDEQ). (2022). Final 2022 §305(b) Integrated Report. Retrieved June 2022, from IDEG: https://mapcase.deq.idaho.gov/wq2022/.

[9] Ricondo. (2019, December). Boise Airport Master Plan Update.

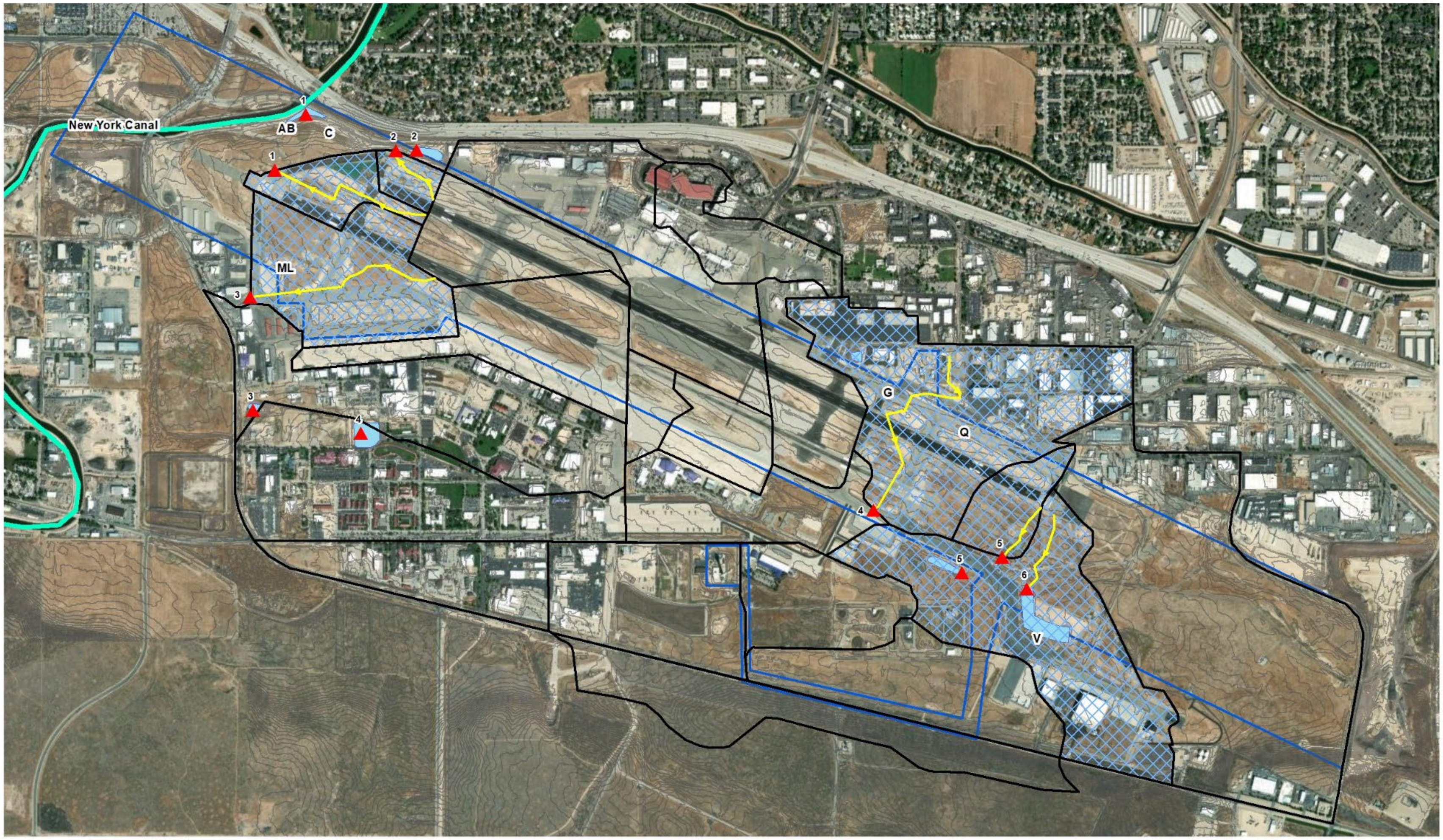
[10] Ricondo. (2019, December). Boise Airport Master Plan Update.

[11] HDR Engineering, Inc. (2021, May). 2021 Stormwater Pollution Prevention Plan.

[12] HDR Engineering, Inc. (2021, May). 2021 Stormwater Pollution Prevention Plan.

[13] HDR Engineering, Inc. (2021, October). Spill Prevention, Control, and Countermeasure Plan.

Figure K-2
Existing Hydrologic Conditions in the Project Construction Area



Source: ESRI, 2022; RS&H, 2022; Isbill Associates, Inc., 1990

Legend

- Time of Concentration (Tc) Flowpath
- Impacted Drainage Subbasin
- Drainage Subbasin
- Design Points*
- Stormwater Retention Ponds
- 2' Elevation Contour
- Project Construction Area
- Surface Waters

Notes:

*Design points have been assigned numerical pairs where the drainage subbasin outlet point and receiving stormwater retention pond are not coterminous.

0 1,250 2,500 Feet

N

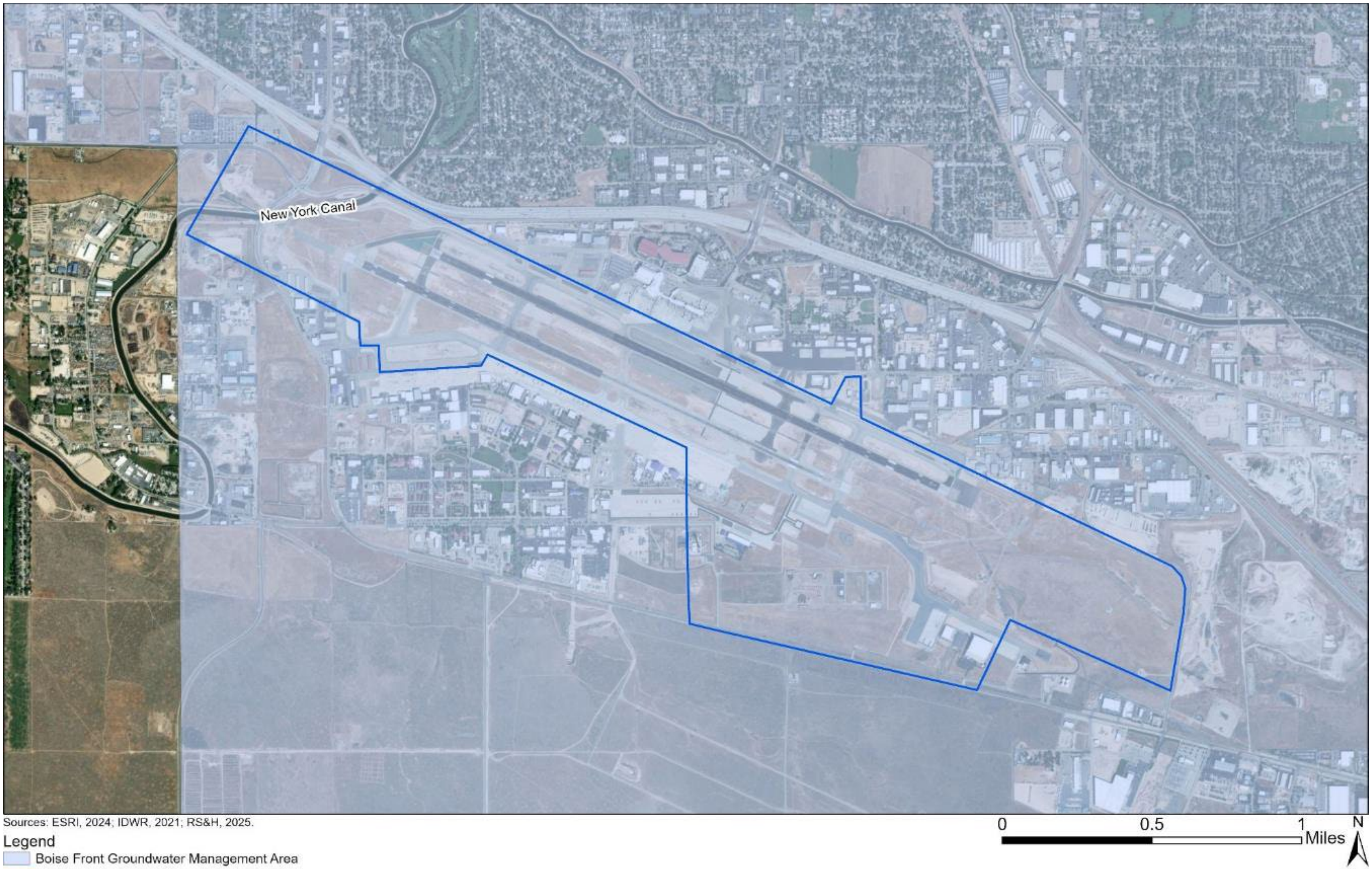
K.1.1.3 Groundwater

According to Federal Aviation Administration (FAA) 1050.1 Desk Reference, "groundwater is subsurface water that occupies the space between sand, clay, and rock formations. The term aquifer is used to describe the geologic layers that store or transmit groundwater to wells, springs, and other water sources."[14] The Project Construction Area is within the Snake River Plain aquifer.[15] There are no sole source aquifers located within the Project Construction Area, the closest being the Eastern Snake River Plain Aquifer about 50 miles to the southeast.[16] The Project Construction Area is located in the Boise Front Ground Water Management Area (see **Figure K-3**), which means "all or part of the groundwater basin does not have sufficient groundwater to provide a reasonably-safe supply for irrigation or other uses at the current or projected rates of withdrawal."[17]

Based on the nearest Idaho Division of Water Resources (IDWR) groundwater monitoring well, Well #03N 02E 25CBCA1, groundwater elevation within the Project Construction Area is about 2,758 feet North American Vertical Datum of 1988 (NAVD 88). This is about 80 feet below the bottom of existing stormwater ponds in the Project Construction Area. The Project Construction Area is not located within an IDWR Designated Area of Groundwater Concern, and contamination of groundwater is not reported within the Project Construction Area.[18]

[14] FAA. (2025, July 7). *1050.1 Desk Reference*.
[15] IDEQ. (2021). Water Quality, Ground Water, Aquifers. Accessed September 2021, from IDEQ: https://www.deq.idaho.gov/water-quality/ground-water/aquifers/.
[16] IDEQ. (2008, July). Designated Sole Source Aquifers in EPA Region 10, Idaho, Oregon, Washington (None in Alaska). Accessed September 2021, from IDEQ: https://www2.deq.idaho.gov/admin/LEIA/api/document/download/5922.
[17] IDWR. (2021). Groundwater Levels. Accessed September 2021, from IDWR: https://idwr.idaho.gov/water-data/groundwater-levels/.
[18] Idaho Department of Water Resources (IDWR) (2022). *Groundwater Quality: Environmental Data Management System (EDMS).* Accessed September 2022, from IDWR: https://maps.idwr.idaho.gov/agol/GroundwaterQuality/

Figure K-3
Groundwater Management Area in Project Construction Area



Sources: ESRI, 2024; IDWR, 2021; RS&H, 2025.

Legend
Boise Front Groundwater Management Area
Project Construction Area

K.1.2 Environmental Consequences

K.1.2.1 Proposed Action

Wetlands

This analysis includes data obtained from the 2019 MPU, the WHMP, and the NWI. Construction of the Proposed Action requires the relocation of Runway 10R ALSF-2 in connection with the removal of 1,341 feet of Runway 10R. The ALSF-2 is currently located on a bridge over the New York Canal and would be relocated to the southeast onto Airport property. The ALSF-2 bridge would be removed in three phases to minimize impacts and would occur when the New York Canal is dry, which is typically between November and March.[19] See Appendix L for details on the ALSF-2 bridge removal. The first phase would remove the lights and the steel tubing running the length of the bridge. The second phase would remove the concrete girder and two support columns next to the west side of South Orchard Street, and the third and final phase would remove the remaining bridge support columns on both sides of South Orchard Street. During the first phase when the lights and steel tubing are removed, the New York Canal would be protected with a temporary platform underneath the ALSF-2 bridge that would restrict any debris from falling into the New York Canal. The steel tubing of the ALSF-2 bridge would be removed in sections with a crane from Gowen Road to minimize ground disturbances around the New York Canal. During the second phase when the concrete girder and two support columns are removed, the New York Canal would be protected with a similar temporary platform to restrict any debris from falling into the New York Canal. The concrete would be removed in sections similar to the removal of the steel tubing using a crane from Gowen Road. The concrete support columns are surrounded by fencing and have a total area of about 3,000 square feet, or less than one acre. The depth of the columns ranges from about 30 to 50 feet deep. During the third and final phase, the remaining concrete support columns would be removed. During the removal of the columns closest to the New York Canal, a temporary fence would be set up to prevent any potential debris from falling into the New York Canal. Due to the depth of the concrete support columns into the ground, and to minimize the surface area affected by the removal, the concrete columns would be removed to a depth of about five feet, and the remaining concrete would be left in place. The area where the concrete columns are removed would be filled in with a native soil similar to the existing soil. Runway 10R/28L would need to be closed during these three weeks during which time, all operations would shift to Runway 10L/28R.

Figure K-4 shows the Proposed Action around the unnamed riverine. Two project components, the Taxiway P construction and the MALSR replacement, are in the area of the unnamed riverine.

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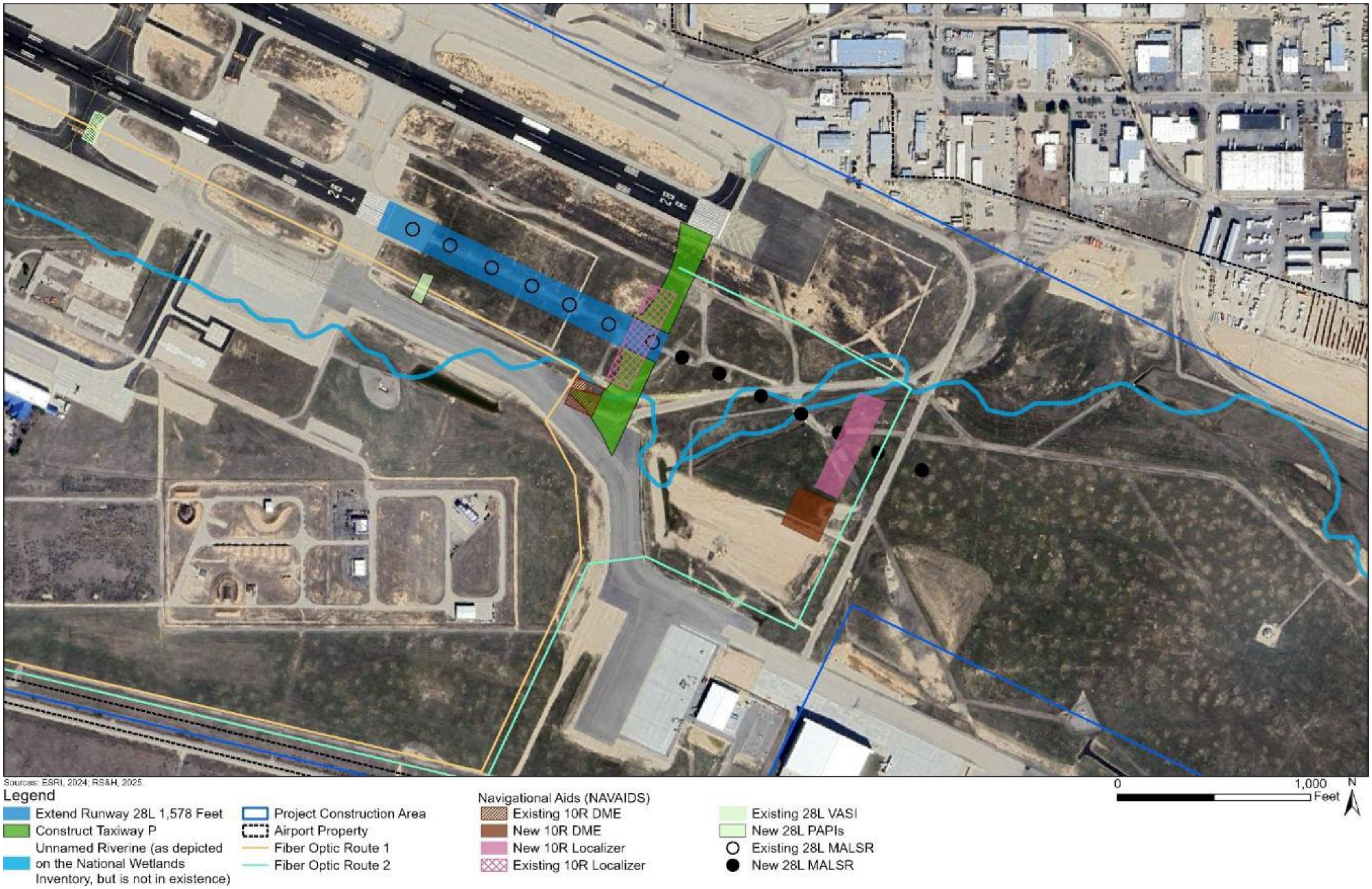
[19] IDWR. (n.d.). New York Canal 6-Mile Rehabilitation Project.

Figure K-4
Proposed Action near NWI Unnamed Riverine Not in Existence



Surface Waters

Implementing the Proposed Action would alter the hydrology and impervious cover in six on-Airport drainage basins, as delineated in the 1990 Stormwater Master Plan. As stated in **Section 1.3** of the Environmental Assessment (EA), the Proposed Action would result in a net decrease of impervious surfaces of about one acre. Drainage basin boundaries were also assumed to be the same between existing and proposed conditions. See **Figure K-2** for existing drainage conditions and **Figure K-5** for proposed drainage conditions.

Table K-1 and **Table K-2** summarize the change in drainage basin conditions as well as peak discharge rates and peak flow volumes as outlined in the City of Boise Stormwater Management Design Manual. Detailed methodology and calculations for hydrologic analysis can be seen in **Appendix K.3**.

Table K-1
Drainage Basin Impervious Cover Summary

Basin	Area (ac)	Discharge Location	Existing Conditions Impervious Area (ac)	Existing Conditions % Imp.	Proposed Conditions Impervious Area (ac)	Proposed Conditions % Imp.	Change in Impervious Area (ac)
AB	28.10	1	14.71	52%	2.47	9%	-12.24
C	11.34	2	7.31	64%	6.99	62%	-0.32
ML	92.12	3	44.09	48%	42.96	47%	-1.13
G	166.01	4	134.57	81%	136.75	82%	2.18
Q	28.56	5	7.82	27%	12.52	44%	4.70
V	154.55	6	51.3	33%	56.69	37%	5.39

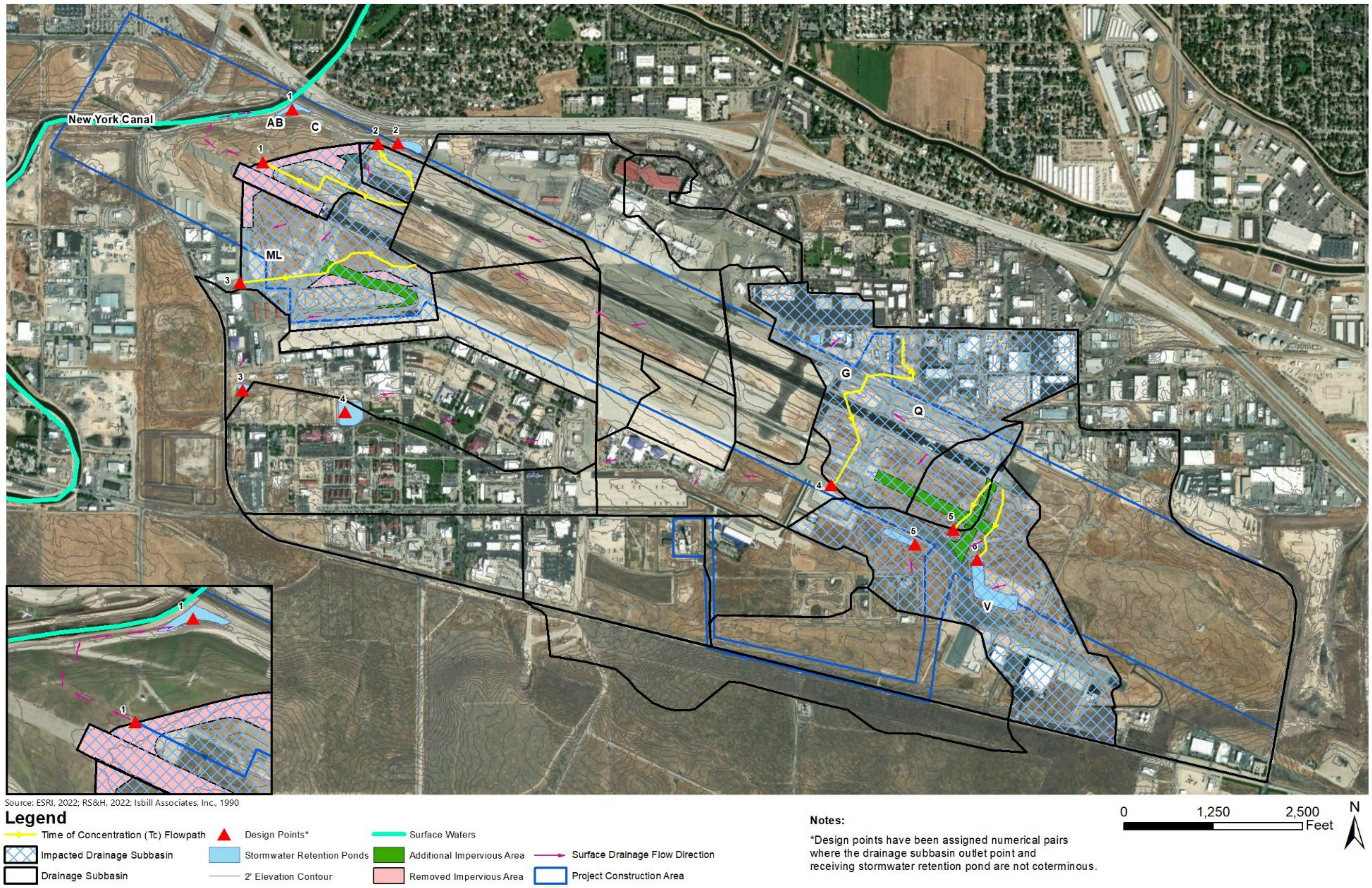
Note: /a/ - See Figures 4-29 and 4-30 for discharge locations.
Source: RS&H, 2022.

Table K-2
Drainage Basin Relative Change Summary

Basin	Area (ac)	Tc/a/ (min)	Relative Change in Impervious Area	Relative Change in Peak Flow Rate	Relative Change in Peak Flow Volume
AB	28.10	66.9	Decrease	Decrease	Decrease
C	11.34	33.5	Decrease	Decrease	Decrease
ML	92.12	59.0	Decrease	Decrease	Decrease
G	166.01	72.9	Increase	Increase	Increase
Q	28.56	28.9	Increase	Increase	Increase
V	154.55	37.0	Increase	Increase	Increase

Note: Drainage basin areas and Tc assumed to be constant in existing and proposed conditions.
/a/ - *Tc = time of concentration, or when the entire basin contributes runoff which is used in determination of the peak flow rate.
Source: RS&H, 2022.

Figure K-5
Proposed Action Hydrologic Conditions in the Project Construction Area



<u>*APPENDIX K.2*</u>

AGENCY COORDINATION

Boise Airport

March 4, 2025

Bryan Horsburgh
Area Manager
Bureau of Reclamation
Snake River Area Office
230 Collins Road
Boise, ID 83702-4520

RE: Removal of the Approach Lighting System with Sequenced Flashing Light (ALSF-2) Bridge over the New York Canal in Boise, Idaho

Dear Mr. Horsburgh,

The City of Boise (Airport Sponsor) is undertaking the Runway 10R/28L Incursion Mitigation and Runway Incursion Mitigation (RIM) Improvements (Proposed Action) Environmental Assessment (EA) to enhance runway safety at the Boise Airport (Airport). Part of the Proposed Action is to remove the ALSF-2 bridge over the New York Canal, which is under the jurisdiction of the Bureau of Reclamation (see Figure 1). This letter is to inform the Bureau of Reclamation of the Airport Sponsor's plan to remove the ALSF-2 bridge without effects to the New York Canal.

Construction of the Proposed Action is proposed to begin in 2028 and the ALSF-2 bridge removal project component is proposed to occur in 2030. The ALSF-2 bridge would be removed in three phases to minimize impacts and would occur when the New York Canal is dry, which is typically between November and March. The first phase would remove the lights and the steel tubing running the length of the bridge. The second phase would remove the concrete girder and two support columns next to the west side of South Orchard Street, and the third and final phased would remove the remaining bridge support columns on both sides of South Orchard Street (see Figure 2 for a picture of the bridge). During the first phase when the lights and steel tubing are removed, the New York Canal would be protected with a temporary platform underneath the ALSF-2 bridge that would restrict any debris from falling into the New York Canal. The steel tubing of the ALSF-2 bridge would be removed in sections with a crane from Gowen Road to minimize ground disturbances around the New York Canal. During the second phase when the concrete girder and two support columns are removed, the New York Canal would be protected with a similar temporary platform to restrict any debris from falling into the New York Canal. The concrete would be removed in sections similar to the removal of the steel tubing using a crane from Gowen Road. The concrete support columns are surrounded by fencing and have a total area of about 3,000 square feet, or about 0.07 acres. The depth of the columns ranges from about 30 to 50 feet deep. During the third and final phase, the remaining concrete support columns would be removed. During the removal of the columns closest to the New York Canal, a temporary fence would be set up to prevent any potential debris from falling into the New York Canal. Due to the depth of the concrete support columns into the ground, and to minimize the surface area affected by the removal, the concrete columns would be removed to a depth of about five feet, and the remaining concrete would be left in place. The area where the concrete columns are removed would be filled in with a native soil similar to the existing soil.

Boise Airport

The Airport Sponsor is requesting comment from the Bureau of Reclamation regarding the no effect to the New York Canal determination from the proposed removal of the ALSF-2 bridge as part of the Proposed Action, as described above. You can provide your response and comment to me at mggreen@cityofboise.org, or send them to me at the following address:

Markus Green, P.E.
Boise Airport
3201 Airport Way, Suite 1000
Boise, ID 83705

Your prompt reply is most appreciated.

Sincerely,

Markus Green, P.E.
Boise Airport, Airside Program Manager

Cc: Heidy Bruner, P.E., FAA Environmental Protection Specialist (Idaho)
Julie Barrow, RS&H Idaho, P.C.

Boise Airport

Figure 1
Proposed Action

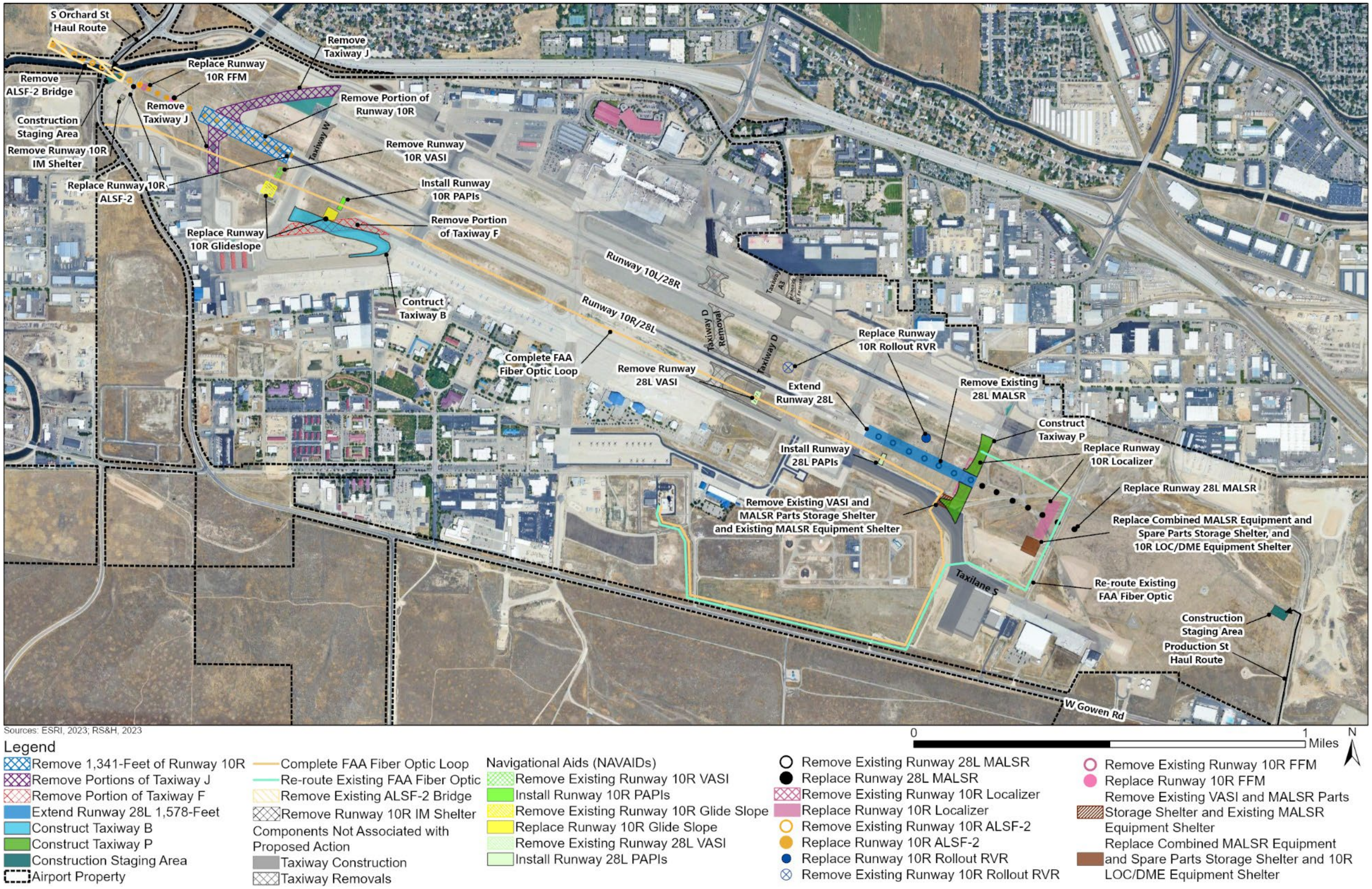


Figure 2
Picture of Bridge over New York Canal showing ALSF-2 Lights, Concrete Girder, and Support Column

<u>*APPENDIX K.3*</u>

SURFACE WATERS ANALYSIS

MAY 2025

BOI Runway 10R/28L Incursion Mitigation EA: Surface Water Analysis

RS&H

BOI Runway 10R/28L Incursion Mitigation EA: Surface Water Analysis

May 2025
Boise, Idaho
RS&H No.: 1025-1927-023

Prepared by RS&H, Inc. at the direction of Boise Airport

RS&H

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CHAPTER 1

HYDROLOGIC ANALYSIS

1.1 INTRODUCTION

Boise Airport (BOI), also known as Boise Air Terminal or Gowen Field, is a joint civil-military, commercial and general aviation airport located three nautical miles south of downtown Boise in Ada County, Idaho. The City of Boise Department of Aviation operates the airport under the supervision of an Airport Commission.

This report evaluates the hydrologic impact of the Proposed Action under the Environmental Assessment (EA) for the BOI Runway Incursion Mitigation (RIM) Program and related improvements at the Airport. The Proposed Action will enhance safety at the Boise Airport by addressing the runway safety deficiencies leading to increased runway incursions by physically removing the FAA-designated hot spot, correcting nonstandard taxiway geometry, and aligning the two runway thresholds to meet current FAA Airport Design Standards consistent with the FAA AC 150/5300-13B, *Airport Design*.

To align the runway thresholds, the Airport Sponsor recommends relocating sections of the runway to create two full parallel runways that are 10,000 feet in length. Navigational Aids (NAVAIDSs) will need to be relocated or replaced on the runway. To correct the taxiway geometry, the Airport Sponsor proposed a reconstruction of Taxiways J and F which will result in a net loss of 1.42 acres of impervious surface at Boise Airport.

RS&H analyzed the changes in peak runoff flow rates and runoff volumes between existing and proposed conditions under the Proposed Action. Drainage analysis within this report was performed in accordance with the City of Boise Stormwater Management Design Manual (SWMDM), dated December 2019.

1.2 HYDROLOGIC ANALYSIS

The Rational Method was utilized to determine the difference in peak discharge rate resulting from the Proposed Action in the six impacted drainage basins as delineated by the 1990 Stormwater Master Plan (Isbill Associates, 1990). Relocation of the NAVAIDs under the Proposed Action were not considered in the hydrologic analysis due to minor changes in impervious area associated with their relocation. Drainage basin boundaries were also assumed to be the same between existing and proposed RS&H validated and incorporated minor corrections for drainage subbasins anticipated to be impacted by Proposed Action with available LiDAR data and existing stormwater system exhibits in the SWPPP. A C value of 0.95 was used to represent highly impervious surface and a C value of 0.15 was used for pervious surfaces in hydrologic soil group (HSG) C soils as listed in City of Boise SWMDM.

The rainfall intensities (i) were determined from the Intensity, Duration, Frequency (IDF) curve provided in Appendix D in the City of Boise SWMDM. A time of concentration (t_c) was determined utilizing the NRCS Runoff Method, with overland flow paths determined through LiDAR elevation data and with pervious areas being classified as short grass prairie. T_c was assumed to be the same between existing and proposed conditions. conditions. Impervious area resulting from ongoing airport construction projects in the Project Study Area was assumed as an existing condition in the hydrologic analysis. Percent imperviousness was determined for modified subbasins utilizing aerial imagery collected from ESRI and utilized in determining the Rational Method C coefficient.

Additionally, all projects over 10 acres must evaluate the peak flow volume, defined as the 100-year design storm event for a duration (T) of one hour, equating to an intensity of 1.1 in/hr. **Tables 1-12** below summarize hydrologic inputs for the Rational Method as well as peak discharge rates and peak flow volumes as outlined in the City of Boise SWMDM.

TABLE 1: EXISTING CONDITIONS DRAINAGE BASIN IMPERVIOUS COVER SUMMARY

Basin	Area (acres)	Discharge Location*	Impervious Area (acres)	Percent Impervious	Rational C Value^
AB	28.10	1	14.71	52%	0.57
C	11.34	2	7.31	64%	0.67
ML	92.12	3	44.09	48%	0.53
G	166.01	4	134.57	81%	0.80
Q	28.56	5	7.82	27%	0.37
V	154.55	6	51.3	33%	0.42

*See Figures 4-36 and 4-39 in Section 4.15 of Environmental Assessment Narrative.

^C pervious = 0.15, C impervious = 0.95

TABLE 2: FUTURE CONDITIONS DRAINAGE BASIN IMPERVIOUS COVER SUMMARY

Basin	Area (acres)	Discharge Location*	Impervious Area (acres)	Percent Impervious	Rational C Value^
AB	28.10	1	2.47	9%	0.22
C	11.34	2	6.99	62%	0.64
ML	92.12	3	42.96	47%	0.52
G	166.01	4	136.75	82%	0.81
Q	28.56	5	12.52	44%	0.50
V	154.55	6	56.69	37%	0.44

*See Figures 4-36 and 4-39 in Section 4.15 of Environmental Assessment Narrative.

^ C pervious = 0.15, C impervious = 0.95

TABLE 3: BASIN CHANGE IN IMPERVIOUS COVER

Basin	Existing Impervious Area (acres)	Proposed Impervious Area (acres)	Change in Impervious Area (acres)
AB	14.71	2.47	-12.24
C	7.31	6.99	-0.32
ML	44.09	42.96	-1.13
G	134.57	136.75	2.18
Q	7.82	12.52	4.70
V	51.3	56.69	5.39

TABLE 4: BASIN PEAK FLOW VOLUME SUMMARY

Drainage Basin	Existing Conditions Peak Flow Volume (cubic feet)	Proposed Conditions Peak Flow Volume (cubic feet)	Difference in Peak Flow Volume (cubic feet)
AB	63,300	24,524	-38,776
C	29,904	28,891	-1,014
ML	194,390	190,810	-3,580
G	524,914	531,820	6,906
Q	41,736	56,625	14,890
V	254,333	271,409	17,076

Peak Flow Volume Equation V=C*i*T*A

i=1.1 in/hr; T=1 hr per City of Boise Stormwater Management Design Manual

TABLE 5: BASIN TIME OF CONCENTRATION AND RAINFALL INTENSITIES

Basin	Time of Concentration (minutes)	2 year Rainfall Intensity (inches/hour [in/hr])	5 year Intensity (in/hr)	10 year Intensity (in/hr)	50 year Intensity (in/hr)	100 year Intensity (in/hr)
AB	66.9	0.38	0.50	0.60	0.80	0.95
C	33.5	0.55	0.78	0.95	1.40	1.60
ML	59.0	0.42	0.56	0.68	0.93	1.10
G	72.9	0.35	0.50	0.60	0.76	0.90
Q	28.9	0.60	0.85	1.10	1.50	1.80
V	37.0	0.54	0.75	0.90	1.30	1.50

TABLE 6: EXISTING CONDITIONS PEAK FLOW RATE SUMMARY

Basin	2 Year, 24 hour Peak Discharge Rate (cubic feet per second [cfs])	5 Year, Peak Discharge Rate (cfs)	10 Year 24 hour Peak Discharge Rate (cfs)	50 Year 24 hour Peak Discharge Rate (cfs)	100 Year Peak Discharge Rate (cfs)
AB	6.07	7.99	9.59	12.79	15.19
C	4.23	5.89	7.17	10.57	12.08
ML	20.62	27.49	33.38	45.65	54.00
G	46.39	66.28	79.53	100.74	119.30
Q	6.32	8.96	11.59	15.81	18.97
V	34.68	48.17	57.80	83.49	96.34

Peak Flow Rate Equation Q=C*i*A

TABLE 7: PROPOSED CONDITIONS PEAK FLOW RATE SUMMARY

Basin	2 Year, 24 hour Peak Discharge Rate (cubic feet per second [cfs])	5 Year, Peak Discharge Rate (cfs)	10 Year 24 hour Peak Discharge Rate (cfs)	50 Year 24 hour Peak Discharge Rate (cfs)	100 Year Peak Discharge Rate (cfs)
AB	2.35	3.10	3.72	4.95	5.88
C	4.09	5.69	6.93	10.21	11.67
ML	20.24	26.98	32.77	44.81	53.00
G	47.00	67.15	80.58	102.07	120.87
Q	8.58	12.15	15.73	21.45	25.74
V	37.01	51.40	61.68	89.10	102.81

Peak Flow Rate Equation Q=C*i*A

TABLE 8: 2-YEAR PEAK FLOW RATE CHANGE

Basin	Existing Peak Flow Rate (cubic feet per second [cfs])	Proposed Peak Flow Rate (cfs)	Change in Peak Flow Rate (cfs)
AB	6.07	2.35	-3.72
C	4.23	4.09	-0.14
ML	20.62	20.24	-0.38
G	46.39	47.00	0.61
Q	6.32	8.58	2.26
V	34.68	37.01	2.33

Peak Flow Rate Equation Q=C*i*A

TABLE 9: 5-YEAR PEAK FLOW RATE CHANGE

Basin	Existing Peak Flow Rate (cubic feet per second [cfs])	Proposed Peak Flow Rate (cfs)	Change in Peak Flow Rate (cfs)
AB	7.99	3.10	-4.89
C	5.89	5.69	-0.20
ML	27.49	26.98	-0.51
G	66.28	67.15	0.87
Q	8.96	12.15	3.19
V	48.17	51.40	3.23

Peak Flow Rate Equation Q=C*i*A

TABLE 10: 10-YEAR PEAK FLOW RATE CHANGE

Basin	Existing Peak Flow Rate (cubic feet per second [cfs])	Proposed Peak Flow Rate (cfs)	Change in Peak Flow Rate (cfs)
AB	9.59	3.72	-5.87
C	7.17	6.93	-0.24
ML	33.38	32.77	-0.61
G	79.53	80.58	1.05
Q	11.59	15.73	4.41
V	57.80	61.68	3.88

Peak Flow Rate Equation Q=C*i*A

TABLE 11: 50-YEAR PEAK FLOW RATE CHANGE

Basin	Existing Peak Flow Rate (cubic feet per second [cfs])	Proposed Peak Flow Rate (cfs)	Change in Peak Flow Rate (cfs)
AB	12.79	4.95	-7.84
C	10.57	10.21	-0.36
ML	45.65	44.81	-0.84
G	100.74	102.07	1.33
Q	15.81	21.45	5.64
V	83.49	89.10	5.61

Peak Flow Rate Equation Q=C*i*A

TABLE 12: 100-YEAR PEAK FLOW RATE CHANGE

Basin	Existing Peak Flow Rate (cubic feet per second [cfs])	Proposed Peak Flow Rate (cfs)	Change in Peak Flow Rate (cfs)
AB	15.19	5.88	-9.31
C	12.08	11.67	-0.41
ML	54.00	53.00	-1.00
G	119.30	120.87	1.57
Q	18.97	25.74	6.77
V	96.34	102.81	6.47

Peak Flow Rate Equation Q=C*i*A

Although the Proposed Action will increase stormwater runoff in three of the six on-airport drainage basins, this increase runoff will not adversely impact surface waters as runoff is retained in the existing stormwater retention ponds. Stormwater retention ponds that will receive additional stormwater runoff have been expanded under recent Airport construction projects to have adequate storage capacity to accept increased stormwater runoff from future impervious area while maintaining compliance with relevant FAA and City of Boise drawdown criteria (RS&H, 2022).

Due to retention of stormwater runoff from the Project Study Area, the Proposed Action will not contribute additional runoff to New York Canal or adversely affect water quality in surface waters, and will meet all local, state, and federal regulations related to surface waters.

1.3 WATER QUALITY

Construction of the Proposed Action could generate pollutants such as soil sedimentation in stormwater runoff that could cause indirect impacts to the water quality of surface waters. Before construction commences, the contractor will be required to submit a Notice of Intent (NOI) to IPDES for discharge from construction activities, develop a site-specific construction SWPPP, and obtain a Construction General Permit (CGP) through IDEQ for projects that disturb over 1 acre or are part of a common plan of development that disturbs over 1 acre. The Airport Sponsor will be responsible for ensuring the contractor follows the SWPPP during construction. The IDEQ CGP and construction SWPPP for the Proposed Action will define requirements for erosion and sediment control practices, such as construction phase stormwater BMPs, that will minimize the potential for construction activities to create additional sources of polluted stormwater runoff.

The Airport Sponsor will also be responsible for complying with or amending its existing IPDES Industrial Stormwater Permit for airside areas. This IPDES permit will include the establishment of non-structural controls to limit pollutant discharges to the receiving stormwater retention ponds and minimize the potential water quality effects from operation of the Proposed Action.

Per the City of Boise SWMDM, operators of stormwater facilities “shall conduct regularly scheduled inspections, clean, and maintain the system when necessary to ensure operation according to the original design.” An Operations and Maintenance (O&M) plan must be developed with an understanding of the sediment pollutant concentrations that will be cleaned from the Airport Sponsor’s stormwater systems to ensure proper disposal. As the Proposed Action is located in an industrial area, testing of sediments will most likely be required prior to disposal. Operation of the Proposed Action will not affect water quality in a manner that will affect the quality of the public drinking water supply.

The City of Boise SWMDM additionally requires 80% of Total Suspended Solids (TSS) to be treated on site. As all stormwater runoff generated from the Project Study Area is retained on site and treated by the stormwater retention ponds, this requirement is automatically met.

See Section 4.15 of the EA narrative for more detailed discussion of the potential water quality impacts and proposed mitigation measures.

1.4 CONCLUSION

The Proposed Action will not exceed established significance thresholds, as defined in Section 4.15 of the EA narrative. Impacts to surface waters as a result of the Proposed Action will be considered minimal and not affect the overall operations of the system and not exceed any water quality standards that are set forth by any local, state, or federal jurisdictions or contaminate surface waters that are used for the public water supply. In the final design, stormwater retention ponds receiving additional stormwater runoff from the Proposed Action will need verification that the increase in stormwater runoff volume maintain compliance relevant FAA and City of Boise drawdown criteria.

1.5 REFERENCES

City of Boise. (2019, December). Stormwater Management Design Manual.

Federal Aviation Administration. (2022, March 31). Advisory Circular 150/5320-5D: Airport Design.

Federal Aviation Administration. (2013, August 5). Advisory Circular 150/5320-5D: Airport Drainage Design.

Ibsill Associates, Inc. (1990, June). Drainage Study for Boise Air Terminal-Gowen Field.

RS&H. (2022, March). Drainage Report for Taxilane S Widening and New Cargo Apron.

BOI RW 10R-28L Runway Incursion Environmental Assessment	
Comp. By:	JMM
Date:	6/17/2022
Chk. By:	LMM
Job No:	10250056.000

Time of Concentration Calculations

Sub-Basin Name: AB
Condition: Existing and Proposed

Sheet Flow [TR-55 equation 3-3]

	AB									
Surface Description	Short grass prairie									
Manning's Roughness coeff., n	0.15									
Flow Length, L (should be <= 100 ft)	100	ft		ft		ft		ft		
Two-yr, 24-hr rainfall, P2	0.43	in		in		in		in		
Elevation 1, E_1	2833.00	ft		ft		ft		ft		
Elevation 2, E_2	2831.00	ft		ft		ft		ft		
Land Slope, $s = (E_1 - E_2) / L$	0.02	ft/ft		ft/ft		ft/ft		ft/ft		
$Tt = 0.007 * (n * L)^{0.8} / (P_2^{0.5} * s^{0.4})$	0.45	hr		hr		hr		hr		
	26.7	+		+		+		=	26.7	min

Shallow Concentrated Flow [TR-55 figure 3-1]

	BC		CD							
Surface Description	Unpaved		Paved							
Flow Length, L	1136	ft	1089	ft		ft		ft		
Elevation 1, E_1	2831.00	ft	2825.00	ft		ft		ft		
Elevation 2, E_2	2825.00	ft	2823.50	ft		ft		ft		
Watercourse Slope, $s = (E_1 - E_2) / L$	0.005		0.001	ft/ft		ft/ft		ft/ft		
Velocity, V	1.17		0.75	ft/s		ft/s		ft/s		
$T_t = L / (3600 * V)$	0.27		0.40	hr		hr		hr		
	16.1	+	24.1	+		+		=	40.2	min

Open Channel Flow [TR-55 equation 3-4]

Open Channel	Front Slope, s_1		:1		:1		:1		:1		
	Bottom width, B		ft		ft		ft		ft		
	Back Slope, s_2		:1		:1		:1		:1		
	Depth, H		ft		ft		ft		ft		
Pipe	Diameter, D		in		in		in		in		
Cross Sectional Flow Area, a			sq ft		sq ft		sq ft		sq ft		
Wetted Perimeter, P_w			ft		ft		ft		ft		
Hydraulic radius, $r = a / P_w$			ft		ft		ft		ft		
Flow Length, L			ft		ft		ft		ft		
Elevation 1, E_1			ft		ft		ft		ft		
Elevation 2, E_2			ft		ft		ft		ft		
Channel Slope, $s = (E_1 - E_2) / L$			ft/ft		ft/ft		ft/ft		ft/ft		
Manning's Roughness coeff., n											
Velocity, $V = 1.49 * r^{2/3} * s^{1/2} / n$			ft/s		ft/s		ft/s		ft/s		
$T_t = L / (3600 * V)$			ft/s		ft/s		ft/s		ft/s		
			+		+		+		=	0.0	min

Total Time of Concentration

Sub-Basin Tc = **66.9** **min**

BOI RW 10R-28L Runway Incursion Environmental Assessment		
	Comp. By:	JMM
	Date:	6/17/2022
	Chk. By:	LMM
	Job No:	10250056.000

Time of Concentration Calculations

Sub-Basin Name: C
Condition: Existing and Proposed

Sheet Flow [TR-55 equation 3-3]

	AB								
Surface Description	Short grass prairie								
Manning's Roughness coeff., n	0.15								
Flow Length, L (should be <= 100 ft)	100	ft		ft		ft		ft	
Two-yr, 24-hr rainfall, P2	0.43	in		in		in		in	
Elevation 1, E_1	2833.00	ft		ft		ft		ft	
Elevation 2, E_2	2831.00	ft		ft		ft		ft	
Land Slope, $s = (E_1 - E_2) / L$	0.02	ft/ft		ft/ft		ft/ft		ft/ft	
$Tt = 0.007 * (n * L)^{0.8} / (P_2^{0.5} * s^{0.4})$	0.45	hr		hr		hr		hr	
	26.7	+		+		+		=	26.7 min

Shallow Concentrated Flow [TR-55 figure 3-1]

	BC		CD						
Surface Description	Unpaved		Paved						
Flow Length, L	480	ft	320	ft		ft		ft	
Elevation 1, E_1	2831.00	ft	2825.00	ft		ft		ft	
Elevation 2, E_2	2825.00	ft	2821.00	ft		ft		ft	
Watercourse Slope, $s = (E_1 - E_2) / L$	0.013		0.013	ft/ft		ft/ft		ft/ft	
Velocity, V	1.80		2.27	ft/s		ft/s		ft/s	
$T_t = L / (3600 * V)$	0.07		0.04	hr		hr		hr	
	4.4	+	2.3	+		+		=	6.8 min

Open Channel Flow [TR-55 equation 3-4]

Open Channel	Front Slope, s_1		:1		:1		:1		:1	
	Bottom width, B		ft		ft		ft		ft	
	Back Slope, s_2		:1		:1		:1		:1	
	Depth, H		ft		ft		ft		ft	
Pipe	Diameter, D		in		in		in		in	
Cross Sectional Flow Area, a			sq ft		sq ft		sq ft		sq ft	
Wetted Perimeter, P_w			ft		ft		ft		ft	
Hydraulic radius, $r = a / P_w$			ft		ft		ft		ft	
Flow Length, L			ft		ft		ft		ft	
Elevation 1, E_1			ft		ft		ft		ft	
Elevation 2, E_2			ft		ft		ft		ft	
Channel Slope, $s = (E_1 - E_2) / L$			ft/ft		ft/ft		ft/ft		ft/ft	
Manning's Roughness coeff., n										
Velocity, $V = 1.49 * r^{2/3} * s^{1/2} / n$			ft/s		ft/s		ft/s		ft/s	
$T_t = L / (3600 * V)$			ft/s		ft/s		ft/s		ft/s	
			+		+		+		=	0.0 min

Total Time of Concentration

Sub-Basin Tc = 33.5 **min**

BOI RW 10R-28L Runway Incursion Environmental Assessment	Comp. By:	JMM
	Date:	6/17/2022
	Chk. By:	LMM
	Job No:	10250056.000

Time of Concentration Calculations

Sub-Basin Name: G
Condition: Existing and Proposed

Sheet Flow [TR-55 equation 3-3]

	AB										
Surface Description	Short grass prairie										
Manning's Roughness coeff., n	0.15										
Flow Length, L (should be <= 100 ft)	100	ft		ft		ft		ft			
Two-yr, 24-hr rainfall, P2	0.43	in		in		in		in			
Elevation 1, E_1	2870.00	ft		ft		ft		ft			
Elevation 2, E_2	2869.00	ft		ft		ft		ft			
Land Slope, $s = (E_1 - E_2) / L$	0.01	ft/ft		ft/ft		ft/ft		ft/ft			
$Tt = 0.007 * (n * L)^{0.8} / (P_2^{0.5} * s^{0.4})$	0.59	hr		hr		hr		hr			
	35.3	+		+		+		=	35.3	min	

Shallow Concentrated Flow [TR-55 figure 3-1]

	BC		CD							
Surface Description	Unpaved		Paved							
Flow Length, L	970	ft	2098	ft		ft		ft		
Elevation 1, E_1	2869.00	ft	2863.00	ft		ft		ft		
Elevation 2, E_2	2863.00	ft	2853.00	ft		ft		ft		
Watercourse Slope, $s = (E_1 - E_2) / L$	0.006		0.005	ft/ft		ft/ft		ft/ft		
Velocity, V	1.27		1.40	ft/s		ft/s		ft/s		
$T_t = L / (3600 * V)$	0.21		0.42	hr		hr		hr		
	12.7	+	24.9	+		+		=	37.6	min

Open Channel Flow [TR-55 equation 3-4]

Open Channel	Front Slope, s_1		:1		:1		:1		:1		
Open Channel	Bottom width, B		ft		ft		ft		ft		
Open Channel	Back Slope, s_2		:1		:1		:1		:1		
Open Channel	Depth, H		ft		ft		ft		ft		
Pipe	Diameter, D		in		in		in		in		
Cross Sectional Flow Area, a			sq ft		sq ft		sq ft		sq ft		
Wetted Perimeter, P_w			ft		ft		ft		ft		
Hydraulic radius, $r = a / P_w$			ft		ft		ft		ft		
Flow Length, L			ft		ft		ft		ft		
Elevation 1, E_1			ft		ft		ft		ft		
Elevation 2, E_2			ft		ft		ft		ft		
Channel Slope, $s = (E_1 - E_2) / L$			ft/ft		ft/ft		ft/ft		ft/ft		
Manning's Roughness coeff., n											
Velocity, $V = 1.49 * r^{2/3} * s^{1/2} / n$			ft/s		ft/s		ft/s		ft/s		
$T_t = L / (3600 * V)$			ft/s		ft/s		ft/s		ft/s		
			+		+		+		=	0.0	min

Total Time of Concentration

Sub-Basin Tc = **72.9** **min**

BOI RW 10R-28L Runway Incursion Environmental Assessment

Comp. By:	JMM
Date:	6/17/2022
Chk. By:	LMM
Job No:	10250056.000

Time of Concentration Calculations

Sub-Basin Name: ML
Condition: Existing and Proposed

Sheet Flow [TR-55 equation 3-3]

	AB										
Surface Description	Short grass prairie										
Manning's Roughness coeff., n	0.15										
Flow Length, L (should be <= 100 ft)	100	ft		ft		ft		ft			
Two-yr, 24-hr rainfall, P2	0.43	in		in		in		in			
Elevation 1, E_1	2833.00	ft		ft		ft		ft			
Elevation 2, E_2	2831.50	ft		ft		ft		ft			
Land Slope, $s = (E_1 - E_2) / L$	0.02	ft/ft		ft/ft		ft/ft		ft/ft			
$Tt = 0.007 * (n * L)^{0.8} / (P_2^{0.5} * s^{0.4})$	0.50	hr		hr		hr		hr			
	30.0	+		+		+		=	30.0	min	

Shallow Concentrated Flow [TR-55 figure 3-1]

	BC		CD							
Surface Description	Unpaved		Paved							
Flow Length, L	1417	ft	1226	ft		ft		ft		
Elevation 1, E_1	2831.50	ft	2822.00	ft		ft		ft		
Elevation 2, E_2	2822.00	ft	2812.00	ft		ft		ft		
Watercourse Slope, $s = (E_1 - E_2) / L$	0.007		0.008	ft/ft		ft/ft		ft/ft		
Velocity, V	1.32		1.84	ft/s		ft/s		ft/s		
$T_t = L / (3600 * V)$	0.30		0.19	hr		hr		hr		
	17.9	+	11.1	+		+		=	29.0	min

Open Channel Flow [TR-55 equation 3-4]

Open Channel	Front Slope, s_1		:1		:1		:1		:1		
	Bottom width, B		ft		ft		ft		ft		
	Back Slope, s_2		:1		:1		:1		:1		
	Depth, H		ft		ft		ft		ft		
Pipe	Diameter, D		in		in		in		in		
Cross Sectional Flow Area, a			sq ft		sq ft		sq ft		sq ft		
Wetted Perimeter, P_w			ft		ft		ft		ft		
Hydraulic radius, $r = a / P_w$			ft		ft		ft		ft		
Flow Length, L			ft		ft		ft		ft		
Elevation 1, E_1			ft		ft		ft		ft		
Elevation 2, E_2			ft		ft		ft		ft		
Channel Slope, $s = (E_1 - E_2) / L$			ft/ft		ft/ft		ft/ft		ft/ft		
Manning's Roughness coeff., n											
Velocity, $V = 1.49 * r^{2/3} * s^{1/2} / n$			ft/s		ft/s		ft/s		ft/s		
$T_t = L / (3600 * V)$			ft/s		ft/s		ft/s		ft/s		
			+		+		+		=	0.0	min

Total Time of Concentration

Sub-Basin Tc = 59.0 **min**

BOI RW 10R-28L Runway Incursion Environmental Assessment

Comp. By:	JMM
Date:	6/17/2022
Chk. By:	LMM
Job No:	10250056.000

Time of Concentration Calculations

Sub-Basin Name: Q
Condition: Existing and Proposed

Sheet Flow [TR-55 equation 3-3]

	AB										
Surface Description	Short grass prairie										
Manning's Roughness coeff., n	0.15										
Flow Length, L (should be <= 100 ft)	100	ft		ft		ft		ft			
Two-yr, 24-hr rainfall, P2	0.43	in		in		in		in			
Elevation 1, E_1	2870.00	ft		ft		ft		ft			
Elevation 2, E_2	2867.00	ft		ft		ft		ft			
Land Slope, s = $(E_1 - E_2) / L$	0.03	ft/ft		ft/ft		ft/ft		ft/ft			
Tt = 0.007 * $(n * L)^{0.8} / (P_2^{0.5} * s^{0.4})$	0.38	hr		hr		hr		hr			
	22.7	+		+		+		=	22.7	min	

Shallow Concentrated Flow [TR-55 figure 3-1]

	BC									
Surface Description	Unpaved									
Flow Length, L	752	ft		ft		ft		ft		
Elevation 1, E_1	2867.00	ft		ft		ft		ft		
Elevation 2, E_2	2855.00	ft		ft		ft		ft		
Watercourse Slope, s = $(E_1 - E_2) / L$	0.016			ft/ft		ft/ft		ft/ft		
Velocity, V	2.04			ft/s		ft/s		ft/s		
T_t = L / (3600 * V)	0.10			hr		hr		hr		
	6.1	+		+		+		=	6.1	min

Open Channel Flow [TR-55 equation 3-4]

Open Channel	Front Slope, s_1		:1		:1		:1		:1		
	Bottom width, B		ft		ft		ft		ft		
	Back Slope, s_2		:1		:1		:1		:1		
	Depth, H		ft		ft		ft		ft		
Pipe	Diameter, D		in		in		in		in		
Cross Sectional Flow Area, a			sq ft		sq ft		sq ft		sq ft		
Wetted Perimeter, P_w			ft		ft		ft		ft		
Hydraulic radius, r = a / P_w			ft		ft		ft		ft		
Flow Length, L			ft		ft		ft		ft		
Elevation 1, E_1			ft		ft		ft		ft		
Elevation 2, E_2			ft		ft		ft		ft		
Channel Slope, s = $(E_1 - E_2) / L$			ft/ft		ft/ft		ft/ft		ft/ft		
Manning's Roughness coeff., n											
Velocity, V = 1.49 * $r^{2/3} * s^{1/2}$ / n			ft/s		ft/s		ft/s		ft/s		
T_t = L / (3600 * V)			ft/s		ft/s		ft/s		ft/s		
			+		+		+		=	0.0	min

Total Time of Concentration

Sub-Basin Tc = **28.9** **min**

BOI RW 10R-28L Runway Incursion Environmental Assessment		
	Comp. By:	JMM
	Date:	6/17/2022
	Chk. By:	LMM
	Job No:	10250056.000

Time of Concentration Calculations

Sub-Basin Name: V
Condition: Existing and Proposed

Sheet Flow [TR-55 equation 3-3]

	AB										
Surface Description	Short grass prairie										
Manning's Roughness coeff., n	0.15										
Flow Length, L (should be <= 100 ft)	100	ft		ft		ft		ft			
Two-yr, 24-hr rainfall, P2	0.43	in		in		in		in			
Elevation 1, E_1	2869.00	ft		ft		ft		ft			
Elevation 2, E_2	2867.00	ft		ft		ft		ft			
Land Slope, $s = (E_1 - E_2) / L$	0.02	ft/ft		ft/ft		ft/ft		ft/ft			
$Tt = 0.007 * (n * L)^{0.8} / (P_2^{0.5} * s^{0.4})$	0.45	hr		hr		hr		hr			
	26.7	+		+		+		=	26.7	min	

Shallow Concentrated Flow [TR-55 figure 3-1]

	BC									
Surface Description	Unpaved									
Flow Length, L	1090	ft		ft		ft		ft		
Elevation 1, E_1	2867.00	ft		ft		ft		ft		
Elevation 2, E_2	2854.00	ft		ft		ft		ft		
Watercourse Slope, $s = (E_1 - E_2) / L$	0.012			ft/ft		ft/ft		ft/ft		
Velocity, V	1.76			ft/s		ft/s		ft/s		
$T_t = L / (3600 * V)$	0.17			hr		hr		hr		
	10.3	+		+		+		=	10.3	min

Open Channel Flow [TR-55 equation 3-4]

Open Channel	Front Slope, s_1		:1		:1		:1		:1		
	Bottom width, B		ft		ft		ft		ft		
	Back Slope, s_2		:1		:1		:1		:1		
	Depth, H		ft		ft		ft		ft		
Pipe	Diameter, D		in		in		in		in		
Cross Sectional Flow Area, a			sq ft		sq ft		sq ft		sq ft		
Wetted Perimeter, P_w			ft		ft		ft		ft		
Hydraulic radius, $r = a / P_w$			ft		ft		ft		ft		
Flow Length, L			ft		ft		ft		ft		
Elevation 1, E_1			ft		ft		ft		ft		
Elevation 2, E_2			ft		ft		ft		ft		
Channel Slope, $s = (E_1 - E_2) / L$			ft/ft		ft/ft		ft/ft		ft/ft		
Manning's Roughness coeff., n											
Velocity, $V = 1.49 * r^{2/3} * s^{1/2} / n$			ft/s		ft/s		ft/s		ft/s		
$T_t = L / (3600 * V)$			ft/s		ft/s		ft/s		ft/s		
			+		+		+		=	0.0	min

Total Time of Concentration

Sub-Basin Tc = 37.0 **min**

Existing Conditions Rational Method Basin Calculations

Storm System Contributing Areas				
Basin	**Area (ac)**	**% Imp.**	**Cw**	**Tc (min)**
AB	28.10	52%	0.57	66.9
C	11.34	64%	0.67	33.5
ML	92.12	48%	0.53	59
G	166.01	81%	0.80	72.9
Q	28.56	27%	0.37	28.9
V	154.55	33%	0.42	37

C Impervious*	0.95
C Pervious**	0.15

Rational Peak Flow (Cfs)					
Basin	**2-yr**	**5-yr**	**10-yr**	**50-yr**	**100-yr**
AB	6.07	7.99	9.59	12.79	15.19
C	4.23	5.89	7.17	10.57	12.08
ML	20.62	27.49	33.38	45.65	54.00
G	46.39	66.28	79.53	100.74	119.30
Q	6.32	8.96	11.59	15.81	18.97
V	34.68	48.17	57.80	83.49	96.34

Rainfall Intensity*** (in/hr)					
Basin	**2-year**	**5-year**	**10-year**	**50-year**	**100-year**
AB	0.38	0.50	0.60	0.80	0.95
C	0.56	0.78	0.95	1.40	1.60
ML	0.42	0.56	0.68	0.93	1.10
G	0.35	0.50	0.60	0.76	0.90
Q	0.60	0.85	1.10	1.50	1.80
V	0.54	0.75	0.90	1.30	1.50

* Value Estabilished for Impervious Surfaces per City of Boise SWMDM, Table A-1

** Value Established for HSG C Soils on 2%-6% slope per City of Boise SWMDM, Table A-1

***Values Derived from IDF Curves in City of Boise SWMDM, Appendix D

Proposed Conditions Rational Method Basin Calculations

Storm System Contributing Areas				
Basin	Area (ac)	% Imp.	Cw	Tc (min)
AB	28.10	9%	0.22	66.9
C	11.34	62%	0.64	33.5
ML	92.12	47%	0.52	59
G	166.01	82%	0.81	72.9
Q	28.56	44%	0.50	28.9
V	154.55	37%	0.44	37

C Impervious*	0.95
C Pervious**	0.15

Rational Peak Flow (Cfs)					
Basin	2-yr	5-yr	10-yr	50-yr	100-yr
AB	2.35	3.10	3.72	4.95	5.88
C	4.09	5.69	6.93	10.21	11.67
ML	20.24	26.98	32.77	44.81	53.00
G	47.00	67.15	80.58	102.07	120.87
Q	8.58	12.15	15.73	21.45	25.74
V	37.01	51.40	61.68	89.10	102.81

Rainfall Intensity*** (in/hr)					
Basin	2-year	5-year	10-year	50-year	100-year
AB	0.38	0.50	0.60	0.80	0.95
C	0.56	0.78	0.95	1.40	1.60
ML	0.42	0.56	0.68	0.93	1.10
G	0.35	0.50	0.60	0.76	0.90
Q	0.60	0.85	1.10	1.50	1.80
V	0.54	0.75	0.90	1.30	1.50

* Value Estabilished for Impervious Surfaces per City of Boise SWMDM, Table A-1

** Value Established for HSG C Soils on 2%-6% slope per City of Boise SWMDM, Table A-1

***Values Derived from IDF Curves in City of Boise SWMDM, Appendix D

Table A-1 Recommended "C" coefficients for "Rational Method Equation"

Modified from ASCE (1972) and the Southeaster Wisconsin Regional Planning Commission

Description of Runoff Area	Runoff Coefficients "C"
Business	
Central business areas	0.70 - 0.95
District and local areas	0.50 - 0.70
Residential	
Single-family	0.35 - 0.45
Multi-family, detached	0.40 - 0.60
Multi-family, attached	0.60 - 0.75
Residential .5 acre lots or larger	0.25 - 0.40
Industrial and Commercial	
Light areas	0.50 - 0.80
Heavy areas	
Parks, cemeteries	0.10 - 0.25
Playgrounds	0.20 - 0.35
Railroad yard areas	0.20 - 0.40
Unimproved areas	0.10 - 0.30
Landscaped areas	0.20
Gravel parking lots	0.45-0.75

For Impervious Surfaces

Character of Surface	Runoff Coefficient
Streets (asphalt, concrete), Drives and Walks, Roofs	0.90 - 0.95

For Pervious Surfaces

		Runoff Coefficient			
Slope		**A soils**	**B soils**	**C soils**	**D soils**
Flat	0-2%	0.04	0.07	0.11	0.15
Average	2-6%	0.09	0.12	0.15	0.20
Steep	>6%	0.18	0.18	0.23	0.28

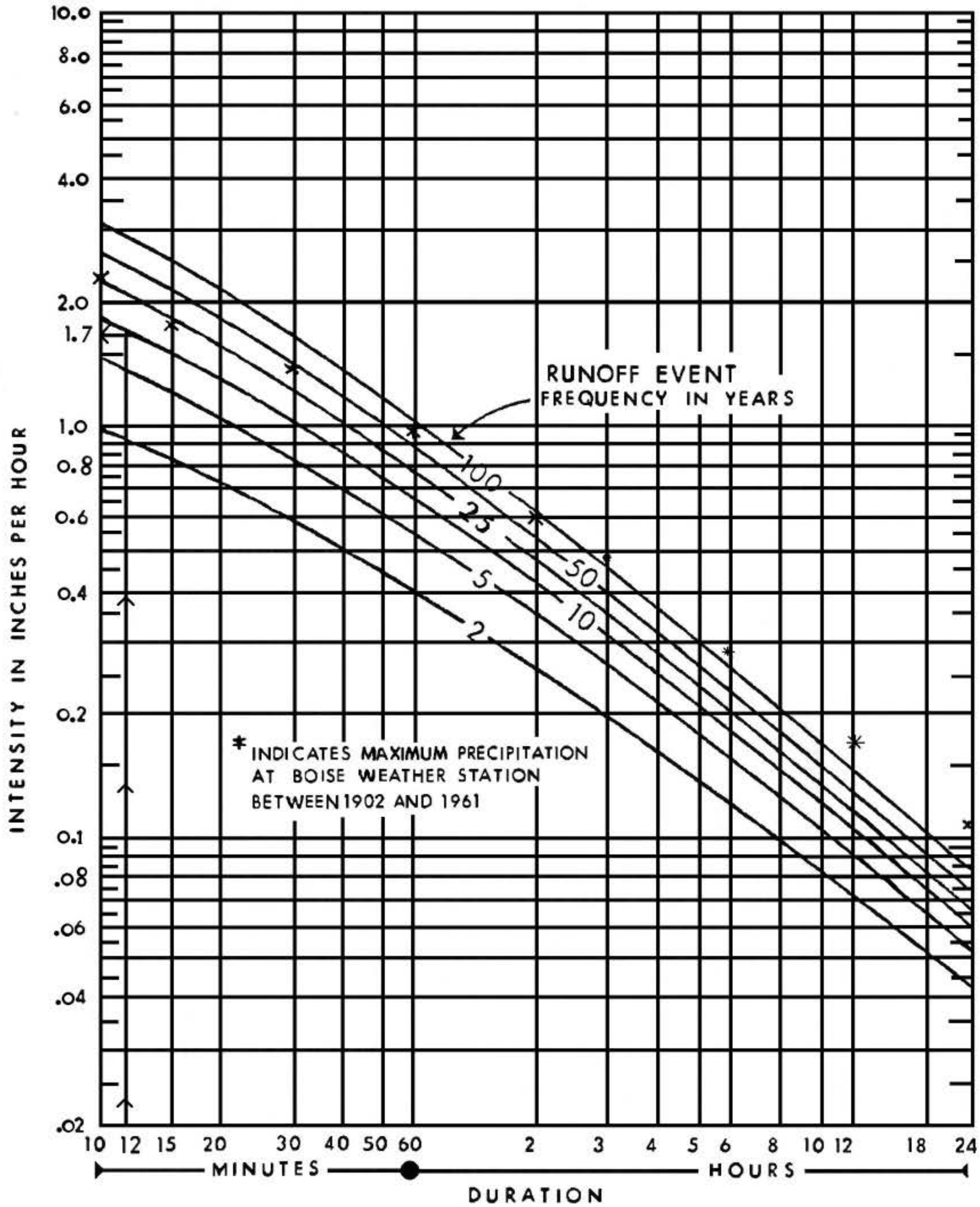


FIGURE D.1 RAINFALL INTENSITY, DURATION AND FREQUENCY RELATIONSHIP

Existing Conditions - Peak Flow Volume					
Basin	C	I (in/hr)	A (Ac)	V (ft^3)	V (ac-ft)
AB	0.57	1.1	28.10	63,300	1.45
C	0.67	1.1	11.34	29,904	0.69
ML	0.53	1.1	92.12	194,390	4.46
G	0.80	1.1	166.01	524,914	12.05
Q	0.37	1.1	28.56	41,736	0.96
V	0.42	1.1	154.55	254,333	5.84

Proposed Conditions - Peak Flow Volume					
Basin	C	I (in/hr)	A (Ac)	V (ft^3)	V (ac-ft)
AB	0.22	1.1	28.10	24,524	0.56
C	0.64	1.1	11.34	28,891	0.66
ML	0.52	1.1	92.12	190,810	4.38
G	0.81	1.1	166.01	531,820	12.21
Q	0.50	1.1	28.56	56,625	1.30
V	0.44	1.1	154.55	271,409	6.23

Difference		
Basin	Δ V (ft^3)	Δ V (ac-ft)
AB	-38776	-0.89
C	-1014	-0.02
ML	-3580	-0.08
G	6906	0.16
Q	14890	0.34
V	17076	0.39

United States Department of Agriculture

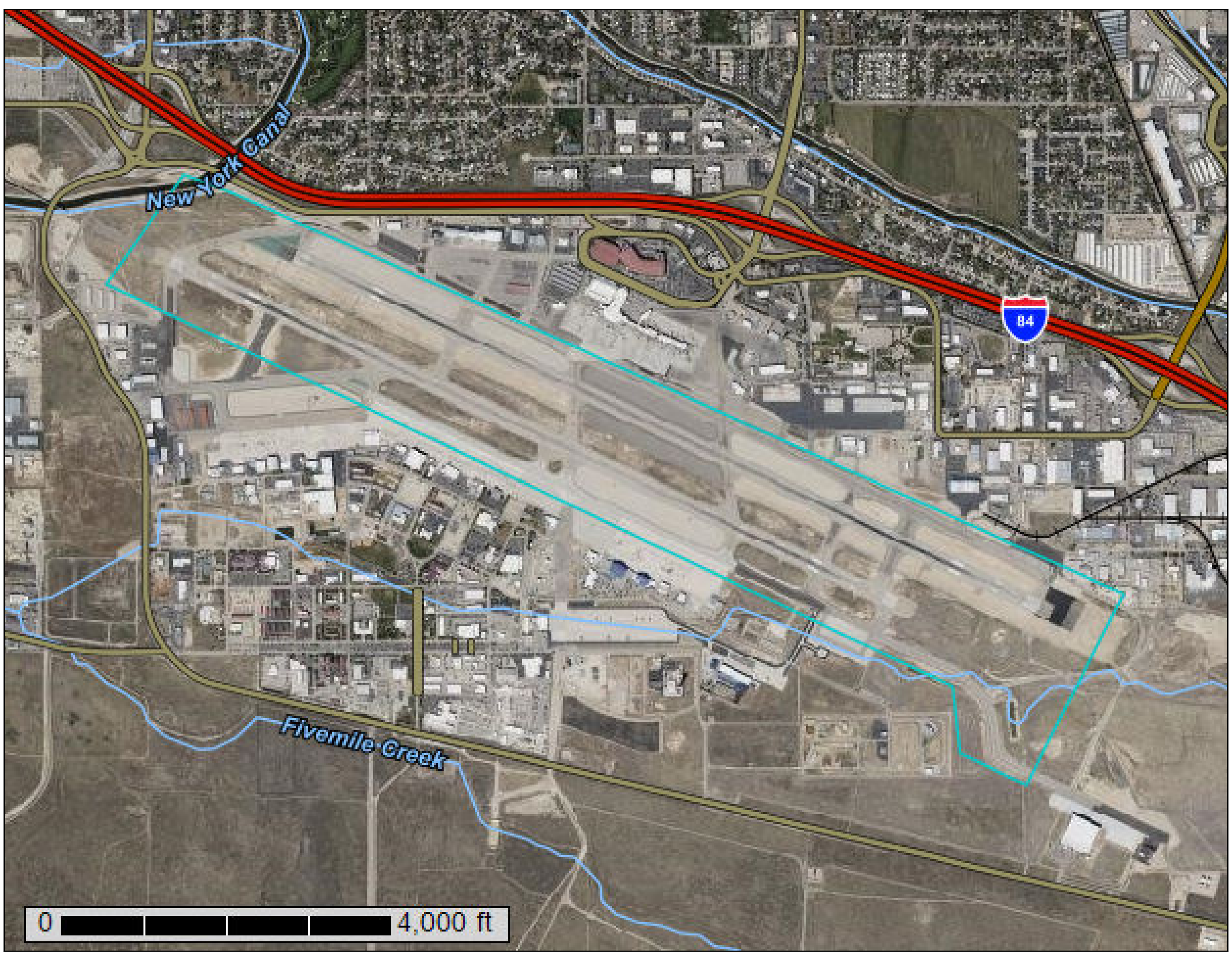
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Ada County, Idaho



June 2, 2022

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

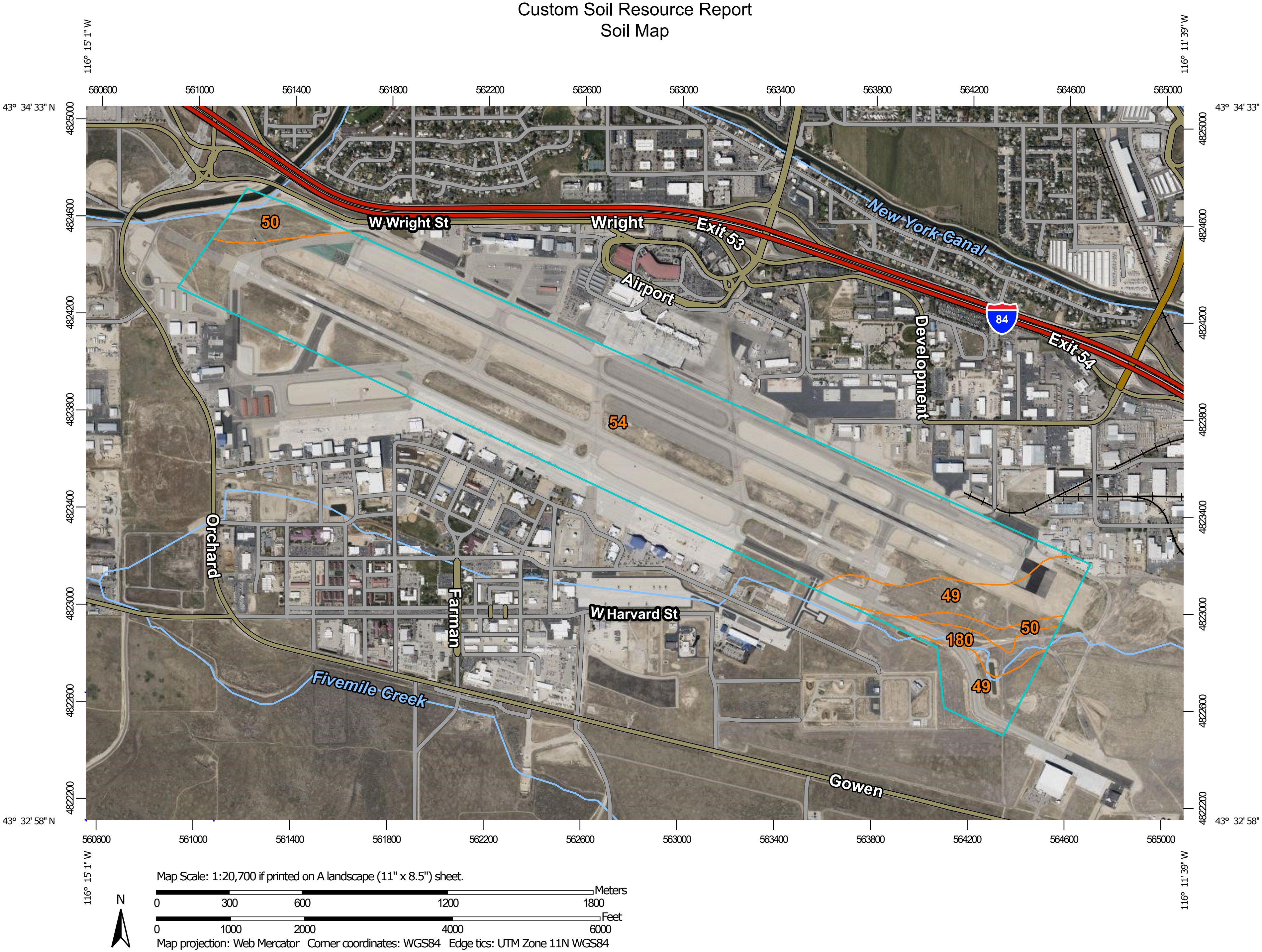
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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: Ada County, Idaho
Survey Area Data: Version 9, Sep 9, 2021

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

Date(s) aerial images were photographed: Apr 19, 2021—Apr 21, 2021

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
49	Elijah silt loam, 2 to 4 percent slopes	64.4	12.1%
50	Elijah silt loam, 4 to 8 percent slopes	24.1	4.5%
54	Elijah-Urban land complex, 0 to 2 percent slopes	428.9	80.5%
180	Tindahay fine sandy loam, 4 to 8 percent slopes	15.6	2.9%
Totals for Area of Interest		**533.1**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Ada County, Idaho

49—Elijah silt loam, 2 to 4 percent slopes

Map Unit Setting

National map unit symbol: 2qb3
Elevation: 2,300 to 5,200 feet
Mean annual precipitation: 8 to 12 inches
Mean annual air temperature: 45 to 54 degrees F
Frost-free period: 100 to 160 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Elijah, Plowed

Setting

Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Lacustrine deposits and/or loess and/or alluvium

Typical profile

A - 0 to 11 inches: silt loam
Bt - 11 to 26 inches: silty clay loam
Bk - 26 to 31 inches: loam
2Bkqm - 31 to 43 inches: cemented material
2Bk - 43 to 96 inches: extremely gravelly sand

Properties and qualities

Slope: 2 to 4 percent
Depth to restrictive feature: 20 to 40 inches to duripan
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0
Available water supply, 0 to 60 inches: Moderate (about 6.2 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 6c
Hydrologic Soil Group: C
Ecological site: R011XY001ID - LOAMY 8-12 - Provisional
Hydric soil rating: No

Minor Components

Pipeline

Percent of map unit: 5 percent
Hydric soil rating: No

Power

Percent of map unit: 3 percent
Hydric soil rating: No

Purdam

Percent of map unit: 3 percent
Hydric soil rating: No

Sebree

Percent of map unit: 2 percent
Hydric soil rating: No

Urban land

Percent of map unit: 2 percent
Hydric soil rating: Unranked

50—Elijah silt loam, 4 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2qb5
Elevation: 2,300 to 5,200 feet
Mean annual precipitation: 8 to 12 inches
Mean annual air temperature: 45 to 54 degrees F
Frost-free period: 100 to 160 days
Farmland classification: Farmland of statewide importance, if irrigated

Map Unit Composition

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

Description of Elijah, Plowed

Setting

Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Lacustrine deposits and/or loess and/or alluvium

Typical profile

A - 0 to 11 inches: silt loam
Bt - 11 to 26 inches: silty clay loam
Bk - 26 to 31 inches: loam
2Bkqm - 31 to 43 inches: cemented material
2Bk - 43 to 96 inches: extremely gravelly sand

Properties and qualities

Slope: 4 to 8 percent
Depth to restrictive feature: 20 to 40 inches to duripan
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0
Available water supply, 0 to 60 inches: Moderate (about 6.2 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 6c
Hydrologic Soil Group: C
Ecological site: R011XY001ID - LOAMY 8-12 - Provisional
Hydric soil rating: No

Minor Components

Pipeline

Percent of map unit: 5 percent
Hydric soil rating: No

Purdam

Percent of map unit: 3 percent
Hydric soil rating: No

Power

Percent of map unit: 3 percent
Hydric soil rating: No

Sebree

Percent of map unit: 2 percent
Hydric soil rating: No

Urban land

Percent of map unit: 2 percent
Hydric soil rating: Unranked

54—Elijah-Urban land complex, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2qb9
Elevation: 2,300 to 5,200 feet
Mean annual precipitation: 8 to 12 inches
Mean annual air temperature: 45 to 54 degrees F
Frost-free period: 100 to 160 days

Farmland classification: Not prime farmland

Map Unit Composition

Elijah, plowed, and similar soils: 65 percent
Urban land: 25 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Elijah, Plowed

Setting

Landform: Terraces
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Lacustrine deposits and/or loess and/or alluvium

Typical profile

A - 0 to 11 inches: silt loam
Bt - 11 to 26 inches: silty clay loam
Bk - 26 to 31 inches: loam
2Bkqm - 31 to 43 inches: cemented material
2Bk - 43 to 96 inches: extremely gravelly sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 20 to 40 inches to duripan
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0
Available water supply, 0 to 60 inches: Moderate (about 6.2 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 6c
Hydrologic Soil Group: C
Ecological site: R011XY001ID - LOAMY 8-12 - Provisional
Hydric soil rating: No

Description of Urban Land

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: Unranked

Minor Components

Abo

Percent of map unit: 10 percent
Hydric soil rating: No

180—Tindahay fine sandy loam, 4 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2q8d
Elevation: 2,000 to 4,700 feet
Mean annual precipitation: 8 to 12 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 105 to 160 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Tindahay, Warm

Setting

Landform: Fan remnants, stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed alluvium and/or eolian deposits

Typical profile

A - 0 to 8 inches: fine sandy loam
C1 - 8 to 23 inches: sandy loam
2C2 - 23 to 60 inches: fine gravelly loamy coarse sand

Properties and qualities

Slope: 4 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.0 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 6c
Hydrologic Soil Group: A
Ecological site: R011XY001ID - LOAMY 8-12 - Provisional
Hydric soil rating: No

Minor Components

Quincy

Percent of map unit: 5 percent
Hydric soil rating: No

Jenness

Percent of map unit: 5 percent
Hydric soil rating: No

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