Midway

PLANNING COMMISSION MEETING STAFF REPORT

DATE OF MEETING: March 12, 2024

NAME OF PROJECT: Whispering Creek Subdivision

NAME OF APPLICANT: Berg Engineering

OWNER OF RECORD: Cari Lane LLC and Jeremy Clark

AGENDA ITEM: Preliminary Approval

LOCATION OF ITEM: 515 Cari Lane

ZONING DESIGNATION: R-1-15

ITEM: 4

Paul Berg, representative for Cari Lane LLC and Jeremy Clark, has submitted a preliminary application for a large-scale subdivision to be known as Whispering Creek Subdivision. The preliminary plan includes seven lots on 4.54 acres. The property is in the R-1-15 zone at approximately 515 West Cari Lane.

BACKGROUND:

This request is for preliminary approval of a large-scale subdivision on 4.54 acres and will contain seven lots. The seven lots proposed in the subdivision will obtain frontage along a new road built within the subdivision. The property is in the R-1-15 zone and all lots in the subdivision comply with the requirements of the code regarding frontage and

acreage. The proposed subdivision will combine two parcels (OMI-0186-0 and OMI-0550-0) and the Cosper Subdivision. The Cosper Subdivision is a one lot plat that was recorded 5-31-2017. The plat will be vacated before the proposed subdivision may be recorded which requires approval by the City Council. There is one dwelling on the property that will be on lot 2 in the Whispering Creek Subdivision.

This property was originally proposed for a subdivision in 2020 and was reviewed by both the Planning commission and the City Council. It was discovered through the review process that some alterations were made by the applicant to the floodplain and wetlands on the property. The City Council continued the item until outstanding issues could be addressed which included restoring the FEMA floodplain and wetlands back to their original condition.

The applicant has submitted several documents that address the restoration of the floodplain and the wetlands on the property (see attached). These include the following:

- Wetlands Disturbance Restoration Letter from Frontier Environmental Consultants
- Whispering Creek Geotechnical Report by Gordon
- Whispering Creek Wetlands Report & Request for Aquatic Resources Restoration
- Whispering Creek Lot 3 Floodplain Study for Proposed Bridge Report

There are three documents that staff has asked the applicant to provide that include the following:

- Stream Alteration Permit for the vehicular bridge to Lot 3 for the sewer later and culinary water lateral
- Army Corps of Engineer approval of the wetlands delineation on the property
- A letter verifying that the FEMA Floodplain has been restored to its original condition

LAND USE SUMMARY:

- 4.54-acre property (per the application)
    - OMI-0186-0 – 1.22 acres
    - OMI-0550-0 – 2.25 acres
    - Cosper Subdivision 1.57 acres

- R-1-15 zoning

- Proposal contains seven lots

- Access from Cari Lane

- Sensitive lands are present including floodplain and wetlands

- The lots will connect to the Midway Sanitation District sewer, Midway City's culinary water line, and Midway Irrigation Company's secondary water line

ANALYSIS:

Access – Access will be from Cari Lane. A second access is not required because the cul-de-sac is less than 1,300' in length and there are not more than 11 lots in the subdivision. The new road will create a four-way intersection on Cari Lane and 520 West which accesses the Lodges at Snake Creek.

Geotechnical Study – A Geotechnical Study has been submitted to the City and portions of that study are attached to the preliminary staff report. A copy of the entire report is available in the Planning Office for review.

Sensitive lands – There are wetlands and FEMA floodplain areas in the proposed subdivision area. A wetland map has been submitted to the City along with a wetlands delineation and inventory investigation (please see attached). The code requires a 25' buffer area for any structures and disturbance from any delineated wetlands. The buffer area has been included in the plans. The study has been submitted to the City and to the US Army Corp. of Engineers for their review and approval. As of the writing of this report, the City has not received information that the wetlands delineation report has been approved by the US Army Corp.

The proposal includes FEMA flood zone areas including Zone AE (1% chance annual flood) which requires a 50' setback. The 50' setback has been marked on the plans from Zone AE. No structures may be located in this area, but the setback area may be filled and landscaped. Landscaping is allowed in the FEMA flood area, but nothing is allowed that will modify the FEMA flood zone, this includes not placing rocks or fill of any type in this area that impacts the topography of the floodplain. There is area in the subdivision that is designated Zone X which is area of the 500-year flood (0.2% annual chance flood) and is considered a low-risk area but there is flooding potential. Flood insurance is not federally required but it is recommended in the Zone X area. A note should be placed on the plat that advises future owners of lot 2, 4, and 5 of the potential flood hazards from a 500-year chance flood.

Water Connection – The lots will connect to water lines that will be built by the developer and connect to the City's water lines along Cari Lane.

Sewer Connection – The lots will connect to Midway Sanitation District's sewer lines located in the area. There is a sewer lateral that crosses the property from the home at 465 West Cari Lane. The proposed plan is to reroute the lateral to the new sewer main that will be built under the new road in the subdivision. The location of the lateral will be required to be shown on the plat.

Secondary Water Connection – The lots will connect to Midway Irrigation Company's secondary water system which is already servicing the property. Laterals will be created for all seven lots. Secondary water meters are required for each lateral.

Trails – There are no planned trails on the Trail System Master Plan in the proposal area. 5' sidewalks will be included on both sides of the proposed street and around the cul-de-sac.

Public Street – The developer will build the proposed road that will create access and frontage for the development. The right-of-way will be 56' wide except where it will extend at the bulb of the cul-de-sac to 90'. The street will be 26', with modified curb, 5' park strips, and 5' sidewalks.

Open Space – Because the property is less than six acres there is not an open space requirement. The proposed plan does include common area on both sides of the road that will be built to access the subdivision where it connects with Cari Lane. A Homeowners' Association will need to be created to manage the common area.

100' Setback Requirement – The subdivision code requires a 100' setback from the edge of the right-of-way from Cari Lane for any structures. The setback line will be noted on the plat so no structures, including accessory structures, are placed in this area.

Lot 3 Access – The driveway for lot 3 will cross Snake Creek and a Stream Alteration Permit and a Zero Rise Analysis is required for the crossing. The developer must build the crossing to lot 3 as part of the subdivision infrastructure.

Existing Dwelling – The existing dwelling that will be located on Lot 2 is nonconforming to the current code regarding the 50' setback required from the AE floodplain. If the dwelling is demolished, the new structure will need to comply with the required 50' setback from the floodplain as shown on the plat. If an addition is added to the existing dwelling, the new addition must comply with the 50' setback from the floodplain as shown on the plat.

WATER BOARD RECOMMENDATION:

The Water Board has recommended that 6.8-acre feet are tendered to the City before the recording of the plat based on the formula below. The Water Board also recommended secondary water meters are installed on each lot.

- 4.54-acre parcel (197,762 sq. ft.)
    - Irrigated area
        - Lots – 162,231 sq. ft. (3.72 acres)
        - Park strip – 8,276 sq. ft. (0.19 acres)

        - Common area – 5,896 sq. ft. (0.14 acres)
    - Impervious area for lots
        - 56,000 sq. ft. (7 x 8,000)
    - Total irrigated acreage
        - 2.76 x 3 = 8.28-acre feet
- 7 culinary connections
    - 5.6-acre feet (7 x .8)
- Credits
    - Cosper – 6 acre feet
    - Existing dwelling – 1.5 acre feet
- 13.9 acre feet requirement

- 6.4 acre feet (13.9 – 6 – 1.5 = 6.4)

POSSIBLE FINDINGS:

- The proposal does meet the intent of the General Plan for the R-1-15 zone

- The proposal does comply with the land use requirements of the R-1-15 zone

- Sensitive lands on the property and setbacks will be included on the plat along with notes informing future lot owners of any risk

- The City has not received approval of the wetlands study by the Army Corps of Engineers

- A stream alteration permit is required for the driveway crossing on lot 3

ALTERNATIVE ACTIONS:

1. <u>Recommendation for Approval (conditional)</u>. This action may be taken if the Planning Commission finds that conditions placed on the approval can resolve any outstanding issues.

    a. Accept staff report
    b. List accepted findings
    c. Place condition(s)

2. Continuance. This action may be taken if the Planning Commission finds that there are unresolved issues.

    a. Accept staff report
    b. List accepted findings
    c. Reasons for continuance
        i. Unresolved issues that must be addressed
    d. Date when the item will be heard again

3. Recommendation for Denial. This action may be taken if the Planning Commission that the request does not meet the intent of the ordinance.

    a. Accept staff report
    b. List accepted findings
    c. Reasons for denial

PROPOSED CONDITIONS:

1. A wetlands study must be approved by the Army Corps of Engineers before the item is placed on an agenda for preliminary approval by the City Council.

2. A stream alteration permit must be approved before the item is placed on an agenda for preliminary approval by the City Council.

3. A note shall be placed on the plat that advises future owners of lots 2, 4 and 5 of the potential flood hazards from a 500-year flood.

4. The developer must build the driveway crossing in lot 3 as part of the subdivision infrastructure.

5. A letter verifying that the FEMA Floodplain has been restored to its original condition must be submitted before the item is placed on an agenda for preliminary approval by the City Council.

6. The plans must be updated to show the common area that borders Cari Lane in the plan submittal for final approval.

7. An advisory notice must be recorded on Lots 2, 3, and 4 regarding the AE floodplain on the lots. The document will explain the limitations of what is allowed in the floodplain. The document will have language similar to the following: *Landscaping is allowed in the FEMA AE flood area which includes planting grass, plants, and trees, but nothing is allowed that will modify the FEMA flood zone, this includes not grading or placing rocks or fill of any type in this area that impacts the topography of the floodplain.*

Midway City Corporation

Midway

75 North 100 West
P.O. Box 277
Midway, Utah 84049

Phone: 435-654-3223
Fax: 435-654-4120

midwaycityut.org

March 12, 2024

Michael Henke
Midway City Planner
75 North 100 West
Midway, Utah 84049
(sent via E-mail)

Subject: Whispering Creek Estates – Preliminary Review

Dear Michael:

We recently reviewed the Whispering Creek Estates for Preliminary Review. The proposed subdivision is located at approximately 515 West Cari Lane. The proposed subdivision consists of 7 lots. The following items should be addressed.

General Comments

- The roads, culinary water, pressurized irrigation system, and storm drain systems within this development will be public infrastructure and maintained by Midway City.
- All red-line comments should be addressed before final submittal.

Water

- The proposed development will be served from the Cottages on the Green pressure zone.
- The water line will connect to the existing 12" water line in Cari Lane.

Roads

- The proposed road within the development will be a 56'public right-of-way, with a cul-de-sac at the south end of the development.
- The bridge for lot three should be bonded for and installed by the developer.

Trails:

- There are no proposed trails located within the subdivision. There will be a five-foot sidewalk on each side of the proposed road.

Storm Drain

- The storm water within the proposed development will be collected and retained onsite with catch basins and a retention basin.

Sensitive Lands

- The development contains flood plan and wetlands.

- A wetland delineation has been submitted to the Army Corp. The Corp should accept the delineation prior to approval.
- The 25 foot setbacks shall be maintain around all delineated wet lands as approved by the Corp.
- The 50' setbacks shall be maintained around all FEMA flood Zones.

Please feel free to call our office with any questions.

Sincerely,

Wesley Johnson, P.E.
Midway City Engineer

cc: Berg Engineering (Sent by Email)

Midway City Corporation

75 North 100 West
P.O. Box 277
Midway, Utah 84049

Phone: 435-654-3223
Fax: 435-654-4120

midwaycityut.org

Whispering Creek Subdivision Preliminary Approval

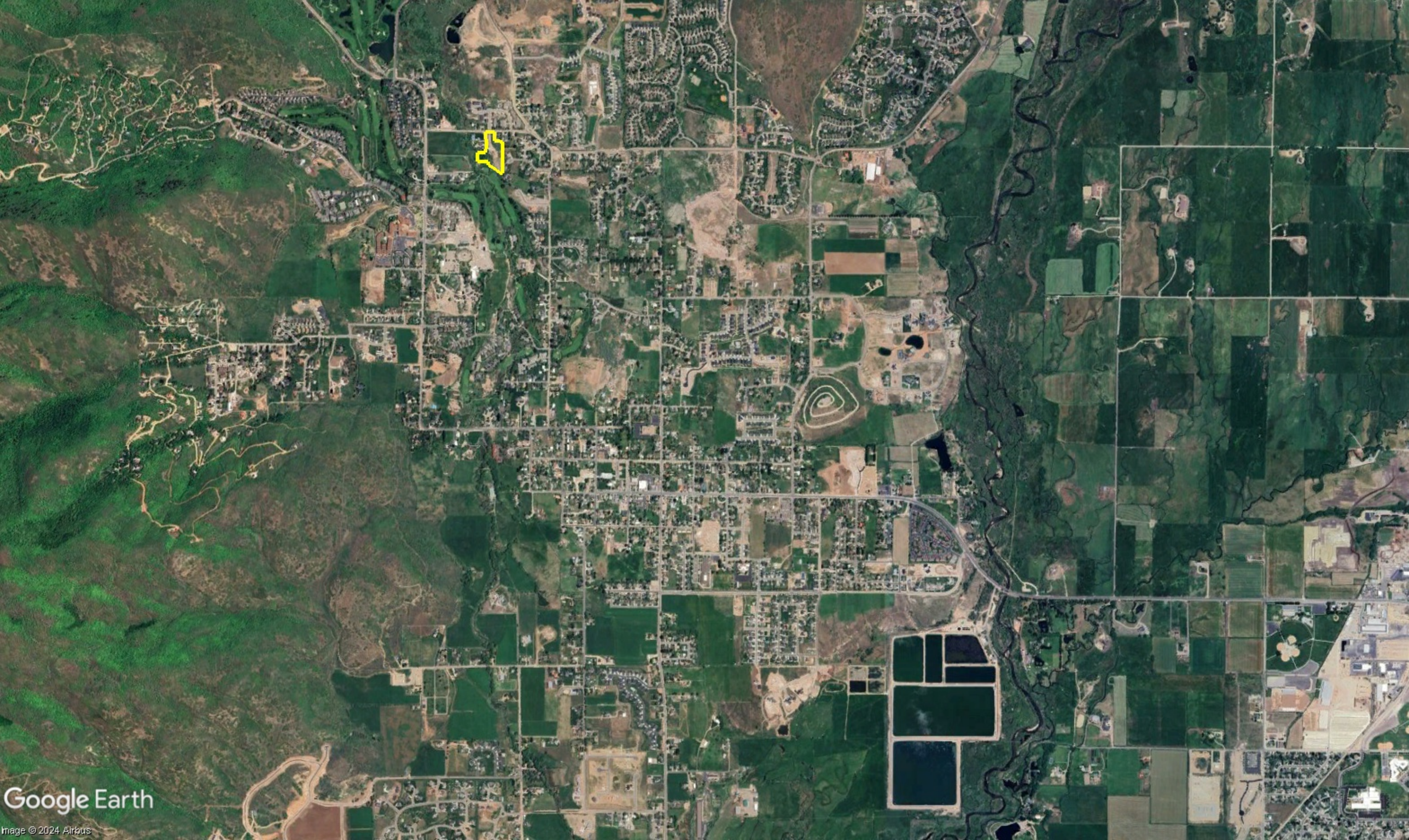
February 4, 2024

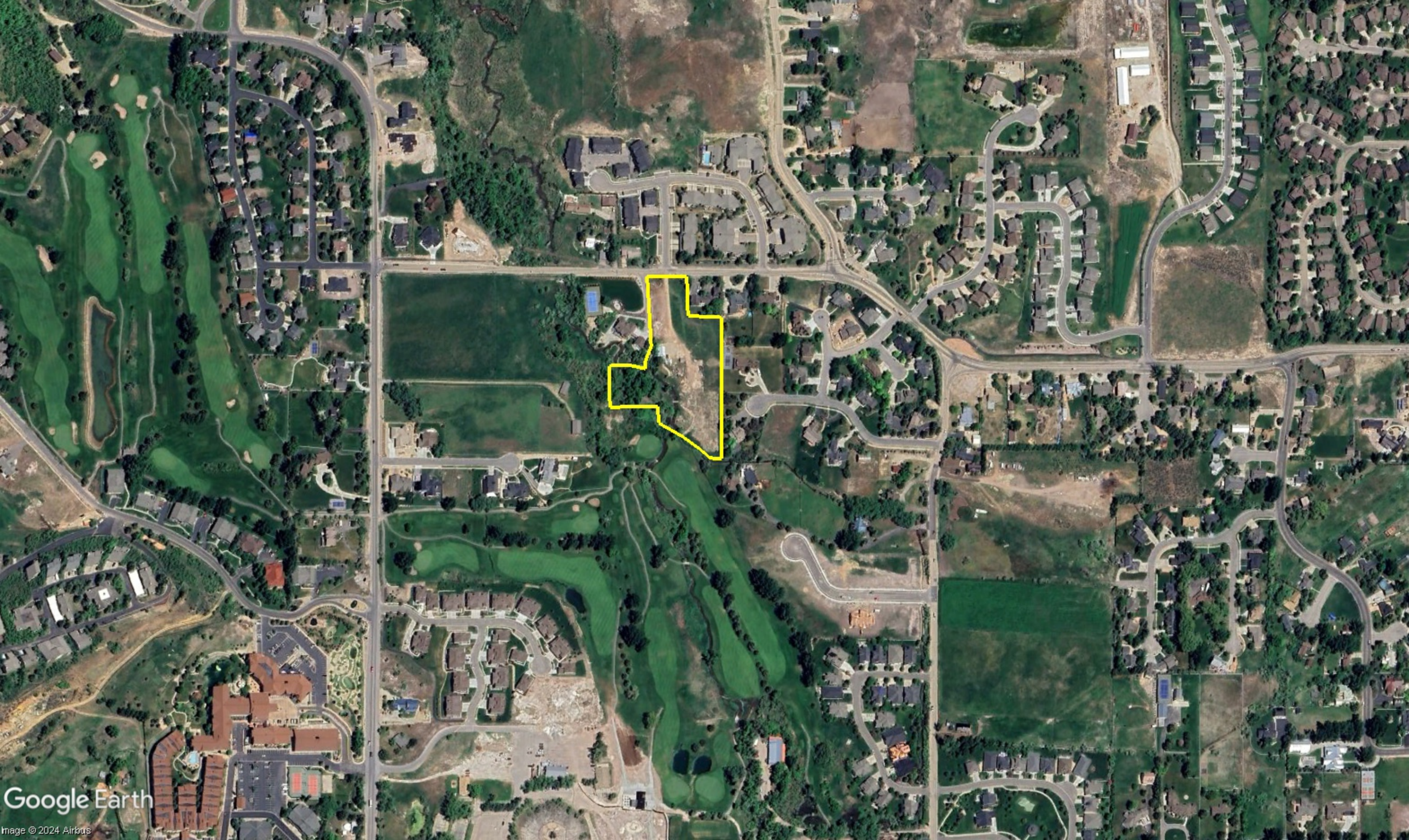
Michael Henke Midway City Planning Director,

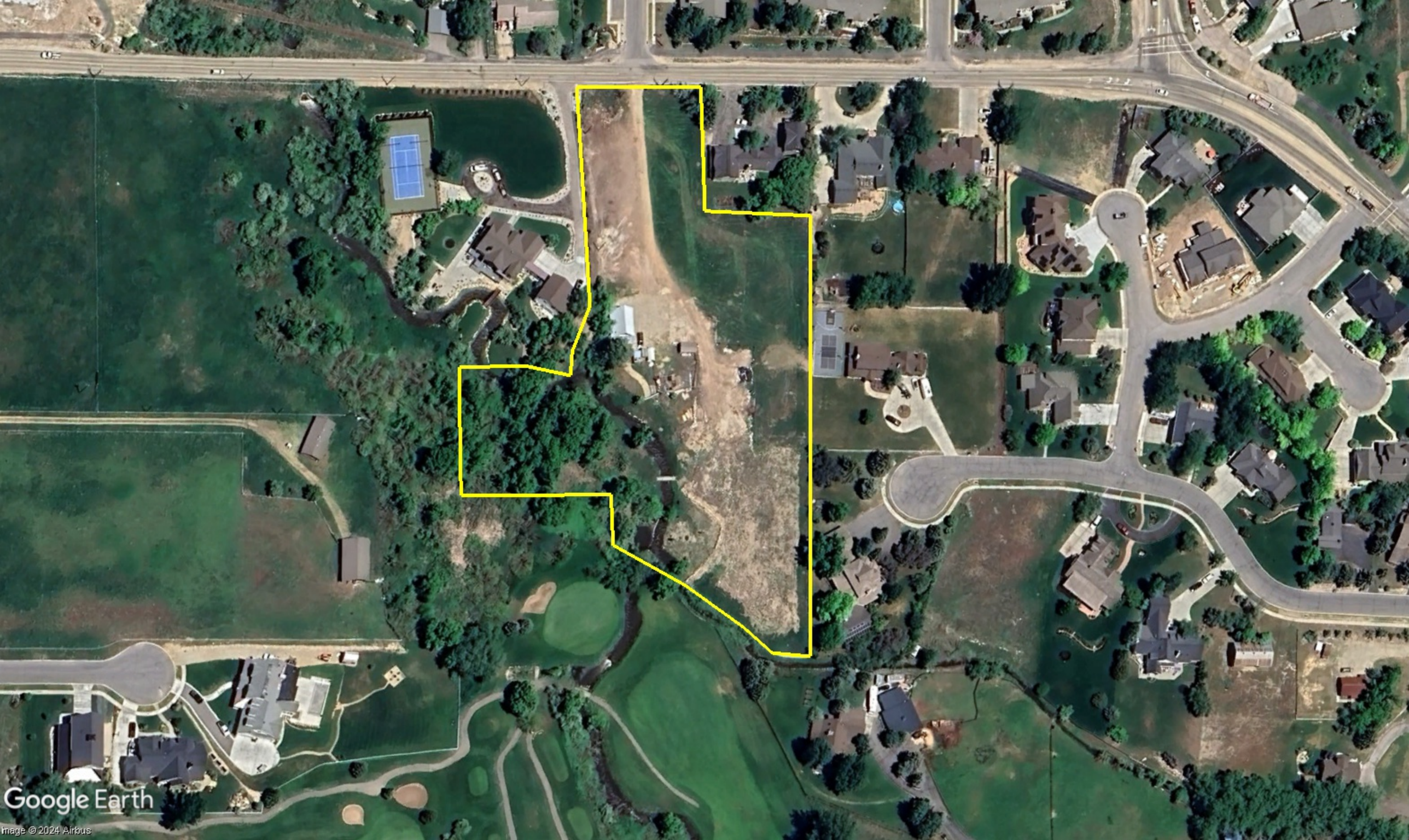
I have reviewed the plans for Whispering Creek Subdivision for compliance with the 2021 International Fire Code (2021 IFC). I have no fire code concerns with these preliminary plans that have already been approved by the Midway City Planning Commission and are now awaiting preliminary approval from the Midway City Council.

I will perform a final approval fire review of the Whispering Creek Subdivision plans prior to final approval.

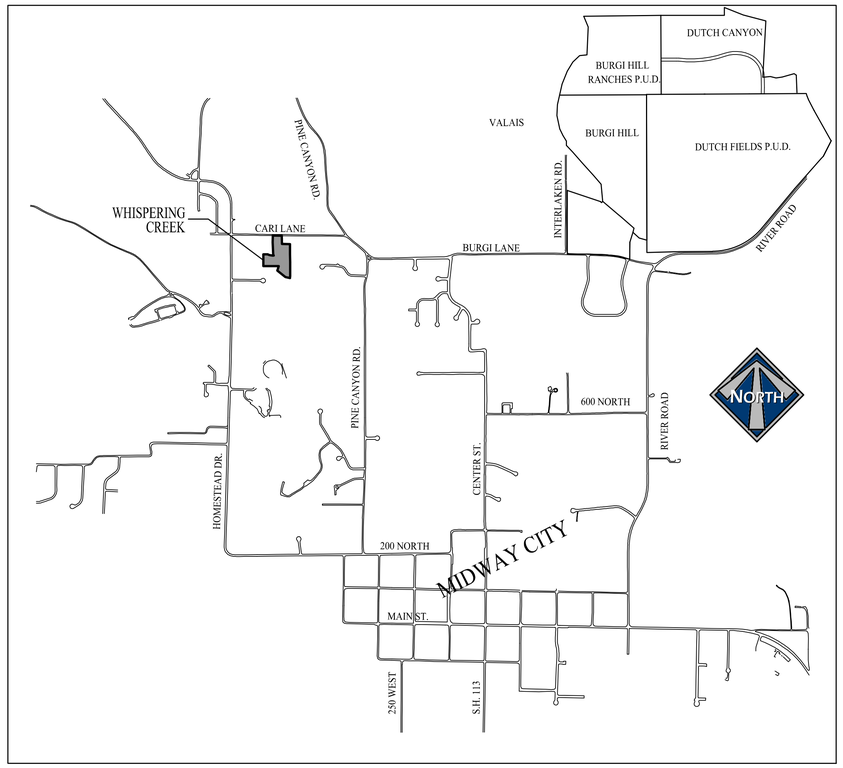
Tex R. Couch CBO/MCP
Midway City Building Official/Fire Marshal
75 West 100 North
Midway, Utah 84049
tcouch@midwaycityut.org
(435)654-3223 Ext. 107


Google Earth
Image © 2024 Airbus


Google Earth
Image © 2024 Airbus


Google Earth
Image © 2024 Airbus

WHISPERING CREEK
PRELIMINARY PLAN



VICINITY MAP

SHEET INDEX

WHISPERING CREEK – PRELIMINARY PLAN – 7 FEBRUARY 2024

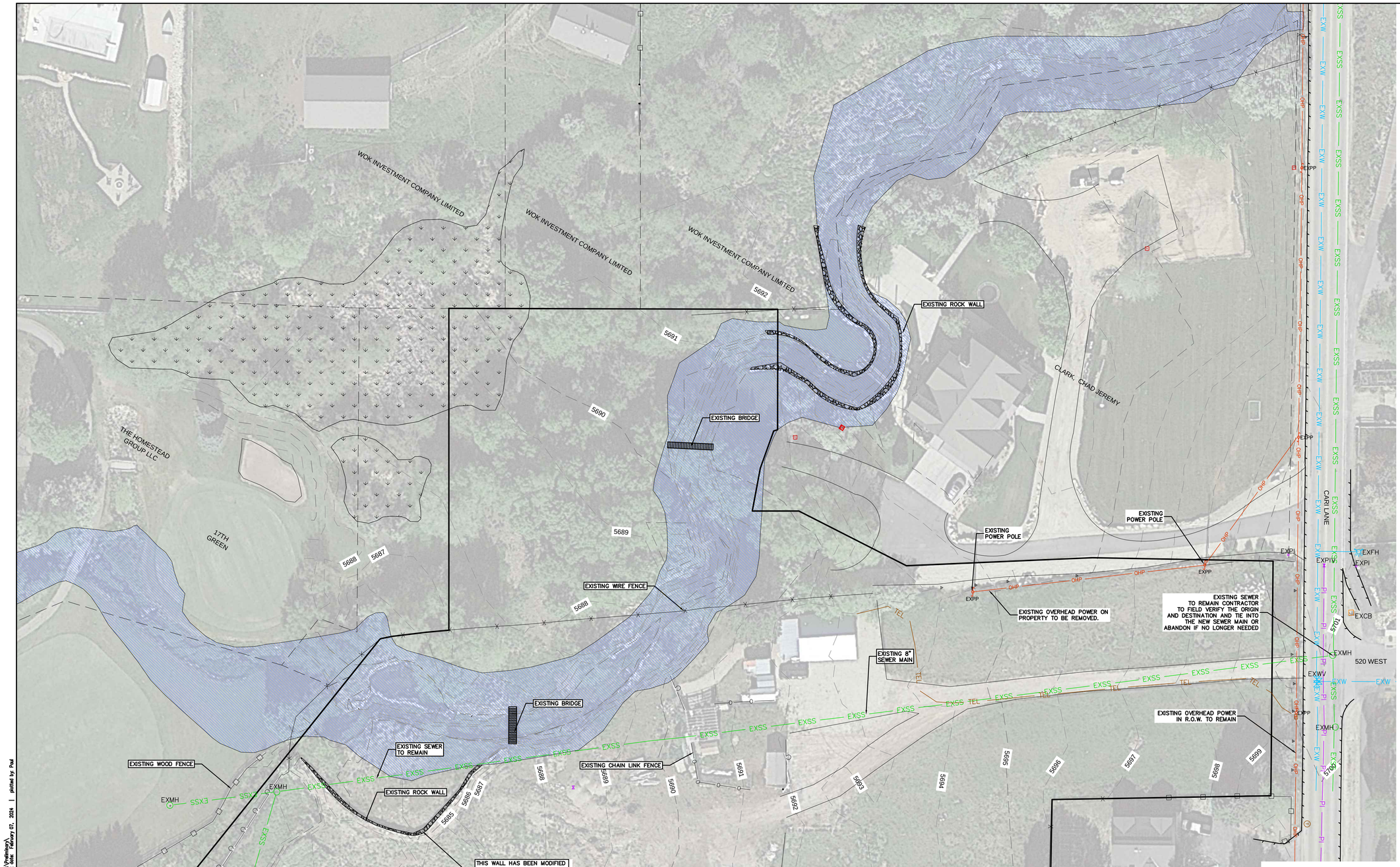
path: \\BERGSERVER\Shared\PROJECTS\Midway\Clark, Jeremy\Whispering Creek\Preliminary\
file name: 00_COVER.dwg | plot date: February 07, 2024 | plotted by: Paul

JEREMY CLARK
WHISPERING CREEK

COVER

BERG ENGINEERING
380 E Main St. Suite 204
Midway, Ut 84049
ph 435.657.9749

DESIGN BY: PDB	DATE: 7 FEB 2024	SHEET
DRAWN BY: DEJ	REV:	0



LEGEND

- FEMA FLOODPLAIN
- WETLANDS
- EXPI — EXISTING PRESSURIZED IRRIGATION
- EXW — EXISTING WATER
- EXSS — EXISTING SEWER
- EXSD — EXISTING STORM DRAIN
- OHP — EXISTING OVERHEAD POWER
- TEL — EXISTING TELEPHONE LINE
- EXISTING WATER VALVE
- EXISTING FIRE HYDRANT
- EXISTING CHAIN LINK FENCE
- EXISTING VINYL FENCE
- EXISTING WIRE FENCE
- EXISTING WOOD FENCE

PREVIOUS WETLANDS DISTURBANCES NEAR THE SNAKE CREEK CHANNEL HAVE BEEN CORRECTED. PLEASE SEE THE LETTER FROM FRONTIER CORPORATION ENVIRONMENTAL CONSULTANTS FOR MORE INFORMATION.

BLUE STAKE NOTE:

- LOCATION OF EXISTING UTILITIES SHOWN ON PLAN ARE APPROXIMATE AND MAY BE INCOMPLETE. CONTRACTOR IS RESPONSIBLE FOR BLUE STAKING OF UTILITIES.

NORTH

0 15 30 60 90

SCALE: 1"=30'

Scale 1" = 60' for 11x17

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PAUL D. BERG P.E.
SERIAL NO. 295595
DATE: 7 FEB 2024

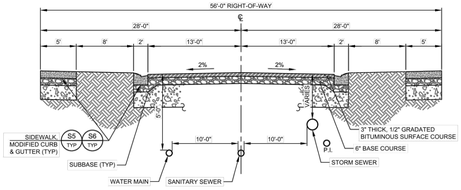
JEREMY CLARK
WHISPERING CREEK

EXISTING CONDITIONS AND SENSITIVE LANDS MAP

BERG ENGINEERING
380 E Main St. Suite 204
Midway, Ut 84049
ph 435.657.9749

DESIGN BY: PDB	DATE: 7 FEB 2024	SHEET 1
DRAWN BY: DEJ	REV:	

path: \\BERGSERVER\Shared\PROJECTS\Midway\Clark, Jeremy\Whispering Creek\Preliminary\Re-zone\01_EXISTING CONDITIONS AND SENSITIVE LANDS.dwg | plotted by: Paul
last plot: February 07, 2024



NOTES:
1. WHEREVER POSSIBLE, SANITARY SEWER SHALL BE INSTALLED ON THE DOWNHILL SIDE OF THE STREET.
2. NO WATER LINE SMALLER THAN 8-INCH DIAMETER SHALL BE INSTALLED.
3. IMPORT/ GRANULAR FILL, A-1-a GRADATED SUBBASE MAY BE REQUIRED WHEN EXISTING SUBBASE IS DETERMINED BY THE CITY ENGINEER TO BE UNSUITABLE AND SHALL BE IN ACCORDANCE WITH SECTION 02250.
4. SUGGESTED UTILITY PLACEMENT; FINAL PLACEMENT TO BE APPROVED BY CITY ENGINEER.

LOCAL STREET CROSS SECTION #2

S1 TYP — STREET CROSS-SECTIONS AND UTILITY LOCATIONS — DETAIL INFO

VERTICAL EXAGGERATION 2:1

HORROCKS ENGINEERS

DATE: JULY 2022

HORROCKS ENGINEERS
726 WEST 500 SOUTH #2
HEBER CITY, UTAH 84032
(435) 654-2226

MIDWAY CITY
75 NORTH 100 WEST
PO BOX 277
MIDWAY, UTAH 84049
(435) 654-3223

MIDWAY CITY
STANDARD DRAWING

STREETS - 1

WOK INVESTMENT COMPANY LIMITED

WETLANDS

THE HOMESTEAD GROUP LLC

17TH GREEN

CLARK, CHAD JEREMY

PROPOSED BOUNDARY PER AGREEMENT WITH CLARK

EXISTING HOME IS A GRANDFATHERED USE. NO BUILDING EXPANSION ALLOWED INTO 50' FEMA SETBACK IF HOME REMAINS

PROPOSED BOUNDARY PER AGREEMENT WITH THE HOMESTEAD

13,451 SF TO HOMESTEAD PER BOUNDARY AGREEMENT

PROPOSED 20' WIDE BRIDGE
BOTTOM OF BRIDGE DECK = 5690.34
TO BE 1' ABOVE THE 100 YEAR WSE

EXISTING BRIDGE

LOT 3
44,444 SF
7,863 SF. BLDG. PAD

LOT 1
15,667 SF
2,426 SF. BLDG. PAD

LOT 2
15,125 SF
2,969 SF. IF EXISTING HOME IS REMOVED

EXISTING HOME

LOT 4
38,764 SF
7,565 SF. BLDG. PAD

LOT 5
18,499 SF
6,146 SF. BLDG. PAD

LOT 6
15,065 SF
4,797 SF. BLDG. PAD

LOT 7
20,563 SF
5,598 SF. BLDG. PAD

557 SF LANDSCAPE EASEMENT

5,339 SF LANDSCAPE EASEMENT

100' SETBACK

520 WEST

CAR LANE

90' DIAMETER CUL-DE-SAC

5' SIDEWALK
8' PLANTER

8' PLANTER
5' SIDEWALK

56' R.O.W.

26' ASPHALT

10' P.U.E.

30' SETBACK

25' WETLAND SETBACK

50' FEMA SETBACK

20' SEWER EASEMENT AND P.U.E.

MEADOW ESTATES PUD

TURNER, BRANDIS AND DANIEL

TRIMBLE, GREGORY

SUNDWALL, CATHERINE AND DAVID

BOLICK, WENDY AND ROBERT

LEGEND

- FEMA FLOODPLAIN
- WETLANDS
- BUILDING PAD
- SETBACKS
- P.U.E.

LAND USE SUMMARY

TOTAL AREA	4.54 AC
ZONE	R-1-15
MIN. LOT SIZE	15,000 SF
MIN. LOT WIDTH	100'
SETBACKS	
FRONT	30'
REAR	30'
SIDE	12'
# OF LOTS	7

SUBDIVISION NOTES:
1. PARCELS 06-1817, 20-0483 AND THE COSPER SUBDIVISION ARE INCLUDED IN THIS SUBDIVISION.
2. THE COSPER SUBDIVISION WILL BE VACATED AS PART OF THIS SUBDIVISION PLAN.
3. OPEN SPACE IS NOT REQUIRED SINCE THIS SUBDIVISION IS LESS THAN 6 ACRES.

BRIDGE NOTE:
PLEASE SEE THE STUDY COMPLETED BY RIMROCK ENGINEERING FOR DETAILS REGARDING THE FEMA FLOODPLAIN AND ELEVATIONS NEEDED FOR THE BRIDGE TO LOT 3.

NORTH

0 15 30 60 90

SCALE: 1"=30'
Scale 1" = 60' for 11x17

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PAUL D. BERG P.E.
SERIAL NO. 295595
DATE: 7 FEB 2024

JEREMY CLARK
WHISPERING CREEK

SITE PLAN

BERG ENGINEERING
380 E Main St. Suite 204
Midway, Ut 84049
ph 435.657.9749

DESIGN BY: PDB	DATE: 7 FEB 2024	SHEET
DRAWN BY: DEJ	REV:	2

path: \\BERGSERV\Shared\PROJECTS\Midway\Clark, Jeremy\Whispering Creek\Preliminary\
file name: 02_SITE PLAN.dwg | plot date: February 07, 2024 | plotted by: Paul

LOT 1

LOT 2

LOT 3

LOT 4

LOT 5

LOT 6

LOT 7

CONNECT TO EXITING P.I.
INSTALL 2–6" GATE VALVES

CONNECT TO EXISTING WATER
INSTALL 8" GATE VALVE

INSTALL 6" DRAIN WITH 6"
GATE VALVE TO CATCH BASIN

90' LF 18" STORM DRAIN

62' LF 18" STORM DRAIN

20' LF 18" SD

69' LF 6" P.I.
79' LF 8" SEWER
62' LF 8" WATER

46' LF 6" P.I.
MH
40' LF 8" SEWER
41' LF 8" WATER

82' LF 6" P.I.
82' LF 8" SEWER
82' LF 8" WATER

27' LF 6" P.I.
29' LF 8" SEWER
30' LF 8" WATER

204' LF 6" P.I.
196' LF 8" SEWER
191' LF 8" WATER

118' LF 8" SEWER

LEGEND

- FEMA FLOODPLAIN
- WETLANDS
- BUILDING PAD
- SETBACKS
- PUBLIC UTILITY EASEMENT (P.U.E.)
- EXPI — EXISTING PRESSURIZED IRRIGATION
- EXW — EXISTING WATER
- EXSS — EXISTING SEWER
- EXSS — EXISTING SEWER TO BE REMOVED
- EXSD — EXISTING STORM DRAIN
- OHP — EXISTING OVERHEAD POWER
- PI — PROPOSED 6" PRESSURIZED IRRIGATION
- W — PROPOSED 8" WATER
- SS — PROPOSED 8" SEWER
- SD — PROPOSED 18" STORM DRAIN
- WM — PROPOSED 1" WATER METER
- PROPOSED FIRE HYDRANT

BLUE STAKE NOTE:

- LOCATION OF EXISTING UTILITIES SHOWN ON PLAN ARE APPROXIMATE AND MAY BE INCOMPLETE. CONTRACTOR IS RESPONSIBLE FOR BLUE STAKING OF UTILITIES.

SEWER NOTES:

- ALL SEWER IMPROVEMENTS SHALL MEET MIDWAY SANITATION DISTRICT STANDARDS & SPECIFICATIONS.

WATER NOTES:

- ALL WATER IMPROVEMENTS SHALL MEET MIDWAY CITY STANDARDS AND SPECIFICATIONS.
- ALL LOTS WILL HAVE A 1" WATER SERVICE.

PRESSURIZED IRRIGATION NOTES:

- ALL PRESSURIZED IRRIGATION IMPROVEMENTS SHALL MEET MIDWAY IRRIGATION COMPANY STANDARDS & SPECIFICATIONS.
- ALL PRESSURIZED IRRIGATION MAIN SHALL BE C-900 DR-18 PURPLE PIPE.

STORM DRAIN NOTES:

- ALL STORM DRAIN CONSTRUCTION TO MEET MIDWAY CITY STANDARDS.

NORTH

0 15 30 60 90

SCALE: 1"=30'

Scale 1" = 60' for 11x17

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PAUL D. BERG P.E.
SERIAL NO. 295595
DATE: 7 FEB 2024

JEREMY CLARK
WHISPERING CREEK

UTILITY PLAN

BERG ENGINEERING
380 E Main St. Suite 204
Midway, Ut 84049
ph 435.657.9749

DESIGN BY: PDB
DRAWN BY: DEJ
DATE: 7 FEB 2024
REV:
SHEET 3

path: \\BERGSERV\Shared\PROJECTS\Midway\Clark, Jeremy\Whispering Creek\Preliminary\
file name: 03_UTILITY PLAN.dwg | plot date: February 07, 2024 | plotted by: Paul

Whispering Creek
Storm Drain Runoff Calculations

February 7, 2024

Runoff from the road and lots adjacent to the road will be collected in the retention pond.

A percolation rate of 4.0 inches per hour assumed for silty sand (SM).
A 6' sump has a total volume of 587 cf.
A 6' sump has a percolation rate of 0.035 cfs with a percolation rate of 4.0 inches / hour.

Table 1 - Runoff Coefficient

Drainage Area	Total Collected Area (acres)	C = 0.95 Building Pads (acres)	C = 0.90 Streets and Sidewalks (acres)	C = 0.20 Landscaped Areas (acres)	Compsite Runoff Coefficient
A	2.33	0.39	0.50	1.44	0.48

Table 2 - 100 Year Storm Peak Runoff and Volume

Time Period (min)	Rainfall Intensity (in / hr)	Area (acres)	Developed Runoff Coefficient	Peak Runoff Rate (cfs)	Total Runoff Volume (cf)
15	4.08	2.33	0.48	4.52	4,070
30	2.76	2.33	0.48	3.06	5,507
60	1.71	2.33	0.48	1.90	6,824
120	0.96	2.33	0.48	1.06	7,662
180	0.65	2.33	0.48	0.72	7,782
360	0.35	2.33	0.48	0.39	8,380
720	0.21	2.33	0.48	0.23	10,056
1440	0.13	2.33	0.48	0.14	12,451

Table 3 - Retention Pond Design

Time Period (min)	Total Runoff Volume (cf)	Soil Percolation Rate (inch / hour)	2 - 6' Sump Volume (cf)	Percolation from Sump (cf)	Storage Needed in Pond (cf)
15	4,070	3.0	1,174	63	2,833
30	5,507	3.0	1,174	126	4,207
60	6,824	3.0	1,174	252	5,398
120	7,662	3.0	1,174	504	5,984
180	7,782	3.0	1,174	756	5,852
360	8,380	3.0	1,174	1,512	5,694
720	10,056	3.0	1,174	3,024	5,858
1440	12,451	3.0	1,174	6,048	5,229

Table 4 - Retention Pond Storage Volume

Elevation	Pond Depth (ft)	Pond Area (sf)	Pond Volume (cf)	
83	0.00	12	0	
84	1.00	946	479	
85	2.00	1,513	1,709	
86	3.00	2,180	3,555	
87	4.00	2,948	6,119	contains the 100 year storm
88	5.00	3,817	9,502	1' of freeboard

LEGEND

- FEMA FLOODPLAIN
- WETLANDS
- BUILDING PAD
- SETBACKS
- PUBLIC UTILITY EASEMENT (P.U.E.)
- EXPI — EXISTING PRESSURIZED IRRIGATION
- EXW — EXISTING WATER
- EXSS — EXISTING SEWER
- EXSS — EXISTING SEWER TO BE REMOVED
- EXSD — EXISTING STORM DRAIN
- OHP — EXISTING OVERHEAD POWER
- PI — PROPOSED 6" PRESSURIZED IRRIGATION
- W — PROPOSED 8" WATER
- SS — PROPOSED 8" SEWER
- SD — PROPOSED 18" STORM DRAIN
- WM — PROPOSED WATER METER
- PROPOSED FIRE HYDRANT
- STORM DRAIN AREA

BLUE STAKE NOTE:
- LOCATION OF EXISTING UTILITIES SHOWN ON PLAN ARE APPROXIMATE AND MAY BE INCOMPLETE. CONTRACTOR IS RESPONSIBLE FOR BLUE STAKING OF UTILITIES.

STORM DRAIN NOTES:
- ALL STORM DRAIN CONSTRUCTION TO MEET MIDWAY CITY STANDARDS.

LOT 1
LOT 2
LOT 3
LOT 4
LOT 5
LOT 6
LOT 7

90' LF 18" STORM DRAIN
SDMH
CB
EXCB
6' SUMP
6' SUMP
INSTALL 4'X6' COMBO BOX WITH OIL AND WATER SEPARATOR

NORTH

0 15 30 60 90

SCALE: 1"=30'
Scale 1" = 60' for 11x17

THIS DOCUMENT IS INCOMPLETE AND IS RELEASED TEMPORARILY FOR INTERIM REVIEW ONLY. IT IS NOT INTENDED FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES.

PAUL D. BERG P.E.
SERIAL NO. 295595
DATE: 7 FEB 2024

JEREMY CLARK
WHISPERING CREEK

STORM DRAIN PLAN

BERG ENGINEERING
380 E Main St. Suite 204
Midway, Ut 84049
ph 435.657.9749

DESIGN BY: PDB
DRAWN BY: DEJ
DATE: 7 FEB 2024
REV:
SHEET 4

path: \\BERGSERV\Shared\PROJECTS\Midway\Clark, Jeremy\Whispering Creek\Preliminary\
file name: 04_STORM DRAIN PLAN.dwg | plot date: February 07, 2024 | plotted by: Paul

LEGEND

- FEMA FLOODPLAIN
- WETLANDS
- BUILDING PAD
- SETBACKS
- P.U.E.

LANDSCAPE NOTES PER MIDWAY CITY CODE:

- DECIDUOUS TREES MUST BE 2" CALIPER AT TIME OF INSTALL.
- CONIFEROUS TREES MUST BE MINIMUM OF 6' AT TIME OF INSTALL.

PLANT SCHEDULE

SYMBOL	QTY	BOTANICAL NAME	COMMON NAME	CONT	CAL	SIZE
TREES						
	1	Acer freemanii `Autumn Blaze`	Autumn Blaze Maple	B&B	2" Cal	
	31	Fagus sylvatica `Fastigiata`	Columnar Green Beech	B&B	2" Cal	
	2	Malus x `Spring Snow`	Spring Snow Crab Apple	B&B	2" Cal	
	2	Prunus virginiana `Canada Red`	Canada Red Chokecherry	B&B	2" Cal	
EVERGREEN TREES						
	3	Abies lasiocarpa `Glauca Compacta`	Subalpine Fir	B&B		8-10'
	5	Pinus flexilis `Vanderwolf`s Pyramid`	Vanderwolf`s Pyramid Pine	B&B		6'
SYMBOL	QTY	BOTANICAL NAME	COMMON NAME	CONT		
GROUND COVERS						
	14,390 sf	Poa pratensis	Kentucky Bluegrass	sod		

N

20' 0 20' 40'

Scale 1" = 20'

Scale 1" = 40' for 11x17

THIS DOCUMENT IS RELEASED FOR REVIEW ONLY. IT IS NOT INTENDED FOR CONSTRUCTION UNLESS SIGNED AND SEALED.

BRYAN M. NICHOLAS P.L.A.
SERIAL NO. 12902936-5301
DATE: 7 FEB 2024

JEREMY CLARK
WHISPERING CREEK

LANDSCAPE PLAN

berg LANDSCAPE ARCHITECTS
380 E Main St, Suite 204
Midway, Ut 84049 ph. (801) 723-2000

DESIGN BY:PDB DRAWN BY:DAA	DATE:7 FEB 2024 REV: 00	SHEET L01

FRONTIER CORPORATION USA
Environmental Consultants

November 17, 2023

Hollis Jencks, Project Manager
U.S. Army Corps of Engineers
Utah Regulatory Office
533 West 2600 South, Suite 150
Bountiful, Utah 84010

RE: Cari Lane Fill Removal and Wetlands Restoration Project As-Built Report
Midway, Wasatch County, Utah
USACE Project Number: SPK-2020-0040
EPA Docket Number CWA-08-2022-0004

Dear Mr. Jencks:

The purpose of this letter report is to provide as-built documentation for the Cari Lane Fill Removal and Wetlands Restoration Project located in Midway, Wasatch County, Utah (Figure 1). The restoration plan was implemented in accordance with the U.S. Environmental Protection Agency's (EPA) administrative order for compliance on consent (AOC) to wetlands and other waters of the United States caused by unpermitted discharges of dredged or fill material at Section 27, Township 3 South, Range 4 East on property owned by Jeremy Clark and Cari Lane, LLC (Figure 2). Additionally, the restoration plan was implemented following U.S. Army Corps of Engineers (USACE) nationwide permit (NWP 32) for enforcement actions issued by your office dated August 21, 2023.

The restoration project entails the removal of fill from and alleged wetland area and back filling of a pond that was excavated in an alleged wetland area that borders Snake Creek. The fill removal and wetlands restoration was done following the EPA- and USACE-approved "Fill Removal and Wetland Restoration Plan for the matter of Jeremy Clark and Cari Lane LLC," dated January 30, 2023, prepared by Frontier Corporation USA (Frontier).

Frontier was on-site in September 2023 to provide guidance for the installation of best management practices, removal of fill from designated areas, back-filling of an excavated pond, recontouring of restored wetland areas, and application or revegetation seed mixes. Figure 3 shows an as-built restoration map showing photo points locations for the attached photolog that documents the restoration work. On September 15, in accordance with the agency approved restoration plan, approximately 0.09 acres of fill was removed from the designated wetlands restoration area and 0.02 acres of excavated pond was backfilled after the removal of the rock embankment to restore a total of approximately 0.11 acres of wetlands. A wetland seed mix and a separate upland seed mix were applied on September 26 using a hydroseed method to revegetate the restored wetlands and adjacent upland areas that were temporarily disturbed during the restoration work. Copies of the wetland and upland revegetation seed mixes are attached with this report for reference.

Frontier Corporation USA
221 N. Gateway Drive, Suite B
Providence, Utah 84332
(435) 753-9502

The restoration construction work and reseeding has been implemented in accordance with the restoration plan. The attached photo log shows the restoration work in progress; it shows final grading of the two restored wetland areas, and it shows the site after the hydroseeding was completed.

Post-construction performance monitoring to track the success of the wetlands restoration work will begin in the late-spring/early-summer of 2024.

Please feel free to contact me at dwenger@frontiercorp.net if you have any questions about this as-built report for the Cari Lane Fill Removal and Wetlands Restoration Project

Sincerely,

Frontier Corporation USA

Dennis C. Wenger
Senior Wetlands Ecologist
Principal

CC:
Rebecca Little Owl – EPA
Jeremy Clark – Cari Lane, LLC

Attachments:
Figure 1. Site Vicinity Map – 1:100,000 scale USGS topo
Figure 2. Project Area Location Map – 1:24,000 scale USGS topo
Figure 3. As-Built Map – 1 inch = 60 feet scale aerial overlay
Wetlands revegetation seed mix
Uplands revegetation seed mix
As-Built Photo log dated September 15 and 26, 2023

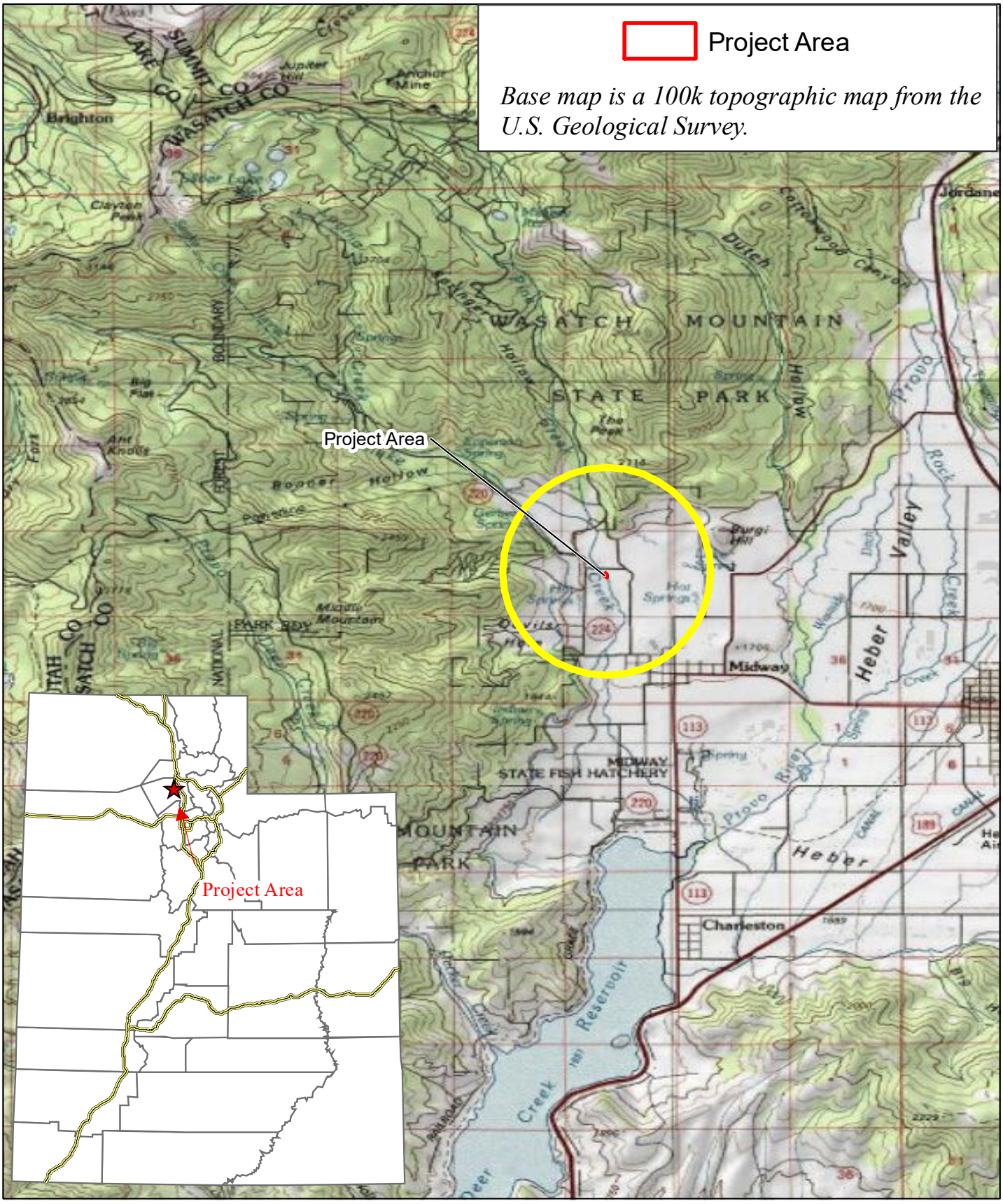

Figure 1: Site Vicinity Map
1:100,000 Scale Topographic Base

Cari Lane Fill Removal and Wetlands Restoration As-Built
Midway, Wasatch County, UT
SPK-2020-00404
Map Date: 11/17/2023

N
W E
S

0 0.75 1.5 Miles

1 inch = 1.58 miles

FRONTIER CORPORATION USA
Environmental Consultants
221 N. Gateway Drive Suite B
Providence UT, 84332
(435) 753-9502

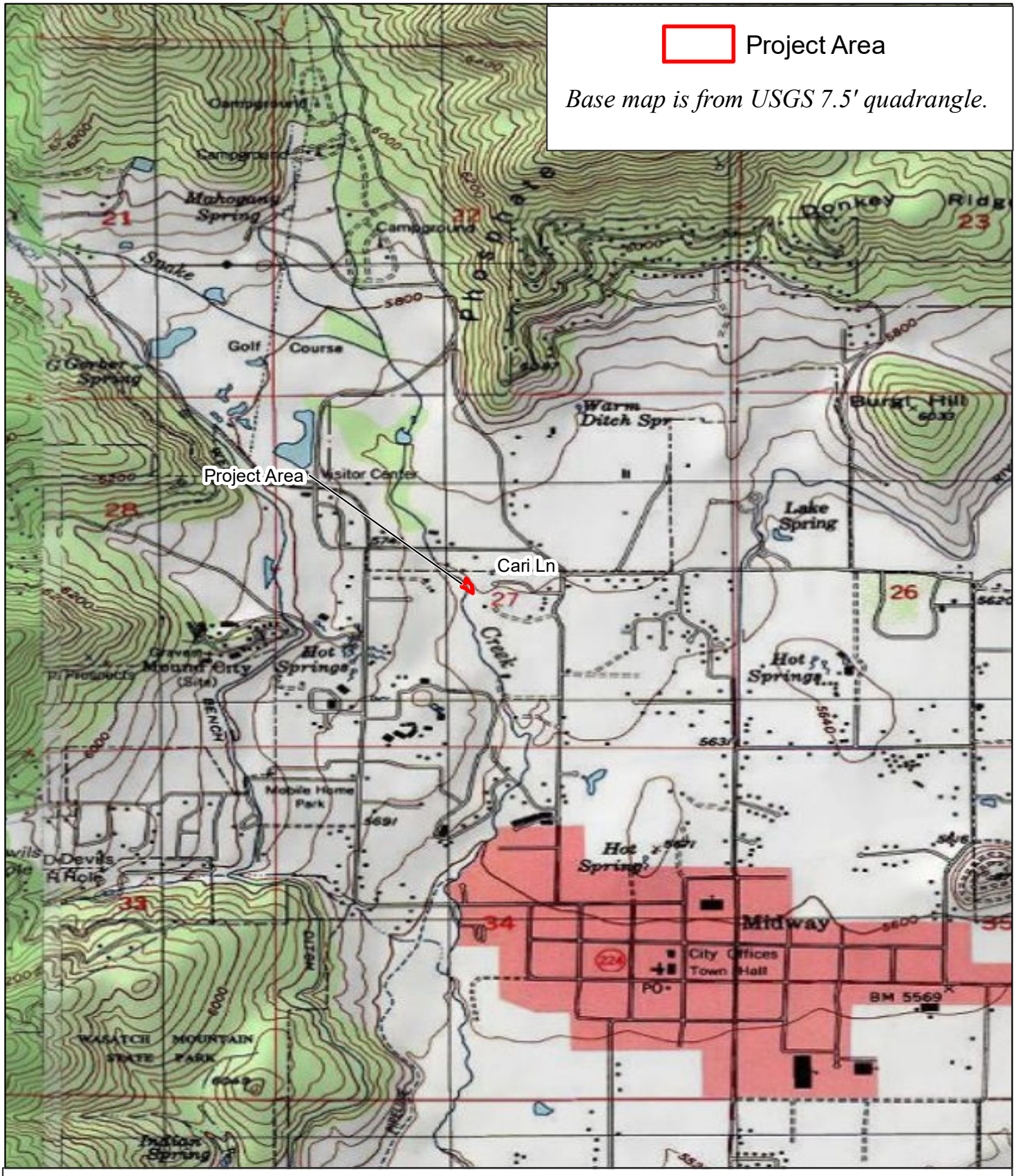

Figure 2: Project Area Location Map
1:24,000 Scale Topographic Base

Cari LaneFill Removal and Wetlands Restoration As-Built
Midway, Wasatch County, UT

SPK-2020-00404
Map Date: 11/17/23

N
W E
S

0 0.175 0.35 Miles

1 inch = 0.38 miles

FRONTIER CORPORATION USA
Environmental Consultants
221 N. Gateway Drive Suite B
Providence UT, 84332
(435) 753-9502

Figure 3: As-Built Map

Cari Lane Fill Removal and Wetland Restoration As-Built
Midway, Wasatch County, UT
SPK-2020-00404
Map Date: November 17, 2023
Map Preparer: J. Eddings

0 50 100 Feet

1 inch = 60 feet

N W E S

FRONTIER CORPORATION USA
Environmental Consultants
221 N. Gateway Drive Suite B
Providence UT, 84332
(435) 753-9502

granite SEED and erosion control
1697 West 2100 North
Lehi, Utah 84043
Toll Free (800) 992-5040
Fax (801) 768-3967

INVOICE

Invoice Date: 05-Sep-23

Invoice Number: **1-74434**

(please show this invoice number on all payments)

Project: Wetlands Restoration - Wetland Mix

Sold To:
Jeremy CLark
PO Box 195
Midway, UT
84049

Ship To:
Jeremy CLark
535 Cari Lane
Midway, UT
84049

Terms:	**Customer P.O.**	**Ordered By:** Jeremy Clark	**Phone Number:** 719-330-7854	**Customer Number:** GS237753
Shipper: UPS	**Freight:** **Prepaid/Collect** Prepaid	**FOB:** Origin	**Sales Rep:** Jason Stettler	**Date Shipped:** 05-Sep-23

Pricing	Quantity Shipped PLS	Bulk	Description	Variety	Price	Total
*** MIX # 249821 Wetland Mix ***						
PLS #	0.02	0.02	Juncus balticus Rush, Baltic	VNS		
PLS #	0.02	0.02	Juncus torreyi Torrey's rush	VNS		
PLS #	0.06	0.06	Astragalus canadensis Milkvetch, Canada	VNS		
PLS #	0.06	0.06	Alopecurus arundinaceus Creeping foxtail	Garrison		
PLS #	0.24	0.27	Poa palustris Bluegrass, Fowl	VNS		
PLS #	0.24	0.29	Hordeum brachyantherum Meadow barley	VNS		
PLS #	0.48	0.55	Carex aquatilis Water sedge	VNS		
PLS #	0.48	0.52	CAREX NEBRASCENSIS Sedge, Nebraska	VNS		
PLS #	0.97	1.05	Carex rostrata Sedge, Beaked	VNS		

*** Mix continued on next page ***

granite SEED and erosion control
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Lehi, Utah 84043
Toll Free (800) 992-5040
Fax (801) 768-3967

INVOICE

Invoice Date: 05-Sep-23

Invoice Number: **1-74434**

(please show this invoice number on all payments)

Project: Wetlands Restoration - Wetland Mix

Pricing	Quantity Shipped PLS	Bulk	Description	Variety	Price	Total
*** MIX # 249821 Wetland Mix (Continued) ***						
PLS #	1.21	1.44	Schoenoplectus acutus spp. Acutus Bullrush, Hardstem	VNS		
PLS #	1.21	1.39	Schoenoplectus americanus Bullrush, Three Square	VNS		
				MIX SUBTOTAL (5 PLS # @ $ 88.3600 Per PLS #): $ 441.80		

Notes: PAID VISA AUTH 0626D 1Z8405510341294976

$491.33 paid by Visa

Subtotal:	**441.80**
Freight:	**17.50**
Sales Tax:	**32.03**
GRAND TOTAL:	**$ 491.33**

PLEASE PAY PER THIS INVOICE. NO STATEMENT WILL BE SENT.

Please read the reverse side of this form carefully. *The terms and conditions of sale set forth on both sides of this form constitute the entire agreement between Seller and Buyer. All purchases of products by Buyer shall be governed and subject to the terms and conditions of sale set forth on the reverse side hereof, as in effect from time to time, and nothing contained in any product order of buyer shall in any way modify such terms and conditions of sale or add any additional terms and conditions unless agreed upon in writing by a corporate officer of Granite Seed. Any additional or inconsistent terms and conditions of any product order of Buyer shall be deemed stricken from such order and each product order shall be deemed to incorporate all of these terms and conditions of sale. Acceptance by Buyer of these terms and conditions is acknowledged by either (1) Buyer's signature set forth herein, or (2) receipt by Buyer of delivery of the products described here in and failure by Buyer to return such products within five (5) days following such delivery.*

TERMS AND CONDITIONS OF SALE

ALL SALES MADE BY GRANITE SEED ("SELLER") ARE MADE ON THE FOLLOWING TERMS AND CONDITIONS OF SALE:

1. Prices and Taxes

Prices are exclusive of all federal, state and local taxes, fees or charges now in force or enacted in the future. Any such taxes, fees or charges imposed by any governmental authority on, or measured by, the transaction between Seller and Buyer will be paid by the Buyer in addition to the prices quoted or invoiced. In the event that Seller is required to pay any such taxes, fees or charges at the time of sale or thereafter, Buyer will reimburse Seller therefore.

2. Delivery

a) Delivery will be made F.O.B. Seller's plant, Lehi, Utah, unless otherwise specified. The time of delivery is the time the products to be delivered are picked up by the carrier.
b) Title to the products will pass to Buyer upon delivery of the products by Seller to carrier (F.O.B. Lehi, Utah), and upon that delivery Buyer will be responsible for and bear the entire risk of loss thereof or damage thereto.

3. Shipment

In the absence of specific shipping instructions, Seller will ship the products by the method it deems most advantageous. Transportation charges will be collected on delivery or, if prepaid, will be subsequently invoiced to Buyer. Unless otherwise indicated, Buyer is obligated to obtain insurance against damage to the products being shipped. Unless otherwise specified, the products will be shipped in standard commercial packaging. When special or export packaging is required or, in the opinion of Seller, required under the circumstances, the cost of the same, if not set forth on the invoice, will be separately invoiced.

4. Security Interest

Seller reserves a purchase money security interest in products sold and the proceeds therefrom in the amount of the purchase price thereof. In the event of default by Buyer in any of its obligations to Seller, Seller will have the right to repossess the products sold hereunder without liability to Buyer. Security interest(s) granted herein will be satisfied by payment in full of the purchase price by Buyer. Buyer agrees that a copy of the invoice utilized in connection with the purchase of products may be filed with appropriate authorities at any time as a financing statement and/or chattel mortgage to perfect Seller's security interest in the products sold. On request of Seller, Buyer agrees to execute financing statements and other instruments that Seller may request to perfect or protect Seller's security interest in the products sold.

5. Invoices and Terms of Payment

a) Seller will invoice Buyer for the purchase price of products sold to Buyer by Seller (which invoice may also reflect charges for freight, handling, taxes and other amounts payable to Seller by Buyer hereunder) concurrently with or immediately after the date of shipment.
b) Payment terms are net thirty (30) days, unless otherwise specified. Accounts 30 days past due will be subject to a monthly charge at the rate of one and one-half percent (1.5%) per month to cover the costs of servicing such accounts.
c) At Seller's discretion, orders from customers with invoices that are sixty (60) days overdue (i.e. not paid within 60 days of the invoice date) will be accepted only on a C.O.D. or cash-with-order basis until credit is reestablished to Seller's satisfaction.
d) Buyer shall pay all of Seller's costs and expenses (including reasonable attorney's fees) to enforce or preserve Seller's rights hereunder.

6. Proprietary Rights and Confidentiality

a) Portions of the products supplied and accompanying product brochures and materials are proprietary to Seller. Seller retains for itself all proprietary rights in and to all designs, technical information and data pertaining to any products sold and product brochures and materials provided except where rights are assigned under separate written agreement signed by a corporate officer of Seller. No proprietary information or data of Seller shall be reproduced or disclosed to others without Seller's prior written consent.
b) Confidentiality. Buyer acknowledges that, by reason of its relationship to Seller hereunder, it will have access to certain information and materials concerning Seller's business, business plans, customers, technology and products that are confidential and of substantial value to Seller which value would be impaired if such information were disclosed to third parties. Buyer agrees that it will not use in any way for its own account or the account of an third party, nor disclose to any third party, any such confidential information revealed to it by Seller. Buyer shall take every reasonable precaution to protect the confidentiality of such information.

7. Limited Warranty

a) Subject to subsections (b) and (c) below, Seller warrants that the products sold meet Seller's written specifications and labeling therefor when shipped, within recognized industry tolerances. This warranty is contingent upon proper handling and use of the products in the applications for which they were intended. **Buyer shall not make or pass on to others any warranty or representation on behalf of Seller other than or inconsistent with the limited warranty referenced above.**
b) Except for the express limited warranty referenced above, seller grants no other warranties, express or implied, regarding the products sold hereunder, their fitness for any purpose, their quality, their merchantability, or otherwise. Seller does not make to Buyer or any customer of Buyer by virtue hereof or any product order, and hereby expressly disclaims any other representation or warranty of any kind with respect to the products.
c) Seller will not be liable for any loss, damages or penalty resulting from delay in delivery when such delay is due to causes beyond the reasonable control of Seller, including but not limited to supplier delay, transportation disruption, force majeure, act of God, labor unrest, fire, explosion or earthquake. In any such event, the delivery date will be deemed extended for a period equal to the delay. **Seller's liability under the limited warranty set forth herein shall be limited to the replacement of the products not meeting the standards of the limited warranty, or, at the election of Seller, a refund of the purchase price of the defective products. In no event shall Seller be liable for the cost of the procurement of substitute products by Buyer or any Customer, or for any special, consequential or incidental damages for breach of warranty. This exclusion includes any liability that may arise out of Third-party claims against Buyer. The essential purpose of the provision is to limit the potential liability of Seller arising out of the sale of this product to Buyer.**

8. Substitutions and Modifications

Seller will have the right to make substitutions and modifications in the specifications of products sold by Seller, provided that such substitutions or modifications will materially affect overall product performance.

9. Change Orders

Buyer may utilize written change orders without penalty for orders that have not yet been accepted by Seller. For orders that have been accepted by Seller but have not yet been shipped, Buyer may utilize written change orders subject to the following conditions:
a) **Buyer may not cancel orders for custom seed mix products after such products have been prepared by Seller and are ready for shipment.**
b) Buyer shall pay Seller a restocking fee equal to twenty percent (20%) of the purchase price of the products on all orders returned for credit or refund, or cancelled or delayed by Buyer later than three (3) days prior to shipping date. Seller reserves the right to refuse acceptance of any materials returned for credit or a refund.

10. Rejection of Goods

a) Buyer shall inspect all products promptly upon receipt thereof and may reject any products that fail in any material way to meet the specifications set forth in Seller's current labeling therefore. Any products not properly rejected within five (5) days of receipt by Buyer shall be deemed accepted.
b) If during such five (5) day period Buyer finds any damage to the products purchased, Buyer shall be responsible for obtaining the necessary verification from the carrier's agent and on filing a claim therewith in accordance with such carrier's procedures. If Buyer finds a short count, or products are shipped via Seller's carrier (not common carrier), Buyer shall file a claim with Seller, accompanied by documentation substantiating such claim, within five (5) days after receipt of shipment. Claims lacking proper documentation or not timely submitted will not be honored.
c) After such five (5) day period, Buyer may not return products to Seller for any reason without Seller's prior written consent. For any products for which Seller gives such consent, Seller shall charge Buyer a restocking fee equal to twenty percent (20%) of the purchase price previously paid to Buyer's account. Buyer shall be responsible for all shipping charges.

11. Bankruptcy

If Buyer (i) becomes bankrupt or insolvent, (ii) compounds with its creditors, (iii) commences to be wound up or dissolved, or (iv) suffers a receiver to be appointed, Seller will be at liberty by notice in writing to cancel its agreement with Buyer without judicial intervention or declaration of default of Buyer and without prejudice to any right or remedy which may have accrued or may accrue thereafter to Seller.

12. Buyer's Indemnity Regarding Third Party Claims

Except as otherwise expressly provided herein, Buyer shall be responsible for any and all losses or damages arising out of or incurred in connection with the use of the products by Buyer or any third party or other related business activity. Buyer agrees to indemnify and hold Seller harmless from and with respect to any such loss or damage (including, without limitation, attorneys' fees and costs).

13. Entire Agreement

a) The terms and conditions set forth herein constitute the entire agreement between Seller and Buyer.
b) This agreement may not be modified, supplemented, qualified or interpreted by any trade usage or prior course of dealing not made a part hereof by its express terms.
c) Buyer hereby acknowledges that it has not entered into this agreement in reliance upon any warranty or representation by any person or entity except for the warranties or representations specifically set forth herein.

14. Waiver

The failure by seller to enforce at any time any of the provisions of this agreement, to exercise any election or option provided herein, or to require at any time the performance by Buyer of any of the provisions herein will not in any way be construed as a waiver of such provisions.

15. Authority

Buyer represents that the person whose signature is set forth herein on behalf of Buyer is duly authorized and empowered by Buyer to enter into this agreement and to accept the terms and conditions contained herein on its behalf.

16. Errors

Stenographic and clerical errors in sales made under this agreement are subject to correction.

17. Applicable Law

This agreement will be governed by the laws of the State of Utah applicable to contracts entered into and to be performed entirely within such State.

18. Jurisdiction and Venue

The Utah state courts of Utah County, Utah (or, if there is exclusive federal jurisdiction, the United States District Court for the District of Utah) will have exclusive jurisdiction and venue over any dispute arising out of this agreement, and Buyer hereby consents to the jurisdiction and venue of such courts.

19. Attorney's Fees

Reasonable attorneys' fees and costs will be awarded to the prevailing party in the event of litigation involving the enforcement or interpretation of this agreement.

granite SEED and erosion control
1697 West 2100 North
Lehi, Utah 84043
Toll Free (800) 992-5040
Fax (801) 768-3967

INVOICE

Invoice Date: 05-Sep-23

Invoice Number: **1-74432**

(please show this invoice number on all payments)

Project: Wetlands Restoration - Upland Mix

Sold To:
Jeremy CLark
PO Box 195
Midway, UT
84049

Ship To:
Jeremy CLark
535 Cari Lane
Midway, UT
84049

Terms:	**Customer P.O.**	**Ordered By:** Jeremy Clark	**Phone Number:** 719-330-7854	**Customer Number:** GS237753
Shipper: UPS	**Freight:** **Prepaid/Collect** Prepaid	**FOB:** Origin	**Sales Rep:** Jason Stettler	**Date Shipped:** 05-Sep-23

Pricing	Quantity Shipped PLS	Bulk	Description	Variety	Price	Total
*** MIX # 249814 Upland Mix ***						
PLS #	1.33	1.39	Elymus lanceolatus ssp. psammophilus Streambank wheatgrass	Sodar		
PLS #	0.67	0.70	Festuca idahoensis Fescue, Idaho	Joseph		
PLS #	0.67	0.75	Melilotus officinalis Sweetclover	Yellow Blossom		
PLS #	1.00	1.09	Poa secunda Sandberg bluegrass	Mountain Home		
PLS #	1.00	1.11	Elymus trachycaulus ssp. trachycaulus Slender wheatgrass	Pryor		
PLS #	0.33	0.35	Agropyron cristatum Crested wheatgrass	Ephraim		

MIX SUBTOTAL (5 PLS # @ $ 7.1320 Per PLS #): $ 35.66

Please read the reverse side of this form carefully. *The terms and conditions of sale set forth on both sides of this form constitute the entire agreement between Seller and Buyer. All purchases of products by Buyer shall be governed and subject to the terms and conditions of sale set forth on the reverse side hereof, as in effect from time to time, and nothing contained in any product order of buyer shall in any way modify such terms and conditions of sale or add any additional terms and conditions unless agreed upon in writing by a corporate officer of Granite Seed. Any additional or inconsistent terms and conditions of any product order of Buyer shall be deemed stricken from such order and each product order shall be deemed to incorporate all of these terms and conditions of sale. Acceptance by Buyer of these terms and conditions is acknowledged by either (1) Buyer's signature set forth herein, or (2) receipt by Buyer of delivery of the products described here in and failure by Buyer to return such products within five (5) days following such delivery.*

granite SEED
and erosion control

1697 West 2100 North
Lehi, Utah 84043
Toll Free (800) 992-5040
Fax (801) 768-3967

INVOICE

Invoice Date:
05-Sep-23

Invoice Number:**1-74432**

(please show this invoice number on all payments)

Project: Wetlands Restoration - Upland Mix

Notes: PAID VISA AUTH 01853D 1Z8405510341294976

$55.75 paid by Visa

Subtotal:	**35.66**
Freight:	**17.50**
Sales Tax:	**2.59**
GRAND TOTAL:	**$ 55.75**

PLEASE PAY PER THIS INVOICE. NO STATEMENT WILL BE SENT.

Please read the reverse side of this form carefully. *The terms and conditions of sale set forth on both sides of this form constitute the entire agreement between Seller and Buyer. All purchases of products by Buyer shall be governed and subject to the terms and conditions of sale set forth on the reverse side hereof, as in effect from time to time, and nothing contained in any product order of buyer shall in any way modify such terms and conditions of sale or add any additional terms and conditions unless agreed upon in writing by a corporate officer of Granite Seed. Any additional or inconsistent terms and conditions of any product order of Buyer shall be deemed stricken from such order and each product order shall be deemed to incorporate all of these terms and conditions of sale. Acceptance by Buyer of these terms and conditions is acknowledged by either (1) Buyer's signature set forth herein, or (2) receipt by Buyer of delivery of the products described here in and failure by Buyer to return such products within five (5) days following such delivery.*

TERMS AND CONDITIONS OF SALE

ALL SALES MADE BY GRANITE SEED ("SELLER") ARE MADE ON THE FOLLOWING TERMS AND CONDITIONS OF SALE:

1. Prices and Taxes

Prices are exclusive of all federal, state and local taxes, fees or charges now in force or enacted in the future. Any such taxes, fees or charges imposed by any governmental authority on, or measured by, the transaction between Seller and Buyer will be paid by the Buyer in addition to the prices quoted or invoiced. In the event that Seller is required to pay any such taxes, fees or charges at the time of sale or thereafter, Buyer will reimburse Seller therefore.

2. Delivery

a) Delivery will be made F.O.B. Seller's plant, Lehi, Utah, unless otherwise specified. The time of delivery is the time the products to be delivered are picked up by the carrier.
b) Title to the products will pass to Buyer upon delivery of the products by Seller to carrier (F.O.B. Lehi, Utah), and upon that delivery Buyer will be responsible for and bear the entire risk of loss thereof or damage thereto.

3. Shipment

In the absence of specific shipping instructions, Seller will ship the products by the method it deems most advantageous. Transportation charges will be collected on delivery or, if prepaid, will be subsequently invoiced to Buyer. Unless otherwise indicated, Buyer is obligated to obtain insurance against damage to the products being shipped. Unless otherwise specified, the products will be shipped in standard commercial packaging. When special or export packaging is required or, in the opinion of Seller, required under the circumstances, the cost of the same, if not set forth on the invoice, will be separately invoiced.

4. Security Interest

Seller reserves a purchase money security interest in products sold and the proceeds therefrom in the amount of the purchase price thereof. In the event of default by Buyer in any of its obligations to Seller, Seller will have the right to repossess the products sold hereunder without liability to Buyer. Security interest(s) granted herein will be satisfied by payment in full of the purchase price by Buyer. Buyer agrees that a copy of the invoice utilized in connection with the purchase of products may be filed with appropriate authorities at any time as a financing statement and/or chattel mortgage to perfect Seller's security interest in the products sold. On request of Seller, Buyer agrees to execute financing statements and other instruments that Seller may request to perfect or protect Seller's security interest in the products sold.

5. Invoices and Terms of Payment

a) Seller will invoice Buyer for the purchase price of products sold to Buyer by Seller (which invoice may also reflect charges for freight, handling, taxes and other amounts payable to Seller by Buyer hereunder) concurrently with or immediately after the date of shipment.
b) Payment terms are net thirty (30) days, unless otherwise specified. Accounts 30 days past due will be subject to a monthly charge at the rate of one and one-half percent (1.5%) per month to cover the costs of servicing such accounts.
c) At Seller's discretion, orders from customers with invoices that are sixty (60) days overdue (i.e. not paid within 60 days of the invoice date) will be accepted only on a C.O.D. or cash-with-order basis until credit is reestablished to Seller's satisfaction.
d) Buyer shall pay all of Seller's costs and expenses (including reasonable attorney's fees) to enforce or preserve Seller's rights hereunder.

6. Proprietary Rights and Confidentiality

a) Portions of the products supplied and accompanying product brochures and materials are proprietary to Seller. Seller retains for itself all proprietary rights in and to all designs, technical information and data pertaining to any products sold and product brochures and materials provided except where rights are assigned under separate written agreement signed by a corporate officer of Seller. No proprietary information or data of Seller shall be reproduced or disclosed to others without Seller's prior written consent.
b) Confidentiality. Buyer acknowledges that, by reason of its relationship to Seller hereunder, it will have access to certain information and materials concerning Seller's business, business plans, customers, technology and products that are confidential and of substantial value to Seller which value would be impaired if such information were disclosed to third parties. Buyer agrees that it will not use in any way for its own account or the account of an third party, nor disclose to any third party, any such confidential information revealed to it by Seller. Buyer shall take every reasonable precaution to protect the confidentiality of such information.

7. Limited Warranty

a) Subject to subsections (b) and (c) below, Seller warrants that the products sold meet Seller's written specifications and labeling therefor when shipped, within recognized industry tolerances. This warranty is contingent upon proper handling and use of the products in the applications for which they were intended. **Buyer shall not make or pass on to others any warranty or representation on behalf of Seller other than or inconsistent with the limited warranty referenced above.**
b) Except for the express limited warranty referenced above, seller grants no other warranties, express or implied, regarding the products sold hereunder, their fitness for any purpose, their quality, their merchantability, or otherwise. Seller does not make to Buyer or any customer of Buyer by virtue hereof or any product order, and hereby expressly disclaims any other representation or warranty of any kind with respect to the products.
c) Seller will not be liable for any loss, damages or penalty resulting from delay in delivery when such delay is due to causes beyond the reasonable control of Seller, including but not limited to supplier delay, transportation disruption, force majeure, act of God, labor unrest, fire, explosion or earthquake. In any such event, the delivery date will be deemed extended for a period equal to the delay. **Seller's liability under the limited warranty set forth herein shall be limited to the replacement of the products not meeting the standards of the limited warranty, or, at the election of Seller, a refund of the purchase price of the defective products. In no event shall Seller be liable for the cost of the procurement of substitute products by Buyer or any Customer, or for any special, consequential or incidental damages for breach of warranty. This exclusion includes any liability that may arise out of Third-party claims against Buyer. The essential purpose of the provision is to limit the potential liability of Seller arising out of the sale of this product to Buyer.**

8. Substitutions and Modifications

Seller will have the right to make substitutions and modifications in the specifications of products sold by Seller, provided that such substitutions or modifications will materially affect overall product performance.

9. Change Orders

Buyer may utilize written change orders without penalty for orders that have not yet been accepted by Seller. For orders that have been accepted by Seller but have not yet been shipped, Buyer may utilize written change orders subject to the following conditions:
a) **Buyer may not cancel orders for custom seed mix products after such products have been prepared by Seller and are ready for shipment.**
b) Buyer shall pay Seller a restocking fee equal to twenty percent (20%) of the purchase price of the products on all orders returned for credit or refund, or cancelled or delayed by Buyer later than three (3) days prior to shipping date. Seller reserves the right to refuse acceptance of any materials returned for credit or a refund.

10. Rejection of Goods

a) Buyer shall inspect all products promptly upon receipt thereof and may reject any products that fail in any material way to meet the specifications set forth in Seller's current labeling therefore. Any products not properly rejected within five (5) days of receipt by Buyer shall be deemed accepted.
b) If during such five (5) day period Buyer finds any damage to the products purchased, Buyer shall be responsible for obtaining the necessary verification from the carrier's agent and on filing a claim therewith in accordance with such carrier's procedures. If Buyer finds a short count, or products are shipped via Seller's carrier (not common carrier), Buyer shall file a claim with Seller, accompanied by documentation substantiating such claim, within five (5) days after receipt of shipment. Claims lacking proper documentation or not timely submitted will not be honored.
c) After such five (5) day period, Buyer may not return products to Seller for any reason without Seller's prior written consent. For any products for which Seller gives such consent, Seller shall charge Buyer a restocking fee equal to twenty percent (20%) of the purchase price previously paid to Buyer's account. Buyer shall be responsible for all shipping charges.

11. Bankruptcy

If Buyer (i) becomes bankrupt or insolvent, (ii) compounds with its creditors, (iii) commences to be wound up or dissolved, or (iv) suffers a receiver to be appointed, Seller will be at liberty by notice in writing to cancel its agreement with Buyer without judicial intervention or declaration of default of Buyer and without prejudice to any right or remedy which may have accrued or may accrue thereafter to Seller.

12. Buyer's Indemnity Regarding Third Party Claims

Except as otherwise expressly provided herein, Buyer shall be responsible for any and all losses or damages arising out of or incurred in connection with the use of the products by Buyer or any third party or other related business activity. Buyer agrees to indemnify and hold Seller harmless from and with respect to any such loss or damage (including, without limitation, attorneys' fees and costs).

13. Entire Agreement

a) The terms and conditions set forth herein constitute the entire agreement between Seller and Buyer.
b) This agreement may not be modified, supplemented, qualified or interpreted by any trade usage or prior course of dealing not made a part hereof by its express terms.
c) Buyer hereby acknowledges that it has not entered into this agreement in reliance upon any warranty or representation by any person or entity except for the warranties or representations specifically set forth herein.

14. Waiver

The failure by seller to enforce at any time any of the provisions of this agreement, to exercise any election or option provided herein, or to require at any time the performance by Buyer of any of the provisions herein will not in any way be construed as a waiver of such provisions.

15. Authority

Buyer represents that the person whose signature is set forth herein on behalf of Buyer is duly authorized and empowered by Buyer to enter into this agreement and to accept the terms and conditions contained herein on its behalf.

16. Errors

Stenographic and clerical errors in sales made under this agreement are subject to correction.

17. Applicable Law

This agreement will be governed by the laws of the State of Utah applicable to contracts entered into and to be performed entirely within such State.

18. Jurisdiction and Venue

The Utah state courts of Utah County, Utah (or, if there is exclusive federal jurisdiction, the United States District Court for the District of Utah) will have exclusive jurisdiction and venue over any dispute arising out of this agreement, and Buyer hereby consents to the jurisdiction and venue of such courts.

19. Attorney's Fees

Reasonable attorneys' fees and costs will be awarded to the prevailing party in the event of litigation involving the enforcement or interpretation of this agreement.

Photo 1. South view of fill removal in progress. Photo taken September 15, 2023.

Photo 2. South view of on-going removal of the rock wall around the pond for backfilling. Photo taken September 15, 2023.

Photo 3. Northeast view of pond backfilling in progress. Photo taken September 15, 2023.

Photo 4a.South view of pond backfill being leveled using a laser-level. Photo taken September 15, 2023.

Photo 4b. South view of straw bale BMP to protect Snake Creek during back-fill of pond. Photo taken September 15, 2023.

Photo 5. North view of backfilled pond (left), the straw bale BMP used to keep fill from entering Snake Creek (center), and fill removal area (right). Photo taken September 15, 2023.

Photo 6a. Southwest view of laser-level being used to ensure proper depth of fill to remove in fill removal area. Photo taken on September 15, 2023.

Photo 6b. Southwest view of straw bale BMP placed in fill removal area to protect Snake Creek. Photo taken on September 15, 2023.

Photo 7. East view of completed fill removal in the fill removal area. Photo taken on September 15, 2023.

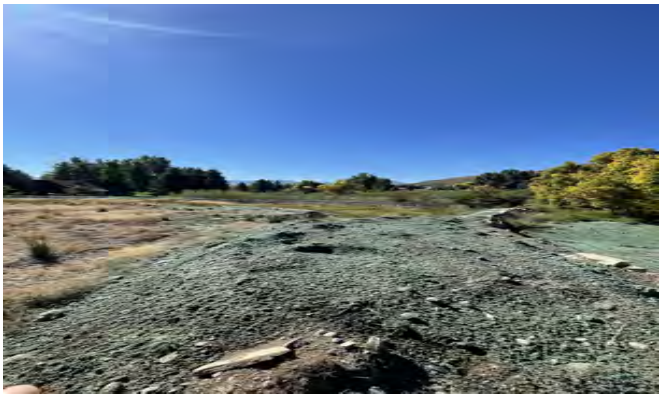

Photo 8. South view of re-seeding done in uplands east of fill removal area. Photo taken September 26, 2023.

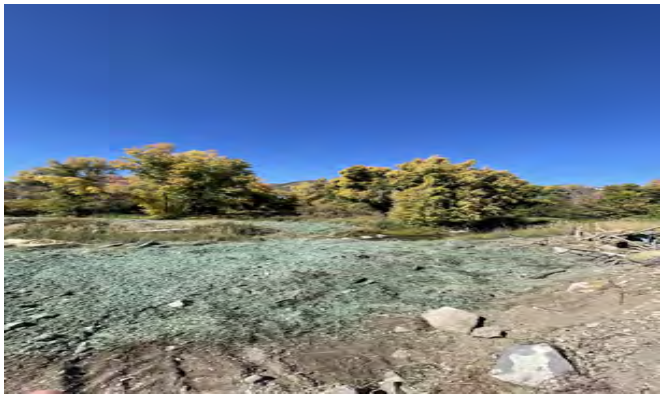

Photo 9. West view of re-seeding in uplands adjacent to fill removal area (foreground) and area used to access and fill pond (background). Photo taken September 26, 2023.

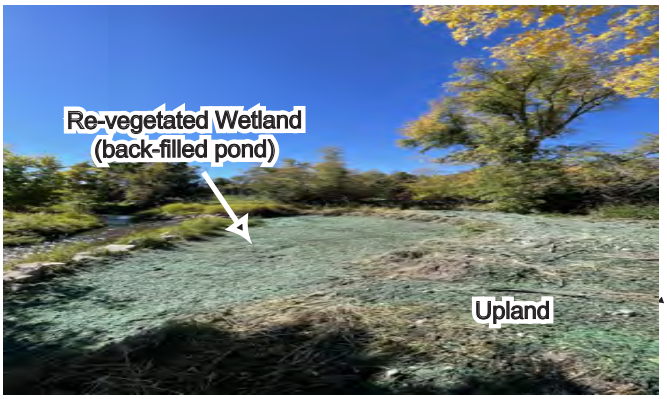

Photo 10. South view of re-seeding done in back-filled pond to re-vegetate restored wetland. Photo taken September 26, 2023.

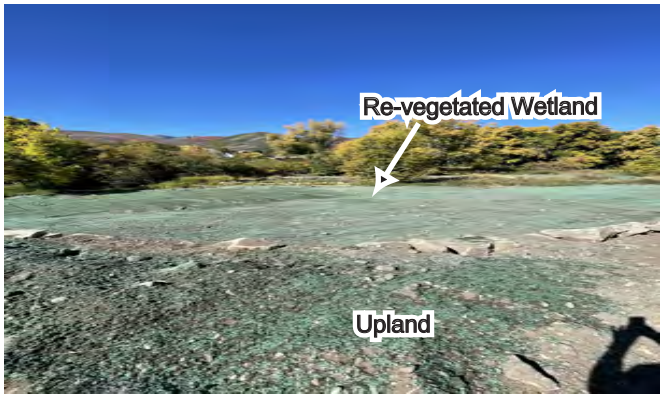

Photo 11. West view of re-seeding in fill removal area to re-vegetate restored wetland. Photo taken September 26, 2023.

REQUEST FOR AQUATIC RESOURCES DELINEATION VERIFICATION

OR JURISDICTIONAL DETERMINATION

A separate jurisdictional determination (JD) is not necessary to process a permit. An Approved Jurisdictional Determination (AJD) is required to definitively determine the extent of waters of the U.S. and is generally used to disclaim jurisdiction over aquatic resources that are not waters of the U.S., in cases where the review area contains no aquatic resources, and in cases when the recipient wishes to challenge the water of the U.S. determination on appeal. Either an Aquatic Resources Delineation Verification or a Preliminary Jurisdictional Determination (PJD) may be used when the recipient wishes to assume that aquatic resources are waters of the U.S. for the purposes of permitting. In some circumstances an AJD may require more information, a greater level of effort, and more time to produce. If you are unsure which product to request, please speak with your project manager or call the Sacramento District's general information line at (916) 557-5250.

I am requesting the product indicated below from the U.S. Army Corps of Engineers, Sacramento District, for the review area located at:

Street Address: 535 Cari Lane City: Midway County: Wasatch
State: Utah Zip: 84049 Section: 27 Township: 3S Range: 4E
Latitude (decimal degrees): 40.528449° Longitude (decimal degrees): -111.483788°
The approximate size of the review area for the JD is _____ acres. **(Please attach location map)**

Choose one:
- [x] I own the review area
- [ ] I hold an easement or development rights over the review area
- [ ] I lease the review area
- [ ] I plan to purchase the review area
- [ ] I am an agent/consultant acting on behalf of the requestor
- [ ] Other: _____

Choose one product:
- [x] I am requesting an Aquatic Resources Delineation Verification
- [ ] I am requesting an Approved JD
- [ ] I am requesting a Preliminary JD
- [ ] I am requesting additional information to inform my decision about which product to request

Reason for request: (check all that apply)
- [x] I need information concerning aquatic resources within the review area for planning purposes.
- [ ] I intend to construct/develop a project or perform activities in this review area which would be designed to avoid all aquatic resources.
- [ ] I intend to construct/develop a project or perform activities in this review area which would be designed to avoid those aquatic resources determined to be waters of the U.S.
- [ ] I intend to construct/develop a project or perform activities in this review area which may require authorization from the Corps; this request is accompanied by my permit application.
- [ ] I intend to construct/develop a project or perform activities in a navigable water of the U.S. which is included on the district's list of navigable waters under Section 10 of the Rivers and Harbors Act of 1899 and/or is subject to the ebb and flow of the tide.
- [ ] My lender, insurer, investors, local unit of government, etc. has indicated that an aquatic resources delineation verification is inadequate and is requiring a jurisdictional determination.
- [ ] I intend to contest jurisdiction over particular aquatic resources and request the Corps confirm that these aquatic resources are or are not waters of the U.S.
- [ ] I believe that the review area may be comprised entirely of dry land.
- [ ] Other: _____

Attached Information:
- [x] Maps depicting the general location and aquatic resources within the review area consistent with Map and Drawing Standards for the South Pacific Division Regulatory Program (Public Notice February 2016, http://www.spd.usace.army.mil/Missions/Regulatory/Public-Notices-and-References/Article/651327/updated-map-and-drawing-standards/)
- [x] Aquatic Resources Delineation Report, if available, consistent with the Sacramento District's Minimum Standards for Acceptance (Public Notice January 2016, http://1.usa.gov/1V68IYa)

By signing below, you are indicating that you have the authority, or are acting as the duly authorized agent of a person or entity with such authority, to and do hereby grant Corps personnel right of entry to legally access the review area. Your signature shall be an affirmation that you possess the requisite property rights for this request on the subject property.

*Signature: Jeremy Cark Date: 5/6/2020
Name: Jeremy Cark Company name: Cari Lane LLC
Address: PO Box 195
Midway, UT 84049
Telephone: 719-330-7854 Email: clarkj1229@gmail.com

***Authorities:** Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413; Regulatory Program of the U.S. Army Corps of Engineers; Final Rule for 33 CFR Parts 320-332.
Principal Purpose: The information that you provide will be used in evaluating your request to determine whether there are any aquatic resources within the project area subject to federal jurisdiction under the regulatory authorities referenced above.
Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public, and may be made available as part of a public notice as required by federal law. Your name and property location where federal jurisdiction is to be determined will be included in the approved jurisdictional determination (AJD), which will be made available to the public on the District's website and on the Headquarters USACE website.
Disclosure: Submission of requested information is voluntary; however, if information is not provided, the request for an AJD cannot be evaluated nor can an AJD be issued.

epic ENGINEERING

50 East 100 South
Heber City, Utah 84032
Phone: (435) 654-6600

Wetlands Delineation and Inventory Investigation
Whispering Creek Estates
Wasatch County, Utah

Prepared by:

Epic Engineering
50 East 100 South
Heber City, Utah 84032

Epic Job Number: 20-RR-002

Prepared for:

Rimrock, LLC
12731 North 4400 West
Cornish, UT 84308

June 2020

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1.0 INTRODUCTION

1.1 INTRODUCTION

This report presents the results of a wetlands delineation and inventory investigation conducted for the proposed project identified as the Whispering Creek Estates development, located at approximately 530 West and Whispering Creek, south of Whispering Creek in Midway City, Wasatch County, Utah. The property is approximately 4.8-acres located in Wasatch County, Utah. The site is located within Section 27 Township 3 South, Range 4 East in Wasatch County (see Figure 1). The approximate mid-point of the site lies at 40.528449^{o} latitude and -111.483788^{o} longitude.

The investigation was performed to determine the extent of areas considered to be potential impacts to waters of the U.S. (WOUS) and special aquatic sites which could result as a part of the proposed development. The delineation field work was conducted on May 1, 2020 at the request of the client. The purpose of this report is to document the results of that delineation.

Upon completion of a field visit with Samuel Bohannon and Mike Pectol of USACE (June 4, 2020), 4 additional test pits were dug along the northern boundary of the wetland areas to establish the presence/absence of histosols. This field work was completed on June 18, 2020.

1.2 DIRECTIONS TO DELINEATION STUDY AREA

The delineation study area is located approximately 1.3-miles northwest of Midway City, Utah. The study area can be accessed from Salt Lake City by traveling east on Interstate 80 to Silver Creek Junction (Hwy-40). From the interchange, travel south on Hwy-40 to the River Road Intersection, take River Road southwest approximately 3 miles to the roundabout. Exit the roundabout on Burgi Lane, and travel west along Burgi Lane, as Burgi Lane bends north to become Whispering Creek, the proposed project will be located on the south side of the road at approximately 530 West. The property is the mainly undeveloped area on the south side of the road.

1.3 SITE DESCRIPTION

1.3.1 General Site Conditions

The delineation study area is located within the Rocky Mountain Forests and Rangeland- LRR E of the greater Wasatch and Uinta Mountains Ecoregion (USACE, 2010). The site has an average annual precipitation of 15.99 inches of total precipitation according to historical climate data provided by Western Regional Climate Centers (WRCC, 2020). The topography of the delineation study area gently slopes from north to south, with a southern facing aspect. Snake Creek bisects the proposed development running south through the project. In 2019, a small manmade pond was created from water flowing in Snake Creek. From the pond, Snake Creek flows southwest out of the project area, with a small canal

taking a share of water and flowing to the south east. Several small wetland areas and seeps are associated with this creek system.

1.3.2 National Wetland Inventory Information

National Wetlands Inventory (NWI) data was obtained from U.S. Fish and Wildlife Service which shows potential wetlands within the delineation study area (see Figure 2). NWI data does not necessarily reflect conditions on site, so each feature identified on the NWI map was surveyed extensively to determine if the area met all three wetland parameters (vegetation, soils, and hydrology) necessary for classification as a wetland. For delineation results refer to Section 4.0 and Figure 8.

1.3.3 Vegetation

The vegetation within the delineation study area consists mainly of grasses and riverine trees. Along the creek corridor, Maple, Birch, Willow, Hawthorn, Cottonwood and hydrophytic plants are typically mixed with wetland grasses and sedges. Refer to Table 1 below for a list of dominant plants observed within the delineation study area with their corresponding wetland indicator status.

Table 1 – Dominant Vegetation Observed within the Delineation Study Area

Scientific Name	Common Name	Indicator Status
Dominant Wetland Plants		
Cyperacear fam.	Sedges	OBL (var)
Eleocharis palustris	Common spikerush	OBL
Cornus alba	Redosier Dogwood	FACW
Typha spp	Cattails	OBL
Phalaris angusta	Timothy Canary Grass	FACW
Juncus spp	Rushes	FACW
Betula spp.	Birch	FACW (var)
Salix spp.	Willow	FACW
Poa spp.	Bluegrass	FAC
Phragmites australis	Phragmites	FACW
Lemna minor	Duck Weed	OBL
Populus spp.	Cottonwood	FACW
Crataegus douglasii	Black Hawthorn	FAC
Rumex crispis	Curly dock	FAC
Eleocharis palustris	Common Spikerush	OBL
Acer negunda	Boxelder	FAC
Urtica dioica	Stinging Nettle	FAC
Dominant Upland Plants		
Dactylis glomerate	Orchard Grass	FACU
Bromus tectorum	Cheatgrass	FACU
Arctium minus	Burdock	UPL

1.3.4 Soils

Soil survey information compiled by the National Resources Conservation Service (NRCS) identifies 2 soil series within the study area (see Appendix B – Custom Soils Resources Report and Figure 3). Kovich loam soils are mapped entirely for this study area. The map unit names of Kovich loam and Kovich loam (deep water table variant) are both found in the project area. These units average 1-3% slopes on stream terraces, and are poorly drained with moderately high to high capacity to transmit water. The NRCS soil series descriptions provide general observations whereas the actual site conditions were recorded on the wetland determination data forms. (See Appendix C).

1.3.5 Hydrology

The delineation study area is situated in the drainage are of the Lake Creek-Provo River Watershed (HUC 16020203), the proposed project is located in the 6th level subwatershed identified as Snake Creek HUC 12 (HUC 160202030305), which flows south approximately 4 miles into Deer Creek Reservoir (AGRC, 2020). Snake Creek is the main water feature located through the rough center of the property and ultimately discharges into Deer Creek Reservoir, contributing to the flow of the middle and lower Provo River. Near the southern border of the project area, Midway Irrigation Company has a canal that removes water from Snake Creek for agricultural purposes.

1.4 EXISTING FIELD CONDITIONS

The delineation field work was conducted by Torrey Copfer and Joshua Call of Epic Engineering over the course of 1 day; May 1, 2020 at the request of the client. The weather was sunny and dry with an overall high of 72^{o}F. No precipitation was recorded in or near the delineation study area during the 2 days prior to the commencement of the delineation field work. As per the National Oceanic and Atmospheric Administration's (NOAA) Palmer Drought Severity Index, over the past couple years, Utah has experienced moderate to severe drought conditions, with lower than average snowfall and precipitation. Given these conditions and given these circumstances, conditions on site appeared to be typical for that time of year (NOAA, 2020).

2.0 WATERS OF THE U.S. DELINEATION METHODOLOGY

2.1 DELINEATION METHODOLOGY FOR WETLANDS

The wetland delineation was completed in accordance with the U.S. Army Corps of Engineers' (USACE) 1987 Wetland Delineation Manual (USACE, 1987) and the 2010 Western Mountain Regional Supplement (USACE, 2010). Where a determination of the ordinary high-water mark (OHWM) is included, the assessment is conducted with use of the latest OHWM field guide (USACE, 2014). All potential wetland areas were verified for wetland indicators as established in the above delineation manuals. The examination for wetlands was based on three parameters: vegetation, soils, and hydrologic features. At each data point, each of these parameters must exhibit wetland characteristics for that point to be within the wetland boundary. The following procedures were implemented and recorded in the attached data

sheets (see Appendix C). Photographs were also taken to document each sample point (see Appendix D – photos).

2.1.1 Hydrophytic Vegetation

All plant species within a five-foot radius area at each sample point were recorded. The relative percent cover for each species was determined by estimating aerial cover. The indicator status of each species was determined using the Western Mountains 2016 Wetland Plant List (USACE 2016). Vegetation species comprising of at least 20% of the total aerial cover in its stratum were considered dominant, following the guidelines of the USACE 50/20 rule. If more than 50% of the dominant plant species had an indicator status of obligate wetland species (OBL), facultative wetland species (FACW), or facultative species (FAC), the sample point met the hydrophytic vegetation parameter. In addition to the 50/20 rule, each sample point was analyzed using the prevalence index worksheet to ensure data integrity and accurate sampling. In accordance with USACE standards, a sampling point with a prevalence index rating of less than or equal to 3.0 was considered to meet the hydrophytic vegetation parameter.

2.1.2 Hydric Soils

At each sample point, a soil pit was dug to a depth of 18-inches (where able) to assess soil characteristics and water conditions. A profile of the soil pit was used to determine soil color, texture, and moisture at different depths within the soil profile. Color of the soil profile and any redox features were identified by comparing a moistened sample to the Munsell Soil Color Charts (Munsell, 2000). Soil textures and moisture were determined by feeling the soil samples. If the soil characteristics met one of the primary hydric soil indicators or two or more secondary hydric soil indicators identified in the Western Mountain Regional Supplement and the Feld Indicators of Hydric Soils in the U.S. Version 7 manual (USDA, 2010), the sample point met the hydric soils parameter.

2.1.3 Wetland Hydrology

Each soil pit was also examined for the presence or absence of hydrologic indicators. These hydrologic indicators are described in the Supplement. If it was determined that at least one primary hydrologic indicator or two or more secondary hydrologic indicators were present, the sample point met the hydrologic parameter.

2.1.4 Wetland Boundary Determination Procedure

The entirety of the proposed development of the property was walked to assess areas that exhibit obvious or questionable wetland indicators. Several unofficial/unrecorded test holes were dug to quickly confirm soil and groundwater conditions if a questionable area was found. No other potential areas were noted for detailed delineation or further test hole study except for the main area of focus and concern located west of Snake Creek along the creek channel of the target property.

Sample points that met all three parameters (hydrophytic vegetation, hydric soils, and wetland hydrology) were classified as occurring in a wetland. A second sample point, located in the adjacent upland, was then documented for the presence of the three indicators. If the point did not meet all three parameters, the

point was classified as occurring in an upland. The next step was to define the wetland boundary occurring between the wetland sample point and the upland sample point. The boundary was based on the information gathered from the two sample points and observable changes in elevation and plant communities. The wetland boundary and sample points were surveyed using a handheld GPS with sub-meter accuracy and downloaded into ArcMAP to produce a map and shapefiles that show delineated wetland boundaries and sample point locations. The acreages for each wetland polygon were calculated in ArcMAP and included on the map (Figure 7). The Cowardin Classification (Cowardin et al., 1979) was used to designate the wetland type.

3.0 DELINEATION RESULTS

In total, three wetland areas were identified and delineated within the delineation study area; two areas of PEM1C classified wetlands were identified totaling 0.68 acres, while one area of impounded PABGx totaling 0.02 acres was also mapped. In addition to the three wetland areas, 4 linear wetland features were identified and classified as PEM1A totaling 251 linear feet. Snake Creek itself was identified and classified as R4SBC totaling 1,165 linear feet through our project area, Snake Creek typically contained rocky to bedrock bottom channels, with wetland vegetation A diversion structure and canal taking water for the Midway Irrigation Company was identified and classified as R4SBCx, totaling 264 linear feet. The delineation results for all identified wetland areas are summarized in Table 2 and Figure 8. The lengths of each of the channels identified in Figure 8 are summarized below. A total of 1,680-feet of riverine features were mapped.

Table 2 – Summary of Delineated Features

Wetlands Data			Riverine Data		
ID	**Code**	**Area (ft2)**	**ID**	**Code**	**Linear (Ft)**
1	PEM1C	27629.27	1	PEM1D	38.80
2	PEM1C	2391.20	2	PEM1D	46.50
3	PABGx	955.27	3	PEM1D	117.77
			4	PEM1D	48.25
			5	R4SBCx	263.50
			6	R4SBC	1164.73
	Total	**30975.74**		**Total**	**1679.54**

3.1 WETLANDS

The transition line between wetlands and uplands across the delineation study area occurs mainly as a result of a difference in available water and depth in relation to the groundwater level from Snake Creek. Wetlands are found in the lowland areas of the creek area and low-lying areas where water seeps and springs are found along the western boundary of the site. As shown above in Table 2, two general types of wetland areas were located from the study and can been seen if Figure 8, as well as described below in section 3.1.2.

3.1.1 Riverine Wetlands

Wetlands are mapped in the low lying areas adjacent to the bottom of the drainage channel. They are isolated to pockets of deeper soil areas and lowland areas allow ponding of water, and shallow groundwater levels to support wetland indicators. Shallow potrock was found in the creek channel through the project area. Snake creek was identified and noted to contain an OHWM no greater than 2-feet above the bottom of channel. The smaller palustrine linear channels identified as PEM1D, IDs 1-4 are springs and weeps noted to be seasonal and are anticipated to only contain water during peak storm events and spring melting events. The deeper soils collect and pond the water on the deeper underlying bedrock contacts and keep soils saturated throughout the drier times of the year. Cross sections were completed following the latest OHWM guide and can be seen in Figure 9.

3.1.2 Ponding Wetland

Wetlands mapped in areas where low lying areas slightly depressed or areas with minimal slopes have been created, allowing water to pond during storm and seasonal runoff events. These areas are also continually saturated throughout the growing season as they are fed by seeps, springs and areas of shallow ground water. Soils typically remain saturated seasonally and between rain/runoff events to the extent to support wetland species. Two types of ponding wetlands were identified on the site, PEM1C and a manmade pond R4SBCx, with their respective size and location identified in Table 2 and in Figure 8.

4.0 SUMMARY

In total, three wetland areas were identified and delineated within the delineation study area consisting of a total of 0.70-acres, along with 1679.54 linear feet of riverine/linear channels. The delineation results for all identified wetland areas are summarized in Table 2 and Figure 8 of this report. All wetland sites met the indicators and criteria for wetland delineation. Our team followed all current guidance found in the US Army Corps of Engineers reference materials (see References) while conducting the field work, and while writing this report. Epic Engineering appreciates the opportunity of providing environmental services on this project. If Epic Engineering can answer questions or be of further service, please call.

Respectfully,

Epic Engineering
Not Official Unless Signed

Torrey Copfer, P.G.
Environmental Geologist

Joshua Call, R.S.I.
Staff Biologist

References:

Automated Geographic Reference Center, US Watershed Areas, Utah Watershed areas. May 2020. https://gis.utah.gov/data/water/watersheds/

National Oceanic and Atmospheric Administration, Climate Prediction Center, Drought Monitoring, Palmer Drought Severity Index. May 2020.
https://www.cpc.ncep.noaa.gov/products/monitoring_and_data/drought.shtml

US Army Corps of Engineers, Field Indicators of Hydric Soils in the United States. A Guide for Identifying, and Delineating Hydric Soils. 2010.

US Army Corps of Engineers, Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys and Coast Region (Version 2.0). May 2010.

US Army Corps of Engineers, 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. August 2014.

US Army Corps of Engineers, Western Mountains, Valleys & Coast 2016 Regional Wetland Plant List. 2016.

Western Regional Climate Center, Western U.S. Climate Summaries – NOAA coop stations, Heber City, Utah, Wasatch County. 2020. https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?uthebe

APPENDIX A
FIGURES

epic ENGINEERING

HEBER CITY QUADRANGLE
UTAH
7.5-MINUTE SERIES
SECTION 27, TOWNSHIP 3S, RANGE 4E

WEST

Visitor Center

Ditch Spr

5741

40.528449°, -111.483788°

27

Creek

Graves Mound Crty (Site)

Hot Springs

BENO

N
W
E
S

S:\PROJ\SMALL PROJECTS\2020 PROJECTS\Cosper Subdivision-Midway\GIS\Data\Wetlands\TopoMap.mxd

LEGEND

AOI

SOURCE UTAH AGRC, EPIC ENGINEERING PC

FOR GENERAL ILLUSTRATIVE PURPOSES ONLY; BOUNDARIES NOT SURVEYED.

DATE
5/6/2020

epic ENGINEERING

REVISIONS
1.

DRAWN: JRC
DESIGNER: JRC
REVIEWED: JNS

PROJECT #
20RR002

SCALES
HORIZ: 1"=500'
(11"X17")
0 1/2"

PROJECT NAME:
CARI LANE ESTATES
WETLAND DELINEATION

SHEET TITLE:
24K TOPO MAP

PLAN SET:

FIGURE:
1

S:\PROJS\MALL PROJECTS\2020 PROJECTS\Cosper Subdivision-Midway\GIS\Data\Wetlands\Wetlands.mxd

LEGEND

AOI

WETLANDS

- Freshwater Emergent Wetland
- Freshwater Forested/ Shrub Wetland
- Riverine

WETLAND CODES:

PEM1C-Palustrine, Emergent, Persistent Seasonally Flooded

PSS/EM1C-Palustrine, Scrub-shrub, Emergent, Persistent, Seasonally Flooded

SOURCE UTAH AGRC, EPIC ENGINEERING PC

FOR GENERAL ILLUSTRATIVE PURPOSES ONLY; BOUNDARIES NOT SURVEYED.

DATE

5/6/2020

epic ENGINEERING

REVISIONS
1.

DRAWN: JRC
DESIGNER: JRC
REVIEWED: JNS

PROJECT # 20RR002

SCALES

HORIZ: 1"=100'

(11"X17")

0 1/2" 1

PROJECT NAME:

CARI LANE ESTATES WETLAND DELINEATION

SHEET TITLE:

NATIONAL WETLAND INVENTORY

PLAN SET:

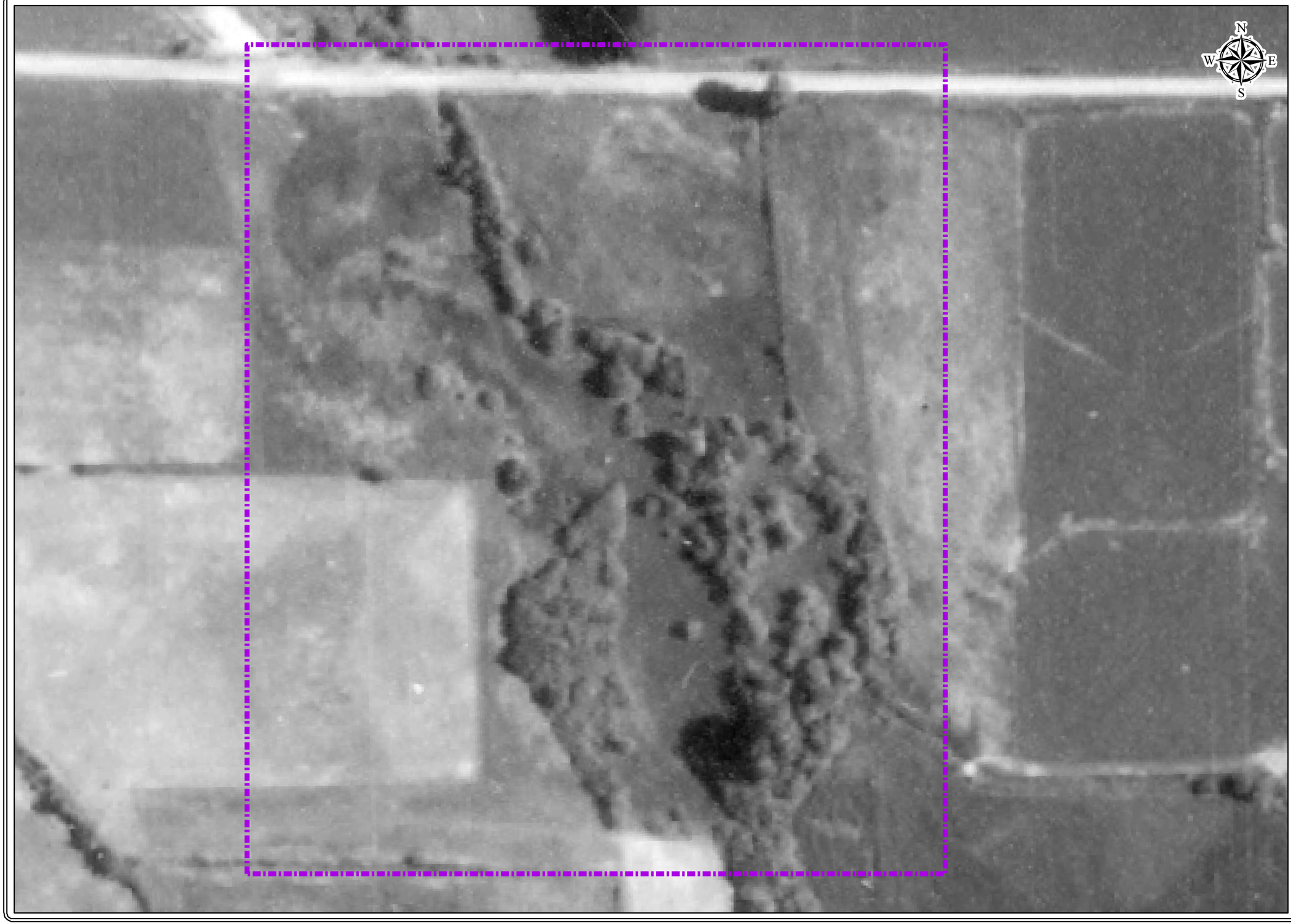
FIGURE: 2

Soil Map—Heber Valley Area, Utah - Parts of Wasatch and Utah Counties
(Cari Lane Estates Wetlands Soil Report)

111° 29' 7" W — 111° 28' 54" W
40° 31' 52" N — 40° 31' 35" N
458890 — 458940 — 458990 — 459040 — 459090 — 459140 — 459190
4486830 — 4486780 — 4486730 — 4486680 — 4486630 — 4486580 — 4486530 — 4486480 — 4486430 — 4486380 — 4486330

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CrC	Crooked Creek clay loam, 3 to 10 percent slopes	1.8	9.1%
Cv	Cudahy silt loam, cold variant	1.2	5.9%
Kc	Kovich loam	9.6	47.3%
Km	Kovich loam, deep water table variant	5.8	28.5%
SpB	Spaa silt loam, 2 to 5 percent slopes	1.9	9.3%
Totals for Area of Interest		**20.3**	**100.0%**

Map Scale: 1:1,440 if printed on B portrait (11" x 17") sheet.
N
0 20 40 80 120 Meters
0 50 100 200 300 Feet
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84



S:\PROJS\SMALL PROJECTS\2020 PROJECTS\Cosper Subdivision-Midway\GIS\Data\Wetlands\1962.mxd

LEGEND

AOI

SOURCES:

Imagery- Utah Geologic Survey, "Historical Imagery Collection: 1962 AD Map Series. Accessed May 11, 2020. https://geodata.geology.utah.gov/imagery/

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DATE

5/11/2020

epic ENGINEERING

REVISIONS
1.

DRAWN: JRC
DESIGNER: JRC
REVIEWED: JNS

PROJECT #
20RR002

SCALES

HORIZ: 1"=100'

(11"X17")

0 1/2"

PROJECT NAME:

CARI LANE ESTATES WETLAND DELINEATION

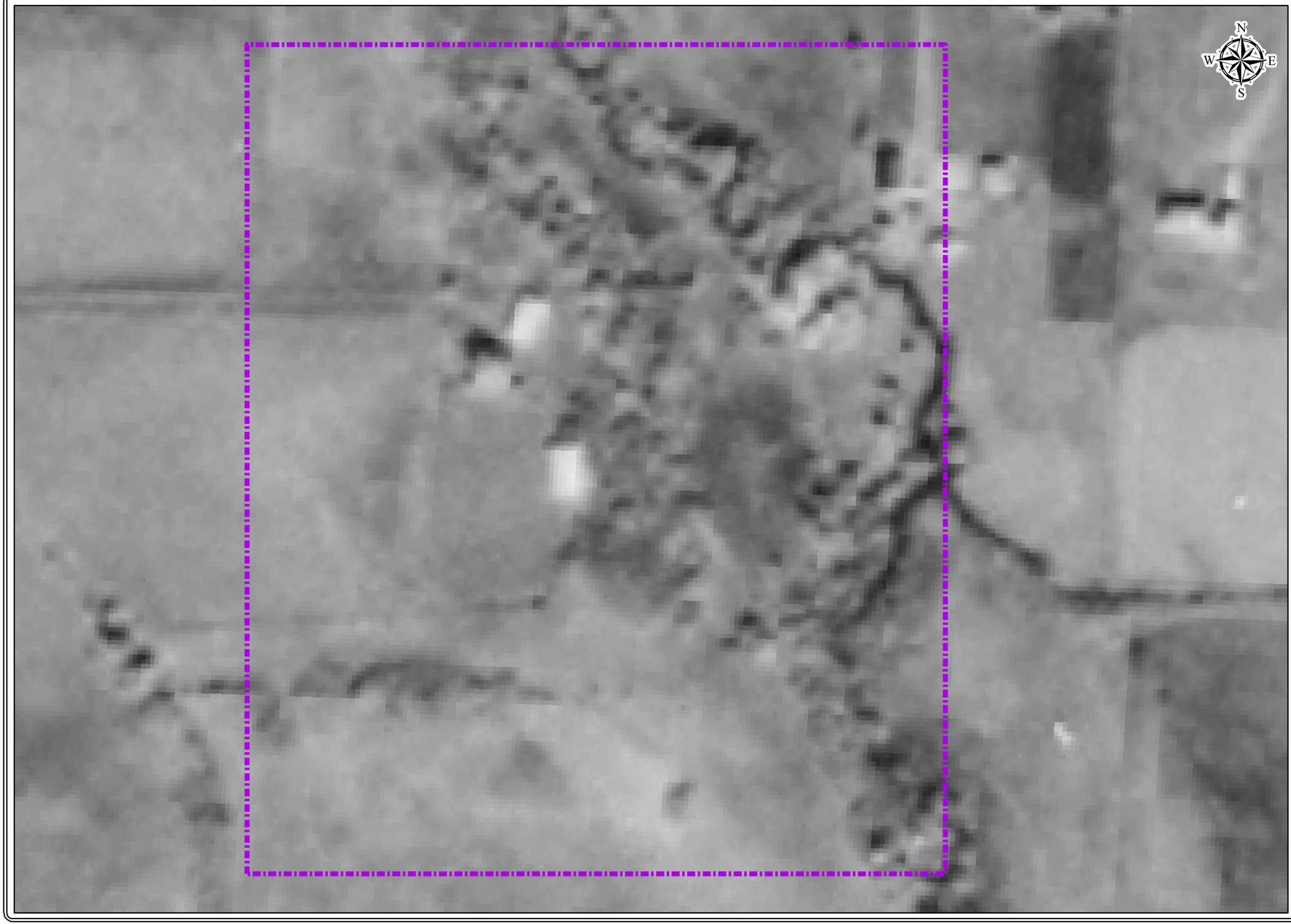
SHEET TITLE:

1962 IMAGERY

PLAN SET:

FIGURE:

4



S:\PROJS\SMALL PROJECTS\2020 PROJECTS\Cosper Subdivision-Midway\GIS\Data\Wetlands\1987.mxd

LEGEND

AOI

SOURCES:

Imagery- Utah Geologic Survey, "Historical Imagery Collection: 1987 AD Map Series. Accessed May 11, 2020. https://geodata.geology.utah.gov/imagery/

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DATE

5/11/2020

epic ENGINEERING

REVISIONS
1.

DRAWN: JRC
DESIGNER: JRC
REVIEWED: JNS

PROJECT # 20RR002

SCALES

HORIZ: 1"=100'

(11"X17")

0 1/2"

PROJECT NAME:

CARI LANE ESTATES WETLAND DELINEATION

SHEET TITLE:

1987 IMAGERY

PLAN SET:

FIGURE: 5

LEGEND

AOI

SOURCES:

Imagery- Utah Geologic Survey, "Historical Imagery Collection: 1990 AD Map Series. Accessed May 11, 2020. https://geodata.geology.utah.gov/imagery/

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DATE
5/11/2020

epic ENGINEERING

REVISIONS
1.

DRAWN: JRC
DESIGNER: JRC
REVIEWED: JNS

PROJECT #
20RR002

SCALES
HORIZ: 1"=100'
(11"X17")
0 1/2"

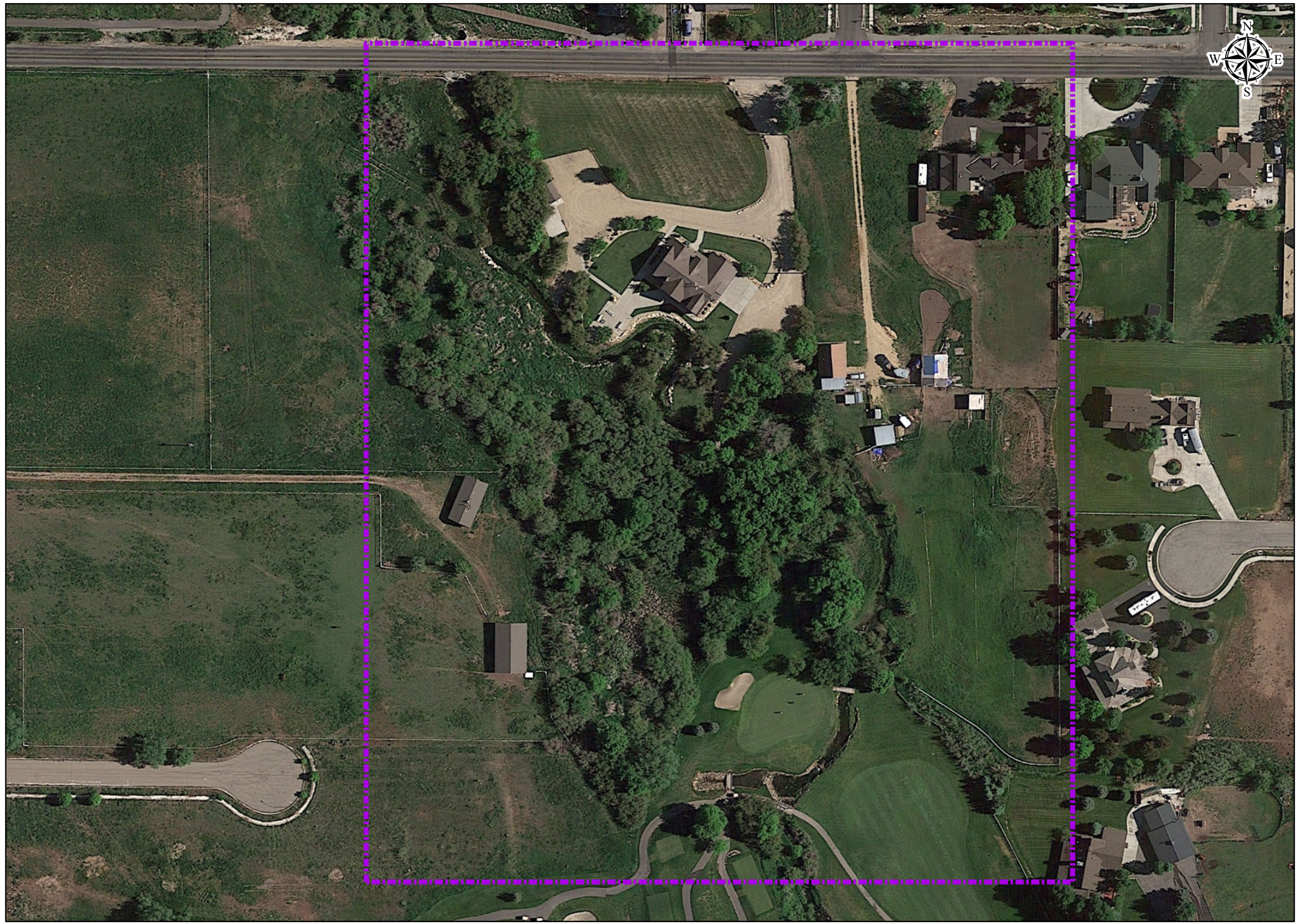
PROJECT NAME:
CARI LANE ESTATES WETLAND DELINEATION

SHEET TITLE:
1962 IMAGERY

PLAN SET:

FIGURE:
6

S:\PROJ\SMALL PROJECTS\2020 PROJECTS\Cosper Subdivision-Midway\GIS\Data\Wetlands\1990.mxd



LEGEND

AOI

SOURCES:

Imagery- Utah Geologic Survey, "Historical Imagery Collection: 2013 AD Map Series. Accessed May 11, 2020. https://geodata.geology.utah.gov/imagery/

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DATE
5/11/2020

epic ENGINEERING

REVISIONS
1.

DRAWN: JRC
DESIGNER: JRC
REVIEWED: JNS

PROJECT # 20RR002

SCALES
HORIZ: 1"=100'
(11"X17")
0 1/2"

PROJECT NAME:
CARI LANE ESTATES WETLAND DELINEATION

SHEET TITLE:
2013 IMAGERY

PLAN SET:

FIGURE:
7

S:\PROJS\SMALL PROJECTS\2020 PROJECTS\Cosper Subdivision-Midway\GIS\Data\Wetlands\2013.mxd

S:\PROJ\SMALL PROJECTS\2020 PROJECTS\Cosper Subdivision-Midway\GIS\Data\Wetlands\DelineatedWetlands.mxd

LEGEND

- LIMIT OF DELINEATION
- CROSS SECTION
- AOI
- DATA POINT

Delineated Wetlands

- PEM1C
- PABGx

Riverine

- PEM1D
- R4SBA
- OHWM

SOURCE UTAH AGRC, EPIC ENGINEERING PC

FOR GENERAL ILLUSTRATIVE PURPOSES ONLY; BOUNDARIES NOT SURVEYED.

DATE
6/18/2020

epic ENGINEERING

REVISIONS
1.

DRAWN: JRC
DESIGNER: JRC
REVIEWED: JNS

PROJECT #
20RR002

SCALES
HORIZ: 1"=80'
(11"X17")
0 1/2"

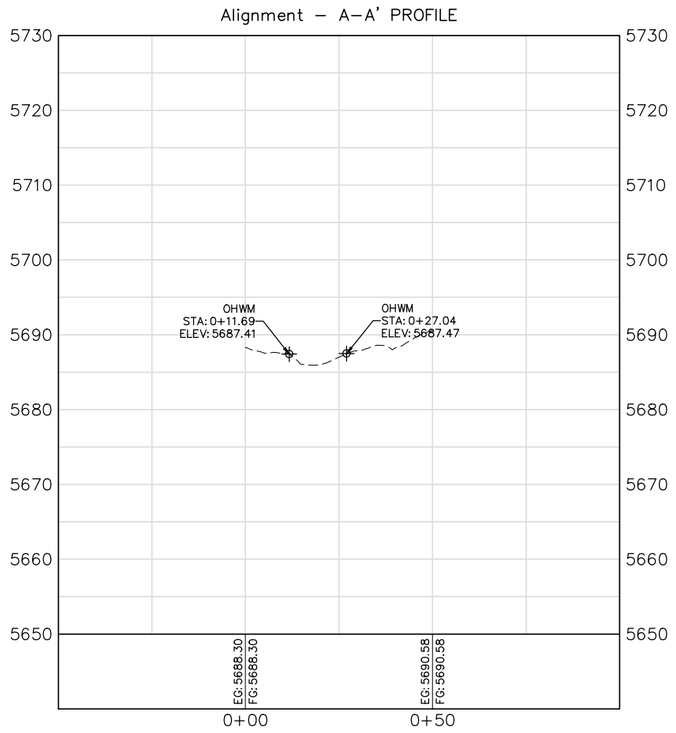
PROJECT NAME:
CARI LANE ESTATES WETLAND DELINEATION

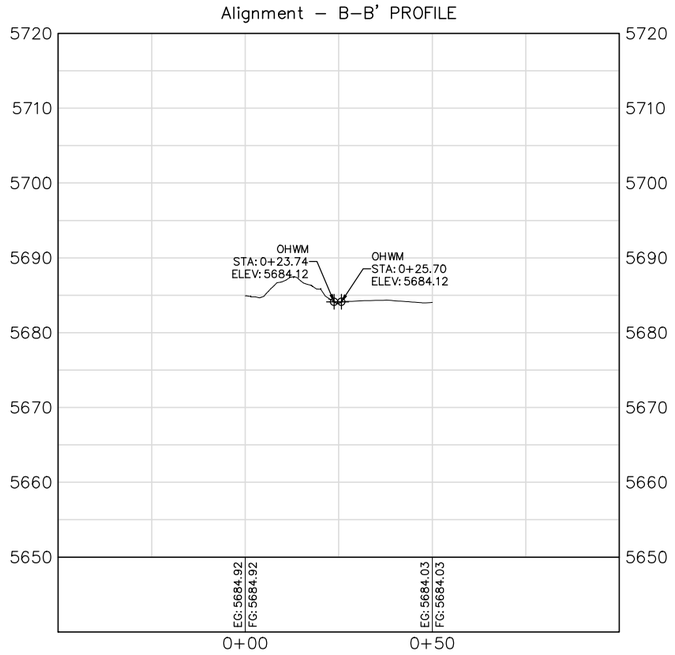
SHEET TITLE:
DELINEATED WETLANDS MAP

PLAN SET:

FIGURE:
8

10/3/19





CONSTRUCTION NOTES

WARNING

CALL BLUE STAKES

epic ENGINEERING

REVISIONS
1.

DRAWN: --
DESIGNER: --
REVIEWED: --

PROJECT #
20RR002

SCALES

HORIZ: 1" = 20'
VERT: 1" = 10'
(24" x 36" SHEET)

0 1"

BAR SCALE MEASURES 1" ON A FULL SIZE SHEET. ADJUST FOR A HALF SIZE SHEET.

PROJECT NAME:
CARI LANE ESTATES
WETLAND DELINEATION

SHEET TITLE:
CROSS SECTIONS

PLAN SET:

FIGURE:
9

S:\PROJ\SMALL PROJECTS\2020 PROJECTS\Cedar Subdivision--Mickey\Wetlands Delineation Report\CROSSSECTIONS1.dwg

APPENDIX B
CUSTOM SOIL RESOURCES REPORT

epic ENGINEERING

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 Heber Valley Area, Utah - Parts of Wasatch and Utah Counties

Cari Lane Estates Wetlands Soil Report

May 11, 2020

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.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

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 Scale: 1:2,040 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 30 60 120 180

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Heber Valley Area, Utah - Parts of Wasatch and Utah Counties
Survey Area Data: Version 10, Sep 16, 2019

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

Date(s) aerial images were photographed: Jun 14, 2016—Nov 8, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

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
CrC	Crooked Creek clay loam, 3 to 10 percent slopes	1.8	9.1%
Cv	Cudahy silt loam, cold variant	1.2	5.9%
Kc	Kovich loam	9.6	47.3%
Km	Kovich loam, deep water table variant	5.8	28.5%
SpB	Spaa silt loam, 2 to 5 percent slopes	1.9	9.3%
Totals for Area of Interest		**20.3**	**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.

Heber Valley Area, Utah - Parts of Wasatch and Utah Counties

CrC—Crooked Creek clay loam, 3 to 10 percent slopes

Map Unit Setting

National map unit symbol: jxp9
Mean annual precipitation: 16 to 22 inches
Mean annual air temperature: 40 to 45 degrees F
Frost-free period: 70 to 90 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Crooked creek and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Crooked Creek

Setting

Landform: Alluvial fans
Down-slope shape: Concave
Across-slope shape: Convex

Typical profile

A11, A12 - 0 to 12 inches: clay loam
C1 - 12 to 23 inches: clay loam
C2 - 23 to 33 inches: silty clay
C3 - 33 to 42 inches: clay loam
C4 - 42 to 50 inches: clay
C5 - 50 to 70 inches: clay loam

Properties and qualities

Slope: 3 to 10 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water storage in profile: High (about 10.2 inches)

Interpretive groups

Land capability classification (irrigated): 4w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D
Ecological site: Interzonal Wet Fresh Meadow (Sedge) (R047XA008UT)
Hydric soil rating: Yes

Cv—Cudahy silt loam, cold variant

Map Unit Setting

National map unit symbol: jxpb
Mean annual precipitation: 16 to 22 inches
Mean annual air temperature: 40 to 45 degrees F
Farmland classification: Farmland of statewide importance

Map Unit Composition

Cudahy and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cudahy

Setting

Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Concave

Typical profile

A11 - 0 to 9 inches: silt loam
A12 - 9 to 16 inches: clay loam
C1 - 16 to 26 inches: silty clay loam
C2 - 26 to 30 inches: indurated
C3 - 30 to 60 inches: silty clay loam, loam, silt loam
C3 - 30 to 60 inches:
C3 - 30 to 60 inches:

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 20 to 40 inches to undefined
Natural drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.02 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Calcium carbonate, maximum in profile: 60 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 10.0
Available water storage in profile: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): 4w
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: D
Ecological site: Interzonal Wet Fresh Meadow (Sedge) (R047XA008UT)
Hydric soil rating: Yes

Minor Components

Rock land

Percent of map unit: 5 percent

Kc—Kovich loam

Map Unit Setting

National map unit symbol: jxqp
Mean annual precipitation: 16 to 22 inches
Mean annual air temperature: 40 to 45 degrees F
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Kovich

Setting

Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Concave

Typical profile

A11, A12 - 0 to 11 inches: loam
A13, A14 - 11 to 29 inches: loam
2C1 - 29 to 41 inches: extremely cobbly sandy clay loam
2C2 - 41 to 60 inches: extremely gravelly sand

Properties and qualities

Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: Rare
Frequency of ponding: None
Available water storage in profile: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: B/D
Ecological site: Interzonal Wet Fresh Meadow (Sedge) (R047XA008UT)
Hydric soil rating: Yes

Minor Components

Peaty surface soils

Percent of map unit: 5 percent
Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: Interzonal Wet Fresh Meadow (Sedge) (R047XA008UT)
Hydric soil rating: Yes

Limey soils

Percent of map unit: 5 percent

Km—Kovich loam, deep water table variant

Map Unit Setting

National map unit symbol: jxqs
Elevation: 5,500 to 6,200 feet
Mean annual precipitation: 16 to 20 inches
Mean annual air temperature: 43 to 45 degrees F
Frost-free period: 70 to 90 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Kovich and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kovich

Setting

Landform: Flood plains, stream terraces
Landform position (three-dimensional): Tread, talf, dip
Down-slope shape: Linear
Across-slope shape: Concave

Typical profile

A1p, A12 - 0 to 16 inches: loam
C1 - 16 to 27 inches: silt loam
C2, C3 - 27 to 60 inches: loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 30 to 42 inches
Frequency of flooding: Rare

Frequency of ponding: None
Available water storage in profile: High (about 9.7 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Hydrologic Soil Group: C
Ecological site: Interzonal Cold Semiwet Fresh Meadow (Meadow Sedge/Tufted Hairgrass) (R047XA004UT)
Hydric soil rating: No

Minor Components

Poorly drained soils

Percent of map unit: 5 percent
Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

SpB—Spaa silt loam, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: jxrt
Mean annual precipitation: 16 to 22 inches
Mean annual air temperature: 40 to 45 degrees F
Farmland classification: Not prime farmland

Map Unit Composition

Spaa and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Spaa

Setting

Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

Ap - 0 to 8 inches: silt loam
A12 - 8 to 15 inches: silt loam
C1 - 15 to 17 inches: loam
R - 17 to 21 inches: weathered bedrock

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Natural 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 in profile: 40 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very low (about 2.9 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: Mountain Shallow Loam (Mountain Big Sagebrush) (R047XA446UT)
Hydric soil rating: No

Minor Components

Deep soils

Percent of map unit: 5 percent

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

APPENDIX C
FIELD FORMS

epic ENGINEERING

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Cari Lane Estates City/County: Midway - Wasatch Co Sampling Date: 5-1-2020

Applicant/Owner: RIMROCK LLC State: _____ Sampling Point: 1A

Investigator(s): Torrey Copfer - Josh Call Section, Township, Range: S27-T3S-R4E

Landform (hillslope, terrace, etc.): Stream bottom Local relief (concave, convex, none): concave Slope (%): 1-5%

Subregion (LRR): E - Rocky Mts - 47 Wasatch Lat: 40.5284-11 Long: -111.483759 Datum: ~~NAD83~~ WGS84

Soil Map Unit Name: KOVICH Loam NWI classification: PSS/EMIC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? NO Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? NO (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes _____ No X
Hydric Soil Present?	Yes _____ No X	
Wetland Hydrology Present?	Yes _____ No X	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Juncus spp.	25		FACW
2. Eleocharis palustris	40		OBL
3. Poa spp.	35		FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	40	x 1 =	40
FACW species	25	x 2 =	50
FAC species	35	x 3 =	105
FACU species	_____	x 4 =	_____
UPL species	_____	x 5 =	_____
Column Totals:	100 (A)		195 (B)

Prevalence Index = B/A = 1.95

Hydrophytic Vegetation Indicators:

- X 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- X 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No _____

Remarks:

SOIL

Sampling Point: 1A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
18	5YR-4/2	100					Sandy loam	Dry to Moist

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Cari Lane Estates City/County: Midway - Wasatch Co. Sampling Date: 5-1-2020

Applicant/Owner: RIMROCK LLC State: _____ Sampling Point: 1b

Investigator(s): Torrey Copfer - Josh Call Section, Township, Range: S27-T3S-R4E

Landform (hillslope, terrace, etc.): Stream bottom Local relief (concave, convex, none): concave Slope (%): 1-5%

Subregion (LRR): E - Rocky Mts - 47 Wasatch Lat: 40.528428 Long: -111.483761 Datum: ~~NAD83~~ WGS84

Soil Map Unit Name: KOVICH Loam NWI classification: PSS/EMK

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? NO Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? NO (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. juncus spp.	15		FACW
2. eleocharis plustrs	35		OBL
3. poa spp	30		FAC
4. lemna minor	20		OBL
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	_____ = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 00

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	55	x 1 =	55
FACW species	15	x 2 =	30
FAC species	30	x 3 =	90
FACU species	_____	x 4 =	_____
UPL species	_____	x 5 =	_____
Column Totals:	100 (A)		175 (B)

Prevalence Index = B/A = 1.75

Hydrophytic Vegetation Indicators:

X 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No _____

Remarks:

SOIL

Sampling Point: 16

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
18	5YR 2.5	100					loam	wet

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ✓ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ✓ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ✓ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ✓ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ✓ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ✓ No ___ Depth (inches): _____

Water Table Present? Yes ✓ No ___ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Cari Lane Estates City/County: Midway - Wasatch Co Sampling Date: 5-1-2020

Applicant/Owner: RIMROCK LLC State: _____ Sampling Point: 2a

Investigator(s): Torrey Copfer - Josh Call Section, Township, Range: S27-T3S-R4E

Landform (hillslope, terrace, etc.): Stream bottom Local relief (concave, convex, none): concave Slope (%): 1-5%

Subregion (LRR): E - Rocky Mts - 47 Wasatch Lat: 40.528333 Long: -111.483927 Datum: WGS84

Soil Map Unit Name: KOVICH Loam NWI classification: PSS/EMIC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? NO Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? NO (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes _____ No X
Hydric Soil Present?	Yes _____ No X	
Wetland Hydrology Present?	Yes _____ No X	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix spp.	60	X	FACW
2.			
3.			
4.			
	60 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Poa spp.	20		FAC
2. Eleocharis palustris	20		OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	40 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 20

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	20	x 1 =	20
FACW species	60	x 2 =	120
FAC species	20	x 3 =	60
FACU species	_____	x 4 =	_____
UPL species	_____	x 5 =	_____
Column Totals:	100 (A)		200 (B)

Prevalence Index = B/A = 2.0

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- X 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No _____

Remarks:

SOIL

Sampling Point: 2a

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
18	5YR 4-2	100					Sandy loam dry	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Cari Lane Estates City/County: Midway - Wasatch Co. Sampling Date: 5-1-2020

Applicant/Owner: RIMROCK LLC State: _____ Sampling Point: 2b

Investigator(s): Torrey Copfer - Josh Call Section, Township, Range: S27-T3S-R4E

Landform (hillslope, terrace, etc.): Stream bottom Local relief (concave, convex, none): concave Slope (%): 1-5%

Subregion (LRR): E - Rocky Mts - 47 Wasatch Lat: 40.528341 Long: -111.483963 Datum: WGS84

Soil Map Unit Name: KOVICH Loam NWI classification: PSS/2Aic

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? NO Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? NO (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No _____	Is the Sampled Area within a Wetland? Yes _____ No _____
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix spp.	40	X	FACW
2. Crataegus douglasii	10	X	FAC
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Lemna minor	20		OBL
2. juncus spp.	0		FACW
3. Typha spp.	60	X	OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	_____ = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species 80	x 1 = 80
FACW species 10	x 2 = 20
FAC species 10	x 3 = 30
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: 100 (A)	130 (B)

Prevalence Index = B/A = 1.30

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- X 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No _____

Remarks:

SOIL

Sampling Point: 26

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
18	5YR 2.5-1	100					Wet mucky loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- X 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- X Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- X Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes X No ___ Depth (inches): 3-4"

Water Table Present? Yes X No ___ Depth (inches): surface

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Area appeared with water on Google Earth Imagery

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Cari Lane Estates City/County: Midway - Wasatch Co Sampling Date: 5-1-2020

Applicant/Owner: RIMROCK LLC State: _____ Sampling Point: 2c

Investigator(s): Torrey Copfer - Josh Call Section, Township, Range: S27-T3S-R4E

Landform (hillslope, terrace, etc.): Stream bottom Local relief (concave, convex, none): concave Slope (%): 1-5%

Subregion (LRR): E-Rocky Mts-47 Wasatch at: 40.528597 Long: -111.484072 Datum: WGS84

Soil Map Unit Name: KOVICH Loam NWI classification: PSS/EMIC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? NO Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? NO (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes _____ No X
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes _____ No X	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Dactylis glomerata	40		FACU
2. Eleocharis palustris	20		OBL
3. poa spp.	30		FAC
4. Rumex crispis	10		FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		
% Bare Ground in Herb Stratum _____			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	20	x 1 =	20
FACW species	_____	x 2 =	_____
FAC species	40	x 3 =	120
FACU species	40	x 4 =	160
UPL species	_____	x 5 =	_____
Column Totals:	100 (A)		300 (B)

Prevalence Index = B/A = 3.0

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No _____

Remarks:

SOIL

Sampling Point: 2c

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
18	5YR 3/2	100					Dark Surface	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ✓ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ✓ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ___ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes ___ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Cari Lane Estates City/County: Midway - Wasatch Co Sampling Date: 5-1-2020

Applicant/Owner: RIMROCK LLC State: _____ Sampling Point: 2d

Investigator(s): Torrey Copfer - Josh Call Section, Township, Range: S27-T3S-R4E

Landform (hillslope, terrace, etc.): Stream bottom Local relief (concave, convex, none): concave Slope (%): 1-5%

Subregion (LRR): E - Rocky Mts - 47 Wasatch Lat: 40.528578 Long: -111.484076 Datum: WGS84

Soil Map Unit Name: KOVICH Loam NWI classification: PSS/EMC1

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? NO Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? NO (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Typha spp.	50	X	OBL
2. Phragmites australis	20	X	FACW
3. Lemna minor	30	X	OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	_____ = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	100	x 1 =	100
FACW species	20	x 2 =	40
FAC species	_____	x 3 =	_____
FACU species	_____	x 4 =	_____
UPL species	_____	x 5 =	_____
Column Totals:	120 (A)		140 (B)

Prevalence Index = B/A = 1.2

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- A 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No _____

Remarks:

Invasive Phrag.

SOIL

Sampling Point: 2d

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
18	5YR 2.5-1	100					Muck	wet

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- [x] Histosol (A1)
- [ ] Histic Epipedon (A2)
- [ ] Black Histic (A3)
- [ ] Hydrogen Sulfide (A4)
- [ ] Depleted Below Dark Surface (A11)
- [x] Thick Dark Surface (A12)
- [ ] Sandy Mucky Mineral (S1)
- [ ] Sandy Gleyed Matrix (S4)
- [ ] Sandy Redox (S5)
- [ ] Stripped Matrix (S6)
- [ ] Loamy Mucky Mineral (F1) **(except MLRA 1)**
- [ ] Loamy Gleyed Matrix (F2)
- [ ] Depleted Matrix (F3)
- [ ] Redox Dark Surface (F6)
- [ ] Depleted Dark Surface (F7)
- [ ] Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- [x] 2 cm Muck (A10)
- [ ] Red Parent Material (TF2)
- [ ] Very Shallow Dark Surface (TF12)
- [ ] Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes [x] No [ ]

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- [x] Surface Water (A1)
- [x] High Water Table (A2)
- [x] Saturation (A3)
- [ ] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [ ] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [ ] Surface Soil Cracks (B6)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [ ] Sparsely Vegetated Concave Surface (B8)
- [ ] Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- [ ] Salt Crust (B11)
- [ ] Aquatic Invertebrates (B13)
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Stunted or Stressed Plants (D1) **(LRR A)**
- [ ] Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- [ ] Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- [ ] Drainage Patterns (B10)
- [ ] Dry-Season Water Table (C2)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)
- [ ] Raised Ant Mounds (D6) **(LRR A)**
- [ ] Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes [x] No [ ] Depth (inches): _____

Water Table Present? Yes [x] No [ ] Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes [x] No [ ] Depth (inches): _____

Wetland Hydrology Present? Yes [x] No [ ]

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Cosper / Cari City/County: Midway / Wasatch Sampling Date: 6/18

Applicant/Owner: Rimrock LLC State: UT Sampling Point: Envelope 3A

Investigator(s): Josh Call, Tovey Cepher, Rachel Section, Township, Range: S27 T3S R4E

Landform (hillslope, terrace, etc.): stream bottom Local relief (concave, convex, none): concave Slope (%): 1-5

Subregion (LRR): E Rocky Mts Lat: 40.52862 Long: -111.483583 Datum: WGS 84

Soil Map Unit Name: Karish Loam NWI classification: PSS Emic

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No X
Hydric Soil Present?	Yes _____	No X	
Wetland Hydrology Present?	Yes _____	No X	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Maianthemum stellatum	90	✓	FAC
2. Lysichiton americanus	10		OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	_____ = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		
% Bare Ground in Herb Stratum _____			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	10	x 1 =	10
FACW species	_____	x 2 =	_____
FAC species	90	x 3 =	270
FACU species	_____	x 4 =	_____
UPL species	_____	x 5 =	_____
Column Totals:	100 (A)		280 (B)

Prevalence Index = B/A = 2.8

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No _____

Remarks:

SOIL

Sampling Point: 3A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
12	5YR 2.5-2							
18+	5YR 5-1							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Cooper / Cari City/County: Midway / Wasatch Sampling Date: 6/18

Applicant/Owner: Rimrock LLC State: UT Sampling Point: Midmar 3B

Investigator(s): Josh Call, Torrey Cooper Rachel Section, Township, Range: S27 T3S R4E

Landform (hillslope, terrace, etc.): stream bottom Local relief (concave, convex, none): concave Slope (%): 1-5

Subregion (LRR): E Rocky Mts Lat: 40.528669 Long: -111.483813 Datum: WGS84

Soil Map Unit Name: Kavich Loam NWI classification: PSS/EMIC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? no Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? no (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No X
Hydric Soil Present?	Yes _____	No X	
Wetland Hydrology Present?	Yes _____	No X	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. willow Salix spp	15		FACW
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Houndstongue Cynoglossum officinale	30	✓	FACU
2. Rock lichen Lysichitum americanus	20		OBL
3. Brome smooth Bromus inermis	10		UPL
4. purp flower Solanum dulcamara	15		FAC
5. thistle spp Cirsium spp.	5		FAC
6. burdock Arctium minus	5		UPL
7.			
8.			
9.			
10.			
11.			
	_____ = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species 20	x 1 = 20
FACW species 15	x 2 = 30
FAC species 20	x 3 = 60
FACU species 30	x 4 = 120
UPL species 15	x 5 = 75
Column Totals: 100 (A)	305 (B)

Prevalence Index = B/A = 2.05

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No _____

Remarks:

SOIL

Sampling Point: _____

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
13	5YK 2.5/1							
13+	5YR 5/1							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Cosper Cari City/County: WACO Sampling Date: 6/18

Applicant/Owner: Rimrock State: UT Sampling Point: 3C

Investigator(s): Josh Toney Rachel Section, Township, Range: S27 T3S R4E

Landform (hillslope, terrace, etc.): stream bottom Local relief (concave, convex, none): Concave Slope (%): 1-3

Subregion (LRR): Rocky mtn Lat: 40.528738 Long: -111-403813 Datum: WGS84

Soil Map Unit Name: Kovich NWI classification: PSS/SMC1

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No _____	Is the Sampled Area within a Wetland? Yes _____ No X
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes _____ No X	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. Box Elder Acer negundo	40	✓	FAC
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: _____)			
1. Burdock Arctium minus	5		UPL
2. Solanum dulcamara	15		FAC
3. Lysichiton americanus	20		OBL
4. Heracleum lanatum Cynoglossum officinale	20		FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	= Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species 20	x 1 = 20
FACW species _____	x 2 = _____
FAC species 55	x 3 = 165
FACU species 20	x 4 = 80
UPL species 5	x 5 = 25
Column Totals: 100 (A)	290 (B)

Prevalence Index = B/A = 2.9

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No _____

Remarks:

SOIL

Sampling Point: _____

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
14	5YR 3/3-2							
17+	5YR 5-1							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Cosper / Cari City/County: _____ Sampling Date: 6/18

Applicant/Owner: Rimrock State: _____ Sampling Point: Prop Conv 3D

Investigator(s): Josh, Rachel Tenney Section, Township, Range: S27 T3S R4E

Landform (hillslope, terrace, etc.): Stream bottom Local relief (concave, convex, none): Concave Slope (%): 1-3

Subregion (LRR): E Rocky Mtn. Lat: 40.5298604 Long: -111.484116 Datum: 84

Soil Map Unit Name: Kaysich Loam NWI classification: PSS/SMC1

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No _____ Hydric Soil Present? Yes _____ No _____ Wetland Hydrology Present? Yes _____ No _____	**Is the Sampled Area within a Wetland?** Yes _____ No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. Box elder Acer negundo	35	✓	FAC
2. willow Salix spp	20		FACW
3.			
4.			
	55 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Nettle Urtica dioica	5		FAC
2. Big leaf Lysichitum americanum	20		OBL
3. Poa pratensis	5		FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	30 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 15

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	20	x 1 =	20
FACW species	20	x 2 =	40
FAC species	45	x 3 =	135
FACU species	_____	x 4 =	_____
UPL species	_____	x 5 =	_____
Column Totals:	85 (A)		195 (B)

Prevalence Index = B/A = 2.29

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No _____

Remarks:

SOIL

Sampling Point: _____

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
13	5YR 5-1							
19+	5YR 5-1							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ✓ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✗

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

APPENDIX D
FIELD PHOTOS

epic ENGINEERING

RIMROCK ENGINEERING & DEVELOPMENT

December 12, 2023

To: Midway City Planning Department

Attn: Michael Henke, Floodplain Manager

From: Devin Earl – Rimrock Engineering & Development

RE: Clark Subdivision – Floodplain Development Analysis

Mr. Henke

This memo is regarding the floodplain along Snake Creek for the proposed bridge that will provide a driveway access across Snake Creek for a future residential lot located on current Wasatch County Parcel 00-0006-1817 with a physical address of approximately 535 Cari Lane, Midway, Utah. I have worked with Mr. Clark to complete a site visit and topographic survey of his property, to determine where the additional cross sections should be created to analyze the effects of the proposed bridge.

I received a copy of the FEMA current effective hydraulic model and used that model in HEC-RAS 6.2 software to add the new cross sections necessary to analyze the addition of the bridge. In the current effective model, the river stations for the area we are analyzing ranged from river station 23856.43 to 25040.43 with 23856.43 being the downstream end of the analysis, which is section AP on FEMA FIRM Map 49051C0113E, and section 25040.43 being the upstream end of the analysis which is located just below Cari Lane as section AS shown on the previously referenced FIRM map. The section of river that was analyzed is also shown on FEMA FIS #49051CV000A on panel 40P effective March 15, 2012.

In order to analyze the impact of the new bridge, four new cross sections were added to the model that was previously updated in May of 2023 for the pedestrian bridge located near river station 24620 to create the corrected effective model. The previous model added cross sections being located at river station 24499, 24611, 24626, and 24884 which were unchanged in this analysis. The four new cross sections added to analyze the proposed driveway bridge were added at sections 24239, 24294, 24331, and 24467. The new cross sections were created using a combination of field survey and USGS available LiDAR data. The survey was completed in the North American Vertical Datum of 1988 (NAVD88) and was spatially referenced in the North American Datum of 1983 (NAD83). The LiDAR data used was the USGS one-meter x45y449 UT FEMAHQ B2 QL1 2018 with a publication date of 2020-03-30 which was available within the RAS-Mapper feature of HEC-RAS 6.2. The elevation data within this model are bare earth elevation values referenced to the North American Vertical Datum of 1988 (NAVD88) and are spatially referenced in North American Datum of 1983 (NAD83) which lines up with the survey data.

Three different models were completed and were as follows:

1. Current Effective Model with no changes
2. Corrected Effective Model (adding 8 new cross sections & upstream pedestrian bridge)
3. Proposed Project Model (adding the proposed bridge to the Corrected Effective Model)

The Current Effective Model was run to check the model against the FIRM panel base flood elevations and to make sure the model was working. This model did not have any changes done to it and as such does not have elevations listed for the new cross sections in the area that we are analyzing.

5513 W 11000 N #435
Highland, UT 84003

The corrected effective model resulted in the addition of eight cross sections, one structure, and shifted two of the existing cross sections from the current effective model as those two sections improperly had an overlap. The first 4 sections and structure added were from the previous "Completed Project Model" from May of 2023 which analyzed the recently constructed pedestrian bridge. Those cross sections were located at river stations 24884, 24626, 24611, and 24499 with the bridge located at 24620. To analyze any effects from the proposed driveway bridge four additional cross sections were added at river stations 24239, 24294, 24331, and 24467 to create a baseline to see if the proposed structure would cause a rise in the floodplain. When adding the new cross sections there were two existing downstream cross sections located at station 24098.27 and 24181.7 that already overlapped improperly and made it difficult to add the new cross sections as the east side of the creek is on the inside of a bend where the cross sections converge as they are to be perpendicular to the flow path of the flood plain. In order to correct the existing overlap and allow enough room for the new cross sections to not overlap the sections were slightly shifted and cross section 24098.27 became section 24103 and cross section 24181.7 became 24158. When the cross sections were adjusted, the elevations were also updated to match the recent survey so that the information would be as current as possible for the model. When corrected effective model was completed, it showed some changes to the current effective water surface elevations which was to be expected as additional data is being added to the model therefore making it more detailed and is the purpose for creating the corrected effective model. The Corrected Effective model with the new cross sections was used as the new baseline to check for a rise with the proposed project.

The Proposed Project Model was then created using the Corrected Effective Model and adding the proposed driveway bridge at river station 24326 which is to have a clear span of 35-feet and be 24-feet wide. The bridge will not have any negative disturbances in the flood plain as it is proposed to completely span the primary creek channel, and the bottom of the girders are to sit at a minimum of 1-foot above the water surface elevation of the 100-year flood. The abutment on the west side of the creek will be located near the outer edge of the floodplain and the abutment on the east side of the creek will be approximately 25-feet within the floodplain where the flood waters would be expected to be moving slow due to shallow depth and thick existing vegetative cover. The initial modeling resulted in a very slight increase in water surface elevation immediately upstream of the bridge which can be offset by removing small amounts of material within the existing high-water mark in the main channel to create more of a trapezoidal channel with a flat bottom to allow for slightly greater capacity. When the model was updated to account for the minor improvements/removal of material from the channel the result was a slight drop in the floodplain elevations as seen in the Table 1 below. The slight drop in water surface elevation is due to a decrease in the wetted perimeter and the Manning's roughness coefficients would improve along the bridge abutments which results in an overall slight improvement in flow. It is recommended that the channel grading modifications begin approximately 10-feet upstream from river station 24331 and carry a constant grade to the proposed elevations at river station 24294 for a total length of 47-feet. The cross sections in Appendix C show the proposed grading changes.

RIMROCK ENGINEERING & DEVELOPMENT

Table 1 – Summary of HEC-RAS Results for the 100-Year Flood Event (610 cfs)

River Station	Current Effective Model W.S.E.	Corrected Effective Model W.S.E.	Completed Project Model W.S.E.	Delta W.S.E.
25057.10 CARI LANE	N/A	N/A	N/A	N/A
25040.43	5697.55	5697.54	5697.54	0.00
24971.71	5695.24	5695.37	5695.37	0.00
24884.00	N/A	5694.90	5694.90	0.00
24626.00	N/A	5692.83	5692.83	0.00
24620.00 BRIDGE	N/A	N/A	N/A	N/A
24611.00	N/A	5692.55	5692.55	0.00
24499.00	N/A	5691.58	5691.58	0.00
24467.00	N/A	5691.22	5691.22	0.00
24331.00	N/A	5689.35	5689.34	-0.01
24326.00 DRIVEWAY	N/A	N/A	N/A	N/A
24294.00	N/A	5688.83	5688.82	-0.01
24239.00	N/A	5687.32	5687.32	0.00
24181.70/24158.00	5686.24	5686.90	5686.90	0.00
24098.27/24103.00	5685.76	5686.30	5686.30	0.00
24058.81	5685.32	5685.28	5685.28	0.00
24047.94	5685.05	5685.05	5685.05	0.00
23998.78	5684.64	5684.64	5684.64	0.00
23856.43	5683.16	5683.17	5683.17	0.00

In summary the proposed bridge along with minor grading in the channel will result in **zero rise** to the base flood elevation at any point upstream or downstream of the project. The HEC-RAS result tables & profiles, proposed grading profiles, and the FEMA Firmette & FIS profile have been attached as appendices to this report. Copies of the HEC-RAS model may be obtained upon request. A state stream alteration permit will need to be obtained prior to work beginning within the stream banks.

It should also be noted that development outside the designated floodway, but within the floodway fringe, is acceptable if it does not increase the base flood elevation by more than one foot. Please see the FEMA *Guidance for Flood Risk Analysis and Mapping*, *November 2021* section 2.1 for additional information. Furthermore, it should be noted that the model is completed assuming that the stream channel both upstream and downstream of the project are free of debris or other blockages.

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RIMROCK ENGINEERING & DEVELOPMENT

If any additional information is needed or for any questions, please feel free to reach me by phone at 801-664-2947 or by email at dearl@re-n-d.com.

Thank you,

Devin Earl, P.E.

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Appendix A - FEMA DATA

National Flood Hazard Layer FIRMette

FEMA

111°29'22"W 40°31'59"N

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

1:6,000

111°28'44"W 40°31'32"N

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

Legend

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

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

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

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

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

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

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

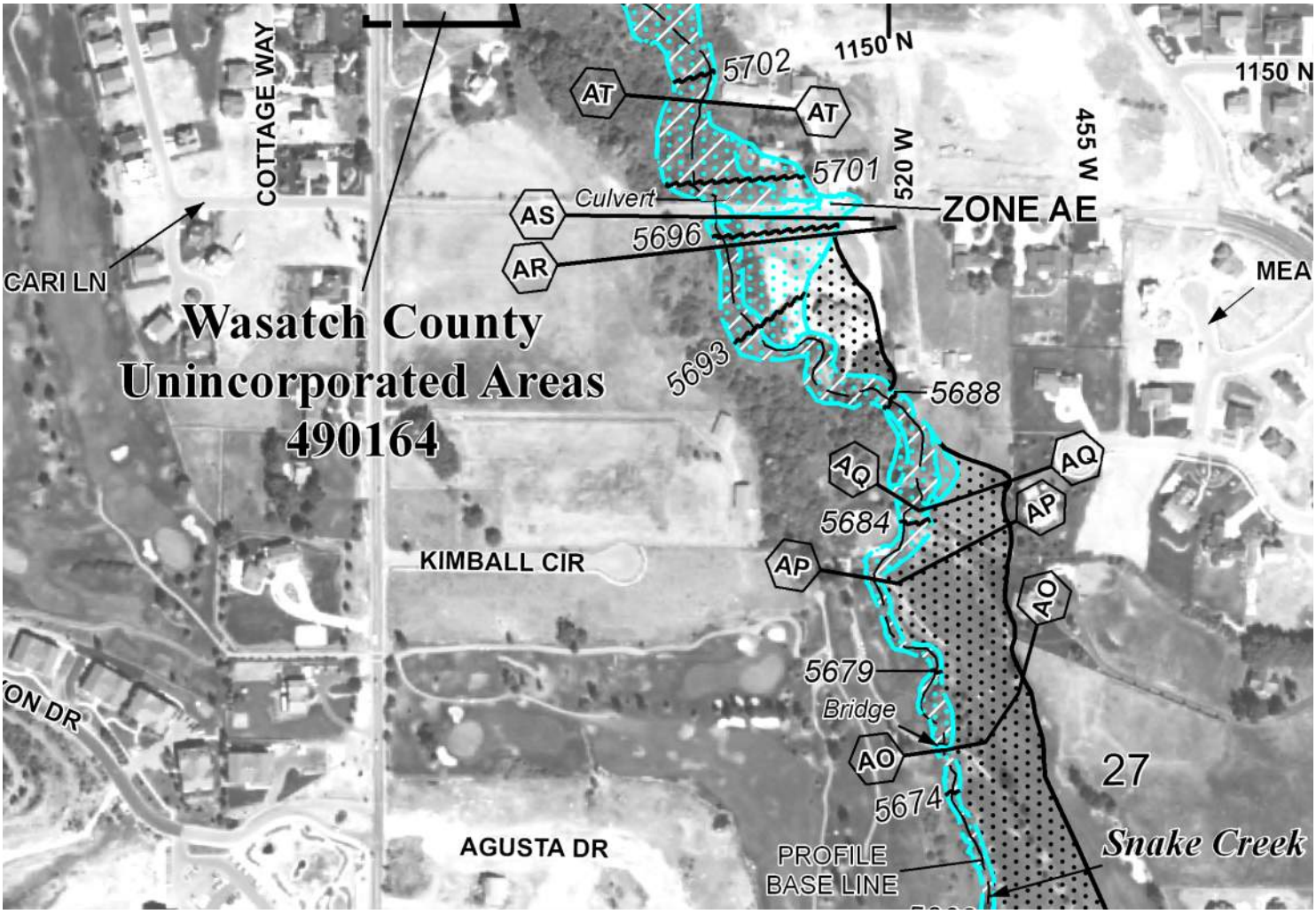
N

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

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 5/11/2023 at 2:45 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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



SCREENSHOT OF FIRM PANEL 49051C0113E FOR PROJECT AREA

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Snake Creek								
AA	14,449	26	81	7.7	5,548.0	5,548.0	5,548.0	0.0
AB	15,672	95	124	5.1	5,566.1	5,566.1	5,566.2	0.1
AC	16,460	123	173	3.6	5,576.9	5,576.9	5,577.7	0.8
AD	17,023	47	77	8.1	5,585.5	5,585.5	5,585.5	0.0
AE	17,378	25	110	6.1	5,588.3	5,588.3	5,588.6	0.3
AF	17,925	49	128	4.8	5,596.4	5,596.4	5,597.2	0.8
AG	18,388	58	77	10.3	5,603.7	5,603.7	5,603.7	0.0
AH	18,476	88	124	5.8	5,606.7	5,606.7	5,606.8	0.1
AI	19,574	121	134	5.1	5,615.5	5,615.5	5,615.5	0.0
AJ	19,698	55	117	5.5	5,616.3	5,616.3	5,616.6	0.3
AK	20,648	23	63	10.0	5,625.8	5,625.8	5,625.9	0.1
AL	21,630	18	66	9.3	5,637.3	5,637.3	5,637.5	0.2
AM	22,183	86	110	5.6	5,654.4	5,654.4	5,654.5	0.1
AN	22,495	42	85	7.2	5,657.7	5,657.7	5,657.8	0.1
AO	23,382	26	72	8.5	5,676.0	5,676.0	5,676.1	0.1
AP	23,856	34	91	6.7	5,683.2	5,683.2	5,683.2	0.0
AQ	24,048	79	158	4.7	5,685.1	5,685.1	5,685.1	0.0
AR	24,972	44	104	5.9	5,695.2	5,695.2	5,695.9	0.7
AS	25,040	12	59	10.4	5,697.6	5,697.6	5,697.6	0.0
AT	25,324	88	171	3.6	5,701.8	5,701.8	5,701.8	0.0
AU	26,877	54	88	6.9	5,731.5	5,731.5	5,731.5	0.0
AV	28,232	82	85	9.4	5,753.8	5,753.8	5,753.8	0.0
AW	28,369	35	84	10.6	5,756.3	5,756.3	5,756.3	0.0
AX	28,466	63	192	3.2	5,760.6	5,760.6	5,761.0	0.4

[1] Feet above Confluence with Middle Provo River

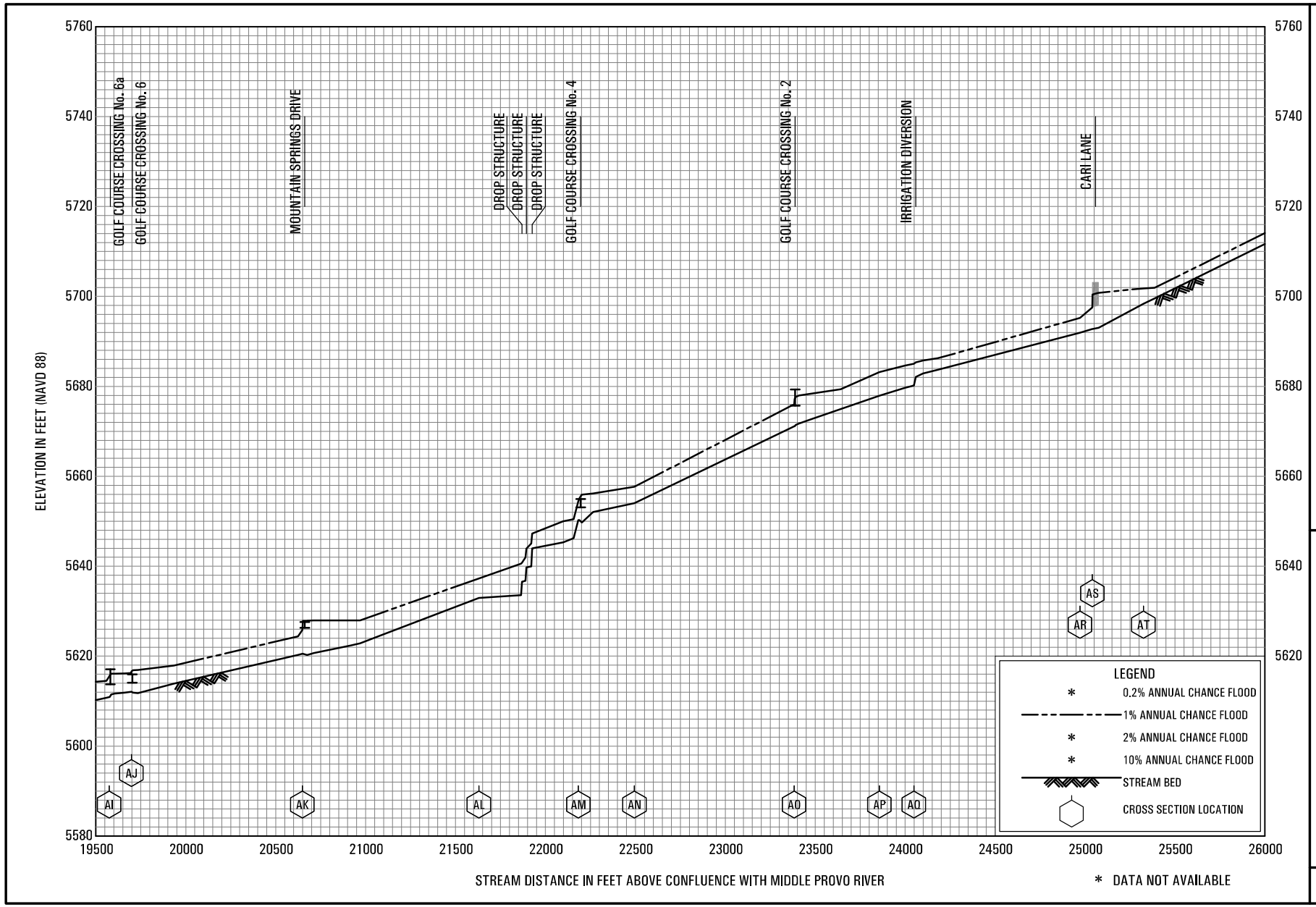
TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASATCH COUNTY AND INCORPORATED AREAS

FLOODWAY DATA

SNAKE CREEK



FLOOD PROFILES

SNAKE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASATCH COUNTY, UT

AND INCORPORATED AREAS

Appendix B - HEC-RAS Results

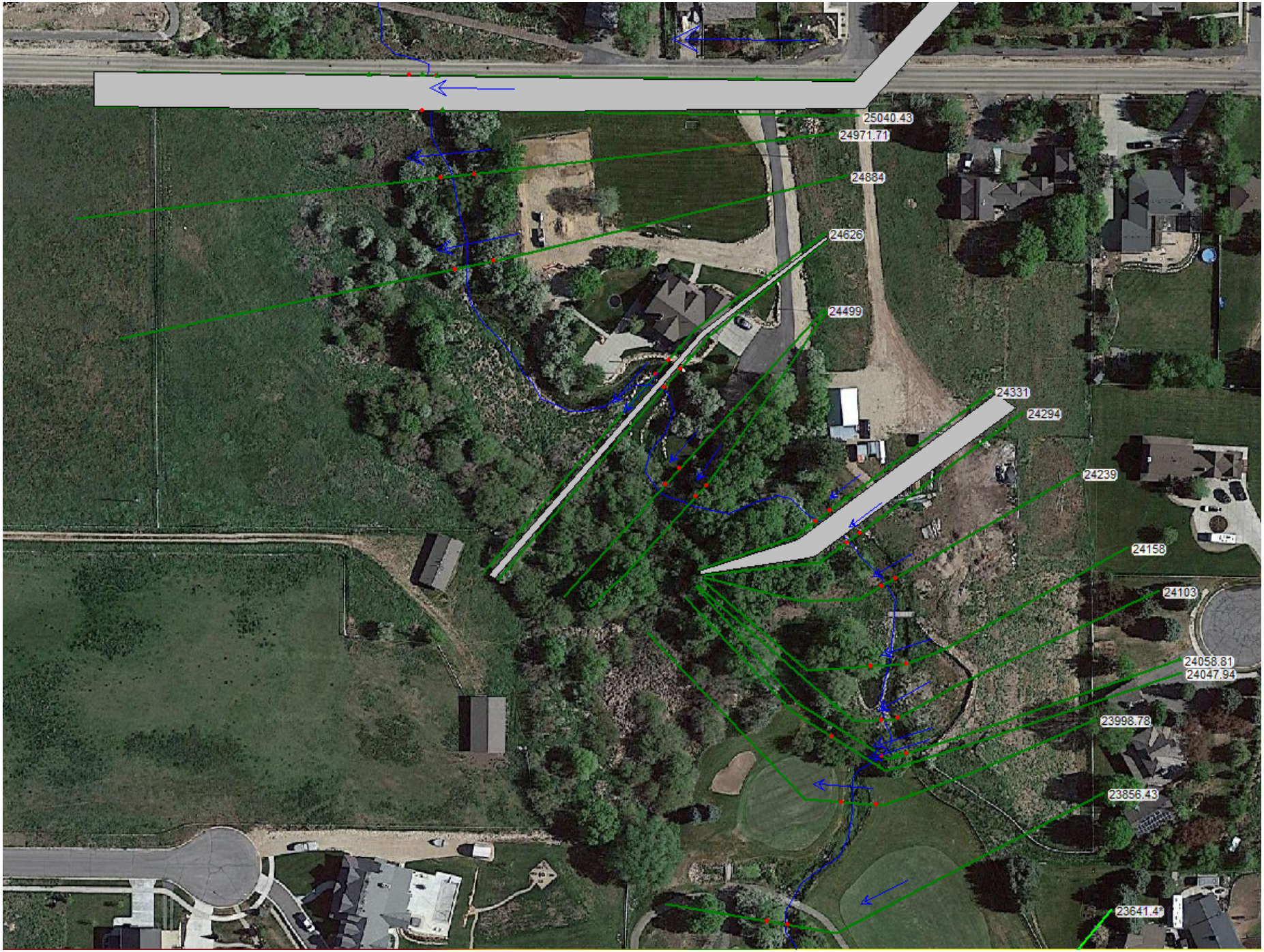
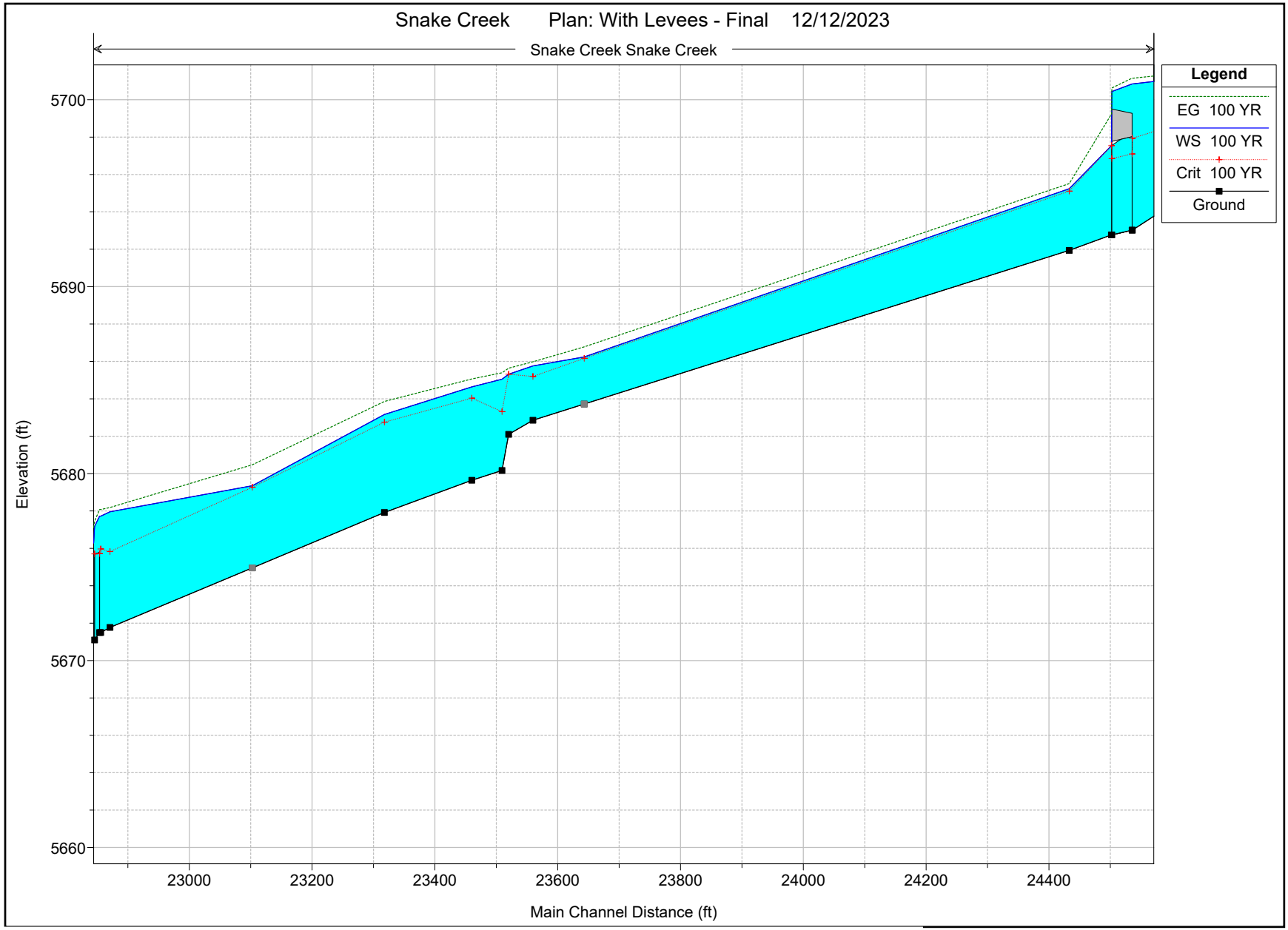


IMAGE 1 - FLOOD ANALYSIS AREA OVERVIEW

HEC-RAS Plan: WLevee Final Locations: User Defined Profile: 100 YR

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Snake Creek	Snake Creek	25040.43	100 YR	610.00	5692.77	5697.55	5697.55	5699.24	0.025786	10.43	58.49	17.49	1.01
Snake Creek	Snake Creek	24971.71	100 YR	610.00	5691.94	5695.24	5695.11	5695.51	0.008277	5.14	214.00	253.53	0.60
Snake Creek	Snake Creek	24181.7*	100 YR	610.00	5683.72	5686.24	5686.16	5686.78	0.015447	6.24	122.80	124.15	0.80
Snake Creek	Snake Creek	24098.27	100 YR	610.00	5682.85	5685.76	5685.20	5685.98	0.005305	4.19	195.32	166.79	0.49
Snake Creek	Snake Creek	24058.81	100 YR	610.00	5682.10	5685.32	5685.32	5685.64	0.020207	5.14	171.52	275.84	0.70
Snake Creek	Snake Creek	24047.94	100 YR	610.00	5680.17	5685.05	5683.31	5685.39	0.006096	4.72	129.27	248.24	0.52
Snake Creek	Snake Creek	23998.78	100 YR	610.00	5679.64	5684.64	5684.04	5685.07	0.006940	5.51	128.95	247.41	0.56
Snake Creek	Snake Creek	23856.43	100 YR	610.00	5677.92	5683.16	5682.75	5683.86	0.009931	6.95	93.12	334.02	0.62

MODEL 1 - CURRENT EFFECTIVE MODEL SIMULATION RESULTS TABLE

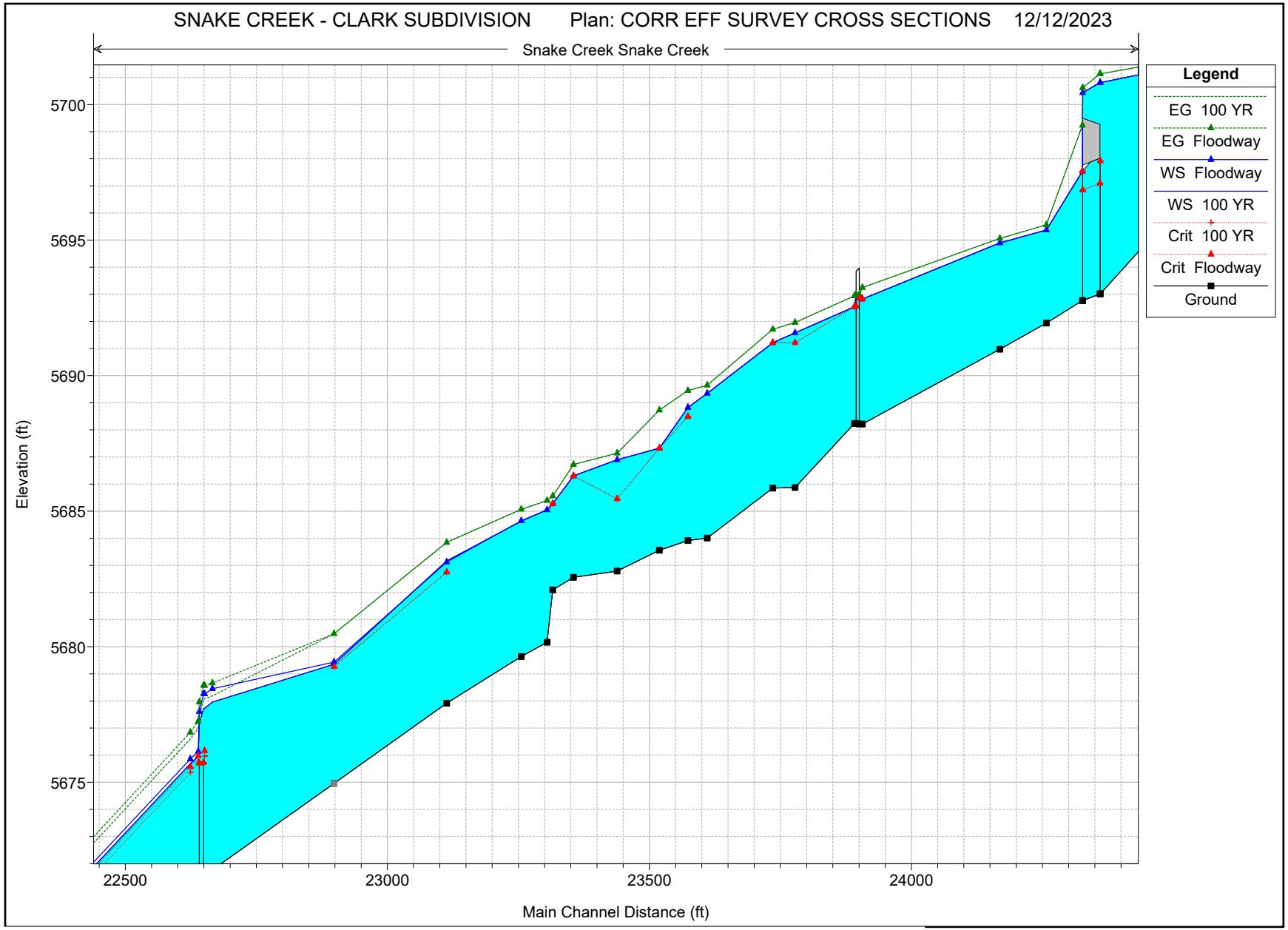


MODEL 1 - CURRENT EFFECTIVE MODEL STREAM PROFILE

HEC-RAS Plan: 12-12 CORR EFF Locations: User Defined Profile: 100 YR

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Snake Creek	Snake Creek	25040.43	100 YR	610.00	5692.77	5697.54	5697.54	5699.24	0.025807	10.43	58.47	17.49	1.01
Snake Creek	Snake Creek	24971.71	100 YR	610.00	5691.94	5695.37		5695.57	0.005732	4.44	248.88	263.49	0.51
Snake Creek	Snake Creek	24884	100 YR	610.00	5690.97	5694.90		5695.07	0.005338	3.94	209.43	252.03	0.47
Snake Creek	Snake Creek	24626	100 YR	610.00	5688.22	5692.83	5692.83	5693.25	0.009041	6.31	180.00	190.43	0.60
Snake Creek	Snake Creek	24620		Bridge									
Snake Creek	Snake Creek	24611	100 YR	610.00	5688.24	5692.55	5692.55	5692.95	0.008841	6.06	174.20	194.66	0.62
Snake Creek	Snake Creek	24499	100 YR	610.00	5685.87	5691.58	5691.22	5691.96	0.005270	5.68	212.89	190.74	0.51
Snake Creek	Snake Creek	24467	100 YR	610.00	5685.86	5691.22	5691.22	5691.71	0.006412	6.77	236.47	254.77	0.58
Snake Creek	Snake Creek	24331	100 YR	610.00	5684.01	5689.35		5689.65	0.002989	4.70	168.98	93.21	0.39
Snake Creek	Snake Creek	24294	100 YR	610.00	5683.92	5688.83	5688.49	5689.45	0.007526	7.15	135.95	96.73	0.62
Snake Creek	Snake Creek	24239	100 YR	610.00	5683.56	5687.32	5687.32	5688.73	0.020983	10.17	71.50	37.58	0.99
Snake Creek	Snake Creek	24158	100 YR	610.00	5682.79	5686.90	5685.46	5687.14	0.003091	4.25	193.37	135.07	0.40
Snake Creek	Snake Creek	24103	100 YR	610.00	5682.56	5686.30	5686.30	5686.72	0.008347	6.44	168.75	173.06	0.62
Snake Creek	Snake Creek	24058.81	100 YR	610.00	5682.10	5685.28	5685.28	5685.56	0.024208	5.53	160.78	274.22	0.76
Snake Creek	Snake Creek	24047.94	100 YR	610.00	5680.17	5685.05		5685.39	0.006096	4.72	129.27	248.24	0.52
Snake Creek	Snake Creek	23998.78	100 YR	610.00	5679.64	5684.64		5685.06	0.006945	5.51	128.92	247.39	0.56
Snake Creek	Snake Creek	23856.43	100 YR	610.00	5677.92	5683.17	5682.75	5683.86	0.009902	6.94	93.21	334.12	0.62

MODEL 2 - CORRECTED EFFECTIVE MODEL SIMULATION RESULTS TABLE

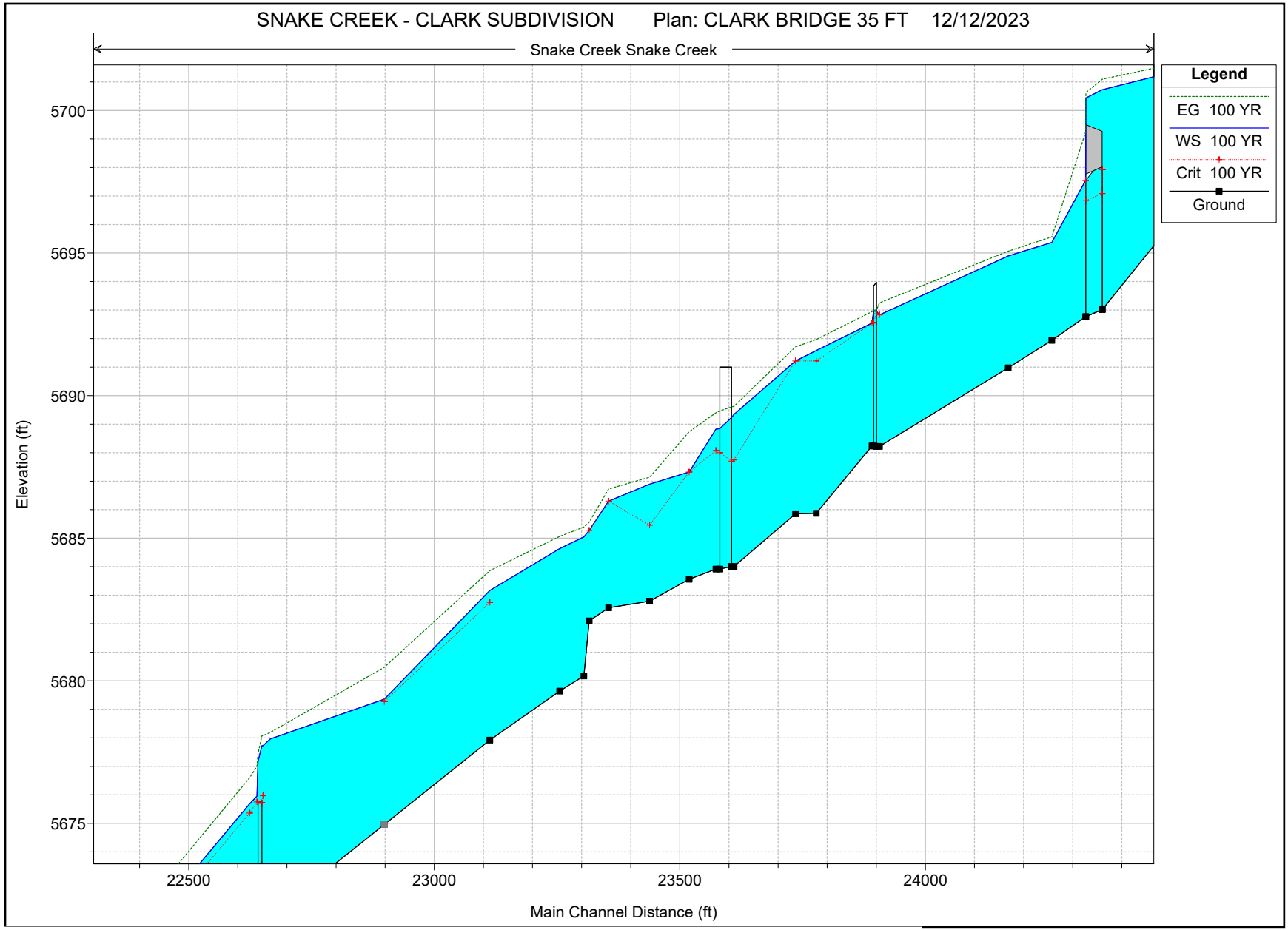


MODEL 2 - CORRECTED EFFECTIVE MODEL STREAM PROFILE

HEC-RAS Plan: CLARK BRIDGE 35FT Locations: User Defined Profile: 100 YR

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Snake Creek	Snake Creek	25040.43	100 YR	610.00	5692.77	5697.54	5697.54	5699.24	0.025807	10.43	58.47	17.49	1.01
Snake Creek	Snake Creek	24971.71	100 YR	610.00	5691.94	5695.37		5695.57	0.005732	4.44	248.88	263.49	0.51
Snake Creek	Snake Creek	24884	100 YR	610.00	5690.97	5694.90		5695.07	0.005338	3.94	209.43	252.03	0.47
Snake Creek	Snake Creek	24626	100 YR	610.00	5688.22	5692.83	5692.83	5693.25	0.009041	6.31	180.00	190.43	0.60
Snake Creek	Snake Creek	24620		Bridge									
Snake Creek	Snake Creek	24611	100 YR	610.00	5688.24	5692.55	5692.55	5692.95	0.008841	6.06	174.20	194.66	0.62
Snake Creek	Snake Creek	24499	100 YR	610.00	5685.87	5691.58	5691.22	5691.97	0.005246	5.67	213.45	190.86	0.50
Snake Creek	Snake Creek	24467	100 YR	610.00	5685.86	5691.22	5691.22	5691.71	0.006412	6.77	236.47	254.77	0.58
Snake Creek	Snake Creek	24331	100 YR	610.00	5684.01	5689.34	5687.74	5689.63	0.002446	4.44	149.35	92.97	0.35
Snake Creek	Snake Creek	24326		Bridge									
Snake Creek	Snake Creek	24294	100 YR	610.00	5683.92	5688.82	5688.08	5689.40	0.006499	6.53	107.12	96.67	0.55
Snake Creek	Snake Creek	24239	100 YR	610.00	5683.56	5687.32	5687.32	5688.73	0.020983	10.17	71.50	37.58	0.99
Snake Creek	Snake Creek	24158	100 YR	610.00	5682.79	5686.90	5685.46	5687.14	0.003091	4.25	193.37	135.07	0.40
Snake Creek	Snake Creek	24103	100 YR	610.00	5682.56	5686.30	5686.30	5686.72	0.008347	6.44	168.75	173.06	0.62
Snake Creek	Snake Creek	24058.81	100 YR	610.00	5682.10	5685.28	5685.28	5685.56	0.024208	5.53	160.78	274.22	0.76
Snake Creek	Snake Creek	24047.94	100 YR	610.00	5680.17	5685.05		5685.39	0.006096	4.72	129.27	248.24	0.52
Snake Creek	Snake Creek	23998.78	100 YR	610.00	5679.64	5684.64		5685.06	0.006945	5.51	128.92	247.39	0.56
Snake Creek	Snake Creek	23856.43	100 YR	610.00	5677.92	5683.17	5682.75	5683.86	0.009902	6.94	93.21	334.12	0.62

MODEL 3 - PROPOSED CONDITIONS MODEL SIMULATION RESULTS TABLE



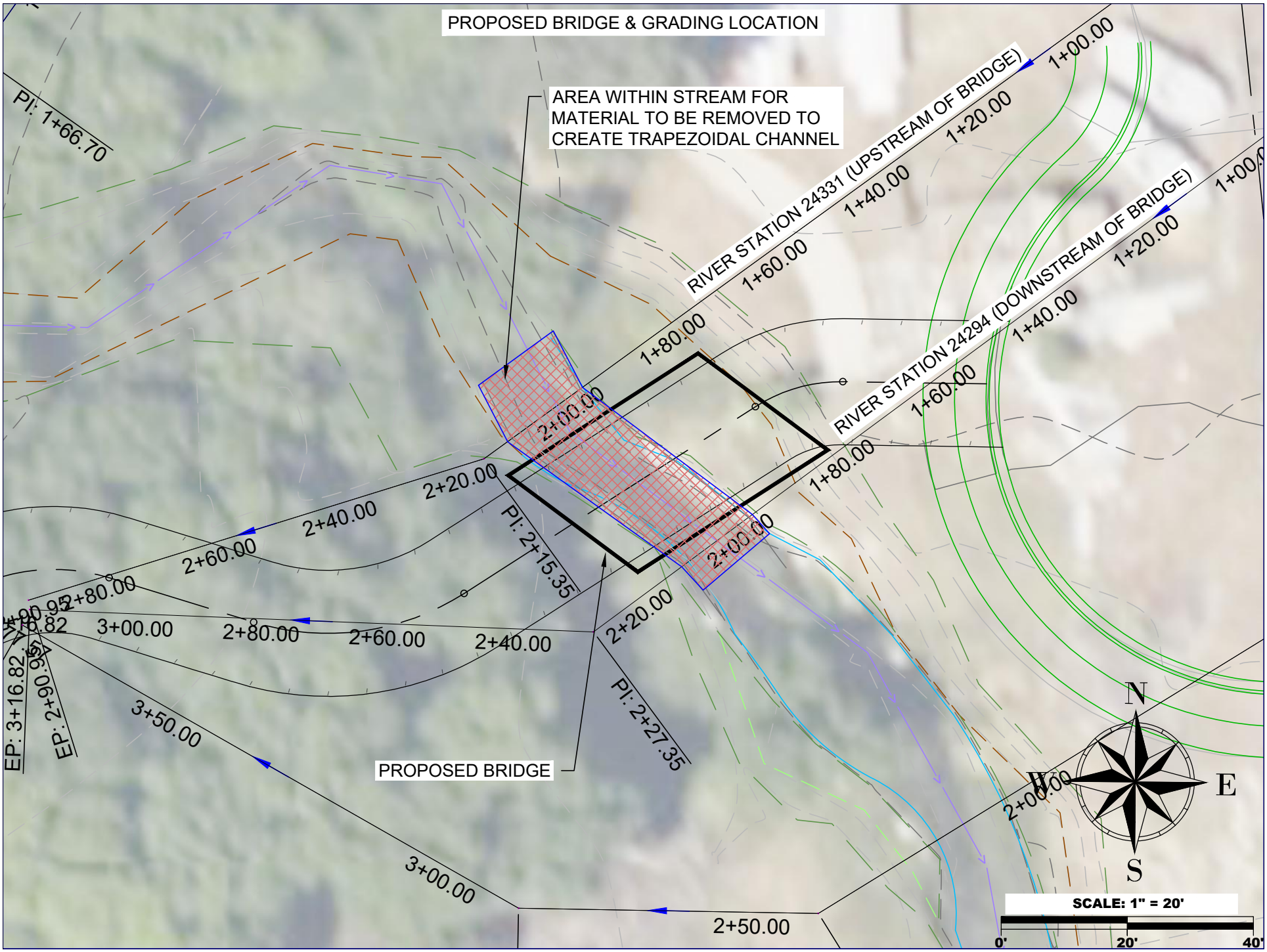
MODEL 3 - PROPOSED CONDITIONS STREAM PROFILE

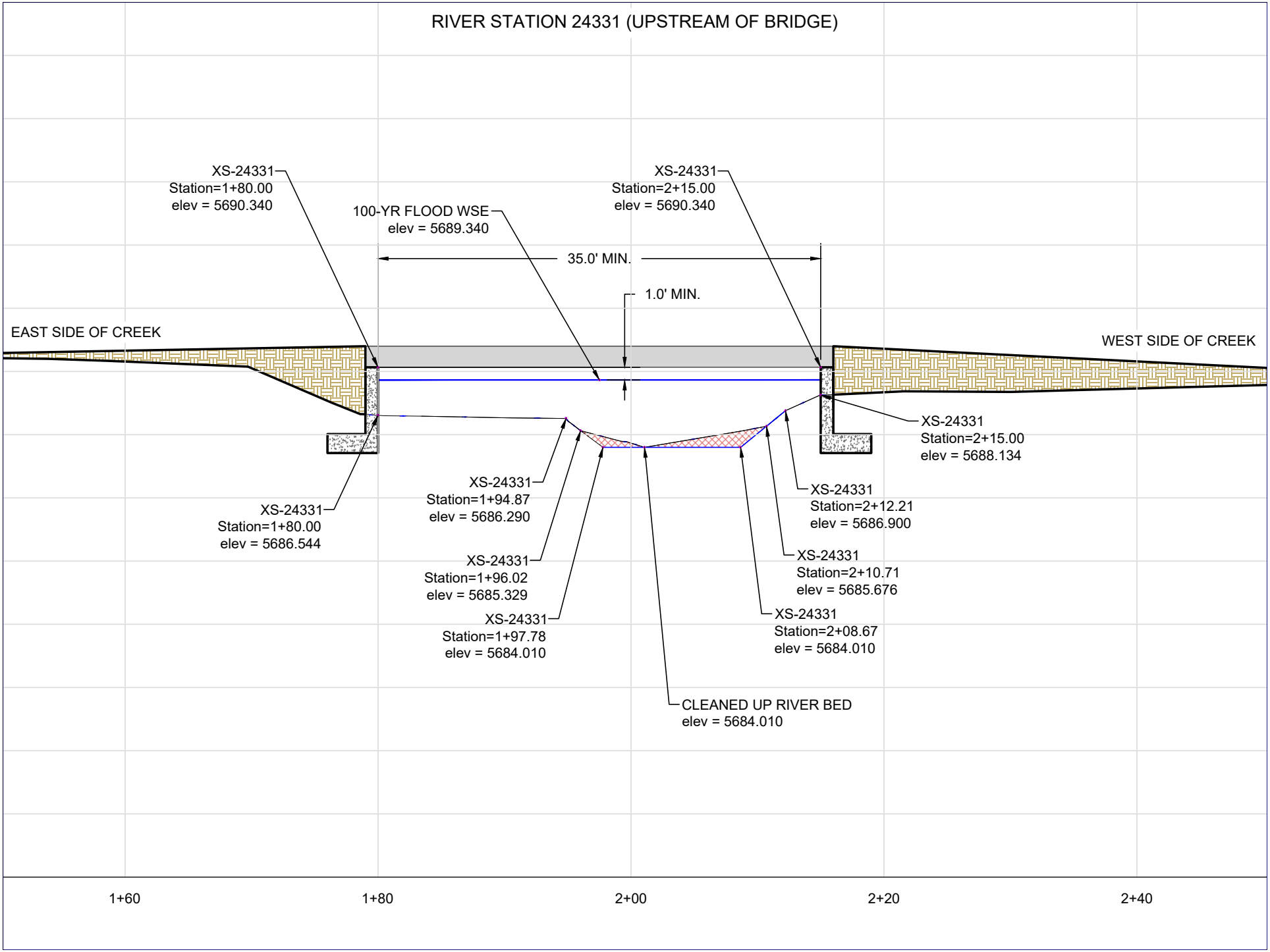
HEC-RAS Locations: User Defined Profile: 100 YR

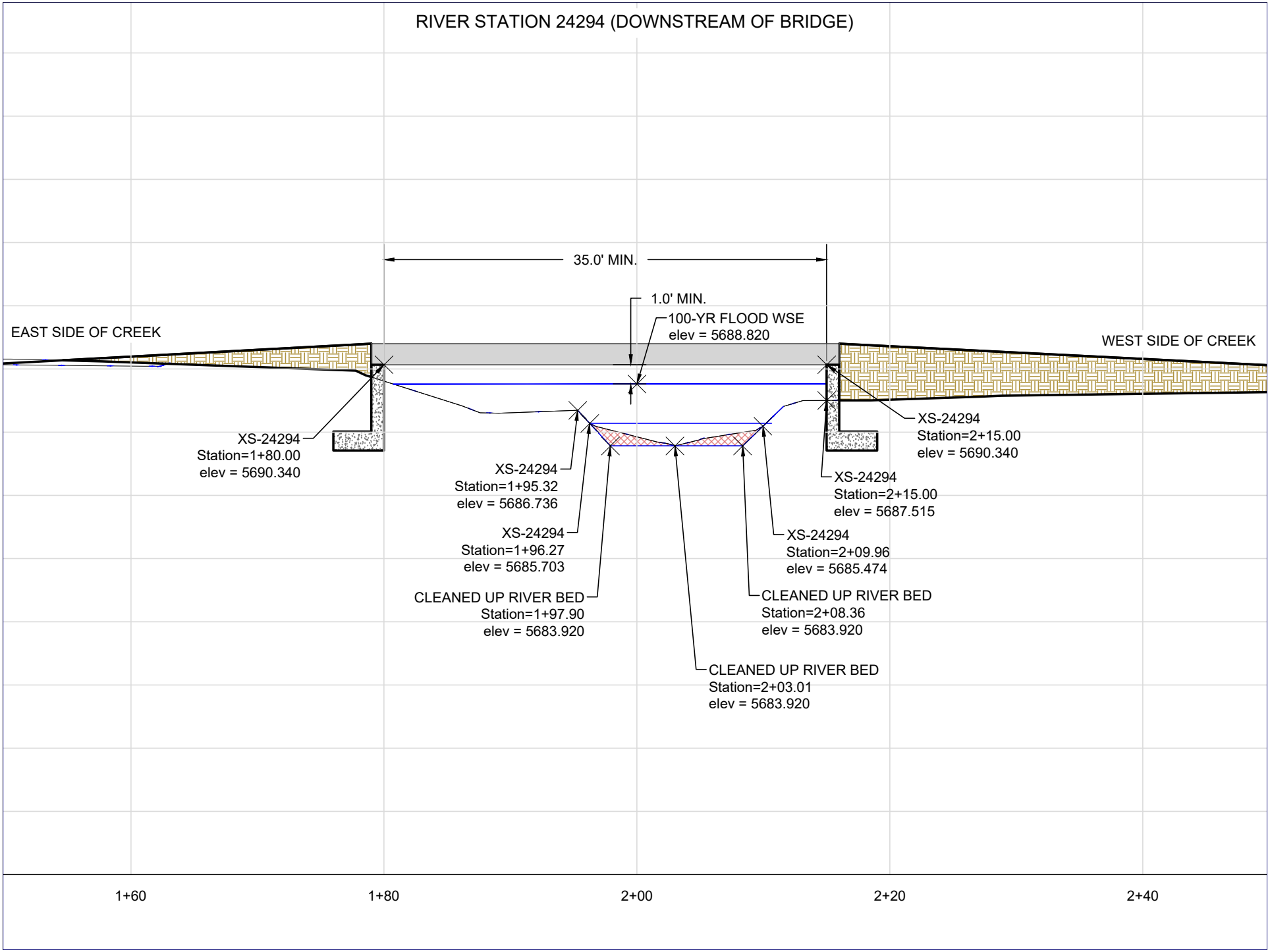
River	Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
					(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Snake Creek	Snake Creek	25040.43	100 YR	CLARK SUB CORRECTED EFFECTIVE	610.00	5692.77	5697.54	5697.54	5699.24	0.025807	10.43	58.47	17.49	1.01
Snake Creek	Snake Creek	25040.43	100 YR	CLARK BRIDGE 35FT	610.00	5692.77	5697.54	5697.54	5699.24	0.025807	10.43	58.47	17.49	1.01
Snake Creek	Snake Creek	24971.71	100 YR	CLARK SUB CORRECTED EFFECTIVE	610.00	5691.94	5695.37		5695.57	0.005732	4.44	248.88	263.49	0.51
Snake Creek	Snake Creek	24971.71	100 YR	CLARK BRIDGE 35FT	610.00	5691.94	5695.37		5695.57	0.005732	4.44	248.88	263.49	0.51
Snake Creek	Snake Creek	24884	100 YR	CLARK SUB CORRECTED EFFECTIVE	610.00	5690.97	5694.90		5695.07	0.005338	3.94	209.43	252.03	0.47
Snake Creek	Snake Creek	24884	100 YR	CLARK BRIDGE 35FT	610.00	5690.97	5694.90		5695.07	0.005338	3.94	209.43	252.03	0.47
Snake Creek	Snake Creek	24626	100 YR	CLARK SUB CORRECTED EFFECTIVE	610.00	5688.22	5692.83	5692.83	5693.25	0.009041	6.31	180.00	190.43	0.60
Snake Creek	Snake Creek	24626	100 YR	CLARK BRIDGE 35FT	610.00	5688.22	5692.83	5692.83	5693.25	0.009041	6.31	180.00	190.43	0.60
Snake Creek	Snake Creek	24620			Bridge									
Snake Creek	Snake Creek	24611	100 YR	CLARK SUB CORRECTED EFFECTIVE	610.00	5688.24	5692.55	5692.55	5692.95	0.008841	6.06	174.20	194.66	0.62
Snake Creek	Snake Creek	24611	100 YR	CLARK BRIDGE 35FT	610.00	5688.24	5692.55	5692.55	5692.95	0.008841	6.06	174.20	194.66	0.62
Snake Creek	Snake Creek	24499	100 YR	CLARK SUB CORRECTED EFFECTIVE	610.00	5685.87	5691.58	5691.22	5691.96	0.005270	5.68	212.89	190.74	0.51
Snake Creek	Snake Creek	24499	100 YR	CLARK BRIDGE 35FT	610.00	5685.87	5691.58	5691.22	5691.97	0.005246	5.67	213.45	190.86	0.50
Snake Creek	Snake Creek	24467	100 YR	CLARK SUB CORRECTED EFFECTIVE	610.00	5685.86	5691.22	5691.22	5691.71	0.006412	6.77	236.47	254.77	0.58
Snake Creek	Snake Creek	24467	100 YR	CLARK BRIDGE 35FT	610.00	5685.86	5691.22	5691.22	5691.71	0.006412	6.77	236.47	254.77	0.58
Snake Creek	Snake Creek	24331	100 YR	CLARK SUB CORRECTED EFFECTIVE	610.00	5684.01	5689.35		5689.65	0.002989	4.70	168.98	93.21	0.39
Snake Creek	Snake Creek	24331	100 YR	CLARK BRIDGE 35FT	610.00	5684.01	5689.34	5687.74	5689.63	0.002446	4.44	149.35	92.97	0.35
		24326		Proposed Bridge										
Snake Creek	Snake Creek	24294	100 YR	CLARK SUB CORRECTED EFFECTIVE	610.00	5683.92	5688.83	5688.49	5689.45	0.007526	7.15	135.95	96.73	0.62
Snake Creek	Snake Creek	24294	100 YR	CLARK BRIDGE 35FT	610.00	5683.92	5688.82	5688.08	5689.40	0.006499	6.53	107.12	96.67	0.55
Snake Creek	Snake Creek	24239	100 YR	CLARK SUB CORRECTED EFFECTIVE	610.00	5683.56	5687.32	5687.32	5688.73	0.020983	10.17	71.50	37.58	0.99
Snake Creek	Snake Creek	24239	100 YR	CLARK BRIDGE 35FT	610.00	5683.56	5687.32	5687.32	5688.73	0.020983	10.17	71.50	37.58	0.99
Snake Creek	Snake Creek	24158	100 YR	CLARK SUB CORRECTED EFFECTIVE	610.00	5682.79	5686.90	5685.46	5687.14	0.003091	4.25	193.37	135.07	0.40
Snake Creek	Snake Creek	24158	100 YR	CLARK BRIDGE 35FT	610.00	5682.79	5686.90	5685.46	5687.14	0.003091	4.25	193.37	135.07	0.40
Snake Creek	Snake Creek	24103	100 YR	CLARK SUB CORRECTED EFFECTIVE	610.00	5682.56	5686.30	5686.30	5686.72	0.008347	6.44	168.75	173.06	0.62
Snake Creek	Snake Creek	24103	100 YR	CLARK BRIDGE 35FT	610.00	5682.56	5686.30	5686.30	5686.72	0.008347	6.44	168.75	173.06	0.62
Snake Creek	Snake Creek	24058.81	100 YR	CLARK SUB CORRECTED EFFECTIVE	610.00	5682.10	5685.28	5685.28	5685.56	0.024208	5.53	160.78	274.22	0.76
Snake Creek	Snake Creek	24058.81	100 YR	CLARK BRIDGE 35FT	610.00	5682.10	5685.28	5685.28	5685.56	0.024208	5.53	160.78	274.22	0.76
Snake Creek	Snake Creek	24047.94	100 YR	CLARK SUB CORRECTED EFFECTIVE	610.00	5680.17	5685.05		5685.39	0.006096	4.72	129.27	248.24	0.52
Snake Creek	Snake Creek	24047.94	100 YR	CLARK BRIDGE 35FT	610.00	5680.17	5685.05		5685.39	0.006096	4.72	129.27	248.24	0.52
Snake Creek	Snake Creek	23998.78	100 YR	CLARK SUB CORRECTED EFFECTIVE	610.00	5679.64	5684.64		5685.06	0.006945	5.51	128.92	247.39	0.56
Snake Creek	Snake Creek	23998.78	100 YR	CLARK BRIDGE 35FT	610.00	5679.64	5684.64		5685.06	0.006945	5.51	128.92	247.39	0.56
Snake Creek	Snake Creek	23856.43	100 YR	CLARK SUB CORRECTED EFFECTIVE	610.00	5677.92	5683.17	5682.75	5683.86	0.009902	6.94	93.21	334.12	0.62
Snake Creek	Snake Creek	23856.43	100 YR	CLARK BRIDGE 35FT	610.00	5677.92	5683.17	5682.75	5683.86	0.009902	6.94	93.21	334.12	0.62

MODEL 2 VS MODEL 3 - CURRENT EFFECTIVE MODEL VS PROPOSED CONDITIONS SIMULATION RESULTS TABLE

Appendix C - Proposed Cross Sections


PROPOSED BRIDGE & GRADING LOCATION
AREA WITHIN STREAM FOR MATERIAL TO BE REMOVED TO CREATE TRAPEZOIDAL CHANNEL
RIVER STATION 24331 (UPSTREAM OF BRIDGE)
RIVER STATION 24294 (DOWNSTREAM OF BRIDGE)
PROPOSED BRIDGE
PI: 1+66.70
PI: 2+15.35
PI: 2+27.35
EP: 3+16.82
EP: 2+90.95
1+00.00
1+20.00
1+40.00
1+60.00
1+80.00
2+00.00
2+20.00
2+40.00
2+60.00
2+80.00
3+00.00
3+50.00
2+50.00
N
S
E
W
SCALE: 1" = 20'
0'
20'
40'


RIVER STATION 24331 (UPSTREAM OF BRIDGE)
XS-24331
Station=1+80.00
elev = 5690.340
100-YR FLOOD WSE
elev = 5689.340
XS-24331
Station=2+15.00
elev = 5690.340
35.0' MIN.
1.0' MIN.
EAST SIDE OF CREEK
WEST SIDE OF CREEK
XS-24331
Station=2+15.00
elev = 5688.134
XS-24331
Station=1+80.00
elev = 5686.544
XS-24331
Station=1+94.87
elev = 5686.290
XS-24331
Station=2+12.21
elev = 5686.900
XS-24331
Station=1+96.02
elev = 5685.329
XS-24331
Station=2+10.71
elev = 5685.676
XS-24331
Station=1+97.78
elev = 5684.010
XS-24331
Station=2+08.67
elev = 5684.010
CLEANED UP RIVER BED
elev = 5684.010
1+60
1+80
2+00
2+20
2+40


RIVER STATION 24294 (DOWNSTREAM OF BRIDGE)
35.0' MIN.
1.0' MIN.
100-YR FLOOD WSE
elev = 5688.820
EAST SIDE OF CREEK
WEST SIDE OF CREEK
XS-24294
Station=1+80.00
elev = 5690.340
XS-24294
Station=1+95.32
elev = 5686.736
XS-24294
Station=1+96.27
elev = 5685.703
CLEANED UP RIVER BED
Station=1+97.90
elev = 5683.920
CLEANED UP RIVER BED
Station=2+03.01
elev = 5683.920
CLEANED UP RIVER BED
Station=2+08.36
elev = 5683.920
XS-24294
Station=2+09.96
elev = 5685.474
XS-24294
Station=2+15.00
elev = 5687.515
XS-24294
Station=2+15.00
elev = 5690.340
1+60
1+80
2+00
2+20
2+40

Appendix D - Manning's N Values

Show

Manning's n Values

Reference tables for Manning's n values for Channels, Closed Conduits Flowing Partially Full, and Corrugated Metal Pipes.

Manning's n for Channels (Chow, 1959).

Type of Channel and Description	Minimum	Normal	Maximum
Natural streams - minor streams (top width at floodstage < 100 ft)			
1. Main Channels			
a. clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
b. same as above, but more stones and weeds	0.030	0.035	0.040
c. clean, winding, some pools and shoals	0.033	0.040	0.045
d. same as above, but some weeds and stones	0.035	0.045	0.050
e. same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
f. same as "d" with more stones	0.045	0.050	0.060
g. sluggish reaches, weedy, deep pools	0.050	0.070	0.080
h. very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150
2. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
a. bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
b. bottom: cobbles with large boulders	0.040	0.050	0.070
3. Floodplains			
a. Pasture, no brush			
1.short grass	0.025	0.030	0.035
2. high grass	0.030	0.035	0.050
b. Cultivated areas			
1. no crop	0.020	0.030	0.040
2. mature row crops	0.025	0.035	0.045
3. mature field crops	0.030	0.040	0.050
c. Brush			
1. scattered brush, heavy weeds	0.035	0.050	0.070
2. light brush and trees, in winter	0.035	0.050	0.060
3. light brush and trees, in summer	0.040	0.060	0.080
4. medium to dense brush, in winter	0.045	0.070	0.110
5. medium to dense brush, in summer	0.070	0.100	0.160
d. Trees			
1. dense willows, summer, straight	0.110	0.150	0.200
2. cleared land with tree stumps, no sprouts	0.030	0.040	0.050
3. same as above, but with heavy growth of sprouts	0.050	0.060	0.080

4. heavy stand of timber, a few down trees, little undergrowth, flood stage below branches	0.080	0.100	0.120
5. same as 4. with flood stage reaching branches	0.100	0.120	0.160
4. Excavated or Dredged Channels			
a. Earth, straight, and uniform			
1. clean, recently completed	0.016	0.018	0.020
2. clean, after weathering	0.018	0.022	0.025
3. gravel, uniform section, clean	0.022	0.025	0.030
4. with short grass, few weeds	0.022	0.027	0.033
b. Earth winding and sluggish			
1. no vegetation	0.023	0.025	0.030
2. grass, some weeds	0.025	0.030	0.033
3. dense weeds or aquatic plants in deep channels	0.030	0.035	0.040
4. earth bottom and rubble sides	0.028	0.030	0.035
5. stony bottom and weedy banks	0.025	0.035	0.040
6. cobble bottom and clean sides	0.030	0.040	0.050
c. Dragline-excavated or dredged			
1. no vegetation	0.025	0.028	0.033
2. light brush on banks	0.035	0.050	0.060
d. Rock cuts			
1. smooth and uniform	0.025	0.035	0.040
2. jagged and irregular	0.035	0.040	0.050
e. Channels not maintained, weeds and brush uncut			
1. dense weeds, high as flow depth	0.050	0.080	0.120
2. clean bottom, brush on sides	0.040	0.050	0.080
3. same as above, highest stage of flow	0.045	0.070	0.110
4. dense brush, high stage	0.080	0.100	0.140
5. Lined or Constructed Channels			
a. Cement			
1. neat surface	0.010	0.011	0.013
2. mortar	0.011	0.013	0.015
b. Wood			
1. planed, untreated	0.010	0.012	0.014
2. planed, creosoted	0.011	0.012	0.015
3. unplaned	0.011	0.013	0.015
4. plank with battens	0.012	0.015	0.018
5. lined with roofing paper	0.010	0.014	0.017
c. Concrete			
1. trowel finish	0.011	0.013	0.015
2. float finish	0.013	0.015	0.016
3. finished, with gravel on bottom	0.015	0.017	0.020
4. unfinished	0.014	0.017	0.020
5. gunite, good section	0.016	0.019	0.023
6. gunite, wavy section	0.018	0.022	0.025

7. on good excavated rock	0.017	0.020	
8. on irregular excavated rock	0.022	0.027	
d. Concrete bottom float finish with sides of:			
1. dressed stone in mortar	0.015	0.017	0.020
2. random stone in mortar	0.017	0.020	0.024
3. cement rubble masonry, plastered	0.016	0.020	0.024
4. cement rubble masonry	0.020	0.025	0.030
5. dry rubble or riprap	0.020	0.030	0.035
e. Gravel bottom with sides of:			
1. formed concrete	0.017	0.020	0.025
2. random stone mortar	0.020	0.023	0.026
3. dry rubble or riprap	0.023	0.033	0.036
f. Brick			
1. glazed	0.011	0.013	0.015
2. in cement mortar	0.012	0.015	0.018
g. Masonry			
1. cemented rubble	0.017	0.025	0.030
2. dry rubble	0.023	0.032	0.035
h. Dressed ashlar/stone paving	0.013	0.015	0.017
i. Asphalt			
1. smooth	0.013	0.013	
2. rough	0.016	0.016	
j. Vegetal lining	0.030		0.500

Manning's n for Closed Conduits Flowing Partly Full (Chow, 1959).

Type of Conduit and Description	Minimum	Normal	Maximum
1. Brass, smooth:	0.009	0.010	0.013
2. Steel:			
Lockbar and welded	0.010	0.012	0.014
Riveted and spiral	0.013	0.016	0.017
3. Cast Iron:			
Coated	0.010	0.013	0.014
Uncoated	0.011	0.014	0.016
4. Wrought Iron:			
Black	0.012	0.014	0.015
Galvanized	0.013	0.016	0.017
5. Corrugated Metal:			
Subdrain	0.017	0.019	0.021
Stormdrain	0.021	0.024	0.030
6. Cement:			
Neat Surface	0.010	0.011	0.013
Mortar	0.011	0.013	0.015
7. Concrete:			
Culvert, straight and free of debris	0.010	0.011	0.013
Culvert with bends, connections, and some debris	0.011	0.013	0.014
Finished	0.011	0.012	0.014
Sewer with manholes, inlet, etc., straight	0.013	0.015	0.017

Unfinished, steel form	0.012	0.013	0.014
Unfinished, smooth wood form	0.012	0.014	0.016
Unfinished, rough wood form	0.015	0.017	0.020
8. Wood:			
Stave	0.010	0.012	0.014
Laminated, treated	0.015	0.017	0.020
9. Clay:			
Common drainage tile	0.011	0.013	0.017
Vitrified sewer	0.011	0.014	0.017
Vitrified sewer with manholes, inlet, etc.	0.013	0.015	0.017
Vitrified Subdrain with open joint	0.014	0.016	0.018
10. Brickwork:			
Glazed	0.011	0.013	0.015
Lined with cement mortar	0.012	0.015	0.017
Sanitary sewers coated with sewage slime with bends and connections	0.012	0.013	0.016
Paved invert, sewer, smooth bottom	0.016	0.019	0.020
Rubble masonry, cemented	0.018	0.025	0.030

Manning's n for Corrugated Metal Pipe (AISI, 1980).

Type of Pipe, Diameter and Corrugation Dimension	n
1. Annular 2.67 x 1/2 inch (all diameters)	0.024
2. Helical 1.50 x 1/4 inch	
8" diameter	0.012
10" diameter	0.014
3. Helical 2.67 x 1/2 inch	
12" diameter	0.011
18" diameter	0.014
24" diameter	0.016
36" diameter	0.019
48" diameter	0.020
60" diameter	0.021
4. Annular 3x1 inch (all diameters)	0.027
5. Helical 3x1 inch	
48" diameter	0.023
54" diameter	0.023
60" diameter	0.024
66" diameter	0.025
72" diameter	0.026
78" diameter and larger	0.027
6. Corrugations 6x2 inches	
60" diameter	0.033
72" diameter	0.032
120" diameter	0.030
180" diameter	0.028

GORDON GEOTECHNICAL ENGINEERING, INC.

REPORT
GEOTECHNICAL STUDY
PROPOSED CREEKSIDE ESTATES
515 CARI LANE
MIDWAY, UTAH

February 27, 2020

Job No. 609-004-20

Prepared for:
Construction Services Consulting
PO Box 571363
Murray, Utah 84157

Prepared by:
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February 27, 2020
Job No. 609-004-20

Construction Services Consulting
PO Box 571363
Murray, Utah 84157

Attention: Mr. Pete Skolmoski

Ladies and Gentlemen:

Re: Report
Geotechnical Study
Proposed Creekside Estates
515 Cari Lane
Midway, Utah

1. INTRODUCTION

1.1 GENERAL

This report presents the results of our geotechnical study performed at the site of the proposed Creekside Estates which is located at 515 Cari Lane in Midway, Utah. The general location of the site with respect to major topographic features and existing facilities, as of 1998 and 1999, is presented on Figure 1, Vicinity Map. A detailed location of the site showing existing roadways and surrounding facilities, on an air photograph base, is presented on Figure 2, Area Map. The locations and alignments of photographs taken of the site during the field portion of study are also shown on Figure 2. A more detailed layout of the site showing the proposed lot boundaries and building footprints is presented on Figure 3, Site Plan. The locations of the test pits excavated in conjunction with this study are also presented on Figure 3.

1.2 OBJECTIVES AND SCOPE

The objectives and scope of our study were planned in discussions between Mr. Pete Skolmoski of Construction Services Consulting and Mr. Patrick Emery of Gordon Geotechnical Engineering, Inc. (G^2).

In general, the objectives of this study were to:

1. Accurately define and evaluate the subsurface soil and groundwater conditions across the site.

2. Provide appropriate foundation, earthwork, pavement, and geoseismic recommendations to be utilized in the design and construction of the proposed development.

In accomplishing these objectives, our scope has included the following:

1. A field program consisting of the excavating, logging, and sampling of five test pits at the site.

2. A laboratory testing program.

3. An office program consisting of the correlation of available data, engineering analyses, and the preparation of this summary report.

1.3 AUTHORIZATION

Authorization was provided by returning a signed copy of our professional services agreement No. 20-0102 dated January 2, 2020.

1.4 PROFESSIONAL STATEMENTS

Supporting data upon which our recommendations are based are presented in subsequent sections of this report. Recommendations presented herein are governed by the physical properties of the soils encountered in the exploration test pits, measured and projected groundwater conditions, and the layout and design data discussed in Section 2., Proposed Construction, of this report. If subsurface conditions other than those described in this report are encountered and/or if design and layout changes are implemented, G^2 must be informed so that our recommendations can be reviewed and amended, if necessary.

Our professional services have been performed, our findings developed, and our recommendations prepared in accordance with generally accepted engineering principles and practices in this area at this time.

2. PROPOSED CONSTRUCTION

A seven-lot single-family residential subdivision is planned for the three and one-half-acre site. The proposed structures are anticipated to be two to three levels above grade with a partial- to full-depth basement level. Construction will be of reinforced concrete below grade and wood-

frame construction above grade. Maximum column and wall loads are projected to be on the order of 40 to 60 kips and 2 to 3 kips per lineal foot, respectively.

Site development will require a minor amount of earthwork in the form of site grading. It is estimated that maximum cuts and fills to achieve design grades will be on the order of three to four feet.

A 435-foot long at-grade roadway terminating in a cul-de-sac will provide access to the lots. Traffic over the pavement will consist of a light to moderate volume of automobiles and light trucks, and some medium-weight trucks.

3. INVESTIGATIONS

3.1 FIELD PROGRAM

In order to define and evaluate the subsurface soil and groundwater conditions across the site, five test pits were excavated to a depths ranging from two to eight and one-half feet below existing grade. It should be noted that excavation refusal was encountered on hard hot spring deposits (tufa) at all test pits except for Test Pit TP-5. The limited depth of Test Pit TP-5 was due to saturated granular soils flowing into the test pit. Locations of the test pits are presented on Figure 3.

The field portion of our study was under the direct control and continual supervision of an experienced member of our geotechnical staff. During the course of the excavation operations, a continuous log of the subsurface conditions encountered was maintained. In addition, relatively undisturbed and small disturbed samples of the typical soils encountered were obtained for subsequent laboratory testing and examination. The soils were classified in the field based upon visual and textural examination. These classifications have been supplemented by subsequent inspection and testing in our laboratory. Detailed graphical representation of the subsurface conditions encountered is presented on Figures 4A through 4E, Log of Test Pits. Soils were classified in accordance with the nomenclature described on Figure 5, Unified Soil Classification System.

Disturbed bag samples were collected from the soils brought up by the backhoe bucket. Additionally, relatively undisturbed samples were obtained utilizing thin-walled hand sampling equipment.

Following completion of excavating and logging, each test pit was backfilled. The backfill was not placed in uniform lifts and compacted to a specific density. Consequently, settlement of the backfill with time is likely to occur.

3.2 LABORATORY TESTING

3.2.1 General

In order to provide data necessary for our engineering analyses, a laboratory testing program was performed. The program included collapse-consolidation tests, partial gradation, and chemical tests. The following paragraphs describe the tests and summarize the test data.

3.2.2 Collapse-Consolidation Tests

In order to assess moisture sensitivity and load deformation characteristics, two collapse-consolidation tests were performed on representative samples of the relatively fine-grained silty sand and sandy silt soil encountered in Test Pits TP-1 and TP-2. The collapse test was performed as follows:

1. Load sample at in-situ moisture content to specific axial pressure.
2. Measure and record axial deflection.
3. Saturate sample.
4. Measure and record resulting collapse.

The test results are tabulated below:

Test Pit No.	Depth (feet)	Soil Classification	Natural Dry Density (pcf)	Natural Moisture Content (percent)	Axial Load When Saturated (psf)	Collapse (percent)
TP-1	3.0	SM	95	10.8	800	0.54*
TP-2	2.5	ML	96	8.2	1,600	1.38*

* Some of the measured collapse is due to sample disturbance.

The results of the tests indicate that the silty sand and sandy silt soils encountered at the site to depths of two to six and one-half feet are slightly moisture sensitive and exhibit a slight collapse potential when saturated or nearly saturated. Some of the measured collapse is attributable to disturbance of the soil during the sampling process.

Following the collapse portion of the test, normal consolidation loading was applied. The results of the test indicate that the silty sand and sandy silt soils encountered are moderately over-

consolidated and exhibit moderately low compressibility and moderate strength characteristics when loaded below the preconsolidation pressure. Results of the test are maintained within our files and can be provided upon request.

3.2.3 Partial Gradation Tests

To aid in classifying the soils and to provide general index parameters, a partial gradation test was performed upon four representative samples of the soils encountered in the exploration test pits. The results of the test are tabulated below:

Test Pit No.	Depth (feet)	Sieve Percent Passing		Soil Classification
		No. 4	No. 200	
TP-1	5.0	58.6	4.0	SP/GP
TP-2	2.5	--	63.6	ML
TP-4	6.0	--	31.6	SM
TP-5	7.0	44.8	2.5	SP/GP

3.2.4 Chemical Tests

To determine if the site soils will react detrimentally with concrete, chemical tests were performed on a representative sample of the near-surface fine-grained soils encountered. The results of the chemical tests are tabulated below:

Test Pit No.	Depth (feet)	Soil Classification	pH	Total Water-Soluble Sulfate (mg/kg-dry)
TP-3	3.0	CL	8.31	< 5.35

4. SITE CONDITIONS

4.1 SURFACE

The overall site is irregular in shape and contains one existing single-family residential structure established slab-on-grade. The remainder of the site consists of vacant/undeveloped land. The site was covered with four to six inches of snow at the time of our field work. Topography across the site slopes gently down to the south with up to approximately 20 feet of overall relief. Snake Creek flows to the south on the southwestern portion of the site. A stacked rock

retaining wall and numerous piles of end-dumped fill material were observed to be raising the grade of the southern portion of the site. The observed fills have not been properly placed and compacted and are considered non-engineered.

The site is bordered by Cari Lane to the north, and single-family residential structures to the east, south, and west.

Representative photographs of the site area are shown on Figure 6, Photographs.

4.2 SUBSURFACE SOIL

The soil conditions encountered in each of the test pits, to the depths penetrated were relatively similar. At the surface in Test Pits TP-4 and TP-5, clayey fine to coarse sand and gravel fill was encountered extending to depths of one and one-half to two and one-half feet below the ground surface. The fill was observed to be loosely end-dumped and without documentation and compaction testing results, the fill must be considered non-engineered. Non-engineered fills will exhibit variable and most likely poor engineering characteristics. This non-engineered fill may be re-utilized as structural fill; however, due to the clay content, the on-site non-engineered fill will require close moisture control and will be difficult during wet and cold periods of the year.

Below the fill Test Pits TP-4 and TP-5, and from the ground surface in the remainder of the test pits, natural soils were encountered to the maximum explored depths, two to eighth and one-half feet below existing grade. The natural soils consist of silty fine sand (SM), fine sandy silt (ML), and fine to coarse sand and gravel with trace silt (SP/GP). Collapse-consolidation tests indicate that the silty sand (SM) and sandy silt (ML) soils are slightly moisture sensitive and exhibit a slight collapse potential when saturated or nearly saturated.

The natural sands and gravels (SP/GP) are slightly moist to saturated, loose to medium dense, and are projected to exhibit high strength and low compressibility characteristics under the anticipated loading range.

Excavation refusal was encountered on hard rock comprised of hot spring deposits calcareous tufa. The tufa is white to light brown in color, moderately closely fractured, porous, hard, and relatively unweathered.

The upper three inches of the soil profile contains major roots and is classified as topsoil.

The lines designating the interface between soil types on the test pit logs generally represent approximate boundaries. In-situ, the transition between soil types may be gradual.

4.3 GROUNDWATER

Groundwater was encountered in Test Pit TP-5, at the lowest portion of the site, at a depth of three feet below existing grade. Very moist soils were encountered in Test Pit TP-4 at a depth of eight feet below existing grade, possibly due to infiltration of water from the nearby creek. Seasonal fluctuations of the groundwater table on the order of one to two feet are expected, with the highest levels occurring during the late spring and early summer months.

5. DISCUSSIONS AND RECOMMENDATIONS

5.1 SUMMARY OF FINDINGS

The proposed structures may be supported upon conventional spread and continuous wall foundations over suitable natural soils or tufa and/or structural fill extending to suitable natural soils or tufa.

The most significant geotechnical aspects of the site are:

1. The non-engineered fill encountered to depths of one and one-half to two and one-half feet at Test Pits TP-4 and TP-5 as well as end-dumped fills observed on the southern portion of the site. Non-engineered fills must be completely removed from beneath the building footprint and rigid pavement areas. Due to the variable nature of the non-engineered fills encountered, a qualified geotechnical engineer from our staff must aid in verifying that all non-engineered fills have been completely removed prior to the placement of structural site grading fills, footings, or foundations.

2. Excavation on refusal on hard tufa at depths of two to eight and one-half feet below existing grade. Deeper excavations into the tufa will be difficult in confined areas. However, in our experience, mass excavations for building footprints are typically feasible with standard excavation equipment. There have been instances in Midway where rock trenching machines were required for utility installation. Due to the porosity of the tufa, rock breakers are typically ineffective.

3. The relatively shallow groundwater encountered at a depth of three feet at Test Pit TP-5. For design groundwater recommendations see Section 5.9, Design Water Table. Groundwater was encountered in Test Pit TP-5 at a depth of three feet below the ground surface at the lowest area of the site. However, it is projected that site grading fill will be utilized to raise the overall grade of the southern portion of the site, where the numerous end-dumped fill piles are currently positioned. For design groundwater recommendations see Section 5.9, Design Water Table.

4. Slightly collapsible soils encountered to depths of two to six and one-half feet at Test Pits TP-1 through TP-4. The silty sand and sandy silt soils encountered at the site are slightly moisture sensitive and exhibit a slight collapse potential when saturated or nearly saturated. Ideally, potentially collapsible soils should be completely removed from below foundations where feasible. However, due to the limited thickness of the slightly collapsible soils encountered, and the relatively low collapse potential, additional settlement upon saturation of the subgrade soils will be within the tolerable range for structures of this type. Therefore, footings may be established directly on undisturbed natural soils utilizing a reduced bearing pressure. See Section 5.3.1, Design Data for details.

5. Potential for "perched" groundwater conditions. Due to the potential for "perched" groundwater conditions, foundation subdrains are recommended around below-grade portions of structures.

Detailed discussions pertaining to earthwork, foundations, floor slabs, lateral resistance, pavement, and the geoseismic setting of the site are discussed in the following sections.

5.2 EARTHWORK

5.2.1 Site Preparation

Preparation of the site must consist of the removal of all non-engineered fills, vegetation, loose surficial soils, topsoil, debris, and other deleterious materials from beneath an area extending at least three feet beyond the perimeter of the proposed building, rigid pavement, and exterior flatwork areas.

Non-engineered fills may remain in flexible pavement areas as long as they are properly prepared. Proper preparation will consist of scarifying and moisture conditioning the upper eight inches and recompacting to the requirements of structural fill. However, it should be noted that compaction of fine-grained soils (clays and silts) as structural site grading fill will be very difficult, if not impossible, during wet and cold periods of the year. As an option for proper preparation and recompaction, the upper eight inches of the non-engineered fills may be removed and replaced with granular subbase over proofrolled subgrade. Even with proper preparation, flexible pavements established on non-engineered fills may experience some long-term movements. If the possibility of these movements is not acceptable, these non-engineered fills must be completely removed.

Subsequent to the above operations and prior to the placement of footings, structural site grading fill, or floor slabs, the exposed natural subgrade must be proofrolled by passing moderate-weight rubber tire-mounted construction equipment over the surface at least twice. If any loose, soft, or disturbed zones are encountered, they must be completely removed in footing and floor slab areas and replaced with granular structural fill. If removal depth required

is greater than two feet, G^2 must be notified to provide further recommendations. In pavement areas, unsuitable soils encountered during recompaction and proofrolling must be removed to a maximum depth of two feet and replaced with compacted granular structural fill.

5.2.2 Excavations

Groundwater is anticipated to be encountered only in the lowest area of the site at a depth of three feet below existing grade. Temporary construction excavations not exceeding four feet in depth may be constructed with near-vertical sideslopes. If cohesionless granular soils and groundwater are encountered, flatter sideslopes may be required. This condition is anticipated in the area of Test Pit TP-5. Deeper excavations are not anticipated at the site.

Utility trench excavations must be constructed in accordance with OSHA trench safety guidelines.

All excavations must be inspected periodically by qualified personnel. If any signs of instability or excessive sloughing are noted, immediate remedial action must be initiated.

5.2.3 Structural Fill

Structural fill is defined as all fill which will ultimately be subjected to structural loadings, such as imposed by footings, floor slabs, pavements, etc. Structural fill will be required as backfill over foundations and utilities, as site grading fill, and in some areas, as replacement fill below footings. All structural fill must be free of sod, rubbish, topsoil, frozen soil, and other deleterious materials. Structural site grading fill is defined as fill placed over fairly large open areas to raise the overall site grade. For structural site grading fill, the maximum particle size should generally not exceed four inches; although, occasional larger particles, not exceeding six inches in diameter may be incorporated if placed randomly in a manner such that “honeycombing” does not occur and the desired degree of compaction can be achieved. The maximum particle size within structural fill placed within confined areas should generally be restricted to two inches.

The on-site natural silty sand, sandy silt, and non-engineered fill soils may be utilized as structural site grading fill. However, it should be noted that compaction of silty and clayey soils will require close moisture control and will be very difficult if not impossible during wet and cold periods of the year.

To stabilize soft subgrade conditions or where structural fill is required to be placed below a level one foot above the water table at the time of construction, a mixture of coarse gravels and cobbles and/or one and one-half- to two-inch gravel (stabilizing fill) should be utilized. Stabilizing fill may be required in the lowest area of the site.

Non-structural site grading fill is defined as all fill material not designated as structural fill and may consist of any cohesive or granular soils not containing excessive amounts of degradable material.

5.2.4 Fill Placement and Compaction

Structural fill shall be placed in lifts not exceeding eight inches in loose thickness. Structural fills shall be compacted in accordance with the percent of the maximum dry density as determined by the AASHTO[1] T-180 (ASTM[2] D-1557) compaction criteria in accordance with the table below:

Location	Total Fill Thickness (feet)	Minimum Percentage of Maximum Dry Density
Beneath an area extending at least 3 feet beyond the perimeter of the structures	0 to 8	95
Outside area defined above	0 to 6	90
Outside area defined above	6 to 8	92
Road base	-	96

Structural fills greater than eight feet thick are not anticipated at the site.

Subsequent to stripping and prior to the placement of structural site grading fill, the subgrade must be prepared as discussed in Section 5.2.1, Site Preparation, of this report. In confined areas, subgrade preparation should consist of the removal of all loose or disturbed soils.

Non-structural fill may be placed in lifts not exceeding 12 inches in loose thickness and compacted by passing construction, spreading, or hauling equipment over the surface at least twice.

Coarse gravel and cobble mixtures (stabilizing fill), if utilized, shall be end-dumped, spread to a maximum loose lift thickness of 15 inches, and compacted by dropping a backhoe bucket onto the surface continuously at least twice. As an alternative, the fill may be compacted by passing moderately heavy construction equipment or large self-propelled compaction equipment over the surface at least twice. Subsequent fill material placed over the coarse gravels and cobbles shall be adequately placed so that the “fines” are “worked into” the voids in the underlying coarser gravels and cobbles.

---

1 American Association of State Highway and Transportation Officials
2 American Society for Testing and Materials

5.2.5 Utility Trenches

All utility trench backfill material below structurally loaded facilities (flatwork, floor slabs, roads, etc.) should be placed at the same density requirements established for structural fill. If the surface of the backfill becomes disturbed during the course of construction, the backfill should be proofrolled and/or properly compacted prior to the construction of any exterior flatwork over a backfilled trench. Proofrolling may be performed by passing moderately loaded rubber tire-mounted construction equipment uniformly over the surface at least twice. If excessively loose or soft areas are encountered during proofrolling, they should be removed to a maximum depth of two feet below design finish grade and replaced with structural fill.

Most utility companies and City-County governments are now requiring that Type A-1 or A-1-a (AASHTO Designation – basically granular soils with limited fines) soils be used as backfill over utilities. These organizations are also requiring that in public roadways the backfill over major utilities be compacted over the full depth of fill to at least 96 percent of the maximum dry density as determined by the AASHTO T-180 (ASTM D-1557) method of compaction. We recommend that as the major utilities continue onto the site that these compaction specifications are followed.

The on-site silty sand and sandy silt soils are not recommended for use as utility trench backfill. Some of the non-engineered fill may be utilized for utility trench backfill provided it meets the requirements stated above.

5.3 SPREAD AND CONTINUOUS WALL FOUNDATIONS

5.3.1 Design Data

The proposed structures may be supported upon conventional spread and continuous wall foundations established upon suitable natural soils or tufa and/or structural fill extending to suitable natural soils or tufa. Under no circumstances shall footings be placed overlying non-engineered fills.

For design, the following parameters are provided with respect to the projected loading discussed in Section 2., Proposed Construction, of this report:

Minimum Recommended Depth of Embedment for Frost Protection	- 42 inches
Minimum Recommended Depth of Embedment for Non-frost Conditions	- 15 inches
Recommended Minimum Width for Continuous Wall Footings	- 18 inches
Minimum Recommended Width for Isolated Spread Footings	- 24 inches
Recommended Net Bearing Pressure for Real Load Conditions	
For footings on suitable natural soils and/or structural fill extending to suitable natural soils	- 1,500 pounds per square foot
For footings established entirely on tufa and/or Structural fill extending to tufa	- 2,500 pounds per square foot
Bearing Pressure Increase for Seismic Loading	- 50 percent*

* Not applicable for edge bearing pressure when the footings are established upon granular soil. Use 25 percent for overturning or other inclined loading.

The term “net bearing pressure” refers to the pressure imposed by the portion of the structure located above lowest adjacent final grade. Therefore, the weight of the footing and backfill to the lowest adjacent final grade need not be considered. Real loads are defined as the total of all dead plus frequently applied live loads. Total load includes all dead and live loads, including seismic and wind.

5.3.2 Installation

Under no circumstances shall the footings be established upon non-engineered fills, loose or disturbed soils, rubbish, construction debris, other deleterious materials, frozen soils, or within ponded water. If unsuitable soils are encountered, they must be completely removed and replaced with compacted structural fill.

The width of structural replacement fill below footings should be equal to the width of the footing plus one foot for each foot of fill thickness.

5.3.3 Settlements

Settlements of foundations designed and installed in accordance with the above recommendations and supporting maximum projected structural loads are anticipated to be on the order of one-half of an inch or less. Settlements are expected to occur rapidly with approximately 60 to 70 percent of the settlements occurring during construction.

5.4 FOUNDATION SUBDRAINS

Due to the potential for “perched” groundwater conditions, and to provide additional protection, we recommend the installation of foundation subdrains around footings in partial- and full-depth basement areas.

Foundation subdrains should consist of a four-inch diameter perforated or slotted plastic or PVC pipe enclosed in clean gravel. The invert of a subdrain should be at least two feet below the top of the lowest adjacent floor slab. The gravel portion of the drain should extend two inches laterally and below the perforated pipe and at least one foot above the top of the lowest adjacent floor slab. The gravel zone must be installed immediately adjacent to the perimeter footings and the foundation walls. To reduce the possibility of plugging, the gravel must be wrapped with a geotextile, such as Mirafi 140N or equivalent. Above the subdrain, a minimum four-inch-wide zone of “free-draining” sand and gravel should be placed adjacent to the foundation walls and extend to within two feet of final grade. The upper two feet of soils should consist of a compacted clayey cap to reduce surface water infiltration into the drain. As an alternative to the zone of permeable sand and a prefabricated “drainage board,” such as Miradrain or equivalent, may be placed adjacent to the exterior below grade walls. Prior to the installation of the footing subdrain, the below-grade walls should be dampproofed. The slope of the subdrain should be at least 0.3 percent. The gravel placed around the drain pipe should be clean three-quarters to one-inch minus gap-graded gravel and/or “pea” gravel. The foundation subdrains can be discharged into the area subdrains, storm drains, or other suitable down-gradient location.

5.5 LATERAL RESISTANCE

Lateral loads imposed upon foundations due to wind or seismic forces may be resisted by the development of passive earth pressures and friction between the base of the footings and the supporting soils. In determining frictional resistance on fine-grained soils, a coefficient of 0.40 should be utilized. In determining frictional resistance on granular soils, a coefficient of 0.45 should be utilized. Passive resistance provided by properly placed and compacted granular structural fill above the water table may be considered equivalent to a fluid with a density of

300 pounds per cubic foot. Below the water table, this granular soil should be considered equivalent to a fluid with a density of 150 pounds per cubic foot.

A combination of passive earth resistance and friction may be utilized provided that the friction component of the total is divided by 1.5.

5.6 FLOOR SLABS

Floor slabs may be established upon suitable undisturbed natural soils, and/or upon structural fill extending to suitable natural soils. Non-engineered fills and topsoil are not considered suitable. To provide a capillary break, it is recommended that floor slabs be directly underlain by at least four inches of "free-draining" fill, such as "pea" gravel or three-quarters- to one-inch minus clean gap-graded gravel. Settlements of lightly to moderately loaded floor slabs are anticipated to be minor.

5.7 PAVEMENTS

The properly prepared non-engineered fills will exhibit poor engineering characteristics when saturated or nearly saturated. Non-engineered fills and collapsible soils may remain in flexible pavement areas if properly prepared, as stated previously in this report. Rigid pavements shall not be placed overlying non-engineered fills, even if properly prepared. Considering the existing non-engineered fill and sandy silt as the pavement subgrade and the projected traffic, the following pavement sections are recommended:

Primary Roadway Area

(Moderate Volume of Automobiles and Light Trucks,
Light Volume of Medium-Weight Trucks,
and Occasional Heavy-Weight Trucks)
[5 equivalent 18-kip axle loads per day]

Flexible:

3.0 inches	Asphalt concrete
8.0 inches	Aggregate base
Over	Properly prepared natural soils, properly prepared non-engineered fills, and/or structural site grading fill extending to suitable stabilized natural soils.

Rigid:

5.5 inches	Portland cement concrete (non-reinforced)
5.0 inches	Aggregate base
Over	Properly prepared natural soils, and/or structural site grading fill extending to suitable stabilized natural soils.*

* Rigid pavements shall not be placed over non-engineered fills, even if properly prepared.

For dumpster pads, we recommend a pavement section consisting of six and one-half inches of Portland cement concrete, four inches of aggregate base, over properly prepared natural stabilized subgrade or site grading structural fills.

These above rigid pavement sections are for non-reinforced Portland cement concrete. Concrete should be designed in accordance with the American Concrete Institute (ACI) and joint details should conform to the Portland Cement Association (PCA) guidelines. The concrete should have a minimum 28-day unconfined compressive strength of 4,000 pounds per square inch and contain 6 percent ±1 percent air-entrainment.

5.8 GEOSEISMIC SETTING

5.8.1 General

In July 2019, the State of Utah adopted the International Building Code (IBC) 2018 but is still using the International Residential Code (IRC) 2015. The IRC 2015 code includes provisions for seismic design under the IBC 2015 code. The IBC 2015 code determines the seismic hazard for a site based upon 2008 mapping of bedrock accelerations prepared by the United States Geologic Survey (USGS) and the soil site class. The USGS values are presented on maps incorporated into the IBC code and are also available based on latitude and longitude coordinates (grid points).

The structures must be designed in accordance with the procedure presented in Section 1613, Earthquake Loads, of the IBC 2015 edition.

5.8.2 Faulting

Based on our review of available literature, no active faults pass through or immediately adjacent to the site.

5.8.3 Soil Class

Based on our experience in the area, for dynamic structural analysis, the Site Class D - Stiff Soil Profile as defined in Table 20.3-1, Site Classification, of ASCE 7-10 can be utilized.

5.8.4 Ground Motions

The IBC 2015 code is based on 2008 USGS mapping, which provides values of short and long period accelerations for the Site Class B boundary for the Maximum Considered Earthquake (MCE). This Site Class B boundary represents a hypothetical sandstone bedrock surface and must be corrected for local soil conditions. The following table summarizes the peak ground and short and long period accelerations for a MCE event and incorporates a soil amplification factor for a Site Class D soil profile in the second column. Based on the site latitude and longitude (40.5292 degrees north and -111.4830 degrees west, respectively), the values for this site are tabulated below:

Spectral Acceleration Value, T Seconds	Site Class B-C Boundary [mapped values] (% g)	Site Class D [adjusted for site class effects] (% g)
Peak Ground Acceleration (Geo-Mean)	25.7	33.1
0.2 Seconds (Short Period Acceleration)	S_S = 64.2	S_{MS} = 82.6
1.0 Seconds (Long Period Acceleration)	S_1 = 21.4	S_{M1} = 42.2

The IBC 2015 code design accelerations (S_{DS} and S_{D1}) are based on multiplying the above accelerations (S_{MS} and S_{M1}) for the MCE event by two-thirds (⅔).

5.8.5 Liquefaction

The site is located in an area that has been identified by the Utah Geological Survey as having “very low” liquefaction potential. Liquefaction is defined as the condition when saturated, loose, finer-grained sand-type soils lose their support capabilities because of excessive pore water pressure which develops during a seismic event.

Due to the non-liquefiable tufa encountered at the test pit locations, and the coarse nature of the saturated granular soils encountered at Test Pit TP-5, the likelihood of liquefaction at the site during the design seismic event is very low.

5.9 CEMENT TYPES

Laboratory tests indicate that the site soils contain negligible amounts of water-soluble sulfates. Therefore, all concrete which will be in contact with the site soils may be prepared using Type I or IA cement.

5.10 SITE OBSERVATIONS

As stated previously, due to the variable nature of the non-engineered fills encountered, a qualified geotechnical engineer from our staff must aid in verifying that all non-engineered fills have been completely removed prior to the placement of structural site grading fills, footings, or foundations.

5.11 DESIGN INFILTRATION RATE

A conservative design infiltration rate of 30 minutes per inch is recommended for retention basins terminating in the natural silty sand and sandy silt soils encountered. A higher rate may potentially be utilized if infiltration testing is performed in the proposed basin location.

5.12 DESIGN WATER TABLE

The water table of our study was measured at a depth of three feet below existing grade at the lowest portion of the site (Test Pit TP-5). Considering seasonal and long-term groundwater fluctuations, we recommend that a design groundwater table of one foot below existing grade at Test Pit TP-5 be utilized in the design for the structures. Based on the provided topographic survey, this design water table corresponds to an elevation of approximately 5,683 feet. We recommend that all habitable floor slabs be established a minimum of two feet above the design water table.

We appreciate the opportunity of providing this service for you. If you have any questions or require additional information, please do not hesitate to contact us.

Respectfully submitted,

Gordon Geotechnical Engineering, Inc.

Jordan K. Culp, State of Utah No. 10975604
Professional Engineer

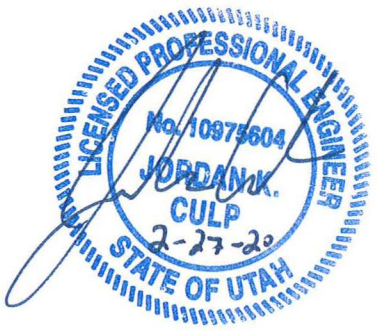
Reviewed By:

Patrick R. Emery, State of Utah No. 7941710
Professional Engineer

JKC/PRE:sn

Encl. Figure 1, Vicinity Map
Figure 2, Area Map
Figure 3, Site Plan
Figures 4A through 4E, Log of Test Pits
Figure 5, Unified Soil Classification System
Figure 6, Photographs

Addressee (3 + email)



CONSTRUCTION SERVICES CONSULTING
JOB NO. 609-004-20

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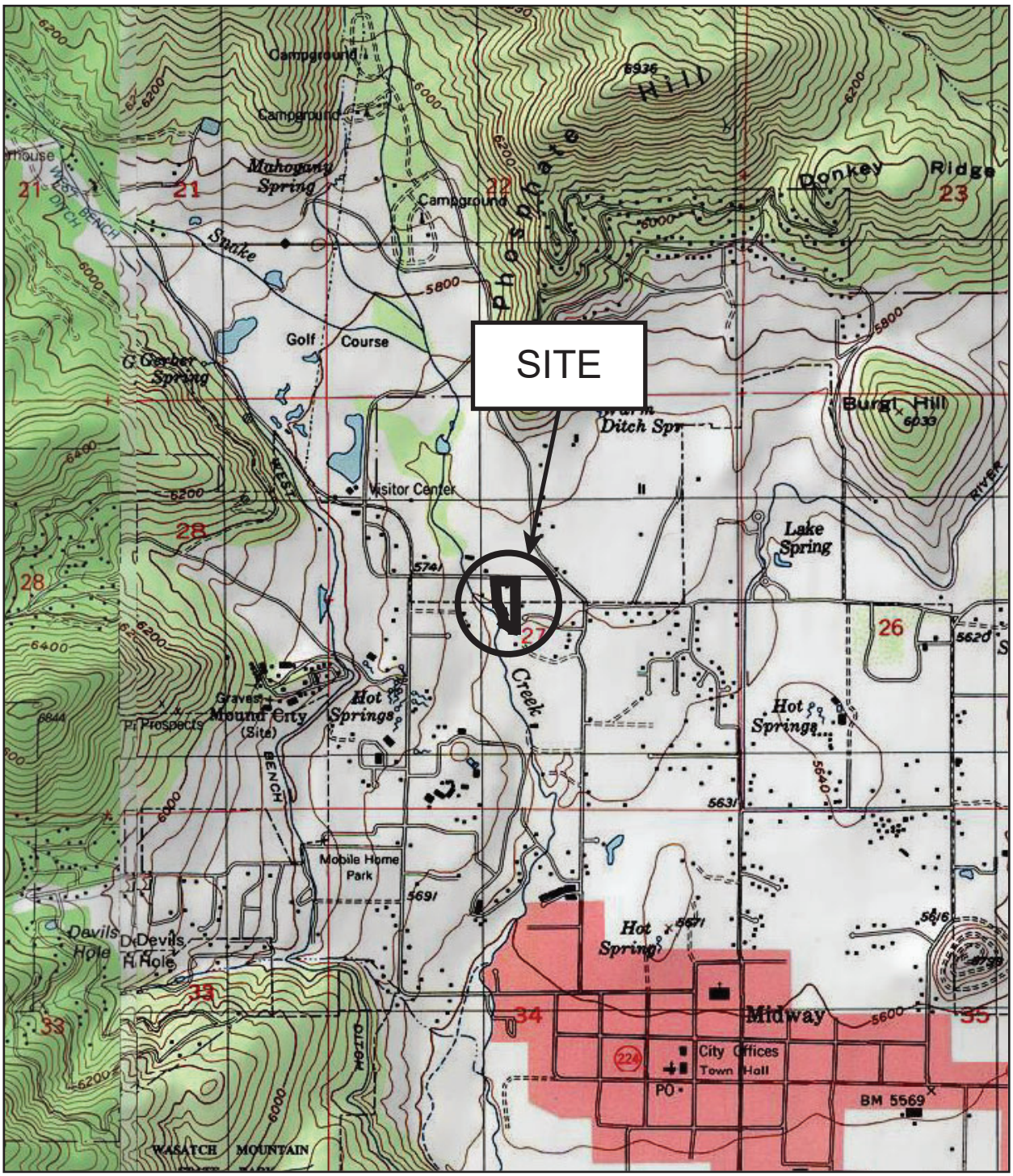

SCALE IN FEET
1000 0 1000 2000

REFERENCE:
USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE MAPS
TITLED “HEBER CITY, UTAH”, DATED 1999 AND
“BRIGHTON, UTAH”, DATED 1998

FIGURE 1
VICINITY MAP

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FIGURE 2
AREA MAP

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KEY

X.X' Depth of Non-Engineered Fill (ft)
X.X' Depth of Excavation Refusal (ft)

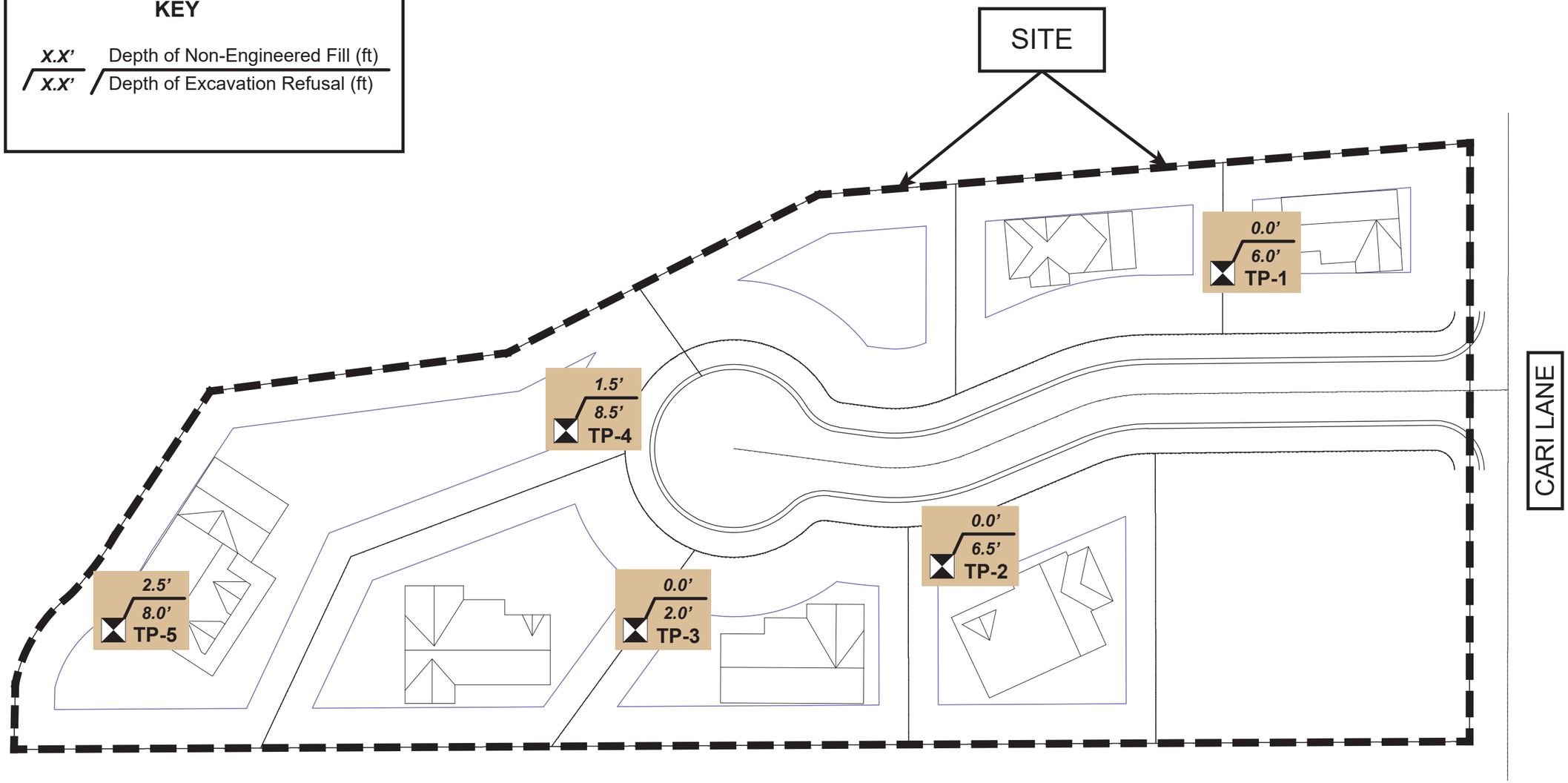

FIGURE 3
SITE PLAN

REFERENCE:
ADAPTED FROM DRAWING PROVIDED
BY CLIENT, NOT DATED

NOT TO SCALE

Gordon Geotechnical Engineering, Inc.
4426 South Century Drive, Suite 100
Salt Lake City, Utah 84123

TEST PIT TP-1

Project Name: Proposed Creekside Estates
Project No.: 609-004-20
Location: 515 Cari Lane, Midway, Utah
Client: Construction Services Consulting
Excavating Method: Kubota KX057
Date Excavated: 01-28-20
Elevation: ---
Water Level: No groundwater encountered.
Remarks:

DESCRIPTION	GRAPHIC LOG	WATER LEVEL	DEPTH (FT.)	SAMPLE SYMBOL	SAMPLE TYPE	BLOWS/FT.	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	REMARKS
SILTY FINE SAND major roots (topsoil) to 3"; light brown (SM)					TW		10.8	95				slightly moist "medium dense"
FINE TO COARSE SAND AND FINE AND COARSE GRAVEL with trace silt; light brown (SP/GP)			5		B				4.0			slgithly moist "medium dense"
Excavation refusal at 6.0' on hard tufa. Stopped sampling at 5.5'. No groundwater encountered at time of excavating. No significant sidewall caving.			10 15 20 25									

The discussion in the text under the section titled, SUBSURFACE CONDITIONS, is necessary for a proper understanding of the nature of the subsurface material.

FIGURE 4A

Gordon Geotechnical Engineering, Inc.
4426 South Century Drive, Suite 100
Salt Lake City, Utah 84123

TEST PIT TP-2

Project Name: Proposed Creekside Estates
Project No.: 609-004-20
Location: 515 Cari Lane, Midway, Utah
Client: Construction Services Consulting
Excavating Method: Kubota KX057
Date Excavated: 01-28-20
Elevation: ---
Water Level: No groundwater encountered.
Remarks:

DESCRIPTION	GRAPHIC LOG	WATER LEVEL	DEPTH (FT.)	SAMPLE SYMBOL	SAMPLE TYPE	BLOWS/FT.	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	REMARKS
FINE SANDY SILT major roots (topsoil) to 3"; light brown (ML)												slightly moist "stiff"/"medium dense"
				■	TW		8.3	96	63.6			
Excavation refusal at 6.5' on hard tufa. Stopped sampling at 3.0'. No groundwater encountered at time of excavating. No significant sidewall caving.			5 10 15 20 25									

The discussion in the text under the section titled, SUBSURFACE CONDITIONS, is necessary for a proper understanding of the nature of the subsurface material.

FIGURE 4B

Gordon Geotechnical Engineering, Inc.
4426 South Century Drive, Suite 100
Salt Lake City, Utah 84123

TEST PIT TP-3

Project Name: Proposed Creekside Estates
Project No.: 609-004-20
Location: 515 Cari Lane, Midway, Utah
Client: Construction Services Consulting
Excavating Method: Kubota KX057
Date Excavated: 01-28-20
Elevation: ---
Water Level: No groundwater encountered.
Remarks:

DESCRIPTION	GRAPHIC LOG	WATER LEVEL	DEPTH (FT.)	SAMPLE SYMBOL	SAMPLE TYPE	BLOWS/FT.	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	REMARKS
SILTY FINE SAND with chunks of tufa; major roots (topsoil) to 3"; brown (SM)					B							
Excavation refusal at 2.0' on hard tufa. Stopped sampling at 1.5'. No groundwater encountered at time of excavating. No significant sidewall caving.			5 10 15 20 25									

The discussion in the text under the section titled, SUBSURFACE CONDITIONS, is necessary for a proper understanding of the nature of the subsurface material.

FIGURE 4C

Gordon Geotechnical Engineering, Inc.
4426 South Century Drive, Suite 100
Salt Lake City, Utah 84123

TEST PIT TP-4

Project Name: Proposed Creekside Estates
Project No.: 609-004-20
Location: 515 Cari Lane, Midway, Utah
Client: Construction Services Consulting
Excavating Method: Kubota KX057
Date Excavated: 01-28-20
Elevation: ---
Water Level: No groundwater encountered.
Remarks:

DESCRIPTION	GRAPHIC LOG	WATER LEVEL	DEPTH (FT.)	SAMPLE SYMBOL	SAMPLE TYPE	BLOWS/FT.	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	REMARKS
CLAYEY FINE TO COARSE SAND AND FINE AND COARSE GRAVEL, FILL dark brown (SC/GC-FILL)					B							slightly moist "loose"
SILTY FINE SAND brown (SM)			5		B				31.6			moist "medium dense" very moist
Excavation refusal at 8.5' on hard tufa. Very moist soils possibly due to infiltration from adjacent creek. Stopped sampling at 6.5'. No groundwater encountered at time of excavating. No significant sidewall caving.			10 15 20 25									

The discussion in the text under the section titled, SUBSURFACE CONDITIONS, is necessary for a proper understanding of the nature of the subsurface material.

FIGURE 4D

Gordon Geotechnical Engineering, Inc.
4426 South Century Drive, Suite 100
Salt Lake City, Utah 84123

TEST PIT TP-5

Project Name: Proposed Creekside Estates
Project No.: 609-004-20
Location: 515 Cari Lane, Midway, Utah
Client: Construction Services Consulting
Excavating Method: Kubota KX057
Date Excavated: 01-28-20
Elevation: ---
Water Level: 3.0' (01-28-20)
Remarks:

DESCRIPTION	GRAPHIC LOG	WATER LEVEL	DEPTH (FT.)	SAMPLE SYMBOL	SAMPLE TYPE	BLOWS/FT.	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	REMARKS
CLAYEY FINE TO COARSE SAND AND FINE AND COARSE GRAVEL, FILL dark brown (SC/GC-FILL)												moist "loose"
FINE TO COARSE SAND AND FINE AND COARSE GRAVEL with trace silt; light brown (SP/GP)		▼	5		B				2.5			saturated "loose"
Excavation refusal at 8.0' due to saturated cohesionless granular soil flowing into test pit. Stopped sampling at 7.5'. Major sidewall caving.			10 15 20 25									

The discussion in the text under the section titled, SUBSURFACE CONDITIONS, is necessary for a proper understanding of the nature of the subsurface material.

FIGURE 4E

GORDON GEOTECHNICAL ENGINEERING, INC.

UNIFIED SOIL CLASSIFICATION SYSTEM

FIELD IDENTIFICATION PROCEDURES				GRAPH SYMBOL	LETTER SYMBOL [1]	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS More than half of material is larger than No. 200 sieve size. [2] (The No. 200 sieve size is about the smallest particle visible to the naked eye)	GRAVELS More than half of coarse fraction is larger than No. 4 sieve size. (For visual classifications, the 1/4" size may be used as equivalent to the No. 4 sieve size.)	CLEAN GRAVELS (Little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes.		GW	Well graded gravels, gravel-sand mixtures, little or no fines.
			Predominantly one size or a range of sizes with some intermediate sizes missing.		GP	Poorly graded gravels, gravel-sand mixtures, little or no fines.
		GRAVELS WITH FINES (Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML below).		GM	Silty gravels, poorly graded gravel-sand-silt mixtures.
			Plastic fines (for identification procedures see CL below).		GC	Clayey gravels, poorly graded gravel-sand-clay mixtures.
	SANDS More than half of coarse fraction is smaller than No. 4 sieve size. (For visual classifications, the 1/4" size may be used as equivalent to the No. 4 sieve size.)	CLEAN SANDS (Little or no fines)	Wide range in grain sizes and substantial amounts of all intermediate particle sizes.		SW	Well graded sands, gravelly sands, little or no fines.
			Predominantly one size or a range of sizes with some intermediate sizes missing.		SP	Poorly graded sands, gravelly sands, little or no fines.
		SANDS WITH FINES (Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML below).		SM	Silty sands, poorly graded sand-silt mixtures.
			Plastic fines (for identification procedures see CL below).		SC	Clayey sands, poorly graded sand-clay mixtures.
FINE GRAINED SOILS More than half of material is smaller than No. 200 sieve size. (The No. 200 sieve size is about the smallest particle visible to the naked eye)	IDENTIFICATION PROCEDURES ON FRACTION SMALLER THAN No. 40 SIEVE SIZE					
		DRY STRENGTH (CRUSHING CHARACTERISTICS)	DILATANCY (REACTION TO SHAKING)	TOUGHNESS (CONSISTENCY NEAR PLASTIC LIMIT)		
	SILTS AND CLAYS Liquid limit less than 50	None to slight	Quick to slow	None	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sand with slight plasticity.
		Medium to high	None to very slow	Medium	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
		Slight to medium	Slow	Slight	OL	Organic silts and organic silt-clays of low plasticity.
	SILTS AND CLAYS Liquid limit greater than 50	Slight to medium	Slow to none	Slight to medium	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
		High to very high	None	High	CH	Inorganic clays of high plasticity, fat clays.
		Medium to high	None to very slow	Slight to medium	OH	Organic clays of medium to high plasticity.
HIGHLY ORGANIC SOILS		Readily identified by color, odor, spongy feel and frequently by fibrous texture.			Pt	Peat and other highly organic soils.

[1] Boundary classifications: —Soils possessing characteristics of two groups are designated by combinations of group symbols. For example GW—GC, well graded gravel—sand mixture with clay binder.
[2] All sieve sizes on this chart are U.S. standard.

GENERAL NOTES

1. In general, Unified Soil Classification Designations presented on the logs were evaluated by visual methods only. There rore, actual designations (based on laboratory testing) may differ.
2. Lines seperating strata on the logs represent approximate boundaries only Actual transitions may be gradual.
3. Logs represent general soil conditions observed at teh point of exploration onthe date indicated.
4. No warranty is provided as to the continuity of soil conditions between individual sample locations.

FINE - GRAINED SOIL

CONSISTENCY	SPT (blows/ft)	TORVANE UNDRAINED SHEAR STRENGTH (tsf)	POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH (tsf)	FIELD TEST
Very Soft	<2	<0.125	<0.25	Easily penetrated several inches by Thumb. Squeezes through fingers.
Soft	2 - 4	0.125 - 0.25	0.25 - 0.5	Easily penetrated 1 " by Thumb . Molded by light finger pressure.
Medium Stiff	4 - 8	0.25 - 0.5	0.5 - 1.0	Penetrated over 1/2 " by Thumb with moerate effort. Molded by strong finger pressure.
Stiff	8 - 15	0.5 - 1.0	1.0 - 2.0	Indented about 1/2 " by Thumb but penetrated only with great effort
Very Stiff	15 - 30	1.0 - 2.0	2.0 - 4.0	Readily indented by Thumbnail
Hard	>30	>2.0	>4.0	Indented with difficulty by Thumbnail

LOG KEY SYMBOLS

- Bulk / Bag Sample
- Standard Penetration Split Spoon Sampler
- Rock Core
- Water Level
- Thin Wall
- No Recovery
- 3-3/4" ID D&M Sampler
- 3" ID D&M Sampler
- California Sampler

COARSE -GRAINDE SOIL

APPERENT DENSITY	SPT (blows/ft)	RELATIVE DENSITY (%)	FIELD TEST
Very Loose	<4	0 - 15	Easily penetrated with 1/2 " reinforcing rod pushed by hand
Loose	4 - 10	15 - 35	Difficult to penetrated with 1/2 " reinforcing rod pushed by hand
Medium Dense	10 - 30	35 - 65	Easily penetrated a foot with 1/2 " reinforcing rod driven with 5-lb hammer
Dense	30 - 50	65 - 85	Difficult to penetrated a foot with 1/2 " reinforcing rod driven with 5-lb hammer
Very Dense	>50	85 - 100	Penetrated only a few inches with 1/2 " reinforcing rod driven with 5-lb hammer

STRATIFICATION

DESCRIPTION	THICKNESS
SEAM	1/16 - 1/2 "
LAYER	1/2 - 12 "

DESCRIPTION	THICKNESS
Occasional	One or less per foot of thickness
Frequent	More than on per foot of thichness

CEMENTATION

DESCRIPTION	DESCRIPTION
Weakely	Crumbles or breaks with handling of slight finger pressure
Moderately	Crumbles or breaks with considerable finger pressure
Strongly	Will not crumbles or breaks with finger pressure

MODIFIERS

DESCRIPTION	%
Trace	<5
Some	5 - 12
With	>12

MOISTURE CONTENT

DESCRIPTION	FIELD TEST
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible water, usually soil below Water Table

FIGURE 5

GORDON GEOTECHNICAL ENGINEERING, INC.

#1 Looking south along stream.

#2 Looking west.

#3 Looking southeast.

#4 Looking south.

Locations and direction, see Figure 2, Area Map

FIGURE 6
PHOTOGRAPHS