

Cascade Creek 0697-15-08 Well Site Water Plan Rule 304.c.(18)



**Laramie Energy, LLC
760 Horizon Drive, Suite 101
Grand Junction, CO 81506**

October 2021

Cascade Creek 0697-15-08 Well Site
Water Plan
Rule 304.c.(18)



Rule 304.c.(18) Water Plan

A plan identifying the planned source of water for drilling and completion operations.

The following plan addresses the requirements for Rule 304.c.(18) Water Plan under 300 Series of the Colorado Oil and Gas Conservation Commission's (COGCC) Rules. The Water Plan also incorporates applicable standards and rules listed in Rules 437 and 905a.(3).

Laramie is proposing to drill 18 wells at the Cascade Creek (CC) 0697-15-08 well site (**Vicinity Map – Appendix A**). Drilling and completions activities will utilize water sources. Only water-based bentonite drilling fluids, not oil-based fluids, will be utilized for the 18 wells. Laramie has sufficient volume of fresh water available, either through Laramie's own water rights or purchased from third parties to drill and complete all wells on the well pad.

Location

The site is located on Parcel #216921400026 within Garfield County, Colorado. The parcel is located 12.2 miles north of De Beque, Colorado. The site is located approximately 16 miles northeast of De Beque, Colorado and 21.8 miles northeast by access route. The site is located approximately 9.6 miles from the nearest public road, County Road 213.

The legal description of the site is: SENE of Section 15, Township 6 South, Range 97 West, 6th P.M. Location Coordinates: Latitude: 39.526319°; Longitude: -108.198886°

Rule 304.c.(18).A. *The planned source and volume of all surface water and Groundwater to be used and the coordinates of the planned source of water*

Drilling

Laramie anticipates that drilling will take approximately 110 days to complete. For drilling activities, fresh water will be used. Laramie has two sources of fresh water for operations within the Cascade Creek field: Savage Pond and Firewater Pond (**Fresh Water Source and Storage Map – Appendix B**). Fresh water is derived from Savage Pond and trucked to the subject well site. Water transferred by truck will occur in the morning as crews travel up the mountain in an effort to reduce vehicle trips. Fresh water is transferred to from Firewater Pond to Pond 4 or Pond 13 via pipelines.

The following estimates are based on calculations from water usage records from wells within the Cascade Creek field. During drilling activities, cementing uses approximately 1269 barrels per well hole. During mudding activities, the initial well hole will use about 6090 barrels of fresh water and will return about 2,893 barrels of water from recycled mud. Laramie anticipates an estimated 40% loss of water to formation per well hole. Therefore, after the initial well, approximately 3,197 barrels of fresh water will be added to subsequent wells drilled after the initial well hole.

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During construction and drilling activities, an estimated 1,500 barrels of fresh water will be used for dust abatement per well hole.

Table 1: Drilling Phase – Water Use (barrels) - CC 0697-15-08

Activity	Per Well Hole		Well Site Total – 18 wells	
	Fresh	Recycled Mud	Fresh	Recycled Mud
Cementing	1269		22,842	
Mud (Initial Well Hole)	6090		6090	
Mud (Subsequent Well Holes)	3,197	2,893	54,349	49,181
Dust Abatement	1500		27,000	
TOTAL			110,281	49,181
TOTAL (acre-ft)			14.2	6.3

The total amount of water estimated to be used during drilling for the 18 wells is 20.6 acre-feet.

Completions

During the completions phase (approximately 36 days) produced water will be used. The total timeframe for completions and flowback phase is 66 days; however, only 36 days will have completion activities.

Fresh water is only utilized during the completions phase as an amendment to produce water or during certain times of year when produced water levels are low. According to Laramie's records, fresh water is mixed with produced water during the months of October and November.

Recycled and produced water used during completions will be sourced from Pond G (Facility ID 414402). Produced water will be treated at the Central Water Handling Facility (Facility ID 417559) or at Pond G Facility, in accordance with COGCC Rule 905.c, prior to release into Pond G.

Table 2: Completions Phase – Water Use (Barrels) - CC 0697-15-08

Activity	Per Well Hole	Well Site Total – 18 wells
	Produced Water	Produced Water
Acid Wash/ Hydraulic Fracturing	90,000	1,620,000

The total amount of proposed water estimated to be used during competitions for the 18 wells is 208.8 acre-feet.

Total Water Usage

Produced water and water derived from recycled mud that will be utilized during drilling and completions activities is approximately 94% of Laramie's water, resulting in only a 6% fresh water use for pre-production phase.

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Table 3: Total Water Usage – Water Use (barrels) – CC 0697-15-08

Phase	Well Site Total – 18 wells			
	Fresh	Recycled Mud	Produced Water	Total Water Usage
Drilling	110,281	49,181		159,462
Completions			1,620,000	1,620,000
TOTAL	110,281	49,181	1,620,000	1,779,462

The total amount of water estimated to be used during pre-production operations for the 18 wells is 229.3 acre-feet.

Fresh Water Sources

The Firewater Pond is located on Laramie’s property. Water from the pond is an available source when no calls on the river (referred to as “free water”). Free water typically is available during spring run/melt-off. Historically, the Roan Creek goes on call during the month of July and remains on call until September. During years of reduce precipitation, the water may go on call at Cameo (Colorado River). Though Cameo may be placed on call at any time of the year, the call most commonly occurs in October.

Table 4: Fresh Water Source – CC 0697-15-08

Name	Owner	Parcel #	Coordinates: Latitude/ Longitude	Water Source
Savage Pond	SAVAGE LIMITED PARTNERSHIP I & ANDERSON, GEORGE M REVOCABLE TRUST PO Box 1926 Rifle, CO 81650-1926	2411-0820- 0019	39.466971° / - 108.245172°	Spring
Firewater Pond	Laramie Energy, LLC 1001 17 th Street Suite 1900 Denver, CO 80202	2169-2140- 0026	39.542880°/- 108.221807°	Spring

Laramie may also utilize additional water sources. Fresh water may also be purchased from Knowles Transportation Enterprises (Knowles) or the Kobe Water Authority (Kobe) (**Table 5**). Both Knowles and Kobe have established water rights and fresh water is source from the Colorado River utilizing water rights. Fresh water transportation via truck by Knowles will be used for drilling activities and/or dust abatement.

Table 5: Additional Water Sources - Purchased

Owner	Water Source	Transportation Method	Coordinates: Latitude/ Longitude
Kobe Water Authority	Colorado River – Debeque, CO	Water Line	39.319726/ -108.222130
Knowles Transportation Enterprises	Colorado River	Trucking	39.330931/ -108.208115

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Table 6: Fresh Water Storage Ponds – CC 0697-15-08

Name	Owner	Parcel #	Coordinates: Latitude/ Longitude	COGCC Facility ID
Pond 4	Laramie Energy, LLC 1001 17 th Street Suite 1900 Denver, CO 80202	2169-2140-0026	39.539750° / -108.227194°	291972
Pond 13 E	Laramie Energy, LLC 1001 17 th Street Suite 1900 Denver, CO 80202	2169-0440-0003	39.548658°/ -108.216361°	414403
Pond 13 W	Laramie Energy, LLC 1001 17 th Street Suite 1900 Denver, CO 80202	2169-2140-0026	39.548659° / -108.217238°	414403

Water from Firewater Pond is pumped to Pond 4 or Pond 13, depending on which pond is at a lower water level. The Cascade Creek Water Gathering System Figure (**Appendix C**) depicts water lines in the Cascade Creek operating field.

Rule 304.c.(18).B. *The seller's name and address if water is to be purchased*

- **Knowles Transportation Enterprises** - PO Box 40656, Grand Junction, CO 81504
- **Kobe Water Authority** - Colorado River Water Conservation District
201 Centennial St., Suite 200, Glenwood Springs, CO 81601

Rule 304.c.(18).C. *If recycled or reused water is anticipated to be used, a description of the source of that water, background concentrations of chemicals listed in Table 437-1, anticipated method of transporting the water, and anticipated volumes to be used in addition to the reuse and recycling plan requirements of Rule 905.a.(3)*

Laramie will utilize reused or recycled water whenever possible to alleviate the heavy demand on local sources of water by recycling water back into operations versus obtaining fresh water from local sources for completion operations. Produced water will be used for the completion phases of the CC 0697-15-08 as stated in this Water Plan. Background concentrations are listed below in Table 7.

Table 7: Background Concentrations for Produced Water – Pond G

Analyte	Background Concentrations (mg/L)*
TPH High Fraction	4.81
TPH Low Fraction	23.8
Benzene	1.22
Toluene	2.89
Ethylbenzene	ND
Xylene	2.65
Naphthalene	ND
1,3,5-Trimethylbenzene	ND

*Samples collected May 28, 2021.

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All 18 wells that will be drilled at the 0697-15-08 well site will be drilled to the same formation and produced water will be derived from the same producing horizon. Laramie will comply with Rule 909.j.(6) *“Alternative to the sampling required by Rules 909.j.(1)–(5) the Operator transporting produced water produced from the same formation(s) in the same Field or unit to the same Pit may submit a Form 4 to request the Director’s approval for an alternative sampling program to consolidate the number of samples required from the same formation(s).”* Laramie is currently developing a sampling program for produced water that is obtained from the same producing formation within the Mesaverde Group. Laramie will submit a Form 4 detailing an alternative sampling program for produced water prior to drilling.

Water from Savage Pond will be transferred by water truck to the 0697-15-08. Water from Firewater Pond is pumped to Pond 4 or Pond 13, depending on which pond is at a lower water level. The Cascade Creek Water Gathering System Figure (**Appendix C**) depicts the water line in the Cascade Creek operating field.

During the completions phase at the CC 0697-15-08 well site, produced water will be used. Fresh water is only utilized during the completions phase as an amendment to produce water or during certain times of year when produced water levels are low. According to Laramie’s records, fresh water is mixed with produced water during the months of October and November.

Requirements of Rule 905.a.(3) are detailed throughout the Water Plan and the Cascade Creek Waste Management Plan. Brief summaries for the 905.a.(3) are stated below:

Rule 905.a.(3).A. Produced water will be used during completions activities.

Rule 905.a.(3).B. Volumes of produced water are identified in the CC 0697-15-08 Water Plan. Tables 1, 2, and 3 identified types of water and anticipated volumes.

Rule 905.a.(3).C. Recycled and produced water used during completions will be sourced from Pond G (Facility ID 414402).

Rule 905.a.(3).D. Laramie will not add additives listed in Table 437-1 to produced water. Laramie will test for chemicals listed in Table 437-1 to determine background concentrations of produced water.

Rule 905.a.(3).E. Produced water will be disposed of at Laramie’s permitted injection wells: 604-12-13 SWD (UIC Facility ID: 160016) and 604-1 SWD (UIC Facility ID: 159398). Produced water disposal is detailed in the Cascade Creek Waste Management Plan.

Rule 905.a.(3).G. Laramie will use produced water during completions activities.

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Rule 905.a.(3).I. Water from Savage Pond will be transferred by water truck to the 0697-15-08. Water from Firewater Pond is pumped to Pond 4 or Pond 13, depending on which pond is at a lower water level. The Cascade Creek Water Gathering System Figure (**Appendix C**) depicts the water line in the Cascade Creek operating field.

Rule 304.c.(18).D. *If fresh water is anticipated to be used, a description of why the Operator does not intend to use recycled or reused water.*

During the completions phase at the 0697-15-08 well site, recycled produced water will be used. Fresh water is only utilized during the completions phase as an amendment to produce water or during certain times of year when produced water levels are low. According to Laramie's records, fresh water is mixed with produced water during the months of October and November.

Produced water will be transported via Laramie's Cascade Creek water gathering system (**Appendix C**). Anticipated volumes are stated in Table 2 and Table 3 for produced water. Calculations are based on produced water usage records from wells within the Cascade Creek field. During completions/flowback use about 90,000 barrels per well hole. Produced water will be sourced from Pond G - Table 8.

Table 8: Recycled/Produced Water Source – CC 0697-15-08

Name	Owner	Parcel #	Coordinates: Latitude/ Longitude
Pond G (Facility ID 414402)	Laramie Energy, LLC 1001 17 th Street Suite 1900 Denver, CO 80202	2169-2140-0026	39.525690 ° / - 108.228311°

Rule 437. Hydraulic Fracturing Chemical Additives.

Rule 437.a. Effective Date. *After January 15, 2021, Operators will not use the chemicals listed in Table 437-1 as additives in Hydraulic Fracturing Fluid.*

Rule 437.b. *This Rule 437 does not prevent Operators from recycling or reusing produced water that has naturally occurring, trace amounts of chemicals listed in Table 437-1.*

Laramie does not use additives listed in Table 437-1 to produced water, adhering to Rule 437.a. Laramie collected samples of untreated produced water from Pond G as representative of background concentrations from formation that will be drilled at the CC 0697-15-08, displayed in Table 7. Laramie will utilize produced water that has naturally occurring trace amounts of chemicals listed in Table 437-1.

Rule 437.c. *For any chemical constituent listed in Table 437-1 for which Table 915-1 also provides a standard, the concentration in recycled or reused produced water will be below the Table 915-1 standard, or the unconcentrated naturally occurring background level, whichever is greater.*

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Chemical constituents listed in Table 437-1 and have a standard in 915-1 are:

- Benzene
- Ethylbenzene
- Xylene
- 1,3,5-trimethylbenzene

Produced water is transferred to Pond G (Facility ID 414402) prior to treatment at the Central Water Handling Facility (Facility ID 417559); therefore, Pond G is representative of background concentrations that are naturally occurring. Analytical results of Pond G pertaining to Rule 437.c. are shown in Table 9.

Table 9: Pond G Produced Water Background Analytical Results for Rule 437.c.*

Analyte	Benzene	Ethylbenzene	Xylene	1,3,5-Trimethylbenzene
Background Concentrations (mg/L)	1.22	ND	2.65	ND

*Samples collected May 28, 2021, collected from Pond G.

Analytical results of background produced water display background concentrations of naturally occurring benzene and xylene.

Rule 304.c.(18).D. *If fresh water is anticipated to be used, a description of why the Operator does not intend to use recycled or reused water.*

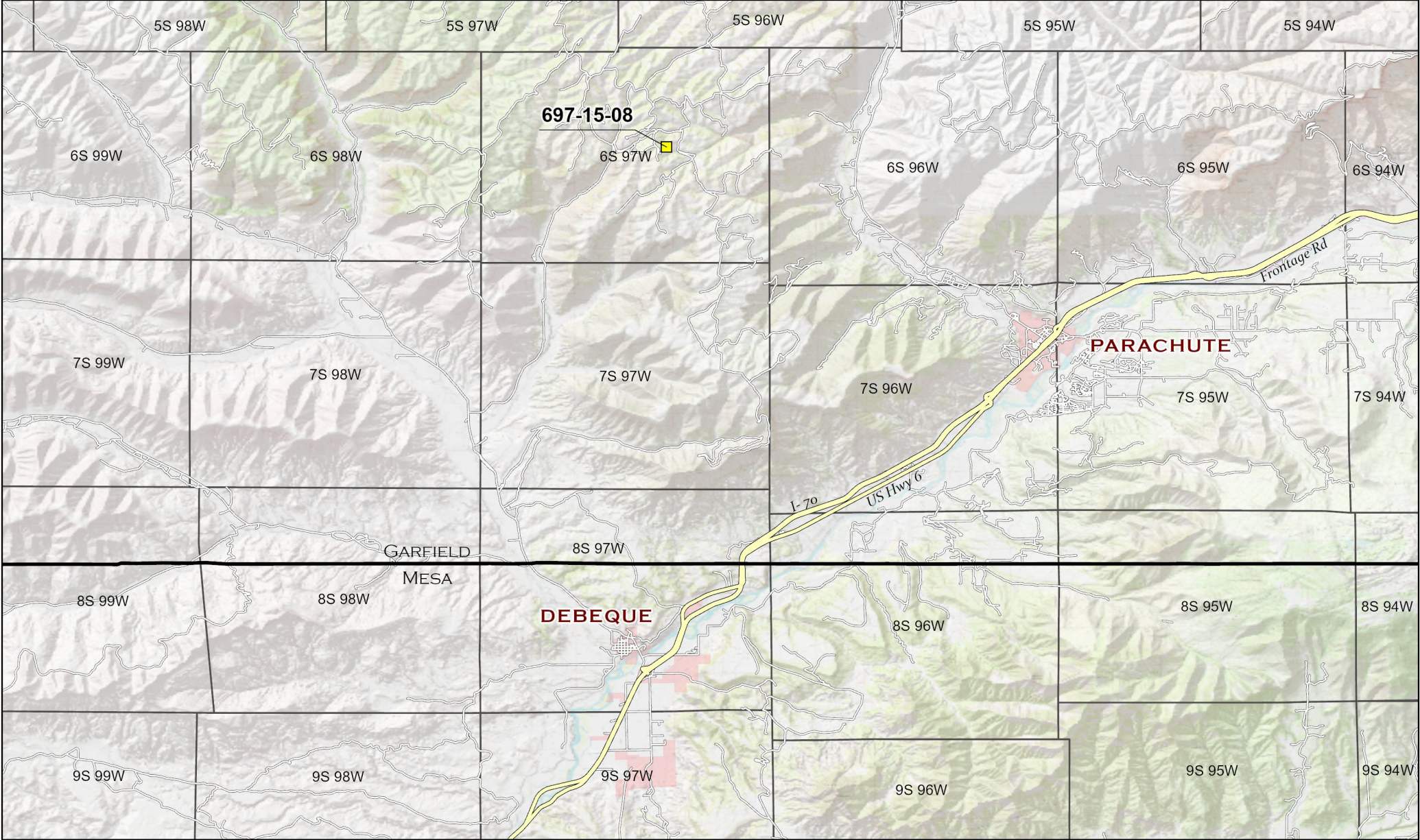
During the completions phase at the 0697-15-08 well site, produced water will be used. Fresh water is only utilized during the completions phase as an amendment to produce water or during certain times of year when produced water levels are low. According to Laramie's records, fresh water is mixed with produced water during the months of October and November.


Appendix List	
Appendix A	Vicinity Map
Appendix B	Fresh Water Source and Storage Map
Appendix C	Cascade Creek Water Gathering System



Appendix A

Vicinity Map





LEGEND
 Site Location

03.57

mi

1 inch = 3.5 mi

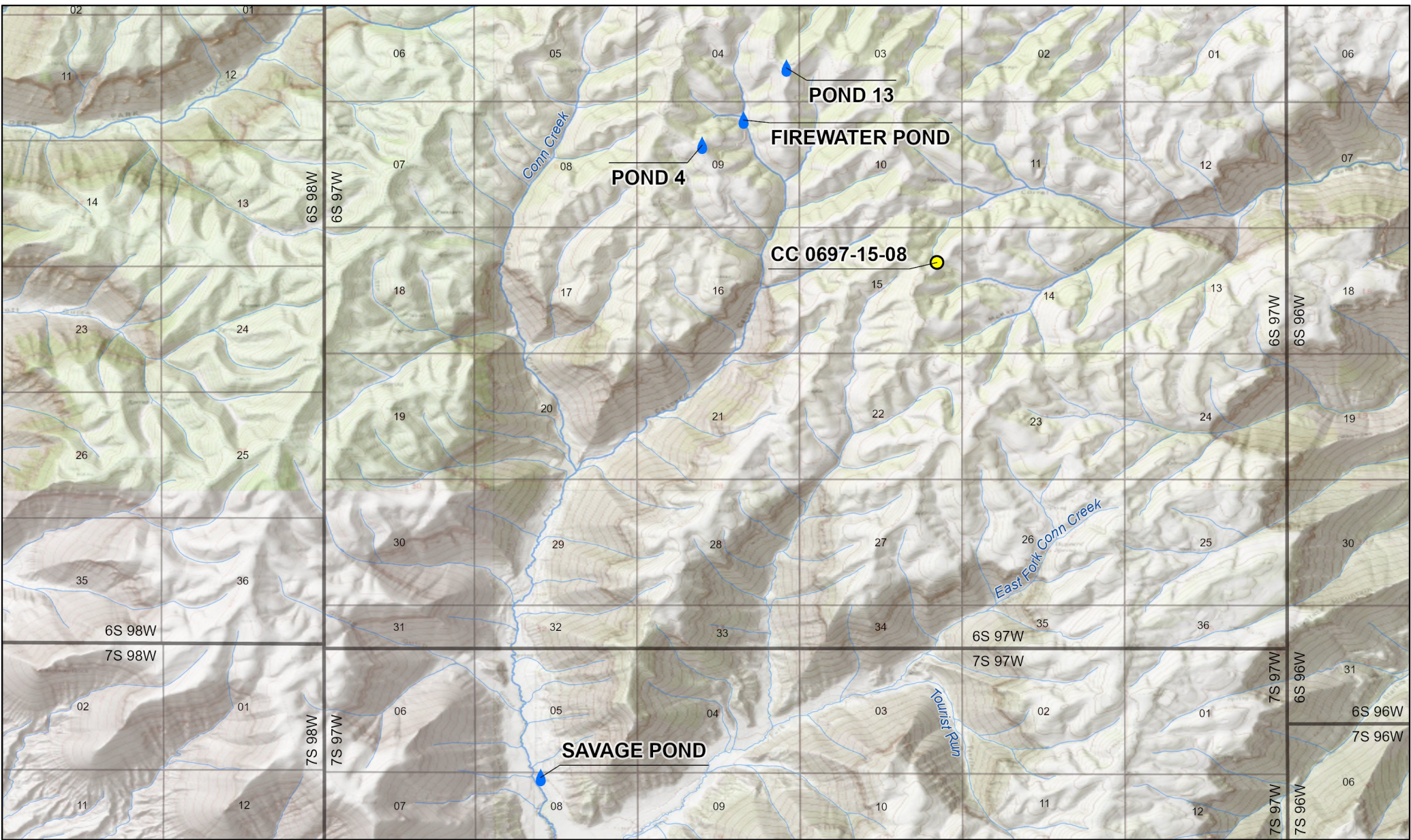




Project No: 021-036		Vicinity Map Cascade Creek 697-15-08 Pad Laramie Energy SENE, Section 15, T6S R97W, 6th P.M. Garfield County, Colorado	 <div>330 Grand Avenue, Unit C Grand Junction, CO 81501 970-549-1015</div>	Figure
Map By: NDB				
Date: 4/13/2021				1



Appendix B

Fresh Water Source and Storage Map





LEGEND
 Pond Location
 Site Location

04,0008,00012,000

Ft

1 inch = 5,500 ft



Project No: 021-036	Fresh Water Source and Storage Map Cascade Creek 697-15-08 Pad Laramie Energy SENE, Section 15, T6S R97W, 6th P.M. Garfield County, Colorado	 <div>330 Grand Avenue, Unit C Grand Junction, CO 81501 970-549-1015</div>	
Map By: NDB			
Date: 7/21/2021			



Appendix C

Cascade Creek Water System Map

