



COLORADO
Division of Water Resources
Department of Natural Resources

1313 Sherman Street, Room 821
Denver, CO 80203

MEMORANDUM

TO: Robert P. Koehler, PhD, Oil & Gas Conservation Commission
FROM: Andrew Flor, Hydrogeologist
DATE: October 2, 2017
SUBJECT: Enhanced Recovery Water Injection Project - Quiver Unit #2 (API: 05-061-06763)
SW NE S1 T17S R48W, Kiowa County
Mull Drilling Company, Inc.

On July 19, 2017 you sent a memo describing a proposal by Mull Drilling Company, Inc. to use an existing well, Quiver Unit #2, as part of an enhanced recovery water injection project in the St. Louis Limestone (4,967-5,040 feet Below ground surface(BGS)) and the Spergen Formation (5,050 to 5,061 feet BGS). The Quiver Unit #2 well is located in the SW ¼ of the NE ¼ of Section 1, Township 17 South, Range 48 West of the Sixth Principal Meridian in Kiowa County. The well is approximately 11 miles south of Kit Carson, CO and 9 miles north of Eads, CO.

The well completion information indicates that this well is constructed with 8-5/8 inch surface casing grouted from ground surface to a depth of 453 feet. 5-1/2-inch casing extends to a depth of 5,137 feet and is cemented from 5,137 feet back up to 4,236 feet and from 2,472 feet back up to ground surface, placed in two stages.

There are three completed water supply wells of record within ½ mile of the wellhead, which are likely completed in the unconsolidated Quaternary deposits which overlie the Niobrara Formation, as shown in Table 1. There is one water right structures within ½ mile of the wellhead as shown in Table 2. There are twenty-three COGCC oil/gas wells within ½ mile of the wellhead as shown in Table 3. A PDF output from AquaMap delineating a ½ mile radius from the enhanced recovery unit is attached. Permitted water supply wells are shown with green circles, decreed water rights structures are shown with magenta squares, and OGCC wells are shown as blue squares. There are six dams within ten miles of this well. The dams and hazard ratings are shown on an attached map.

Most of the existing water supply wells in this area produce from the shallow quaternary sediments. Due to the depth and poor water quality of the injection zone formation (TDS=15,500 to 28,600 mg/L) it is not considered to be a source of potable groundwater at this location. Based on the information provided, injection into the St. Louis Limestone and Spergen Formation through a properly constructed well should not negatively impact existing groundwater or surface water resources in the vicinity. If you have any questions or require additional information, please feel free to contact me (303-866-3581 x8218).





COLORADO
Oil & Gas Conservation
Commission

Department of Natural Resources

1120 Lincoln Street, Suite 801
Denver, CO 80203

July 19, 2017

TO: Andrew Flor Division of Water Resources

FROM: Robert P. (Bob) Koehler Oil and Gas Conservation Commission

SUBJECT: Need for Hydrologic Information

The Oil and Gas Conservation Commission (OGCC) has received an application for a Enhanced Recovery water injection project, summarized as follows:

LOCATION	COUNTY	FIELD
Surface SWNE Section 1, Township 17 South, Range 48 West, 6th P.M.	Kiowa	Quiver # 70900

WELL NAME	Mull Drilling Company, Inc.: Quiver Unit #2 (API: 061-06763)	
INJECTION ZONE FORMATION	St. Louis Limestone and Spergen Formation	
DEPTH OF INJECTION INTERVAL	4967-5040 (St. Louis-Formation), 5,050-5,061 (Spergen-Perfs)	feet
PROPOSED INJECTION PRESSURE	100-500	psig
FRAC GRADIENT OR PRESSURE (BHP)	0.6	psi/ft
VOLUME OF FLUID TO BE INJECTED	600-2,500	bbl/day
TDS OF INJECTION ZONE FLUID	15,500 (St. Louis), 28,600 (Spergen)	mg/L
TDS OF FLUID TO BE INJECTED	28,600 (Spergen)	mg/L

WELL CONSTRUCTION DATA								
CASING STRING	HOLE SIZE	CASING SIZE	CSG WT.	CSG TOP	SET DEPTH	CEMENT VOLUME	CEMENT TOP	CEMENT BOTTOM
Surface String	12-1/4"	8-5/8"	24#	0'	453'	275 sks	0'	453'
First String	7-7/8"	5-1/2"	15.5#	0'	5,137'	100 sks	4,236'	5,137'
Stage Tool*	7-7/8"	5-1/2"	15.5#	0'	2,472'	450 sks	0'	2,472'

Please furnish the OGCC with the name and depth of any aquifer in the area of injection that is a known or potential fresh water stratum. We would also like a list of the water wells within one half mile of this location. Any other information with regard to distance to streams, ditches or outcrops would be very helpful. Thank you.

P 303.894.2100 F 303.894.2109 www.colorado.gov/cogcc

Commissioners: John H. Benton - Acting Chair, Ashley L. Ager, Howard Boigon, James W. Hawkins,
Tommy Holton, Kent Jolley, Erin A. Overturf, Robert W. Randall, Dr. Larry Wolk

John W. Hickenlooper, Governor | Robert W. Randall, Executive Director, DNR | Matthew J. Lepore, Director



Mull Drilling: Quiver Unit, Kiowa County

Doc # 2618701

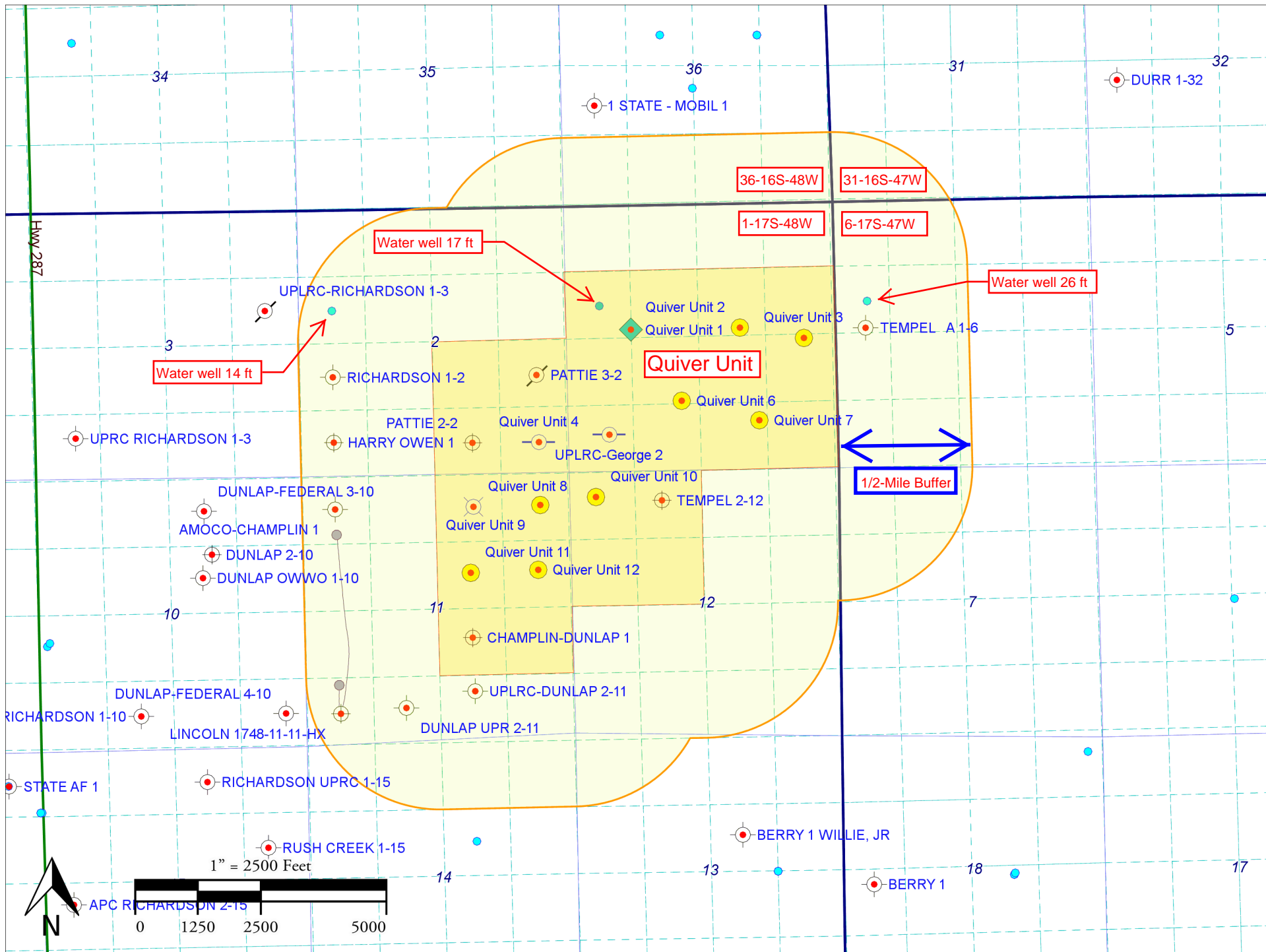


Table 1

RECEIPT	PERMIT	WELL NAME	USE	AQUIFER	DEPTH	OWNER	MORE INFO
9087771	12187		Livestock	All Unnamed Aquifers	14	OWENS, HARRY	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=9087771
9087772	12188		Livestock	All Unnamed Aquifers	17	CLEAVES ESTATE	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=9087772
9087773	12189		Livestock	All Unnamed Aquifers	26	CLEAVES ESTATE	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=9087773

Table 2

Structure Type	WDID	Associated Permits	Associated Case Numbers	Structure Name	More Info
Well	6708420		W2417	Gibbs Well No 3	http://www.dwr.state.co.us/structure/structure.aspx?wd=67&strid=8420

Table 3

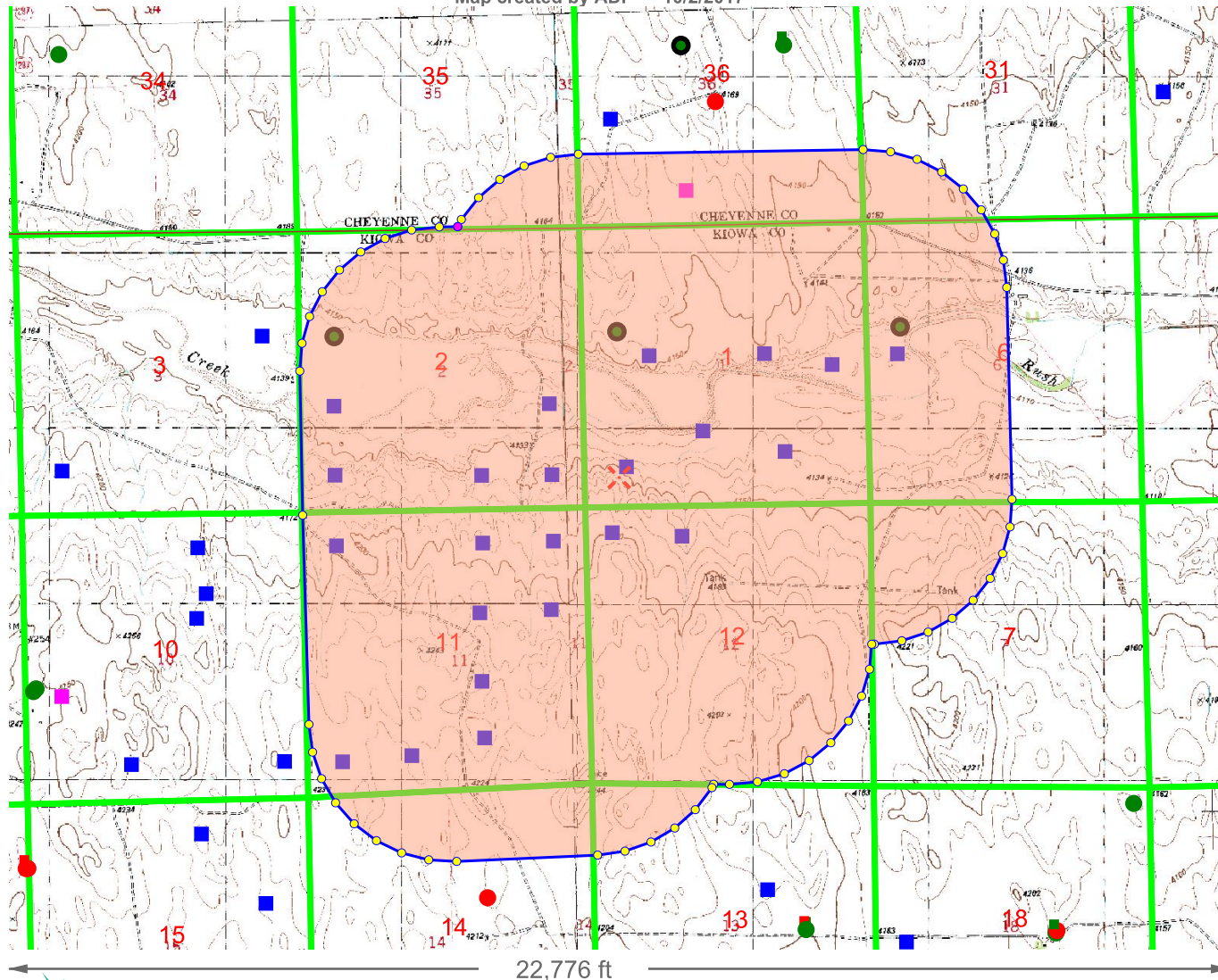
API NUM	WELL NAME	WELL STATUS	PLSS LOCATION	OPERATOR NAME
05-061-06779	PATTIE 3-2	ABANDONED LOCATION	NESE 2 17S 48W 6	MULL DRILLING COMPANY INC
05-061-06237	AMOCO-CHAMPLIN 1	DRY AND ABANDONED	NWNW 11 17S 48W 6	COLUMBINE EXPLORATION CORP
05-061-06564	DUNLAP UPR 2-11	DRY AND ABANDONED	SESW 11 17S 48W 6	FLEXX RESOURCES
05-061-06737	UPLRC-DUNLAP 2-11	DRY AND ABANDONED	SWSE 11 17S 48W 6	MULL DRILLING COMPANY INC
05-061-06745	RICHARDSON 1-2	DRY AND ABANDONED	NWSW 2 17S 48W 6	MULL DRILLING COMPANY INC
05-061-06028	HARRY OWEN 1	PLUGGED AND ABANDONED	SWSW 2 17S 48W 6	PHILLIPS PETROLEUM CO
05-061-06211	CHAMPLIN-DUNLAP 1	PLUGGED AND ABANDONED	NWSE 11 17S 48W 6	CLC OPERATIONS INC
05-061-06780	PATTIE 2-2	PLUGGED AND ABANDONED	SWSE 2 17S 48W 6	MULL DRILLING COMPANY INC
05-061-06783	TEMPEL 2-12	PLUGGED AND ABANDONED	NENW 12 17S 48W 6	MULL DRILLING COMPANY INC
05-061-06732	UPLRC - MERWIN 1-11	PRODUCING	SWNE 11 17S 48W 6	MULL DRILLING COMPANY INC
05-061-06738	UPLRC-GEORGE 1	PRODUCING	NESW 1 17S 48W 6	MULL DRILLING COMPANY INC
05-061-06761	UPLRC GEORGE 2	PRODUCING	SWSW 1 17S 48W 6	MULL DRILLING COMPANY INC
05-061-06762	PATTIE 1-2	PRODUCING	SESE 2 17S 48W 6	MULL DRILLING COMPANY INC
05-061-06766	TEMPEL 1-12	PRODUCING	NWNW 12 17S 48W 6	MULL DRILLING COMPANY INC
05-061-06771	UPLRC-MERWIN 2-11	PRODUCING	NENE 11 17S 48W 6	MULL DRILLING COMPANY INC
05-061-06776	UPLRC-MERWIN 4-11	PRODUCING	SENE 11 17S 48W 6	MULL DRILLING COMPANY INC
05-061-06767	UPLRC-GEORGE 3	SHUT IN	SWNW 1 17S 48W 6	MULL DRILLING COMPANY INC
05-061-06777	UPLRC-MERWIN 3-11	TEMPORARILY ABANDONED	NWNE 11 17S 48W 6	MULL DRILLING COMPANY INC
05-061-06890	LINCOLN 1748-11-11-H	LOCATION	SWSW 11 17S 48W 6	ANADARKO EANDP ONSHORE LLC
05-061-06778	TEMPEL A 1-6	DRY AND ABANDONED	SWNW 6 17S 47W 6	MULL DRILLING COMPANY INC
05-061-06739	UPLRC-GEORGE A 1	PRODUCING	SWSE 1 17S 48W 6	MULL DRILLING COMPANY INC
05-061-06763	UPLRC-GEORGE A 2	PRODUCING	SWNE 1 17S 48W 6	MULL DRILLING COMPANY INC
05-061-06770	UPLRC-GEORGE A 3	PRODUCING	NESE 1 17S 48W 6	MULL DRILLING COMPANY INC

AQUAMAP

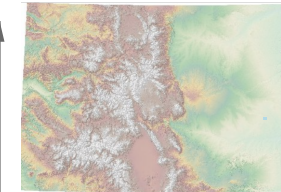
Colorado Division of Water Resources

Mull Drilling Company Quiver Unit 2

Map created by ADF 10/2/2017



MAP NAVIGATION



Click to create PDF
 UTM X, Zone 13: 567506
 UTM Y, Zone 13: 4346490
 Long: -104° 13' 3.0"
 Lat: 39° 15' 54.4"
 UTM and Geographic(LL) coordinates in NAD 83

DATA DISPLAY

- | | | |
|---|--|--|
| <input checked="" type="checkbox"/> Background | <input checked="" type="checkbox"/> Counties | <input checked="" type="checkbox"/> Water Well Application |
| Quad Maps ▾ | <input checked="" type="checkbox"/> PLSS | <input type="checkbox"/> DWR Parcels |
| <input type="radio"/> Low <input checked="" type="radio"/> High | <input type="checkbox"/> Roads | <input checked="" type="checkbox"/> EPA Well Notification |
| Transparency | <input type="checkbox"/> Hydrography | <input checked="" type="checkbox"/> Oil/Gas Well Location |
| | <input type="checkbox"/> County Parcels (No Public Access) | |
| | <input type="checkbox"/> Towns | More Data |

LOCATION

Section: 1 ▾ Township: 17 ▾ S ▾ Range: 48 ▾ W ▾ Meridian: Sixth ▾

[PLSS Locator](#) [Quick Zoom](#) [Spacing](#)

PRINTING

Output Scale: 38,400 ▾ Page Size: 8.5x11 ▾ User: ADF

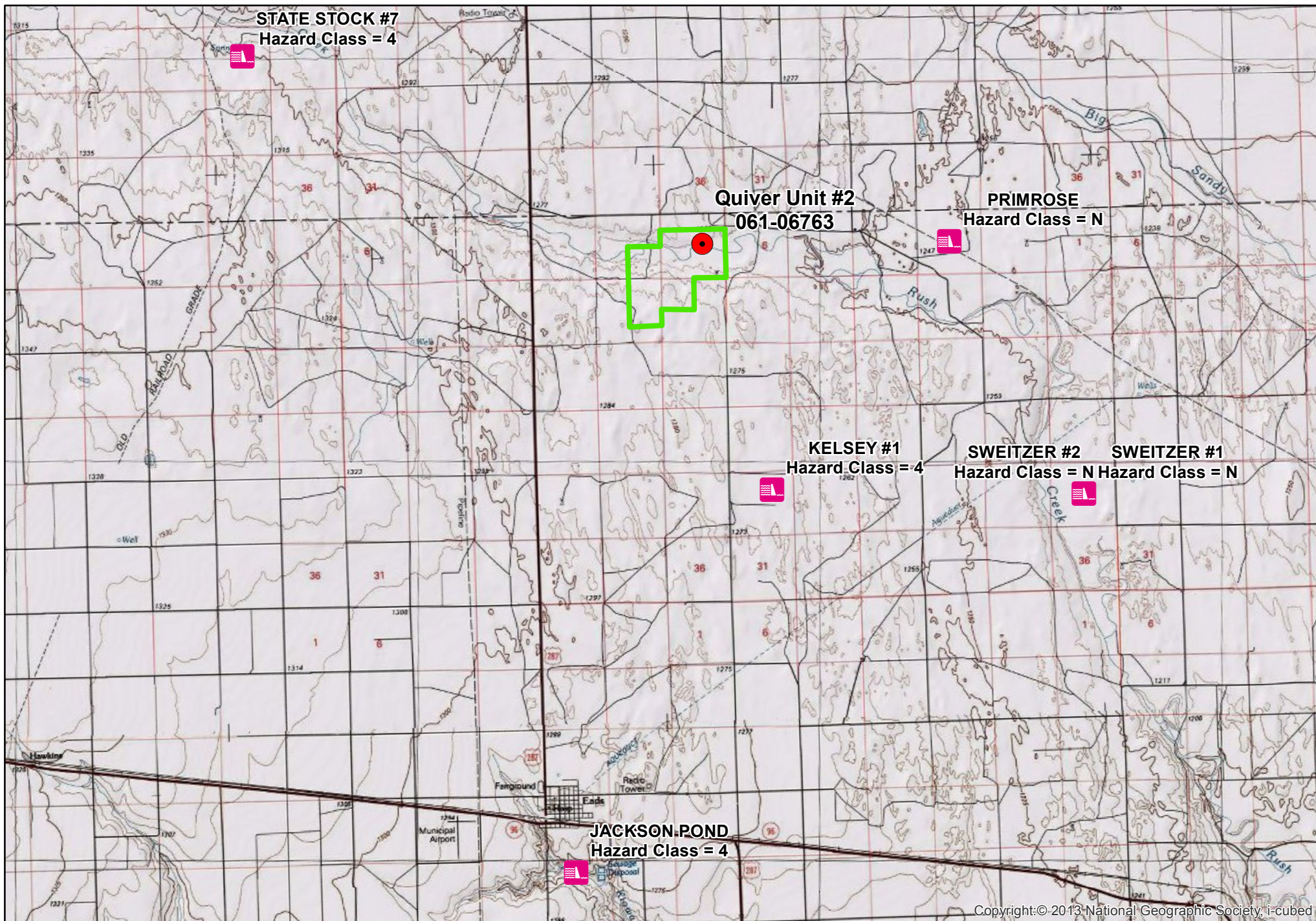
Title:

Note: The well locations displayed on AquaMap are based on location information provided by well permit application forms and are only as accurate as the information provided. The actual physical locations of all wells have not been field verified and may vary from the location displayed. Refer to a copy of the original well permit file, available on the Division of Water Resources website, for well location details.



Based on work developed at <http://www.carto.net>

Address location by Bing Maps
 AquaMap Version 3.0.1 July 5, 2009



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Mull Drilling Company, Inc. Quiver Unit #2 Dams within 10 miles

1 inch = 10,152 feet
0 0.65 1.3 1.95 2.6
Miles