STATE OF COLORADO

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M1997054 Parkdale Quarry 112 (c) Permit Amendment - Water Quality Report from EIS

1 message

David Bieber <David.Bieber@martinmarietta.com> Tue, Jul 13, 2021 at 1:38 PM
To: "Cazier - DNR, Tim" <tim.cazier@state.co.us>
Cc: Erin Kunkel <Erin.Kunkel@martinmarietta.com>

Hi Tim.

As per our discussion today, the appended document is the water quality information presented in the Parkdale Quarry EIS. I will send our consultant's water report as two separate e-mails due to file size.

Dave

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Water Quality from EIS.pdf
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3.5. SURFACE, GROUND WATER, AND WATER QUALITY

Issue 1: What are the water sources and water requirements for the Parkdale Quarry expansion?

Issue 2: Is dewatering anticipated to be required in any of the pits?

Issue 3: How would the Parkdale Quarry expansion affect water quality, quantity, and water rights?

Issue 4: How would surface water and groundwater be monitored for the proposed mine expansion

3.5.1. Affected Environment

The analysis area for direct and indirect effects to surface water and groundwater resources is shown in Figure 3.5-1 (Appendix C) and includes the area north of the Arkansas River within about 1.5 miles of the Sale Area. The area south of the Arkansas River is excluded from the analysis because the river forms a hydrologic boundary that is below the elevation of the pit floor and the potential level of groundwater drawdown effects that could be caused by the proposed mining operation.

The cumulative effects study area for water resource is shown on (Figure 3.5-2, Appendix C) and includes the sixth-level U.S. Geological Survey (USGS) hydrologic unit code (HUC) 12 sub-watersheds that contain the Sale Area or parts of the analysis area (Table 3.6).

Table 3.6. USGS 6th Level Sub-Watersheds within the Water Resources Cumulative Effects Study Area

4th Level Sub-Basin (HUC 8)	5th Level Watershed (HUC 10)	6th Level Sub-Watershed (HUC 12)	Sq. Mile
Arkansas Headwaters (11020001)	Tallahassee Creek – Currant Creek (1102000111)	Lower Cottonwood Creek (110200011108)	(32.8)
		Lower Currant Creek (110200011109)	(35.3)
		Tallahassee Creek (11020001110)	(50.2)
	Royal Gorge – Arkansas River (1102000114)	Five Point Gulch – Arkansas River (110200011407)	(47.4)
		Royal Gorge (110200011409)	(26.0)

3.5.1.1. Surface Water Resources

The Sale Area is located on the flank of Cactus Mountain and drains southwest toward Currant and Tallahassee Creeks. All drainages within the proposed pit disturbance are intermittent or ephemeral and flow for limited periods during most years in response to direct precipitation and snowmelt. Three named streams and fifteen springs are located within the analysis area. In downstream order, the streams include Cottonwood Creek, Currant Creek, and Tallahassee Creek. The springs include Cactus Mountain Spring, Cactus Mountain South Spring, Parkdale Spring, Parkdale South Spring, and Tallahassee Ditch No. 2 Spring within the Sale Area, and Willow Patch Spring, Currant Spring, Narrow Canyon Spring, Campbell King Spring No. 1, Harvey Brothers Twelve Mile Spring, Cowan Spring No. 3, Wheaton College Springs Nos. 14, 15, and 16, and spring No. 1 within the analysis area, but outside of the Sale Area.

Cottonwood Creek

Cottonwood Creek is an intermittent stream that flows southeast from its headwaters in Park County to its confluence with Currant Creek about one mile north of the Sale Area. Its designated beneficial uses include Class 1 Coldwater Aquatic Life, Existing Recreation, Agriculture, and Water Supply. Streamflow and water quality data for Cottonwood Creek are available from USGS monitoring station 07094200. The station is located about 2.3 miles above the confluence with Currant Creek (Figure 3.5-3, Appendix C) and was monitored on 13 dates extending from January 1981 to September 1982. Reported instantaneous streamflows for the period of record ranged from 0.03 to 23 cubic feet per second (cfs). Monitored water quality parameters including field measurements of pH, specific conductance (SC), dissolved oxygen (DO), and temperature, and laboratory analyses for selected major ions, metals, and radionuclides generally met applicable standards and are presented in Appendix F. The mainstem of Cottonwood Creek from F6 Road to the confluence with Currant Creek is not 303(d) listed in the 2018 Colorado Integrated Report (CDPHE 2018) but it has not been assessed as meeting its designated beneficial uses because of a lack of supporting data.

Currant Creek

Currant Creek is a perennial stream that flows south through the western portion of the Sale Area to its confluence with Tallahassee Creek about 1,700 feet south of the Sale Area boundary. The stream channel is within the planned buffer zone under Alternative A and would not be disturbed by the proposed mining operation. The total length of Currant Creek within the Sale Area is 1.5 miles. Designated beneficial uses of the stream include Class 1 Coldwater Aquatic Life, Existing Recreation, Agriculture, and Water Supply. Streamflow and water quality data for Currant Creek are available from three stations located above its confluence with Cottonwood Creek (Figure 3.5-3, Appendix C). Stations 07094090 and 383150105225500 were monitored by the USGS. Station 21COL001-7110 was monitored by CDPHE. Available data from the stations are presented in Appendix F and summarized in Table 3.7. The monitored parameters generally met applicable water quality standards. The mainstem of Currant Creek from its source in Park County to the confluence of Tallahassee Creek is not 303 (d) listed in the 2018 Colorado Integrated Report (CDPHE 2018) and with the exception of Existing Recreational Use, it is currently assessed as meeting its designated beneficial uses. Existing Recreational Use for Currant Creek was not assessed in the 2018 Colorado Integrated Report (CDPHE 2018).

Table 3.7. Summary of Available Streamflow and Water Quality Data for Currant Creek

Station	Period of Record	Number of Samples	Range of Measured Streamflows	Water Quality Analyses
USGS 07094090	01/13/1981 – 09/21/1982	12	0.30 – 31 cfs	Field parameters, selected ions, metals, and radionuclides
USGS 383150105225500	4/22/72	1	--	Field parameters, major ions, nutrients, iron and manganese
CDPHE 21COL001-7110	08/17/2010	1	--	Field parameters, alkalinity, hardness, nutrients, selected ions and metals

cfs = cubic feet per second

Tallahassee Creek

Tallahassee Creek is a perennial stream that flows southeast through the southwestern portion of the Sale Area, and then through the existing Parkdale Quarry to its confluence with the Arkansas River. The stream channel within the buffer zone under Alternative A would not be disturbed by the proposed mine expansion, however, the current disturbance of the creek on private land south of the Sale Area would continue with continued mining. The total length of Tallahassee Creek within the Sale Area is 0.2 miles. Designated beneficial uses of the stream include Class 1 Coldwater Aquatic Life, Existing Recreation, Agriculture, and Water Supply. Streamflow and water quality data for Tallahassee Creek are available from four stations (Figure 3.5-3, Appendix C). Stations 07094300 and 382917105225200 were monitored by the USGS and are located above the confluences with Currant Creek and the Arkansas River, respectively. Stations 21COL001-Tallahassee04 and 21COL001-7115 are located above and below the confluence with Currant Creek, respectively and were monitored by CDPHE. Available data from the stations are presented in Appendix F and summarized in Table 3.8. The monitored parameters generally met applicable water quality standards. The mainstem of Tallahassee Creek from the confluence with South Tallahassee Creek to the confluence with the Arkansas River is not 303 (d) listed in the 2018 Colorado Integrated Report (CDPHE 2018) and is currently assessed as meeting its designated beneficial uses.

Table 3.8. Summary of Available Streamflow and Water Quality Data for Tallahassee Creek

Station	Period of Record	Number of Samples	Range of Measured Streamflows	Water Quality Analyses
USGS 07094300	01/13/1981 – 09/21/1982	11	0.01 – 31 cfs	Field parameters, selected ions, metals, and radionuclides
USGS 382917105225200	06/03/1987 – 10/21/1992	14	0.14 – 44 cfs	Field parameters, alkalinity, TDS, nutrients, and metals
CDPHE 21COL001-Tallahassee04	0/14/1980	1	--	Field parameters, alkalinity, hardness TDS, TSS, nutrients, selected ions and metals
CDPHE 21COL001-7115	09/12/2005 – 06/21/2011	3	--	Field parameters, E. Coli, alkalinity, hardness, nutrients, major ions and metals

cfs = cubic feet per second; TDS = total dissolved solids; TSS = total suspended solids.

Springs

Fifteen springs are located within the analysis area (Figure 3.5-1, Appendix C). Cactus Mountain Spring, Cactus Mountain South Spring, Parkdale Spring, and Parkdale South Spring are located within the Sale Area. The other springs are located within the analysis area, but occur outside of the Sale Area. Locations, elevations, and discharge information for the springs are summarized in Table 3.9**.**

Springs within the Sale Area were surveyed by the BLM on November 19, 2019. Cactus Mountain, Cactus Mountain South, and Parkdale springs were all flowing at about 0.25 gpm at the time of observation. Parkdale South Spring was dry. The springs are recharged by the infiltration of precipitation on their local watersheds, and they discharge from granitic bedrock in intermittent drainages on the southwest side of Cactus Mountain. The BLM holds federal reserved water rights on Parkdale Spring (# 1202149) and Cactus Mountain Spring (# 1202067) with decreed amounts of 0.22 cfs each.

Willow Patch, Currant, and Narrow Canyon springs are located on BLM land north and northwest of the Sale Area (Figure 3.5-1, Appendix C). Willow Patch and Narrow Canyon springs were surveyed by the BLM near the end of June in 2016. Both springs were flowing at the time of observation, but at very low rates (Table 3.9). Willow Patch Spring issues from a stream terrace adjacent to an intermittent tributary to Lower Cottonwood Creek. Narrow Canyon Spring is located in the channel of an intermittent tributary to Currant Creek. Current Spring was surveyed at the end of August in 2012 at which time it was dry.

Campbell King Spring 1, Tallahassee Ditch No. 2 Spring, Harvey Brothers Twelve Mile Spring, Wheaton College Springs 14, 15 and 16, and unnamed spring No. 1 are located on private land and only limited information including the spring locations and elevations are available. All of the springs have privately held water rights with the exception of unnamed spring 1 (Table 3.10).

Table 3.9. Summary of Springs within the Analysis Area

Spring	Latitude	Longitude	Elevation (ft.)	Discharge (gpm)	Date Surveyed
Cactus Mountain Spring[1]	38.50599	-105.39281	6,480	0.25	11/19/2019
Cactus Mountain South Spring[1]	38.50336	-105.40489	6,040	0.25	11/19/2019
Parkdale Spring[1]	38.5002	-105.40104	6,140	0.25	11/19/2019
Parkdale South Spring[1]	38.49727	-105.39662	5,920	No Flow	11/19/2019
Willow Patch Spring[1]	38.52571	-105.42888	6,600	0.016	06/27/2016
Currant Spring[1]	38.51939	-105.40823	6,200	No Flow	08/24/2012
Narrow Canyon Spring[1]	38.51673	-105.40668	6,300	Very Low	06/27/2016
Campbell King Spring 1[2]	38.49140	-105.37232	5,840	Unknown	Not Surveyed
Tallahassee Ditch No. 2 Spring[3]	38.49544	-105.41055	5,920	Unknown	Not Surveyed
Harvey Brothers Twelve Mile Spring[3]	38.52156	-105.39913	6,120	Unknown	Not Surveyed
Wheaton College Spring 14[3]	38.52503	-105.35265	6,500	Unknown	Not Surveyed
Wheaton College Spring 15[3]	38.52173	-105.36301	6,380	Unknown	Not Surveyed
Wheaton College Spring 16[3]	38.52605	-105.37654	6,250	Unknown	Not Surveyed
Cowan Spring No. 3[3]	38.52891	-105.36630	6,560	Unknown	Not Surveyed
Unnamed Spring No. 1[2]	38.50220	-105.34645	6,200	Unknown	Not Surveyed

Sources: [1] BLM Royal Gorge Field Office (BLM 2019)
[2] National Hydrography Dataset (USGS 2005)
[3] Colorado Division of Water Resources (DWR) Water Rights Database (DWR 2020)

Surface Water Rights

Surface water rights for the analysis area were compiled from a search of the Colorado Division of Water Resources (DWR) water rights database. A total of 19 surface water rights were identified within the analysis area. The water rights are summarized in Table 3.10. The downloaded records are presented in Appendix G.

Table 3.10. Summary of Surface Water Rights within the Analysis Area

Water Right ID	Structure Name	Structure Type	Water Source	Decreed Amount (cfs)	Latitude	Longitude
1200854	Tallahassee Ditch No 1	Ditch	Tallahassee Creek	3.5	38.49612	-105.414
1200570	Pioneer Ditch Current Creek	Ditch	Currant Creek	3.75	38.49867	-105.408
1200573	Third Ditch	Ditch	Currant Creek	4	38.48973	-105.389
1200928	Cc Royal Gorge Intake	Ditch	Arkansas River	19	38.47221	-105.354
1200928	Cc Royal Gorge Intake	Ditch	Arkansas River	3.5	38.47221	-105.354
1203021	Currant Creek Minimum Flow	Min. Flow	Currant Creek	1.9	38.49546	-105.405
1203020	Currant Creek Minimum Flow	Min. Flow	Currant Creek	2	38.52139	-105.4
1203011	Tallahassee Creek Minimum Flow	Min. Flow	Tallahassee Creek	1	38.48778	-105.38
1202834	Hasp Currant Creek Exchange	Reach	Currant Creek	0	38.49545	-105.405
1202835	Hasp Tallahassee Creek Exchange	Reach	Tallahassee Creek	0	38.48765	-105.381
1200857	Tallahassee Ditch No 2	Spring	Tallahassee Creek	14	38.49544	-105.41055
1202149	Parkdale Spring	Spring	Arkansas River	0.0022	38.50029	-105.40104
1202400	Harvey Brothers Twelve Mile	Spring	Arkansas River	3.2	38.52156	-105.39913
1202067	Cactus Mountain Spring	Spring	Arkansas River	0.0022	38.50599	-105.39281
1202549	Wheaton College Spring 16	Spring	Arkansas River	0.022	38.52605	-105.37654
1202247	Campbell King Spring 1	Spring	Arkansas River	0.01	38.49140	-105.37232
1202281	Cowan Spring No 3	Spring	Arkansas River	0.013	38.52891	-105.36630
1202548	Wheaton College Spring 15	Spring	Arkansas River	0.0044	38.52173	-105.36301
1202547	Wheaton College Spring 14	Spring	Arkansas River	0.0088	38.52503	-105.35265

Source: Colorado Division of Water Resources (DWR) Water Rights Database (CDWR 2020)

3.5.1.2. Groundwater Resources

Groundwater at the site is recharged by the infiltration of precipitation on upland areas and flows laterally away from high points following topography to discharge at streams and springs at lower elevations. The average precipitation at the site is about 17 inches annually (BLM 2017a) with recharge to groundwater being estimated to be about 0.16 inches per year (ERM 2019).

Four hydrostratigraphic units are noted in the analysis area. They include alluvium in stream channels and drainages, sedimentary rocks located north and south of the Sale Area, and granitic rocks that are divided into weathered granite near the surface and competent but fractured granite below a depth of about 20 feet (ERM 2019). Alluvium occurs as a thin veneer over granitic bedrock in intermittent drainages within the Sale Area and as thicker deposits adjacent to perennial streams including Currant Creek, Tallahassee Creek, and the Arkansas River. The sedimentary rocks rest unconformably on granite near the southern boundary of the Sale Area and are in fault contact with granite along the Parkdale Fault north of the Sale Area and unnamed faults near the southeast and southwest portions of the Sale Area (Figure 3.5-6, Appendix C).

The faults are believed to cause some compartmentalization of groundwater flow across the structures by the disruption of stratigraphy and juxtaposition of rock types with different hydraulic characteristics.

Groundwater levels within the Sale Area have been evaluated by three monitoring wells installed by the Proponent (Figure 3.5-4, Appendix C). The wells were installed in cored boreholes that were drilled to depths of about 250 feet below ground surface (Table 3.11**)**. The observed depths to groundwater ranged from about 10 to 128 feet, and water levels in the wells fluctuated by up to 24 feet during four monitoring events completed between December 2018 and August 2019 (Table 3.12**)**. Water level elevations in the monitoring wells ranged from about 6,027 to 6,262 feet and indicate a southeast flow direction away from Cactus Mountain toward Tallahassee Creek and the Arkansas River. The observed groundwater elevations ranged from about 87 to 322 feet higher than the planned minimum pit floor elevation of 5,940 amsl for Alternative A. The need and method for dewatering the proposed quarry is discussed in Section 3.5.2.1, *Direct and Indirect Effects from Alternative A.*

Table 3.11. Completion Details for Monitoring Wells and Exploration Boreholes

Well ID	Latitude	Longitude	Casing Elevation (ft. amsl)	Total Depth (ft. btoc)	Well Casing	Screened Interval (ft. btoc)
PD-1	38.496541°	-105.382685°	6,252.7	239	2-inch PVC	20-239
PD-3	38.499052°	-105.399946°	6,075.8	249	2-inch PVC	20-249
PD-10	38.504486°	-105.394678°	6,271.6	251	2-inch PVC	20-251

Note: Coordinate locations GCS- NAD 83

amsl = above mean sea level; btoc = below top of casing; ft. = feet

Table 3.12. Summary of Measured Groundwater Levels in Monitoring Wells

Monitored Date	PD-1		PD-3		PD-10	
	Depth to Water (ft. btoc)	*Water Level Elevation (ft. amsl)*	*Depth to Water (ft. btoc)*	*Water Level Elevation (ft. amsl)*	*Depth to Water (ft. btoc)*	*Water Level Elevation (ft. amsl)*
12/7/2018	103.63	6149.11	47.52	6028.23	11.19	6260.37
12/11/2018	104.13	6148.61	47.55	6028.2	9.76	6261.8
5/14/2019	123.99	6128.75	38.38	6037.37	10.17	6261.39
8/29/2019	127.71	6125.03	49.19	6026.56	18.69	6252.87

amsl = above mean sea level; btoc = below top of casing; ft. = feet

Information about the permeability (hydraulic conductivity) and transmissivity of the granitic rocks within the Sale Area are available from single well tests performed in the monitoring wells listed in Table 3.11. The results of the tests are summarized in Table 3.13 and indicated hydraulic conductivity values ranging from 0.0019 to 0.0065 ft./day (ERM 2019). The average hydraulic conductivity from the three tests was calculated to be 0.0039 ft./d, which is assumed to be the best estimate of the average hydraulic conductivity of the fractured granitic rocks below a depth of about 20 feet (ERM 2019). The granite body within the Sale Area is not considered to be an aquifer under the generally accepted definition because the average hydraulic conductivity of the rock mass is too low to consistently transmit economic quantities of water to wells. Bedrock with this range of observed hydraulic conductivity is generally considered to be an aquitard if it is located between two units with higher hydraulic conductivity.

Site-specific hydraulic conductivity data are not available for weathered granite, sedimentary rocks or alluvium near the proposed quarry expansion, but typical values for weathered granite range from about 0.9 to 15 ft./day (Domenico and Schwartz 1990). Typical hydraulic conductivity values for fractured sandstone range from about 0.003 to 3 ft./day, and typical values for alluvium range from about 3 to 300 ft./day (Spitz and Moreno 1996).

Table 3.13. Summary of Pumping Test Results

Well ID	Average Pumping Rate (gpm)	Pumping Duration (min)	Maximum Drawdown (ft.)	Saturated Thickness (ft.)	Transmissivity ($ft.^2/d$)	Hydraulic Conductivity (ft./d)
PD-1	0.136	110	10.5	134.9	0.26	0.0019
PD-2	0.716	74	99.8	201.4	0.63	0.0031
PD-3	0.960	102	≈128	241.2	1.57	0.0065

ft. = feet; $ft.^2/d$ = foot squared per day; gpm = gallons per minute; min = minutes

Groundwater quality data for the Sale Area are available from six samples that were collected from the monitoring wells listed in Table 3.11. The wells were monitored for field parameters, major ions, dissolved metals, and radionuclides during two sampling events completed in December 2018 and May 2019. Monitoring results indicate that groundwater at the site has near neutral pH (6.64-7.71) low to moderate concentrations of total dissolved solids (318-437 mg/l) and generally meets water quality standards for drinking water with the exception of gross alpha radiation and uranium (ERM 2019). Groundwater quality data for the site are presented in Appendix F.

In addition to site-specific groundwater data that were developed for the Sale Area, well records from the Colorado Division of Water Resources (DWR) were reviewed to identify other wells and groundwater users within the analysis area. The database search found 97 wells that were listed as either being constructed or replaced within the area of interest (Figure 3.5-5, Appendix C). The majority of wells are reported as being located east and northeast of the Sale Area in areas that are underlain by cretaceous-age sedimentary rocks (Figure 3.5-6, Appendix C). Eight of the wells are reported to be located within the granitic rocks on the north side of Cactus Mountain, but review of aerial photographs and well construction reports indicates that the locations are misreported and that the wells are actually completed in sedimentary rocks north of the Parkdale Fault (Figure 3.5-6,

Appendix C). The exact locations of the wells are unknown, but with the exception of the three monitoring wells installed by the Proponent, no wells are located in the granite within the fault block defined by the Parkdale Fault and unnamed faults 1 and 2 (Figure 3.5-6, Appendix C).
A summary of primary water uses for wells in the analysis area is presented in Table 3.14. DWR well records are presented in Appendix G.

An analysis of the completion water levels for wells reported in the DWR database indicates that groundwater elevations in the analysis area vary widely, ranging from 5,657 to 7,041 feet elevation. The variation occurs over relatively short distances and often exceeds 100 to 200 feet between wells that are located within 1,000 to 2,000 feet of each other. The accuracy of the water level analysis is affected by a number of factors including the accuracy of the reported well locations and surface elevations, completion details for individual wells, and the range of time over which the groundwater levels were measured, but the reported variability is consistent with groundwater systems in low-permeable rocks that are poorly inter connected over short distances.

Table 3.14. Summary of Primary Water Uses for Wells within the Analysis Area

Primary Water Use	Count
Commercial	3
Domestic	56
Domestic, Industrial	1
Domestic, Irrigation	1
Domestic, Stock	21
Domestic, Storage	1
Household Use Only	7
Stock	4
Monitoring	2
Other	1
Total	**97**

3.5.2. Environmental Effects

3.5.2.1. Direct and Indirect Effects from Alternative A

Four issues for surface water and groundwater resources were determined during the scoping process for the proposed Parkdale Quarry Expansion. The issues are related to: (1) the water usage requirements and sources of water for the proposed mine expansion; (2) the need for active dewatering of the pits to facilitate mining in the expansion area; (3) the potential effects of mining in the Sale Area on surface water and groundwater quality, quantity, and current water users; and,

(4) how the existing water monitoring plan would be modified to incorporate mining in the expansion area.

Issue 1: Water Usage Requirements and Sources.

The current quarry operation uses about 1,500 gallons of water per minute (gpm), most of which is recycled water that is used at the wash plant or is applied to roads for dust control. It is expected that water usage under Alternative A would be similar to current usage by the quarry. Water for the quarry is obtained from tributary groundwater that collects in the completed alluvial pit and is augmented as needed by water from Tallahassee Creek under a state reviewed and approved withdrawal permit. Water shares are leased from the Board of Water Works of Pueblo, the Twin Lakes Reservoir and Canal Company, and the Cañon City Water Department to allow the use of groundwater and surface water by the mine. Alternative A would continue to use these sources of water for mining operations in the Sale Area and the potential effects of water usage under Alternative A would be the same as the effects of the currently permitted usage.

Issue 2: Need for Active Dewatering of the Pits.

The need for active dewatering of the pits to facilitate mining in the Sale Area was evaluated based on observations on groundwater inflow to the current quarry operation and scoping-level calculations of inflow performed by ERM (2019) and Whetstone (2020a). The analysis by ERM used two types of analytical calculations: one for southwest linear flow towards the quarry highwall and one for radial flow to a semicircle representing the northeast portion of the quarry. Both calculations assumed the following conditions:

- The hydraulic conductivity of the granitic rocks is equal to the average of the testing data in Table 3.13 (i.e., 0.0039 ft./day).
- Specific yield of the granitic rocks is equal to 0.01.
- The quarry is instantaneously excavated to full depth at time zero.
- Groundwater drawdown at the quarry wall would be 300 feet.
- The thickness of the permeable fractured bedrock is 500 feet.
- Groundwater flow is horizontal.
- The potentially affected area has homogeneous characteristics, is unbounded, and has infinite aerial extent.

The analysis by Whetstone used the groundwater modeling software MODFLOW-SURFACT V.4.0- (Hydrogeologic 2011) and a similar set of assumptions with the following exceptions:

- The potentially affected area is bound (no flow) to the south by the Arkansas River. The river elevation is below the planned elevation of the pit floor and therefore the cone of depression caused by groundwater drawdown cannot expand past this boundary.
- The potentially affected area is also bound (no flow) by Currant and Tallahassee Creeks where the elevations of the drainages are below the minimum level of the planned pit floor.

The analyses by ERM and Whetstone generally provide similar estimates of groundwater inflow to the quarry. ERM estimated that inflows during mining were likely to range from 15 to 25 gpm (ERM 2019). These values are consistent with observed flows from the existing quarry face, which is about 270 feet high and typically has little or no seepage except after precipitation events and during spring snowmelt. Whetstone estimated an inflow rate of 27 gpm to the quarry at its full extent after 100 years of mining (Whetstone 2020a). This estimate is considered to be conservatively high because groundwater systems in fractured granite bodies with low hydraulic conductivity tend to be poorly connected over broad areas and the Parkdale and unnamed fault 2 are likely to act as boundaries to the north and east (Whetstone 2020a). Under any circumstance, the predicted inflows are low enough to not be of operational consequence, and advanced dewatering of the quarry by pumping from groundwater wells would not be required to facilitate mining. Free flowing groundwater that enters the quarry during mining would be routed to settling ponds for re-infiltration to groundwater or discharge to Currant or Tallahassee Creek. Water in settling ponds would be monitored for suspended sediment and turbidity to ensure that it meets applicable standards prior to any surface release.

Issue 3: Potential Effects of Mining in the Sale Area on Surface Water and Groundwater Quality, Quantity, and Current Water Users.

The potential effects of Alternative A on surface water and groundwater quality, quantity, and current water users in the analysis area were evaluated using the following methods: stormwater runoff modeling by Whetstone (2020b, Appendix F), the previously discussed scoping-level calculations and modeling by ERM and Whetstone (ERM 2019 [Appendix K], Whetstone 2020a [Appendix F]), evaluation of the hydrogeologic setting of wells and springs relative to the proposed mine expansion area, comparison of groundwater quality data from monitoring wells in the Sale Area to water quality data for Currant and Tallahassee Creeks, and comparison of the estimated area of potential groundwater drawdown related to mining to the locations of wells and groundwater users identified in the DWR database.

Development of Alternative A could affect groundwater levels and availability in the Analysis Area. The quarry would be developed in a structurally isolated block that is bound to the north by the Parkdale Fault and to the east and west by unnamed faults 1 and 2. The drainages for Currant Creek, Tallahassee Creek, and the Arkansas River also form hydrologic boundaries west and south of the Sale Area because their elevations are below the level of the planned pit floor and the cone of depression associated with mine dewatering would not be able to expand into areas that are below the lowest elevation that would be dewatered. The streams would also act as sources of groundwater recharge that would maintain groundwater elevations at constant levels adjacent to the waterbodies.

The potential for impacts to existing groundwater users was evaluated using scoping-level calculations and modeling by ERM (2019, Appendix K) and Whetstone (2020a, Appendix F). The analyses were used to define the area in which groundwater levels could be theoretically reduced by 5 feet or more after 100 years of mining (Figure 3.5-5, Appendix C) and incorporates numerous simplifying but conservative assumptions. The most important assumptions that affect the results of the evaluation are that groundwater near the proposed quarry expansion is well connected over a broad area that has consistent hydrogeologic properties, and that groundwater levels are drawn-down to the lowest level of the final pit floor at the start of mining. In reality, available water level data from DWR well records suggest that groundwater is poorly connected over relatively short distances, and drawdown associated with pit dewatering would occur gradually over the expected 100-year life of the mine. Other factors that result in overprediction of drawdown in areas distal to the proposed quarry include hydrologic boundaries that are not considered such as the Parkdale Fault, unnamed fault 2, and the Mikesell Gulch Fault (Figure 3.5-6, Appendix C). Unnamed fault 1 has less effect on the analysis because the drainage for Currant Creek is simulated as a no-flow boundary in the Whetstone model (Whetstone 2020a, Appendix F) and is located in the same general area as unnamed fault 1. Sedimentary rocks that are in fault contact with the granite north and south of the Sale Area are expected to have higher hydraulic conductivity than the granite and are also recharged by water from perennial sections of Currant and Cottonwood creeks that lose flow to groundwater and become intermittent near State Highway 9. A number of smaller intermittent drainages located northeast of the highway also contribute runoff that infiltrates into to the sedimentary rocks. The higher hydraulic conductivity of the sedimentary rocks and additional recharge from surface water are not considered in the analyses by ERM and Whetstone, which tends to increase the conservatism of the predicted drawdowns along the State Highway 9 corridor.

The results of the analytical calculations (Appendix K) and numerical model (Appendix F) for Alternative A predict groundwater drawdowns of between 5 and 30 feet for wells located in sedimentary rocks north of the Parkdale Fault (Figure 3.5-6, Appendix C). This prediction is considered to be a conservative overestimation based on the previously discussed rational. With the exceptions of wells 276232, 238087, 30210MH, and 203262, wells that are located within the zone of potential impacts east of the Sale Area in the fault block between unnamed fault 2 and the Mikesell Gulch Fault and southeast of the Mikesell Gulch Fault have water level elevation that are below the lowest elevation of the proposed pit or they are located on the opposite side of Bumback Gulch, which has surface elevations below the level of the proposed pit. These wells have negligible potential to be impacted by drawdown related to mine dewatering. Wells 276232 and 238087 have reported water level elevations of 6,164 feet and predicted drawdown at the well locations is about 25 feet. Wells 30210MH and 203262 have reported water level elevations between 6,194 and 6238 feet and drawdown in this area is predicted to be about 8 feet. Potential drawdown impacts to wells would be permanent to the extent that they would actually occur.

Alternative A would lower groundwater levels in the quarry area by up to about 300 feet and would result in the elimination of flows from Parkdale South, Cactus Mountain, and Cactus Mountain South Springs, which would be in, or immediately adjacent to the pit. The BLM-held federal reserved water rights on Cactus Mountain Spring and Parkdale Spring would be affected because the springs would cease to flow. This impact would be permanent and major, but could be mitigated by development of surface water impoundment(s) or the installation of groundwater wells for wildlife and livestock watering within the Sale Area as the impacts are observed to occur. Drawdown of groundwater levels outside of Sale Area under Alternative A also has the potential to reduce or interrupt flows from springs located within the zone of potential impacts shown on Figure 3.5-6 (Appendix C). This would affect the associated water rights. The impacts would be permanent and major but could be mitigated by the installation of wells or construction of surface water impoundments should they occur. The pre-mining groundwater flow direction in the Sale Area is south to southeast toward Tallahassee Creek and the Arkansas River under a gradient of 0.89 ft./ft. (Whetstone 2020c, Appendix F). After mining and reclamation of the site, the gradient will be in the same direction but will be lower. The post-mining groundwater gradient in the quarry is estimated to be 0.024 ft./ft. based on the slope of the reclaimed pit floor.

Groundwater quality under Alternative A could be affected in the area of the planned quarry. The potential impacts include increases in total dissolved solids (TDS) and nitrogen species (nitrate and nitrite) from mining and controlled subsurface blasting. These impacts would be localized and temporary during active mining and may be mitigated by monitoring and modification of mining practices if impacts are observed. Alternative A is not expected to affect the quality of groundwater accessed by existing users at wells or springs outside of the Sale Area.

The Sale Area currently drains south to southwest with the majority of surface water runoff flowing to Currant Creek and Tallahassee Creek through three main drainage areas (Figure 3.5-1, Appendix C). Once mining is complete, the topography of the quarry would generally slope in the same direction as the pre-mining surface and drainage channels would be excavated into the quarry floor to maintain the current general patterns of runoff. The drainage channels would be constructed with profiles and sinuosity similar to natural drainages in Webster Park that feed into the south side of the Arkansas River. Under Alternative A, streamflow and water quality could be affected in Currant and Tallahassee creeks. Development of the quarry would modify the topography of areas tributary to the creeks and affect the timing and volume of runoff reporting to the creeks. The removal of mountainous terrain by the proposed quarry and restoration of the land to a broad, gently sloping valley may affect the temperature of runoff reporting to Currant and Tallahassee Creek. This effect would be permanent, but is expected to be insignificant to minor because the disturbed area of the quarry would represent less than 1.4 percent of the total watershed area for the Tallahassee Creek-Currant Creek Watershed (Whetstone 2020b).

Potential impacts to surface water flow rates in Currant Creek and Tallahassee Creek were evaluated using HydroCAD modeling software and the NRCS TR-55 method. The models estimated the surface water runoff from the Sale Area under existing conditions, which were then compared to the potential runoff after mining disturbance and reclamation. The stormwater runoff modeling (Whetstone 2020b, Appendix F) indicates that the reduction of slopes in the quarry area and change in vegetation after reclamation could increase the volume of runoff reporting to the creeks by 160 percent for the 100-year precipitation event and by 220 percent for the 10-year precipitation event. This would consequently decrease infiltration of precipitation and snowmelt to groundwater. Decreased infiltration to groundwater and the reduced groundwater gradient in the quarry would result in decreased baseflows to the creeks that would be offset by increased streamflows during major storm events. The calculated reductions in baseflows to Currant Creek and Tallahassee Creek under Alternative A are 0.00012 cfs (0.053 gpm) and 0.00028 cfs (0.124 gpm) respectively (Whetstone 2020c, Appendix F). Under assumed low-flow conditions of 0.1 cfs for Currant Creek and 0.5 cfs for Tallahassee Creek, the reductions in baseflows would be 0.12 percent and 0.06 percent of the total streamflows, respectively (Whetstone 2020c, Appendix F).

Runoff from the site during mining could have increased turbidity, sediment, and elevated concentrations of nitrate and nitrite, but it would be routed to settling ponds and monitored to ensure that it meets applicable water quality standards prior to being discharged to either Currant or Tallahassee Creek. Runoff from the reclaimed quarry is expected to be similar in quality to the pre-mining condition and would not require settling before being allowed to flow into Current and Tallahassee creeks. Potential impacts to streamflows in Currant and Tallahassee creeks could decrease over time as vegetation returns to native pinyon-juniper canopy. The increase in runoff predicted by the stormwater modeling is small relative to the total runoff from the Currant and Tallahassee Creek watershed (Whetstone 2020b, Appendix F) because the modeled area (1.6 mi^2) represents less than 1.4 percent of the total watershed area for the Tallahassee Creek-Currant Creek Watershed (118.3 mi^2). The annualized increase in runoff in Tallahassee Creek below the Sale Area, calculated from the probability-weighted changes in runoff for the 2-year, 5-year, 10-year, 25-year, 50-year, and 100-year storms, is 0.067 cfs (Whetstone 2020b, Appendix F). The Intergovernmental Panel on Climate Change fifth assessment report (IPCC 2014) projects that Colorado will warm by +2°F to +6.5°F by mid-century, but indicates that there is a lack of consensus about potential changes in precipitation with models projecting between -5 percent to +8 percent change in annual precipitation. Climate change has the potential to increase or decrease the frequency and intensity of precipitation events, which may increase or decrease the percentage of water that runs off from the site under Alternative A. Potential impacts to water quality from storm water runoff would be mitigated by the use of BMPs to control turbidity, sediment, and nitrogen in runoff and by monitoring to ensure that runoff collected in sediment ponds meets applicable water quality standards prior to release to the surrounding drainages.

Issue 4: How would surface water and groundwater be monitored for the proposed mine expansion?

Mining in the Sale Area under Alternative A has the potential to reduce groundwater levels within the area shown on Figure 3.5-5 (Appendix C) and reduce water availability to nearby wells and springs. Potential impacts to groundwater quality may include increased TDS, nitrate, and nitrite concentrations within the mining area. Potential impacts to Currant and Tallahassee Creeks under Alternative A include increased runoff during storm events and the alteration of patterns of streamflow. Water quality impacts to Currant and Tallahassee creeks may include increased levels of turbidity, temperature, TDS, suspended solids, and nitrogen species (nitrate and nitrite) in runoff and baseflow from the mining area. A monitoring plan would be developed that requires operational and post reclamation monitoring in areas adjacent to the mine to detect changes in groundwater levels that could affect groundwater availability to springs and wells and allow for the timely mitigation of impacts if any. Monitoring would also be implemented between the proposed quarry and Currant and Tallahassee creeks to detect changes in shallow groundwater chemistry that could affect baseflow reporting to the creeks. Potential impacts to surface water would be evaluated by establishing streamflow and water quality monitoring stations on Currant and Tallahassee creeks. The monitoring plan would also require monitoring of spring flows and water quality for springs located within the area of potential impacts south of the Parkdale Fault (Figure 3.5-6, Appendix C).

Protective/Mitigation Measures

Potential impacts to water resources under Alternative A include:

- Alteration of groundwater levels and reduction of groundwater availability to users and springs located within the area shown on Figure 3.5-5 (Appendix C).
- Elimination of spring flows within the proposed quarry footprint and elimination of the water source for the Federal Reserved Water Right on Parkdale and Cactus Mountain Springs.
- Alteration of groundwater quality near the proposed quarry including increased concentrations of TDS, nitrate and nitrite.
- Increased runoff to Currant and Tallahassee creeks during storm events and alteration of patterns of streamflow caused by changes in runoff and baseflow from the proposed quarry area.
- Alteration of water quality in Currant and Tallahassee Creeks including increased turbidity and concentrations of TDS, suspended solids, nitrate and nitrite.

Mitigation Measure W1: Develop Water Monitoring Plan

Mitigation to minimize impacts of groundwater availability to users near Alternative A would include monitoring to detect changes in groundwater levels in and around the Sale Area. If lowered levels are observed in monitoring areas anticipated to directly be affected by the mining activities, then the following protocol will be followed:

1. Initiate a focused analysis, at the expense of the operator and in coordination with applicable regulatory agencies, to better determine if the lowered water levels can be attributed to the mining activity.
2. If the lowered water levels can be directly attributed to the mining activity, then the operator will need to initiate actions for timely replacement of affected water supplies by the drilling new wells, deepening existing wells or other comparable action.

Mitigation of potential impacts to streamflow and surface water and groundwater quality would include monitoring to detect changes to allow for adaptive management of mining practices if adverse impacts are observed.

If monitoring indicates that reductions in spring flows or streamflows are occurring and that these reductions are probably caused by mine induced drawdown, the following measures would be implemented:

1. The BLM would evaluate the available information and determine if mitigation is required;
2. If mitigation is required, Proponent would be responsible for preparing a detailed, site-specific plan to enhance or replace the impacted water resources. The mitigation plan would be submitted to the BLM identifying drawdown impacts to surface water resources. Mitigation would depend on the actual impacts and site-specific conditions and could include a variety of measures including flow augmentation, and on-site or off-site improvements). Methods for providing a new water source or improving an existing water source may include, but are not limited to:
   a. Installation of a water supply pump in an existing well (e.g., monitoring well) – this could provide replacement water for directly impacted Cactus Mountain Spring and Parkdale Spring
   b. Installation of a new water production well
   c. Piping water from a new or existing source
   d. Installation of a guzzler
   e. Enhanced development of an existing seep to promote additional flow
   f. Fencing or other protection measures for an existing seep to maintain flow

An approved site-specific mitigation plan would be implemented followed by monitoring and reporting to measure the effectiveness of the implemented measures. If initial implementation were unsuccessful, the BLM may require implementation of additional measures.

Effectiveness

Feasibility and success of mitigation would depend on site-specific conditions and details of the monitoring and mitigation plan.

Mitigation Measure W2: Loss of Springs and Federal Reserved Water Right

Mitigation of the springs and Federal Reserved Water Right that would be eliminated by Alternative A would include the development of alternative perennial sources of water within the reclaimed quarry footprint including the creation of small surface water impoundments that could be used by wildlife. Alternatively, the BLM may require the proponent to provide alternative water supply for wildlife though the pumping and delivery of water from existing or new groundwater production wells to surface water impoundments or wildlife guzzler installations.

Two of the springs that may be impacted by the proposed action are federally reserved water rights that are considered “Public Water Reserves”. Although they are not shown on the plats, the springs are “withdrawn”. So, in order to have a potential impact, the withdrawals have to be revoked, which could be a 6-9 month process.

Effectiveness

Feasibility and success of mitigation would depend on site-specific conditions and details of the mitigation plan.

Residual Effects

The area of residual mine-related groundwater drawdown is predicted to persist for the foreseeable future around the mine as shown in Figure 3.5-5 (Appendix C). Successful implementation of mitigation measures would minimize or eliminate most residual adverse effects to water resources. However, a permanent reduction of groundwater levels potentially could occur and would comprise a residual adverse effect to individual surface water locations, but would have little effect on the overall water balance of the hydrologic basins.

3.5.2.2. Direct and Indirect Effects from Alternative B

Under Alternative B, the proposed mineral Sale Area would not be developed, and direct and indirect effects to groundwater and surface water resources would not occur beyond those effects resulting from previously authorized disturbance. Under this alternative, the natural watershed in Sale Area would not be disturbed and mining related changes to the patterns of surface water and groundwater flow would not occur.

Issue 4: How Would the Existing Water Monitoring Plan be Modified to Incorporate Mining in the Expansion Area?

Under Alternative C, a monitoring plan would be developed that would be similar to the one for Alternative A. The monitoring plan would require operational and post reclamation monitoring in areas adjacent to the mine to detect changes in groundwater levels that could affect groundwater availability to springs and wells and allow for the timely mitigation of impacts if any. Monitoring would also be implemented between the proposed quarry and Tallahassee Creek to detect changes in shallow groundwater chemistry that could affect baseflow reporting to the creeks. Potential impacts to surface water would be evaluated by establishing streamflow and water quality monitoring stations on Tallahassee and Currant creeks. The monitoring plan would also require monitoring of spring flows and water quality for springs located within the area of potential impacts south of the Parkdale Fault (Figure 3.5-6, Appendix C).

Protective/Mitigation Measures

Mitigation of direct and indirect impacts to water resources under Alternative C would be the same as for Alternative A and would include:

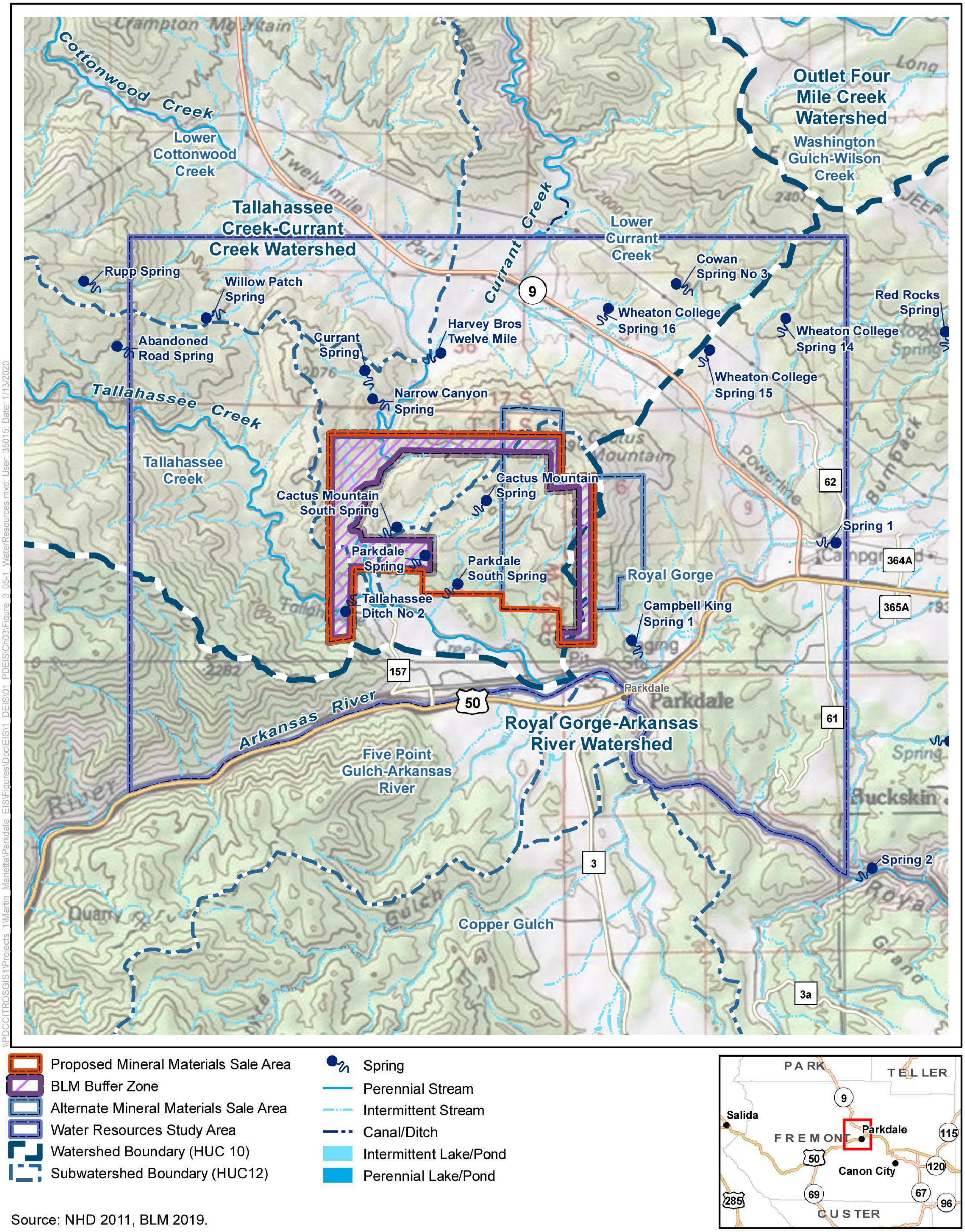
- Monitoring to detect changes in groundwater levels outside of the Sale Area and allow for timely replacement of affected water supplies by the Proponent by drilling new wells or deepening existing wells.
- The development of alternative sources of water including surface impoundments within or near the Sale Area to replace or augment spring flows that could be reduced by mining.
- Monitoring of streamflow and surface water and groundwater quality to detect changes and allow for adaptive management of mining practices if adverse impacts are observed. Spring flow and water quality monitoring at the Campbell King Spring 1 would be required under Alternative C.

Residual Effects

Residual effects are anticipated to be similar to those discussed under Alternative A.

3.5.3. Cumulative Effects Analysis

The CESA for water resources is the Lower Currant Creek, Royal Gorge, Five Point Gulch-Arkansas River, Tallahassee Creek, and Lower Cottonwood Creek HUC 12 subwatersheds. Reasonably foreseeable future conditions that could cumulatively impact water resources include the projected population increase (36 percent over the next 20 years [Colorado Department of Local Affairs 2017]) combined with the current trend in climate change, which may combine to create an overall decrease in water quantity.



Source: NHD 2011, BLM 2019.

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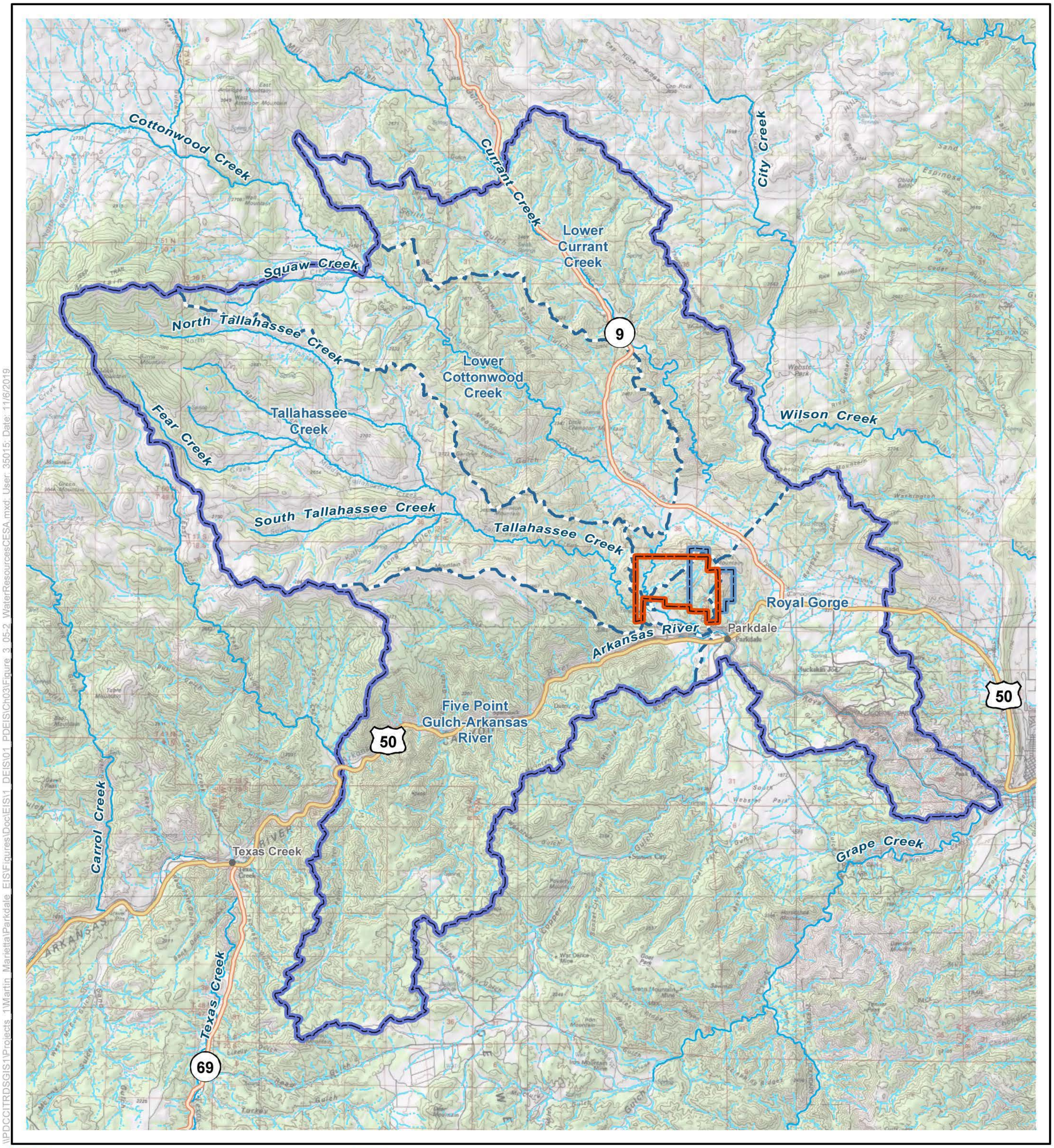
Figure 3.5-1
Water Resources Analysis Area for Direct and Indirect Effects



Proposed Mineral Materials Sale Area

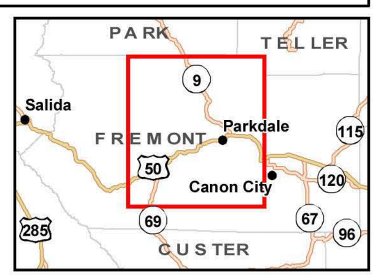
Alternate Mineral Materials Sale Area

Water Resources Cumulative Effects Study Area Boundary

Subwatershed Boundary (HUC12)

Perennial Stream

Intermittent Stream



Source: NHD 2011

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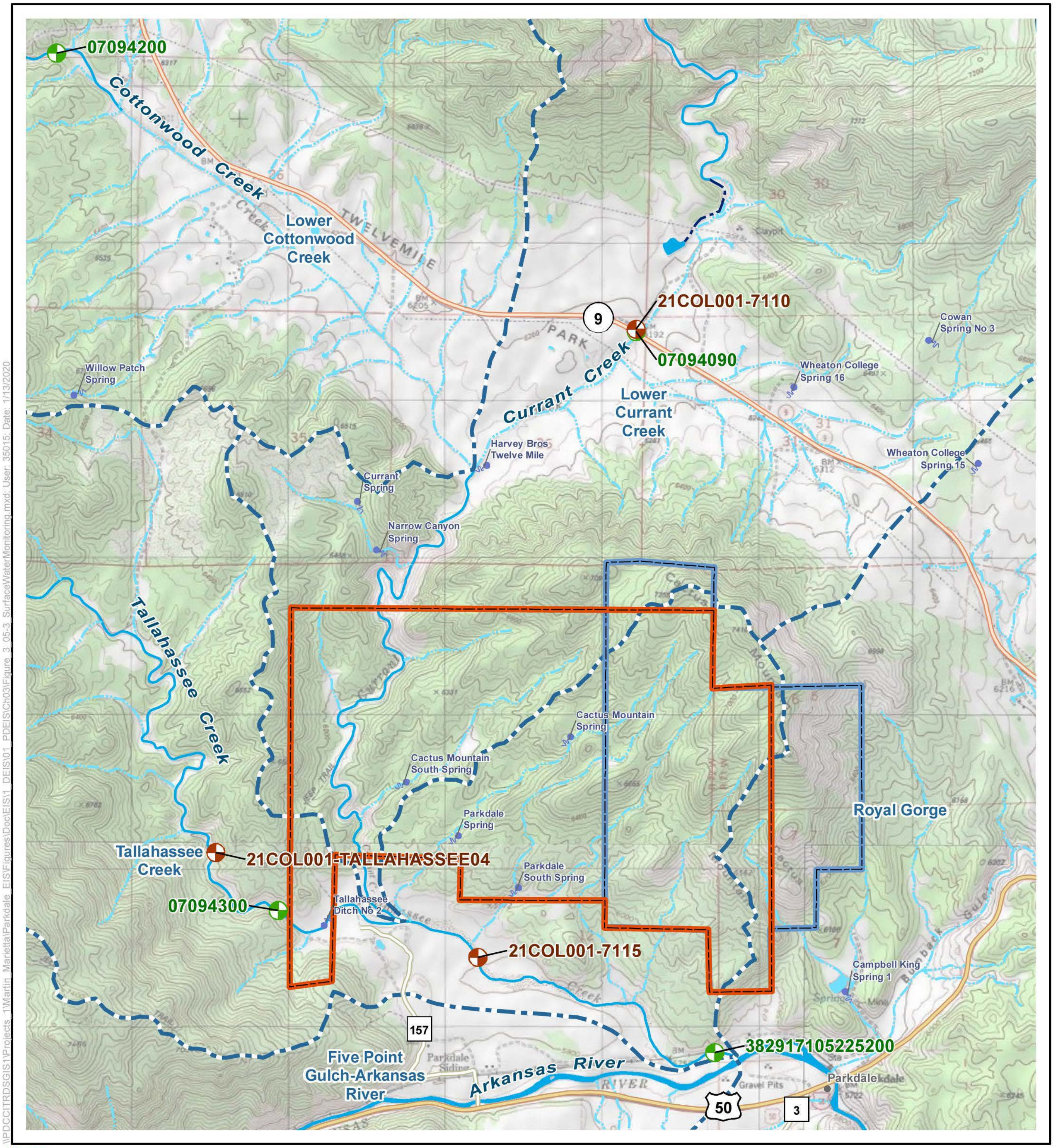
Figure 3.5-2
Water Resources
Cumulative Effects Study Area



Proposed Mineral Materials Sale Area

Alternate Mineral Materials Sale Area

Subwatershed Boundary (HUC12)

Spring

Surface Water Monitoring Site

CDPHE

USGS

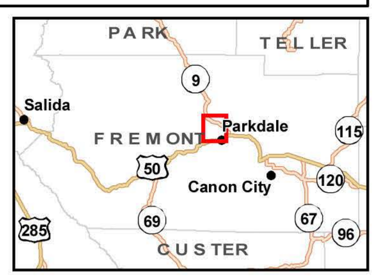
Perennial Stream

Intermittent Stream

Canal/Ditch

Intermittent Lake/Pond

Perennial Lake/Pond



Source: NWQMC 2019

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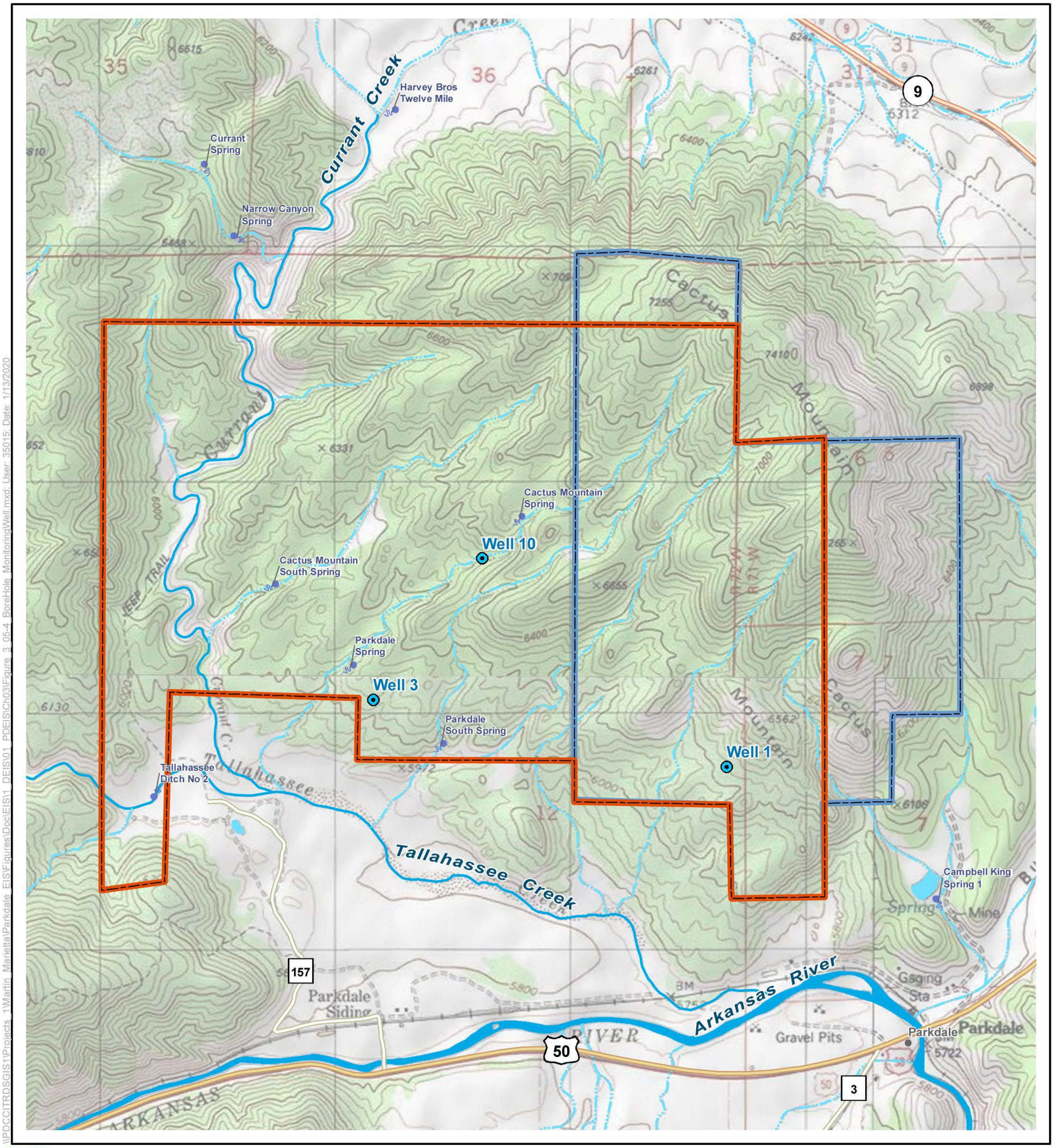
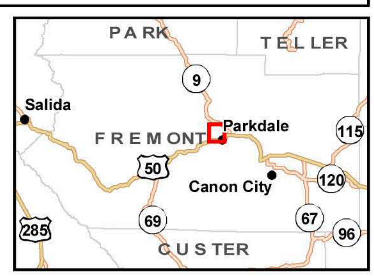
Figure 3.5-3
USGS and CDPHE Surface Water Monitoring Locations



Proposed Mineral Materials Sale Area	Spring
Alternate Mineral Materials Sale Area	Perennial Stream
Monitoring Well	Intermittent Stream
	Intermittent Lake/Pond



Source: BLM 2019

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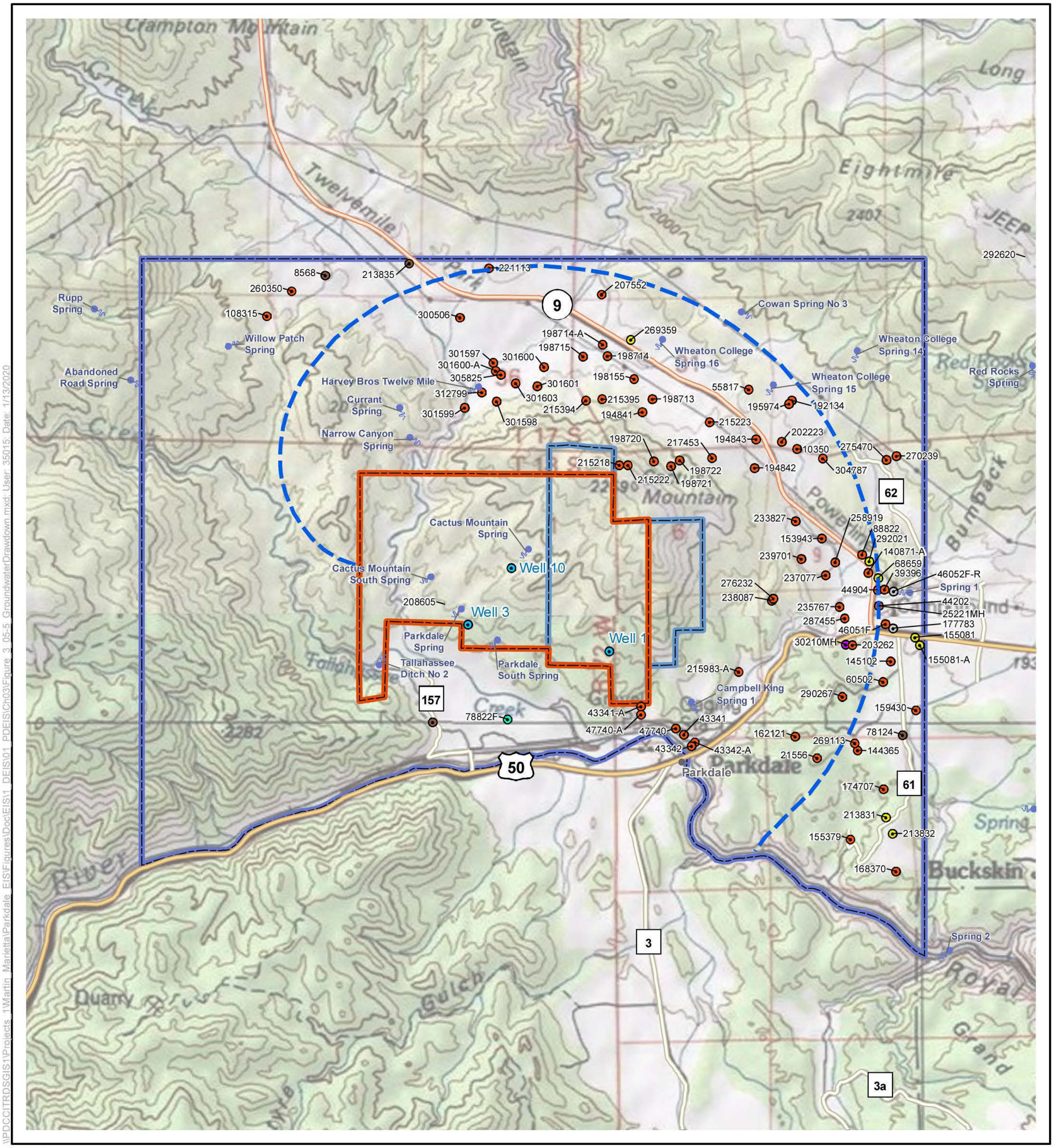
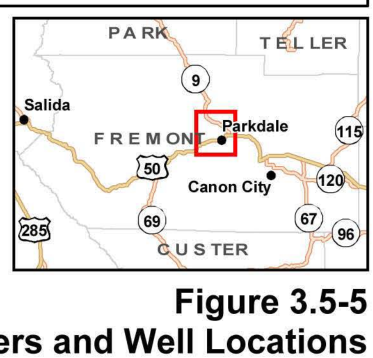
Figure 3.5-4 Monitoring Well Locations within the Mineral Sale Area





- Proposed Mineral Materials Sale Area
- Alternate Mineral Materials Sale Area
- Water Resources Study Area
- Estimated limit of potential drawdown impacts after 100 years of mining
- Monitoring Well
- Spring

DWR Wells - Primary Use

- Commercial
- Domestic
- Household use only
- Monitoring/Sampling
- Stock
- Other

Source: DWR 2019

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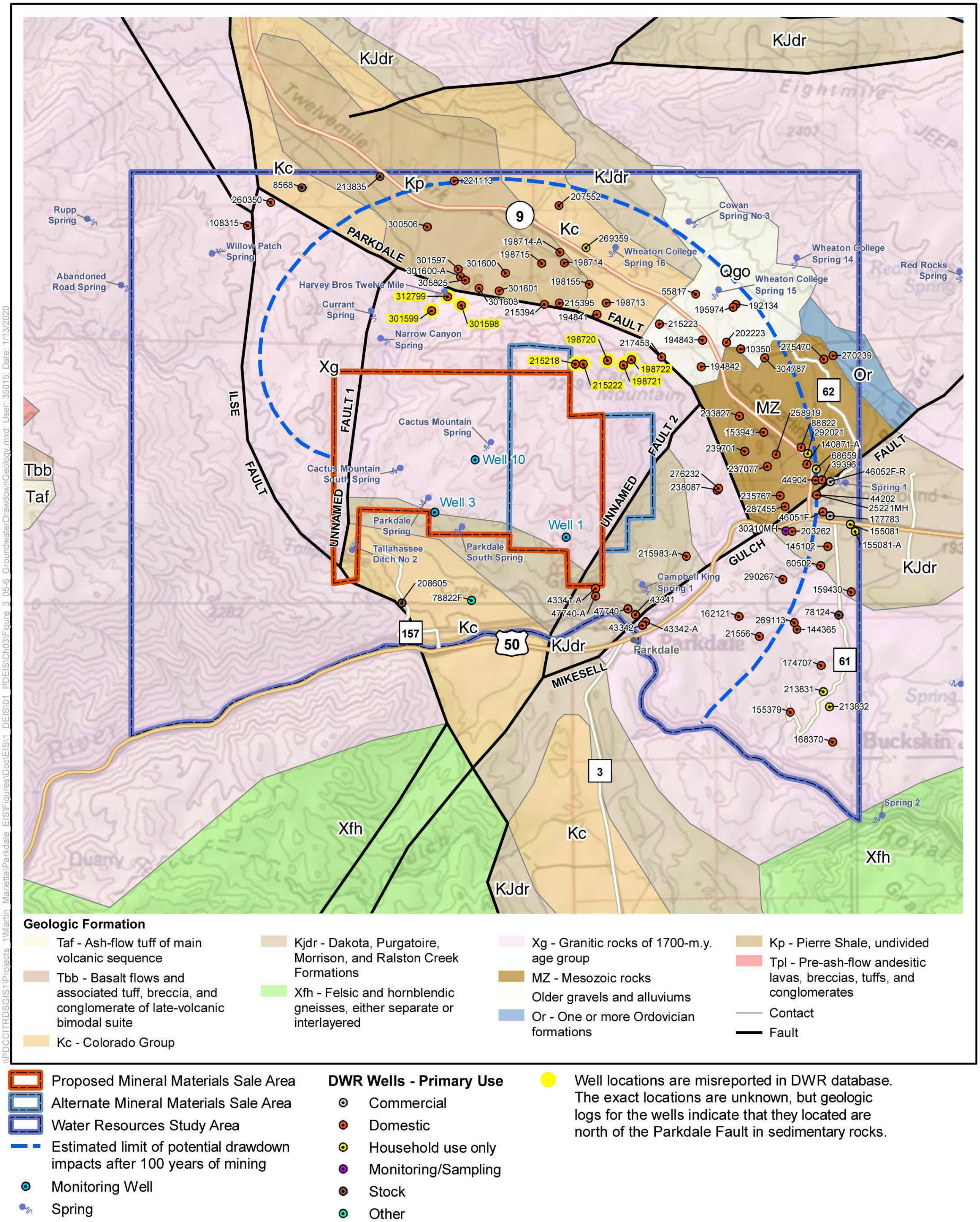
Figure 3.5-5
Groundwater Users and Well Locations within the Water Resources Study Area



Source: DWR 2019, Green 1992.

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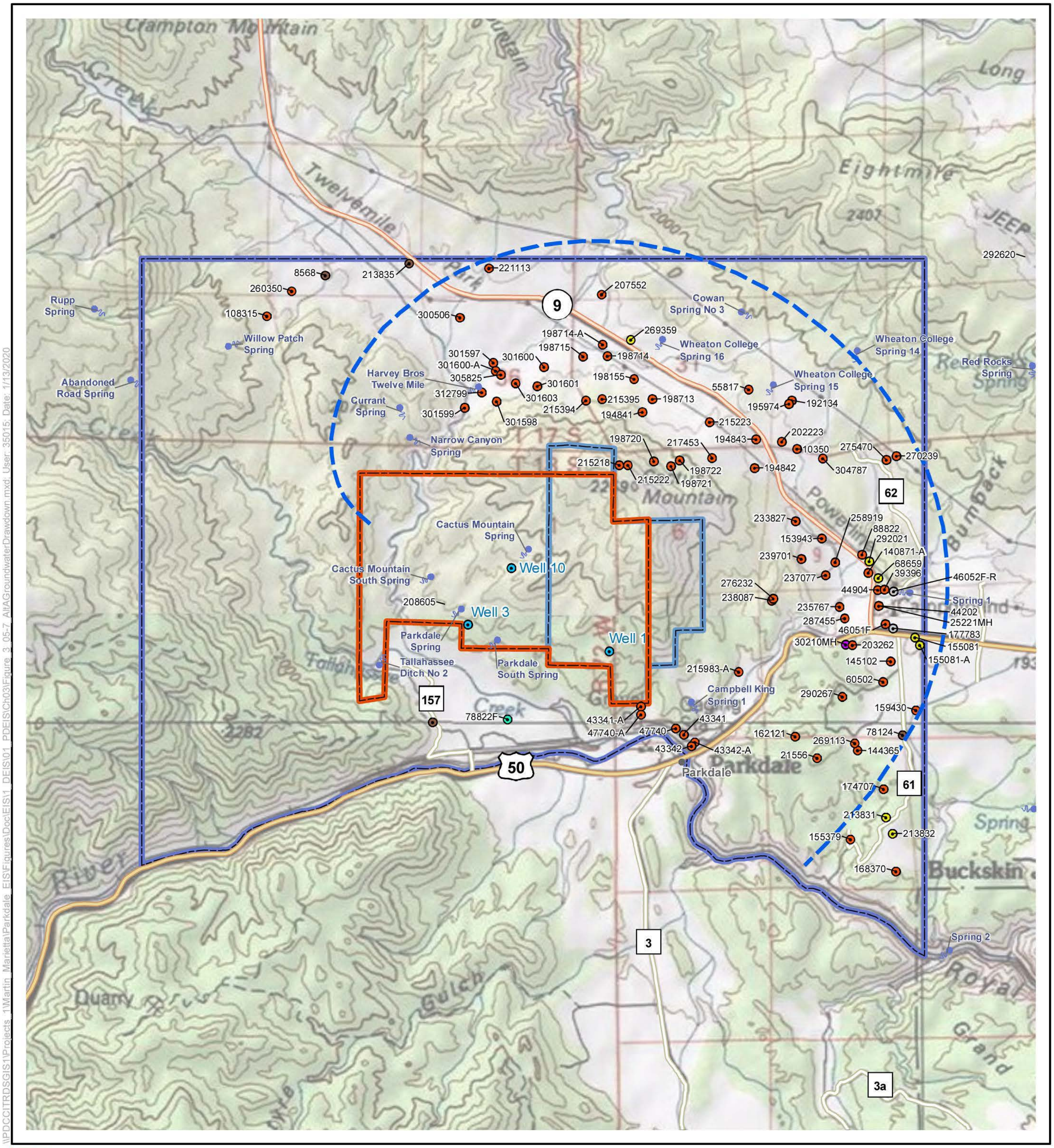
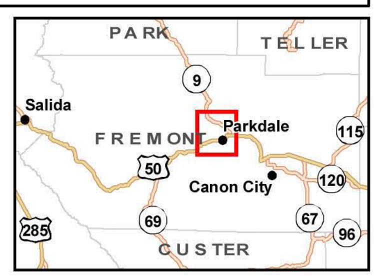
N

Figure 3.5-6
Geologic Setting of Groundwater Wells within the Water Resources Study Area





Proposed Mineral Materials Sale Area
Alternate Mineral Materials Sale Area
Water Resources Study Area
Estimated limit of potential drawdown impacts after 100 years of mining for Alternative A
Monitoring Well
Spring

DWR Wells - Primary Use
Commercial
Domestic
Household use only
Monitoring/Sampling
Stock
Other

Source: DWR 2019

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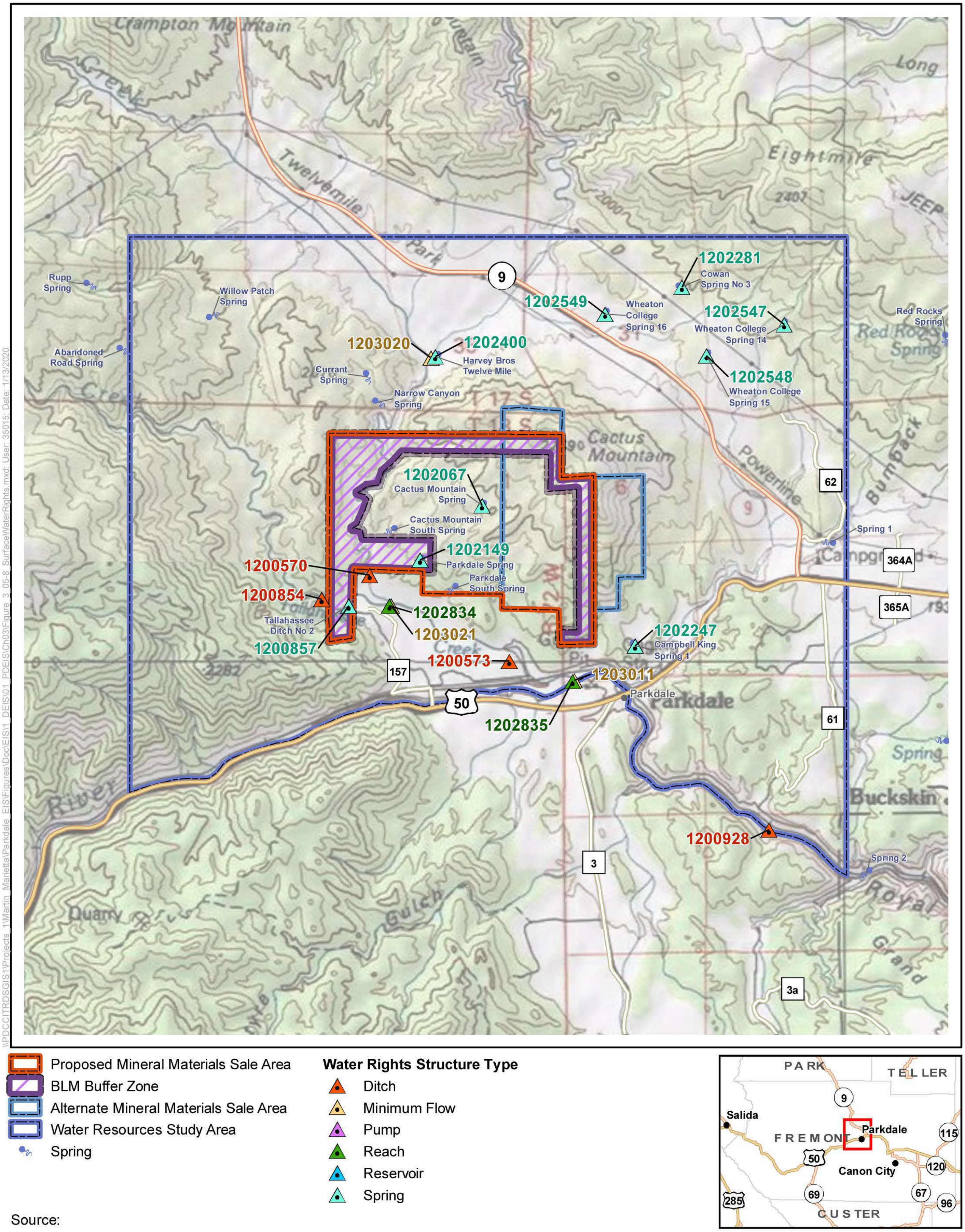
Figure 3.5-7
Area of Potential Groundwater Drawdown Impacts for Alternative A



Source:

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Figure 3.5-8
Surface Water Rights in the Water Resources Study Area

Final Environmental Impact Statement
Parkdale Quarry Expansion Project

Appendix F

Supporting Water Resources Information

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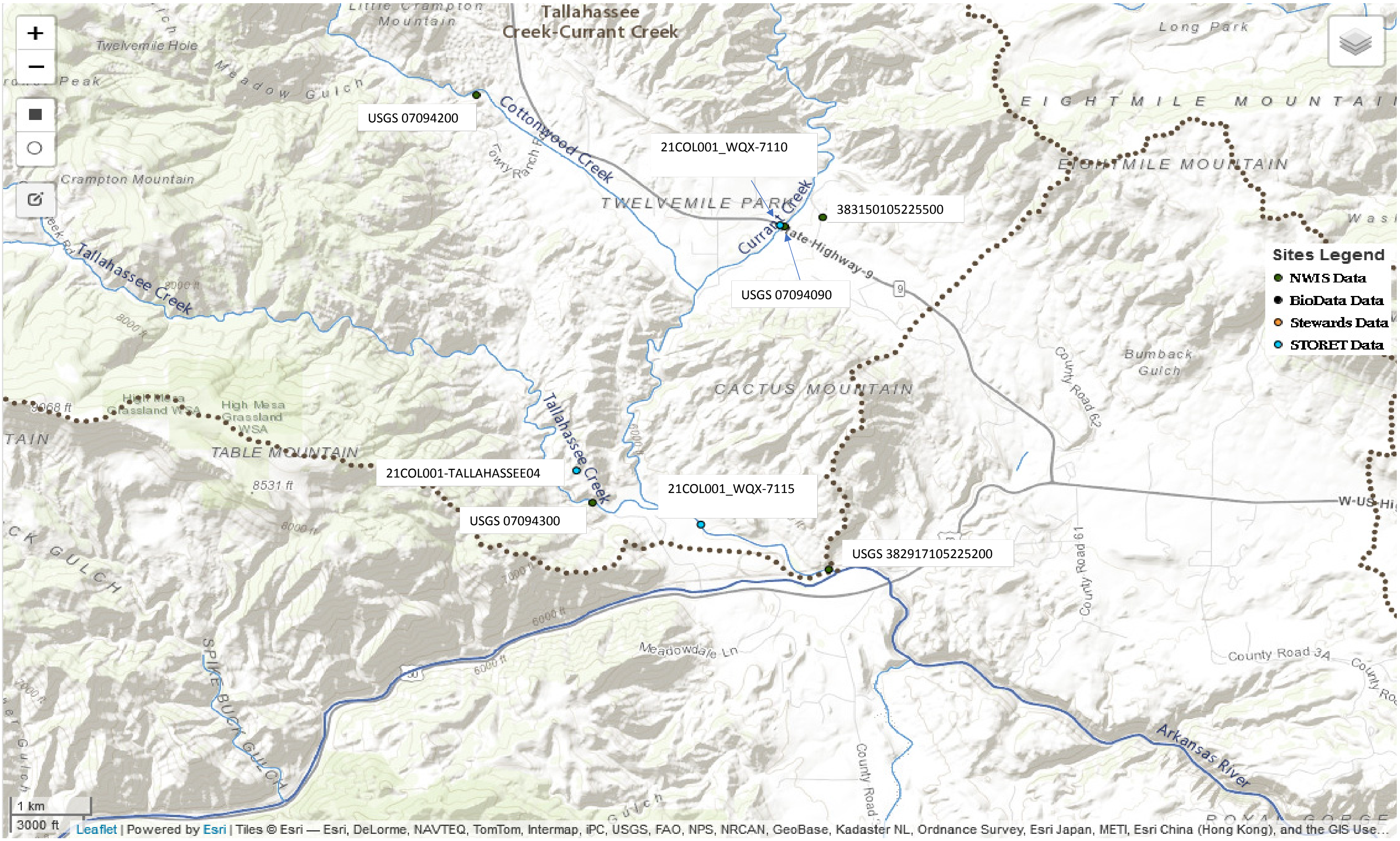
Station Locations



Technical Memorandum

To:	Scott Duncan (ICF)	**4189A**
From:	Susan Wyman, P.E., P.G. (Whetstone Associates)	
Date:	January 15, 2020	
Subject:	Runoff Modeling, Parkdale Quarry Project	

Potential impacts to surface water flow rates in Currant Creek and Tallahassee Creek resulting from proposed mining at the Parkdale Quarry Project were evaluated using the Natural Resources Conservation Service (NRCS) TR-55 method and HydroCAD® modeling software. The models estimate the surface water runoff from the proposed quarry expansion area (Sale Area) under existing conditions, which are then compared to the potential runoff after mining and reclamation.

1. SITE DESCRIPTION

1.1 Surface Water Flow

The Sale Area is located on the flank of Cactus Mountain and drains southwest toward Currant Creek and Tallahassee Creek. All drainages within the proposed pit disturbance are intermittent or ephemeral and flow for limited periods during most years in response to direct precipitation and snowmelt.

The proposed mining operation would remove vegetation and overburden soils to expose the granite deposit. Granite would be blasted, excavated, and hauled to an existing onsite processing facility. Final reclamation of the Sale Area would create a landscape that substantially mimics the landscape in Webster Park, south of and bordering the Sale Area. After mining is complete, the topography of the quarry would generally slope in the same direction and drainage channels would be excavated into the quarry floor to maintain the current general patterns of runoff. The drainage channels would be constructed with a channel profile and sinuosity similar to that of natural drainages in Webster Park that feed into the south side of the Arkansas River.

1.2 Precipitation

Lower areas of the watershed receive about 13 inches of annual precipitation and higher elevation areas receive about 19 inches, with most of the rainfall events occurring in July and August. The average precipitation at the site is about 17 inches annually (BLM 2017) with recharge to groundwater being estimated to be about 0.16 inches per year (ERM 2019).

The precipitation frequency (magnitude and recurrence interval) of storms for the site are shown in Table 1. The rainfall intensity for 24-hour storms with 2-year to 100-year recurrence intervals were interpolated from the online NOAA Atlas 14, Vol. 8, version 2 (NOAA 2020, **Error! Reference source not found.**), for the purpose of runoff calculations.

Table 1. Design Storm Parameters

Recurrence Interval	Duration (Hours)	Storm Magnitude NOAA Atlas (inches)
100-year	24	4.35
50-year	24	3.73
25-year	24	3.17
10-year	24	2.52
5-year	24	2.12
2-year	24	1.69

Rainfall is assumed to follow the 24-hr Type II rainfall-time distribution curve which is applicable to this area of the United States (USDC, 1973).

1.3 Hydrologic Characteristics of Local Soils

The dominant soils in the Sales Area are Ustic Torriorthents, which are shown as soil type 120 in Figure 1. Additionally, the southern third of the drainages are mapped as the Roygorge very gravelly sandy clay loam, shown as soil type 98 in Figure 1 and Table 2. Soils in the lower reaches of the drainages, just north of Tallahassee Creek, are mapped as Shanta loam (104), Kim loam (50), Louviers-Travessilla complex (64), Otero fine sandy loam (81), and Riverwash (92) (**Error! Reference source not found.**).

The Ustic Torriorthents and Roygorge gravelly sandy clay loam occupy the majority of the area and are mapped as Hydrologic Soil Group D. Much smaller areas are mapped as Hydrologic Group A and Group B. These soil groups are defined by the NRCS (2007) as:

> ***Group A.*** *Soils having a low runoff potential (high infiltration rate) when thoroughly wet. Water is transmitted freely through the soil.*
>
> ***Group B.*** *Soils having a moderately low runoff potential when thoroughly wet. Water transmission through the soil is unimpeded. Group B soils typically have between 10 percent and 20 percent clay and 50 percent to 90 percent sand and have loamy sand or sandy loam textures.*
>
> ***Group C.*** *Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.*
>
> ***Group D.*** *Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. Water movement through the soil is restricted or very restricted. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.*

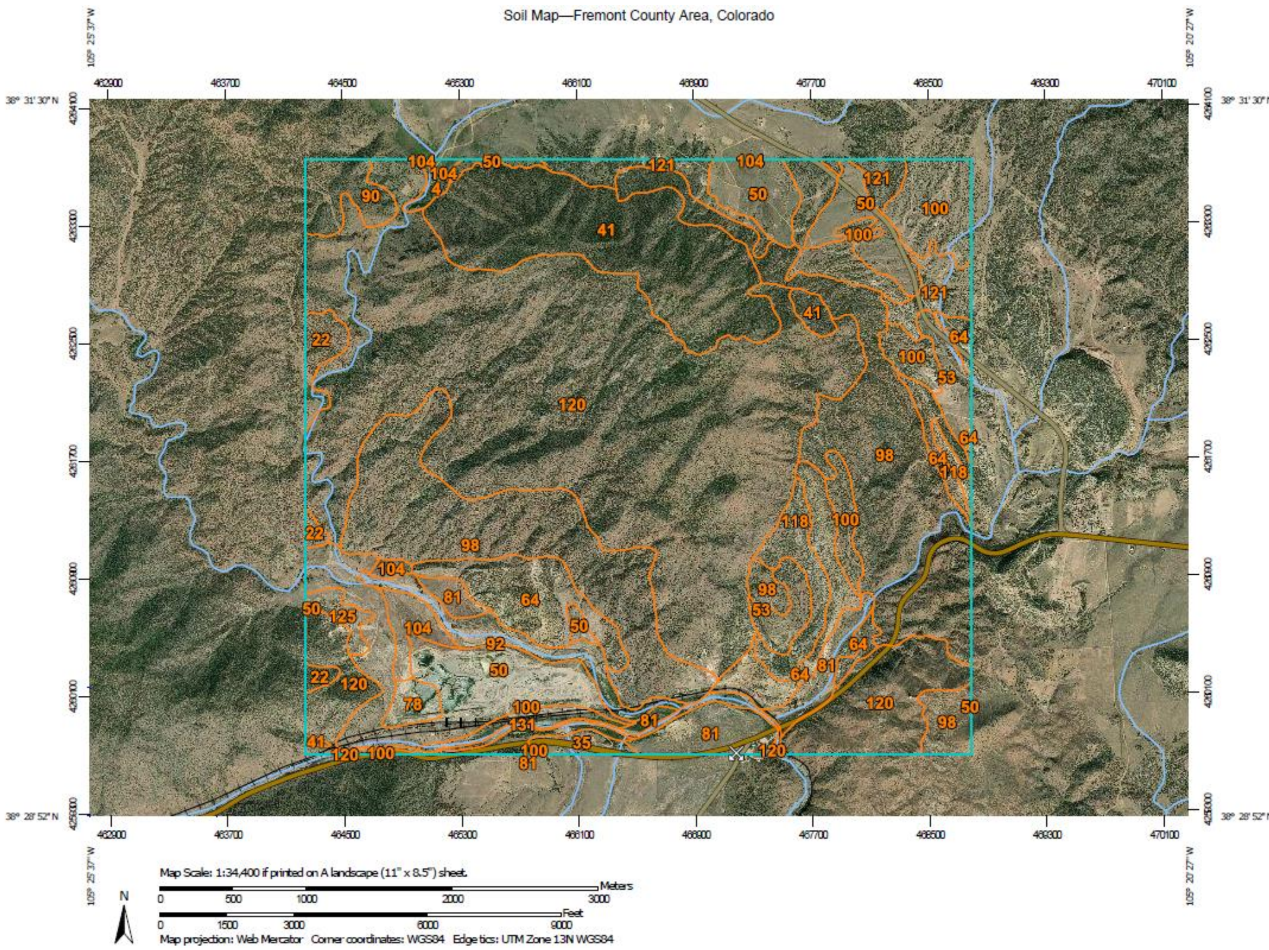


Figure 1. Soil Map

Table 2. Soils Types in Vicinity of the Sales Area

Map Unit Symbol	Map Unit Name	Acres in AOI	Hydrologic Group
50	Kim loam, cool, 3 to 8 percent slopes	377.8	B
64	Louviers-Travessilla complex, 20 to 50 percent slopes	252.2	D
81	Otero fine sandy loam, 3 to 8 percent slopes	132.2	A
92	Riverwash	71.9	n/a
98	Roygorge very gravelly sandy clay loam, 25 to 50 percent slopes	849.9	D
104	Shanta loam, 0 to 3 percent slopes	45.4	B
120	Ustic Torriorthents, bouldery-Rock outcrop complex, 35 to 90 percent slopes	1,712.70	D

The runoff curve numbers for the model were selected based on soil type, land use, and vegetative cover. A curve number of 75 was applied for pinyon-juniper with grass understory, in fair to good condition (30-70% vegetative cover) and group D soils (Table 3). A curve number of 89 was applied to areas revegetated with an herbaceous mixture of grasses, weeds, and low-lying brush in fair condition. Site curve numbers are summarized in Table 4.

Table 3. Runoff Curve Numbers for Arid and Semi-Arid Rangelands

(Table 2-2d of TR-55 [NRCS, 1986])

Cover Description (1)		**Curve Numbers for Hydrologic Soil Group**			
Cover Type	**Hydrologic Condition** (2)	**A**	**B**	**C**	**D**
Herbaceous-mixture of grass, weeds, and low-growing brush, with brush the minor element	Poor		80	87	93
	Fair		71	81	**89**
	Good		62	74	85
Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper—pinyon, juniper, or both; grass understory	Poor		75	85	89
	Fair		58	73	**80**
	Good		41	61	**71**
Sagebrush with grass understory	Poor		67	80	85
	Fair		51	63	70
	Good		35	47	55
Desert shrub—major plants include saltbush, greasewood, creosote bush, blackbrush, bursage, palo verde, mesquite, and cactus	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84
Gravel Road (3)		76	85	89	91

Notes:
(1) Based on average runoff condition, and Ia, = 0.2S.
(2) Poor: <30% ground cover (litter, grass, and brush overstory).
Fair: 30 to 70% ground cover.
Good: > 70% ground cover.
(3) Source for gravel road CN is Table 2-2a of TR-55 (NRCS 1986)

Table 4. Runoff Curve Numbers for Parkdale Quarry Sales Area

Description	**CN**
Pinyon-juniper, grass understory, fair to good condition, Group D soils	75
Herbaceous mixture of grasses, weeds, low-lying brush, fair condition (revegetated)	89

1.4 Approach for Evaluation of Surface Water Impacts

Pre-mining and post-mining runoff rates were computed to evaluate the relative changes in surface water flow resulting from mining disturbance (changes in slope, stream lengths, and vegetation). Four drainages were simulated in the pre-mining condition (Figure 2). In keeping with scope of the analysis, the pre-mining drainage areas were limited to the area from the southern confluence of the intermittent or ephemeral stream channels with Currant Creek or Tallahassee Creek to the northern boundary of proposed disturbance.

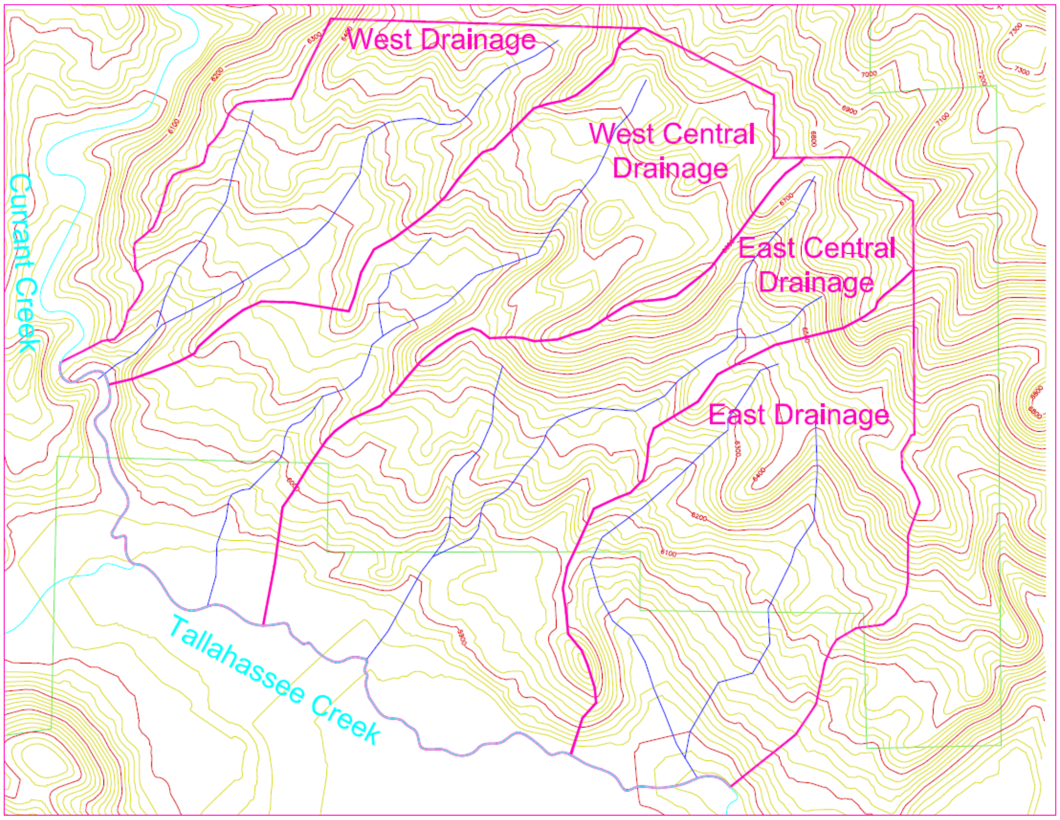


Figure 2. Pre-Mining Watersheds Evaluated

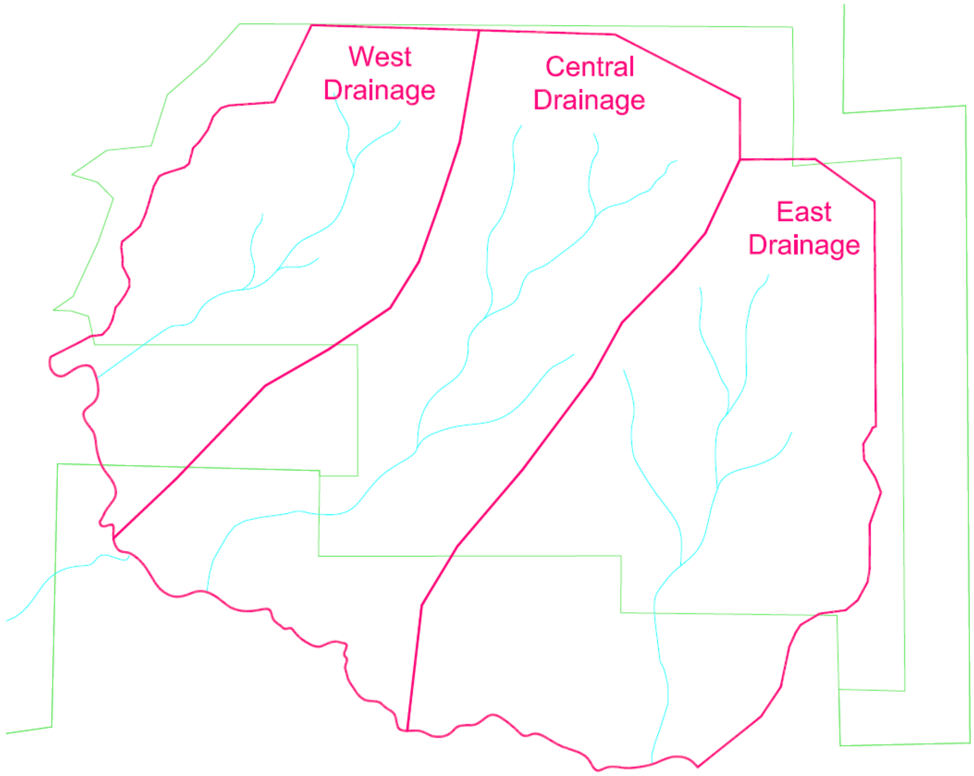


Figure 3. Post-Mining Watersheds Evaluated

2. RUNOFF MODELING

2.1 Runoff Estimation Methodology

Watershed runoff was estimated using the methods described in Technical Release 55 (TR-55), which was developed by the U. S. Department of Agriculture Natural Resources Conservation Service (NRCS, 1986). TR-55 presents simplified procedures to calculate storm runoff volume, peak rate of discharge, hydrographs, and storage volumes required for floodwater reservoirs in small watersheds.

Runoff depth (q_d) is calculated in TR-55 by the Curve Number (CN) method, using the following equation:

$$q_d = \frac{(P-0.2S)^2}{(P+0.8S)}$$

where: q_d = Runoff depth, inches (q_d = 0, if P < 0.2S),
P = Rainfall depth, inches
S = Potential maximum rainfall retention after runoff begins, inches

This method assumes initial abstraction (losses before runoff begins due to retention in surface depressions, interception by vegetation, evaporation, infiltration etc.) is equal to 0.2S.

The parameter S is related to curve number (CN) by:

$$S = \frac{1000}{CN} - 10$$

Site-specific curve numbers are discussed in Section 1.3.

Runoff volume (Q) is obtained from : $Q = q_d / 12 \cdot A \cdot 43{,}560$

where: Q = Runoff volume, cubic feet
q_d = Runoff depth, inches
A = Catchment area, acres

Peak discharge is calculated using Time of Concentration (T_c) which is the time it takes for runoff to travel from the most hydraulically distant point in the watershed (or sub-basin) to a point of interest. T_c is the sum of travel time for sheet flow (T_{sh}) plus the travel time for shallow concentrated overland flow (T_{sc}) plus the travel time for channel flow (T_{ch}).

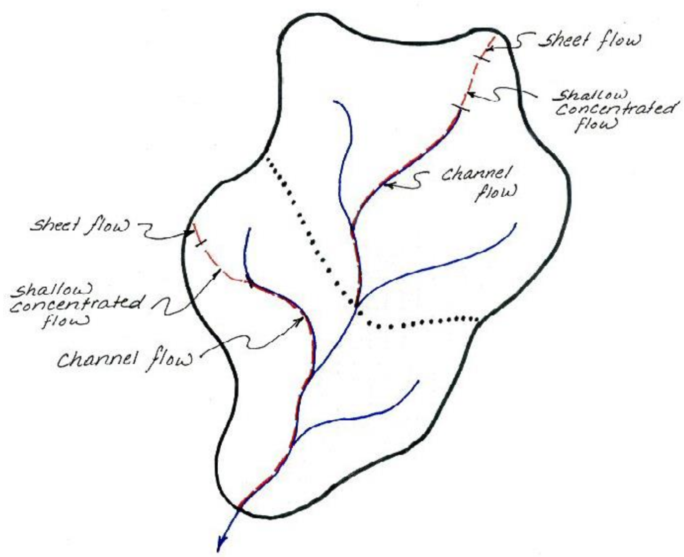


Figure 4. Location of Sheet Flow, Shallow Concentrated Flow, and Channel Flow within a Basin

Sheet flow occurs over plane surfaces in the "headwaters" or uppermost reaches of the watershed, as shown in Figure 4 above. For the pre-mining condition at the Parkdale Quarry Sales Area, sheet flow is assumed to occur in the upper 80 feet of the sub-basin. Sheet flow travel time is calculated using the simplified form of Manning's kinematic solution from Overton and Meadows (1976) which is Equation 3.3 of TR55 (NRCS, 1986):

$$T_{sh} = \frac{0.007\ (nL)^{0.8}}{P^{0.5} s^{0.4}}$$

where:

T_{sh} = sheet flow travel time (hr)
n = Manning's roughness coefficient for surface flow
L = flow length (ft)
P = 24-hour rainfall (in)
s = land slope (ft/ft)

Shallow concentrated flow has been assumed to occur from the end of sheet flow until the flow path reaches an incised intermittent stream channel. The travel time for shallow concentrated flow is calculated as:

$$T_{sc} = \frac{L}{3600 \cdot V}$$

where:

T_{sc} = shallow concentrated flow travel time (hr)
L = flow length (ft)
3600= conversion factor for seconds to hours
V = velocity on unpaved surface, interpolated from Figure 3-1 of TR-55 for land slope (ft/s) or calculated using Manning's equation:

$$V = \frac{1.49\, r^{2/3} s^{1/2}}{n}$$

where:

r = hydraulic radius = depth of flow = 0.4 ft
s = slope of the hydraulic grade line (land surface) (ft/ft)
n = Manning's n (roughness coefficient) for open channel flow = 0.05

Simplifying for unpaved conditions:

V = $16.13\ s^{1/2}$

Channelized flow occurs in defined channels or intermittent drainages. The travel time for channelized flow is calculated using Manning's equation for channelized flow and the channel-specific geometry and hydraulic characteristics (rather than the simplifying assumptions used for shallow concentrated flow).

Shallow concentrated flow has been assumed to occur from the end of sheet flow until the flow path reaches a topographically well-defined channel. The travel time for shallow concentrated flow is calculated as:

$$T_{ch} = \frac{L}{3600 \cdot V}$$

where:

T_{ch} = channel flow travel time (hr)
L = flow length (ft)

3600= conversion factor for seconds to hours
V = velocity (ft/sec) calculated using Manning's equation for channelized flow:

$$V = \frac{1.49\, r^{2/3} s^{1/2}}{n}$$

where:

r = hydraulic radius = cross sectional area / wetted perimeter (A/Pw) (ft)
s = slope of the hydraulic grade line (channel bottom) (ft/ft)
n = Manning's n (roughness coefficient) for open channel flow (as discussed in Section 2.3.2 and Table 5)

The T_c values calculated using WinTR-55 and HydroCAD are provided in Section 2.3.3.

Runoff peak discharge is calculated from the TR-55 graphical peak discharge method. This approach graphically generates a unit peak discharge rate (Q_u) based upon the general catchment parameters of curve number (CN), initial abstraction (I_a), precipitation (P) and rainfall distribution type (type II for Colorado) and the individual catchment time of concentration (T_c). The input variables used in determining Q_u using the graphical method were determined as follows:

CN = curve number based soil type, as discussed in Section 1.3 and Table 4
I_a = initial abstraction, lookup value in Table 4-1 of TR-55 based on CN
P = Precipitation, based on design storms listed in Table 1 of this tech memo
T_c = Time of concentration, calculated as discussed above

Peak discharge (Q_p) for the catchment area is then calculated from:

$$Q_p = Q_u \cdot A_m \cdot q \cdot F_p$$

where: Q_p = Sub-basin peak discharge (cubic feet per second [cfs])
Q_u = Sub-basin unit peak discharge (cfs/mi^2/in [csm/in])
A_m = Sub-basin area (square miles)
q = Runoff (inches)
F_p = Pond and swamp adjustment factor

2.2 Computational Methods

2.2.1 NRCS WinTR-55

Peak discharge was computed using the NRCS WinTR-55 software (NRCS, 2009). WinTR-55 is a single-event rainfall-runoff, small watershed hydrologic model. The model generates hydrographs from urban, agricultural, and rural areas and at selected points along the stream system. Runoff hydrographs were generated by the model and routed downstream through channels. Multiple sub-areas were modeled within the watershed and routed to the applicable outfalls on Currant Creek and Tallahassee Creek. Although the computational methods employed in WinTR-55 are similar to the worksheet calculations in TR-55 (NRCS, 1986), WinTR-55 uses the TR-20 software engine for more accurate analysis of the hydrology of small watershed systems.

2.2.2 HydroCAD

Peak discharge for sub-basins reporting to the Stormwater Retention Pond was also computed using the HydroCAD-10 software, distributed by HydroCAD Software Solutions, LLC. HydroCAD® uses the procedures described in TR-55 and TR-20 with added features for multiple pond routing, variable pond geometry, pond pumping, exfiltration, baseflow and inflow losses (that is, inflow to and exfiltration from reaches), and an increased number of "nodes" (reaches, sub-basin, and ponds) over the limited number available in WinTR-55. The runoff results computed by HydroCAD are essentially identical to those from the NRCS WinTR-55 software, but additional graphing capability, volumetric calculations, and reporting are available in HydroCAD.

2.3 Model Input

2.3.1 Watershed Delineation

The model area was delineated into four catchments for the pre-mining simulation (Figure 2, Figure 5). These watersheds extended from the confluence with Currant Creek or Tallahassee Creek to the northern boundary of proposed disturbance, and totaled 1,040 acres. For the post-mining simulation, the total watershed area was kept constant with the pre-mining simulation (1,040 acres), but was subdivided into three catchments reflecting the proposed constructed stream channels in the mine reclamation plan (Figure 3, Figure 6).

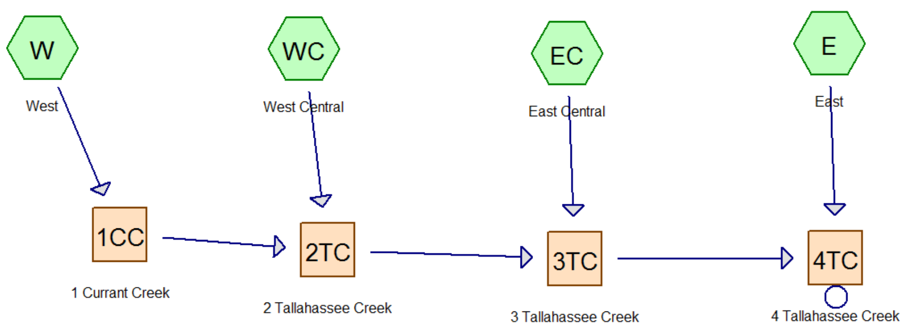


Figure 5. HydroCAD Node Routing, Pre-Mining

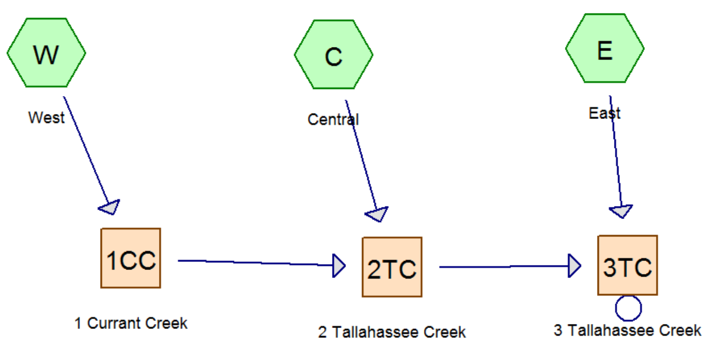


Figure 6. HydroCAD Node Routing, Post-Mining

2.3.2 Manning's n

The value of Manning's n selected for each channel affects channel velocity, conveyance capacity, and peak flows. The most important factors that affect the selection of channel n values are:

1. Type and size of the materials that compose the bed and banks of the channel; and
2. Shape of the channel.

Cowan (1956) developed a procedure for estimating the effects of these factors to determine the value of n for a channel. The value of n may be computed by:

$$n = (n_b + n_1 + n_2 + n_3 + n_4) \cdot m$$

where :

n_b = a base value of n for a straight, uniform, smooth channel in natural materials
n_1 = a correction factor for the effect of surface irregularities
n_2 = a value for variations in shape and size of the channel cross section,
n_3 = a value for obstructions
n_4 = a value for vegetation and flow conditions
m= a correction factor for meandering of the channel

Table 5. Manning's "n" Values Used in Cowan's Method for Channel Roughness

Channel Condition	n Values	Natural Channels	Borrow Ditches	Engineered Channels	Short Natural Channels
Material Involved	**n_b**				
Earth	0.02				0.02
Rock cut	0.025	0.022	0.022	0.022	
Fine gravel	0.024				
Coarse gravel	0.028				
Degree of Irregularity	**n_1**				
Smooth	0				
Minor	0.005			0.005	
Moderate	0.01	0.01	0.01		0.01
Severe	0.02				
Variations of Channel Cross Section	**n_2**				
Gradual	0				
Alternating occasionally	0.005		0.005	0.005	0.005
Alternating frequently	0.010-0.015	0.01			
Relative Effect of Obstructions	**n_3**				
Negligible	0				
Minor	0.010-0.015		0.01	0.01	0.01
Appreciable	0.020-0.030	0.02			
Severe	0.040-0.060				
Vegetation	**n_4**				
Low	0.005-0.010	0.005	0.005	0.005	0.005
Medium	0.010-0.025				
High	0.025-0.050				
Very high	0.050-0.100				
Degree of Meandering	**m**				
Minor	1	1	1	1	1
Appreciable	1.15				
Severe	1.3				
Calculated Manning's n value		0.067	0.052	0.047	0.05

A Manning's n value of 0.067 was used for natural channels in the pre-mining simulation and for reconstructed channels in the post-mining simulation. These values affect the Time of Concentration (Section 2.3.3) and therefore the timing of peak flows, but do not affect the total volumetric runoff predicted by the model.

2.3.3 Time of Concentration

As described in Section 2.1, Time of Concentration (T_c) is the time it takes for runoff to travel from the most hydraulically distant point in the watershed to the discharge outlet (or other point of interest). Tc values computed for the modeled basins are shown in Table 6 and Table 7.

The area-weighted average Tc (Table 8) was 24% higher in the post-mining scenario, due the lower slopes and longer channel lengths in the reconstructed channels. The higher Tc helps to delay the arrival of peak flows from the watershed into the creek.

Table 6. Watershed Channel Length, Slope, and Time of Concentration (Pre-Mining)

Sub-Basin West (Pre-Mining)

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	80	0.4878	0.48		**Sheet Flow, Sheet Flow** Range n= 0.130 P2= 1.69"
0.6	375	0.3733	9.84		**Shallow Concentrated Flow, Concentrated** Unpaved Kv= 16.1 fps
32.7	5,880	0.0722	3.00	4.50	**Channel Flow, Intermittent Channel West** Area= 1.5 sf Perim= 4.2' r= 0.36' n= 0.067
36.1	6,335	Total			

Sub-Basin West Central (Pre-Mining)

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	80	0.4167	0.45		**Sheet Flow, Sheet Flow** Range n= 0.130 P2= 1.69"
0.5	300	0.4667	11.00		**Shallow Concentrated Flow, Concentrated Flow** Unpaved Kv= 16.1 fps
32.4	7,117	0.1075	3.66	5.49	**Channel Flow, Channel West Central** Area= 1.5 sf Perim= 4.2' r= 0.36' n= 0.067
35.9	7,497	Total			

Sub-Basin East Central (Pre-Mining)

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	80	0.3750	0.43		**Sheet Flow, Sheet Flow** Range n= 0.130 P2= 1.69"
0.5	325	0.4923	11.30		**Shallow Concentrated Flow, Concentrated Flow** Unpaved Kv= 16.1 fps
28.6	6,890	0.1292	4.01	6.02	**Channel Flow, Channel Flow** Area= 1.5 sf Perim= 4.2' r= 0.36' n= 0.067
32.2	7,295	Total			

Sub-Basin East (Pre-Mining)

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	80	0.5634	0.50		**Sheet Flow, Sheet Flow** Range n= 0.130 P2= 1.69"
1.2	730	0.4110	10.32		**Shallow Concentrated Flow, Concentrated** Unpaved Kv= 16.1 fps
21.2	5,115	0.1300	4.03	6.04	**Channel Flow, East Channel** Area= 1.5 sf Perim= 4.2' r= 0.36' n= 0.067
25.0	5,925	Total			

Table 7. Watershed Channel Length, Slope, and Time of Concentration (Post-Mining)

Sub-Basin West (Post-Mining)

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	40	0.5300	3.09		**Sheet Flow, Sheet Flow** Smooth surfaces n= 0.011 P2= 1.69"
0.9	650	0.5300	11.72		**Shallow Concentrated Flow, Concentrated** Unpaved Kv= 16.1 fps
13.5	3,560	0.0183	4.40	6.60	**Channel Flow, Reclaimed Channel West** Area= 1.5 sf Perim= 4.2' r= 0.36' n= 0.023 Earth, clean & winding
4.2	770	0.0779	3.07	4.60	**Channel Flow, Outside pit channel** Area= 1.5 sf Perim= 4.3' r= 0.35' n= 0.067
18.8	5,020	Total			

Sub-Basin Central (Post-Mining)

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	40	0.5300	3.09		**Sheet Flow, Sheet Flow** Smooth surfaces n= 0.011 P2= 1.69"
1.1	775	0.5300	11.72		**Shallow Concentrated Flow, Concentrated Flow** Unpaved Kv= 16.1 fps
61.0	5,310	0.0169	1.45	2.18	**Channel Flow, Reclaimed channel Central** Area= 1.5 sf Perim= 4.2' r= 0.36' n= 0.067
7.7	1,520	0.0888	3.28	4.91	**Channel Flow, Channel outside pit Central** Area= 1.5 sf Perim= 4.3' r= 0.35' n= 0.067
70.0	7,645	Total			

Sub-Basin East (Post-Mining)

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	40	0.5300	0.43		**Sheet Flow, Sheet Flow** Range n= 0.130 P2= 1.69"
1.0	708	0.5300	11.72		**Shallow Concentrated Flow, Concentrated** Unpaved Kv= 16.1 fps
14.0	3,820	0.0196	4.55	6.83	**Channel Flow, Reclaimed Channel within Pit East** Area= 1.5 sf Perim= 4.2' r= 0.36' n= 0.023 Earth, clean & winding
5.4	1,490	0.1711	4.62	6.93	**Channel Flow, Channel outside pit - East** Area= 1.5 sf Perim= 4.2' r= 0.36' n= 0.067
22.0	6,058	Total			

Table 8. Area-Weighted Average Time of Concentration

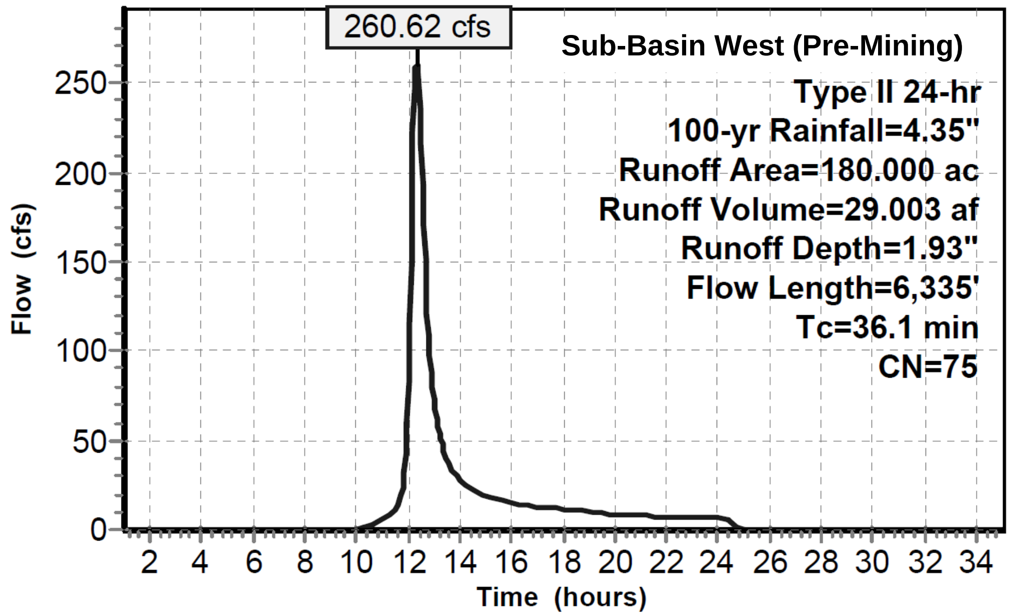
Watershed Catchment	Phase	Tc (hydroCAD) (min)	SubBasin Area (acres)	Weighted Average Tc (min)
West	Pre-mining	36.1	180	
West Central	Pre-mining	35.9	290	
East Central	Pre-mining	32.2	320	
East	Pre-mining	25.00	250	32.2
West-Reclaimed	Post-mining	18.8	235	
Central-Reclaimed	Post-mining	70.0	400	
East-Reclaimed	Post-mining	22.0	405	39.7

3. MODEL RESULTS

3.1 Results

Model results are provided in **Error! Reference source not found.**. Runoff hydrographs for the 100-year storm are shown in Figure 7 and Figure 8. The cumulative peak flows for the 100-year storm after reclamation (2,750 cfs) are 67% higher than before mining (1,650 cfs). Cumulative peak flows for the more frequent recurrence interval storms (2-yr, 5-yr, 10-yr, 25-yr, and 50-yr) are similarly higher in the post-mining model than in the pre-mining model. This implies that the mining project would result in higher flow rates in the intermittent drainages reporting to Currant Creek and Tallahassee Creek after major storm events.

The timing of peak flows is similar in the post-mining and pre-mining scenarios, with post-mining catchments West and East peaking earlier (12.10 – 12.15 hrs) than the pre-mining peaks (12.20 – 12.35 hrs) and the post-mining catchment Central peaking later (12.70 hrs). Runoff hydrographs for all storm events modeled are provided in **Error! Reference source not found.**.



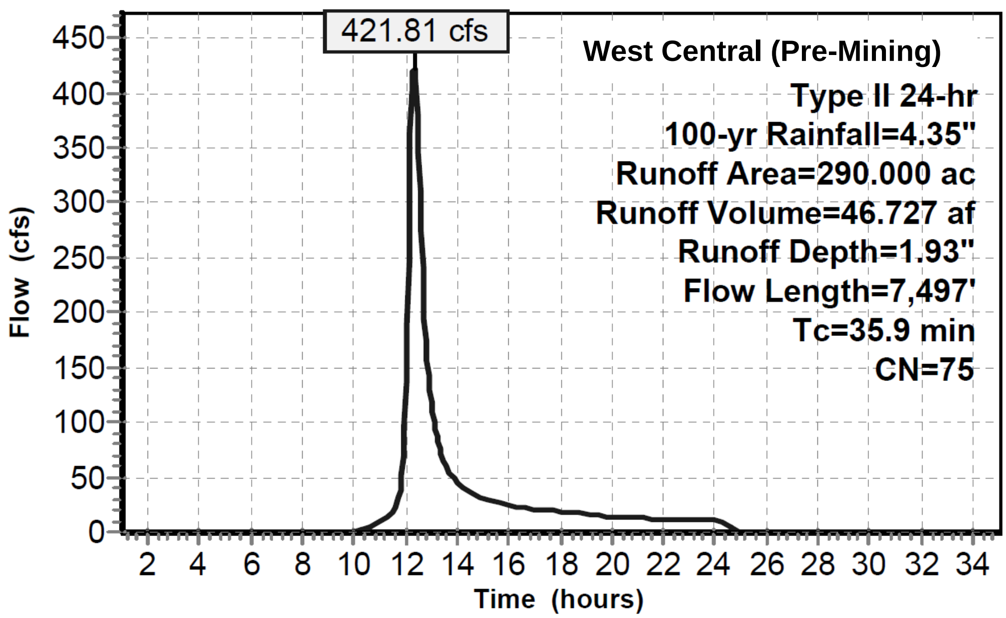
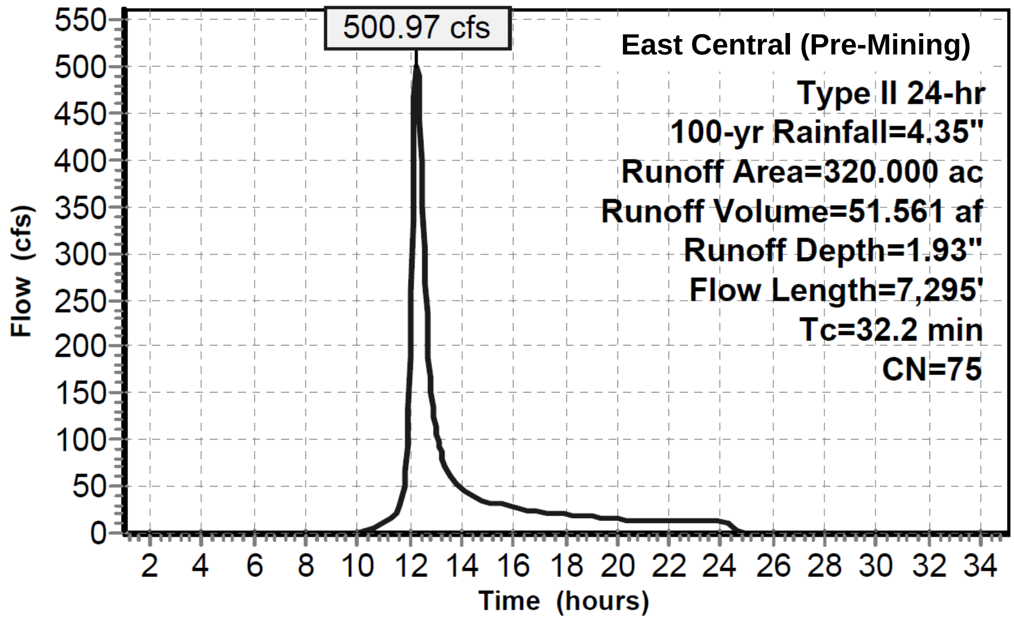


Figure 7. Runoff Hydrographs for 100-Year Storm Event (Pre-Mining)



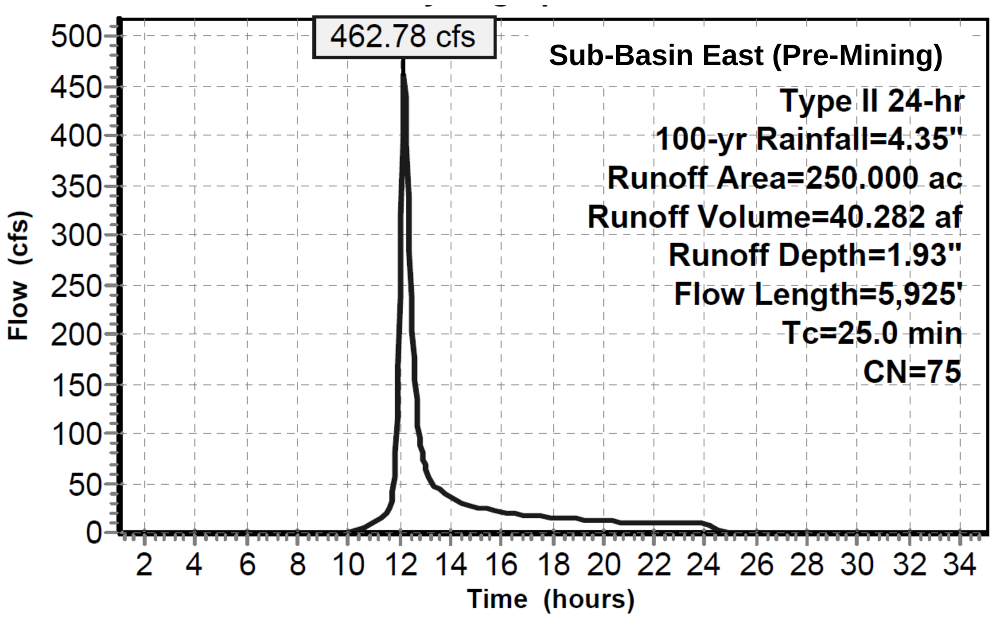
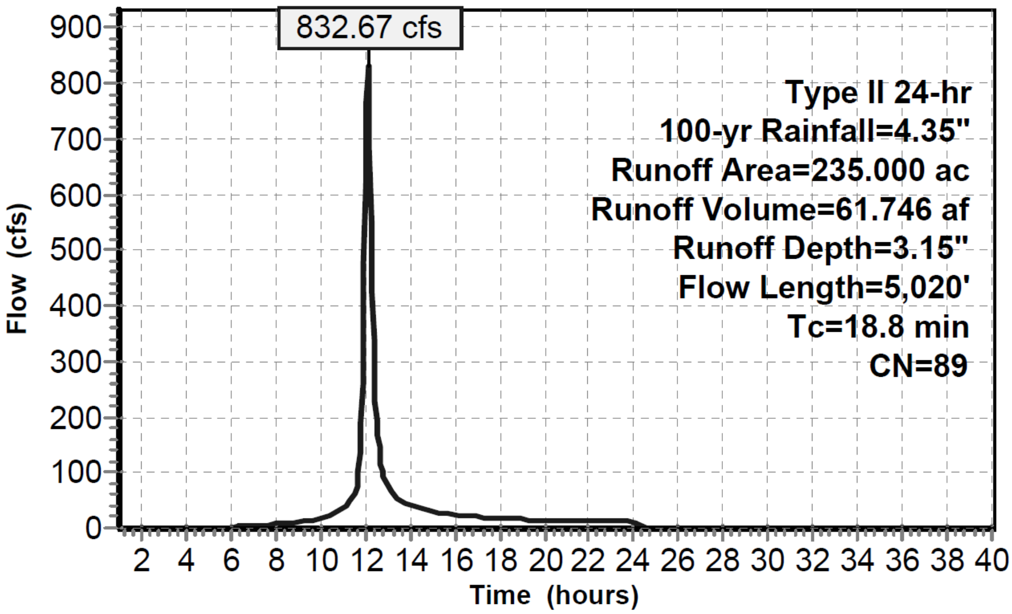


Figure 7. Runoff Hydrographs for 100-Year Storm Event (Pre-Mining) (Part 2)



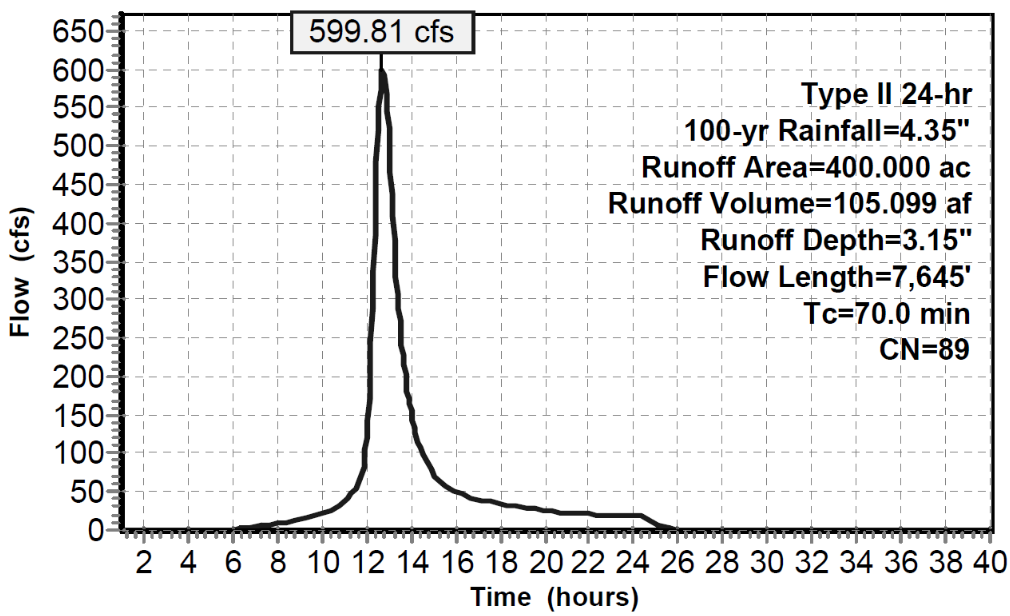


Figure 8. Runoff Hydrographs for 100-Year Storm Event (Post-Mining)

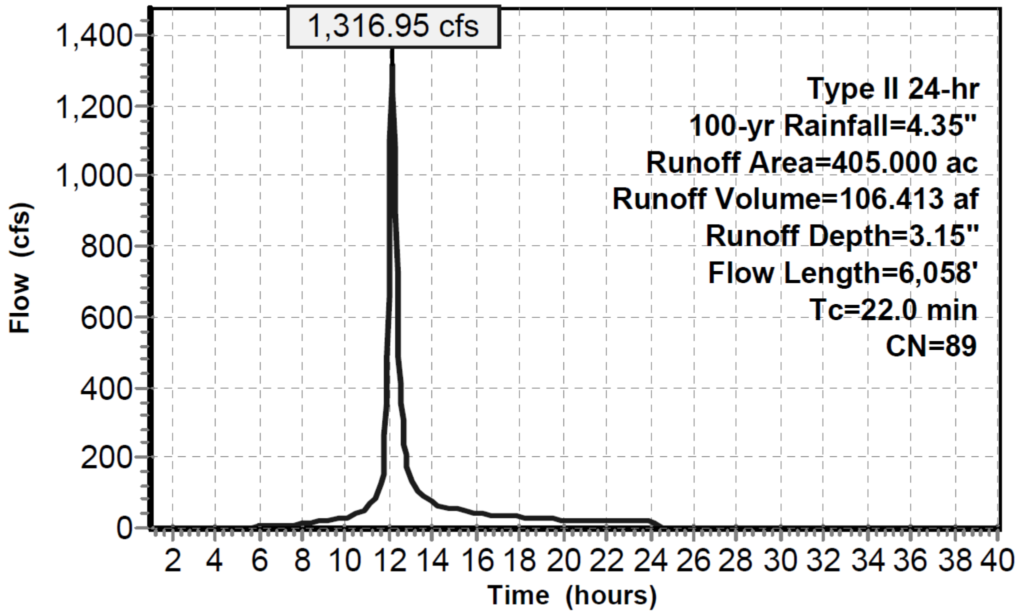


Figure 8. Runoff Hydrographs for 100-Year Storm Event (Post-Mining) (Part 2)

The total volume of runoff from major storms would increase as a result of mining and reclamation. The model results (**Error! Reference source not found.**) indicates that the volume of runoff reporting to the creeks would increase by 160% for the 100-year precipitation event and by 220% for the 10-year precipitation event (Table 9). The increased runoff is primarily due to the change in vegetation after reclamation.

Increased runoff could consequently decrease evapotranspiration and infiltration of precipitation and snowmelt to groundwater. Decreased infiltration to groundwater is expected to result in decreased baseflows to the creeks, which would be partially offset by increased streamflows during major storm events.

Table 9. Relative Comparison Pre-Mining and Post-Mining Runoff Volumes

Watershed Drainage	Phase	Runoff Volume (acre-ft) P2yr-24hr	Runoff Volume (acre-ft) P5yr-24hr	Runoff Volume (acre-ft) P10yr-24hr	Runoff Volume (acre-ft) P25yr-24hr	Runoff Volume (acre-ft) P50yr-24hr	Runoff Volume (acre-ft) P100yr-24hr
West	Pre-mining	3.6	6.6	9.9	16.1	22.0	29.0
West Central	Pre-mining	5.8	10.7	16.0	25.9	35.5	46.7
East Central	Pre-mining	6.4	11.8	17.7	28.6	39.1	51.6
East	Pre-mining	5.0	9.2	13.8	22.4	30.6	40.3
West-Reclaimed	Post-mining	15.2	22.1	28.8	40.2	50.3	61.7
Central-Reclaimed	Post-mining	25.9	37.6	49.1	68.5	85.7	105.1
East-Reclaimed	Post-mining	26.2	38.1	49.7	69.3	86.8	106.4
Total Pre	Pre-mining	20.8	38.2	57.4	93.1	127.1	167.6
Total Post	Post-mining	67.4	97.8	127.6	178.0	222.8	273.3
Increase (multiplier)		3.2	2.6	2.2	1.9	1.8	1.6

The long-term average annual change in runoff volumes was calculated using the probability of occurrence for each design storm in a given year. The probability-weighted average annual runoff volume for the pre-mining condition is 31.7 acre-ft compared to 80.3 acre-ft for the post-mining condition. The annualized increase in runoff in Tallahassee Creek below the Sale Area, calculated from the probability-weighted changes in runoff for the 2-yr, 5-yr, 10-yr, 25-yr, 50-yr, and 100-yr storms, is 0.067 cfs

Table 10. Relative Comparison of Pre-Mining and Post-Mining Annualized Average Runoff Volumes

Watershed Drainage	Phase	Annualized Runoff (acre-ft/yr)	Outlet	% Change
West	Pre-mining	5.5	Currant Creek	
West Central	Pre-mining	8.9	Tallahassee Ck	
East Central	Pre-mining	9.8	Tallahassee Ck	
East	Pre-mining	7.6	Tallahassee Ck	
West-Reclaimed	Post-mining	18.1	Currant Creek	330%
Central-Reclaimed	Post-mining	30.9	Tallahassee Ck	
East-Reclaimed	Post-mining	31.3	Tallahassee Ck	237%
Total Pre	Pre-mining	31.7		
Total Post	Post-mining	80.3	Total	253%

3.2 Comparison to Tallahassee Creek-Currant Creek Watershed Runoff

The runoff results for the Sale Area were compared to the runoff from the regional watershed to determine the magnitude of change as a percentage of regional flows. The portion of the Sale Area modeled is 1,040 acres, or approximately 1.37% of the 108.3 square miles in the Tallahassee Creek-Currant Creek watershed (HUC 1102000111) (Table 11).

Table 11. Hydrologic Units in the Arkansas River Headwaters

4th Level Sub-Basin (HUC 8)	5th Level Watershed (HUC 10)	6th Level Sub-Watershed (HUC 12)	Sq. Mile
Arkansas Headwaters (11020001)	**Tallahassee Creek-Currant Creek (1102000111)**	Lower Cottonwood Creek (110200011108)	32.8
		Lower Currant Creek (110200011109)	35.3
		Tallahassee Creek (110200011110)	50.2
	Royal Gorge-Arkansas River (1102000114)	Five Point Gulch-Arkansas River (110200011407)	47.4
		Royal Gorge (110200011409)	26.0

3.3 Model Sensitivity

The runoff volumes predicted by the model are most sensitive to precipitation and runoff curve numbers. The curve numbers used in the model are the best engineering estimates of pre-mining and reclaimed conditions. If mine reclamation were to more nearly mimic the pre-mining condition, with respect to soils and vegetation, the post-mining runoff would more nearly resemble the pre-mining conditions.

4. REFERENCES

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Whetstone Associates

To:	Scott Duncan	**4189A**
From:	Scott Effner, P.G.	
Date:	April 3, 2020	
Subject:	Drawdown Scoping Analysis - Parkdale Quarry EIS	

1. INTRODUCTION

A MODFLOW-SURFACT simulation was prepared to provide a scoping-level analysis of the potential area that could be affected by groundwater drawdown related to passive dewatering of the proposed Parkdale Quarry Expansion. The purpose of the analysis was to define the area that should be included in the water resources analysis area for the Parkdale Quarry Environmental Impact Study (EIS). The model incorporates a number of simplifying but conservative assumptions that differ from the complex and relatively undocumented hydrogeologic conditions at the site. Model results are believed to significantly over estimate potential drawdowns in areas distal to the proposed quarry, and although it is an appropriate use of the model to conservatively determine the area that should be included in the water resources analysis, model results should not be interpreted to be predictions of the actual drawdowns that would occur from dewatering of the quarry.

2. MODEL CODE

The model was developed using MODFLOW-SURFACT 4.0 (HydroGeologic, 2011), a finite-difference code based on the USGS software package MODFLOW (McDonald and Harbaugh, 1988). MODFLOW-SURFACT is functionally identical to MODFLOW with several enhancements that improve its ability to solve numerical matrices. Model input and output files were processed using the graphical user interface software Groundwater Vistas version 6.96, build 49 (ESI, 2011).

3. MODEL DESCRIPTION AND INPUT PARAMETERS

The model considered an unconfined aquifer (layer type 1) simulated as a flat-lying single layer 520 feet thick. The model domain (Figure 1) is 106,000 x 106,000 feet wide (20.1 x 20.1 miles). It consists of 212 columns and 212 rows with a uniform cell spacing of 500 x 500 feet. The base reference elevation of the model was set at 5,780 feet. The top elevation of the model was set at 6,300 feet. A relatively flat, but east-flowing gradient of 0.00009 ft/ft was established across the model domain using constant head cells located on the east and west margins of the model grid (Figure 1). The assigned constant head elevations for the east and west margins were 6,275 and 6,285 feet respectively. No flow cells were assigned in the drainages for Currant Creek, Tallahassee Creek, and the Arkansas River where the surface elevations are below the level of the proposed pit floor (Figure 1). Given that the elevation of the pit floor (6,020 feet average, 5,940 minimum) is the lowest elevation to which groundwater levels could be drawn down, surface elevations below this level are areas into which the cone of depression cannot expand.

The following parameters were assigned to each cell in the model:

- Hydraulic conductivity = 0.0039 ft/d. This value is the mean of three single-well pumping tests that were performed in granitic rocks within the Sale Area (ERM 2019).

- Specific yield = 0.01. This is an estimated value from ERC 2019 that is considered to be reasonable for fractured granite. Reported literature values of specific yield in crystalline rocks including granite range from 0.0009 (Heath 1983) to 0.03 (Singhal and Gupta 2010) The estimate specific yield value of 0.01 by ERC is near the center of the reference range.
- Recharge is not simulated in the model

4. MODEL RUNS

The model was prepared in three parts including an initial steady-state simulation that was completed to develop the pre-mining flow field and starting heads for the transient simulations that evaluated EIS Alternatives A and C. The transient runs simulated passive dewatering of the proposed quarry using drain cells within the respective footprints of the proposed mining areas. The stage elevations of the drains were set at 6,020 feet which is the average elevation of the proposed pit floors, and the drains in individual cells were specified to have areas of 500 x 500 feet, thicknesses of 10 feet, and hydraulic conductivities of 10 ft/d. Drains cells became active over the entire footprints of the proposed mining areas at the start of the simulations. The duration of the transient simulations was 100 years.

5. MODEL RESULTS

5.1 Steady State Run

The flow field for the steady-state simulation is shown in Figure 2. The simulation establishes a generally flat gradient with simulated heads of about 6,260 feet elevation within the sale area. Observed heads in the Sale Area range from about 6,027 to 6,260 feet elevation and the steady-state simulation provides a conservative starting point to evaluate the maximum drawdown that could occur from mining. The water balance mass error for the steady-state simulation was 0.12%.

5.2 Transient Simulations for Alternatives A and C

Drawdown contours for transient runs that evaluated Alternative A and Alternative C are presented in Figures 3 and 4, respectively. Calculated inflows to the mining area (drain cells) at the end of the 100-year simulations were 5,167 cubic feet per day (26.84 gpm) for Alternative A, and 5,716 cubic feet per day (29.69 gpm) for Alternative C.

Given the conservative and simplistic nature of these scoping-level analyses, the 5-foot drawdown contours are considered to be the maximum extents of the areas in which drawdown-related impacts could occur from the Parkdale Quarry expansion under Alternatives A and C. The water balance mass errors for the Alternative A and Alternative C simulations were 0.00% and 0.03%, respectively.

6. DISCUSSION

The transient runs for Alternatives A and C were developed to define the areas in which groundwater levels could be theoretically reduced by 5 feet or more after 100 years of mining. The simulations incorporate numerous simplifying assumptions, the most important of which are: 1) groundwater near the proposed quarry expansion is well-connected over the modeled area in a flat-lying aquifer with a relatively flat water table, 2) the modeled area has consistent hydrogeologic characteristics, and 3) groundwater levels are drawn-down to the level of the final pit floor at the start of mining.

In reality, available water level data from DWR well records indicate that groundwater elevations in the modeled area vary widely, ranging from 5,657 to 7,041 feet elevation. The variation occurs over relatively short distances and often exceeds 100 to 200 feet between wells that are located within 1,000 to 2,000 feet of each other. The accuracy of the DWR water level data is affected by a number of factors including the accuracy of the reported well locations, completion details for individual wells, and the range of time over which the groundwater levels were measured. However, it is noted that the reported variability is consistent with groundwater systems in low-permeable rocks that are poorly interconnected over short distances.

A number of major faults occur near the Sale Area are not simulated. These faults include the Parkdale Fault, unnamed faults 1 and 2, and the Mikesell Gulch Fault (Figure 5). The Parkdale Fault is located north of the Sale Area and places granitic rocks in contact with younger sedimentary rocks. The majority of groundwater users within the defined area of potential impact are located on the north side of the Parkdale Fault and have wells in sedimentary rocks that are expected to have different hydraulic characteristics than the granite that would be mined. Water from perennial sections of Currant and Cottonwood creeks are sources of recharge to the sedimentary rocks. The stream become intermittent where they cross the sedimentary rocks near State Highway 9. A number of smaller intermittent drainages located northeast of the highway also contribute runoff that infiltrates into the sedimentary rocks. The different hydraulic characteristics of the sedimentary rocks and additional recharge they receive from surface water are not considered in the model which tends to increase the conservatism of the predicted drawdowns in areas north of the proposed quarry expansion.

Finally, the simulation of water levels being drawn down to the level of the ultimate pit floor at the start of mining is inherently conservative. Groundwater drawdown would occur gradually as the mine is developed over its expected 100-year life.

For the reasons stated above, the results of the transient simulations are believed to significantly over estimate potential drawdowns in areas distal to the proposed quarry. Therefore, the modeled drawdown contours presented in Figures 3 and 4 should not be interpreted to be predictions of the actual drawdown that would occur at any given location from the proposed quarry expansion.

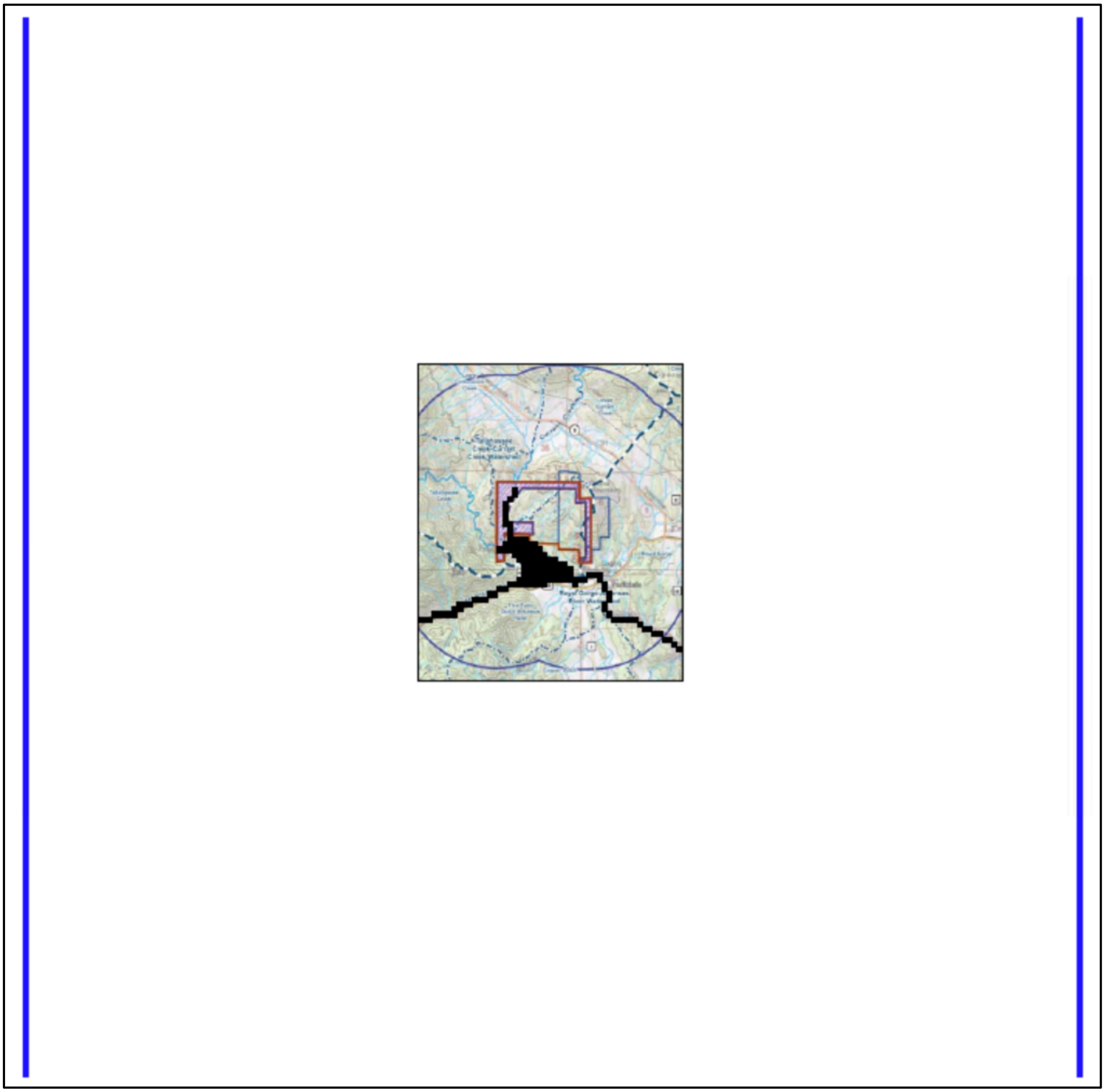

Figure 1. Model Domain and Boundary Conditions

The blue lines at the east and west borders are the locations of the constant head cells. The black lines and black field within the map image are the locations of no flow cells where the surface topography is below the elevation of the planned pit floor.

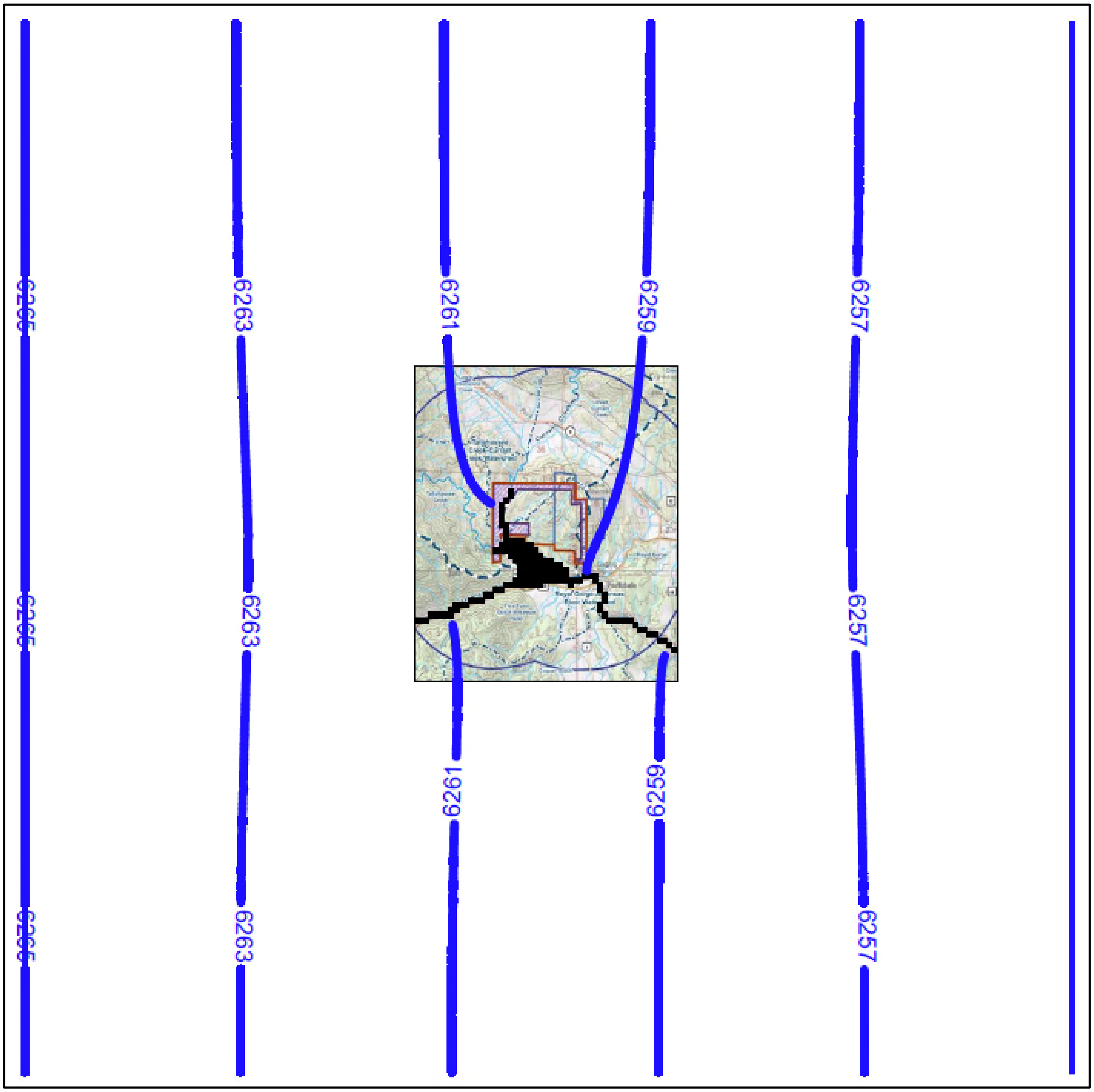

Figure 2. Steady State Flow Field

The blue contours indicated the modeled steady-state water levels. The black lines and black field within the map image are the locations of no flow cells where the surface topography is below the elevation of the planned pit floor.

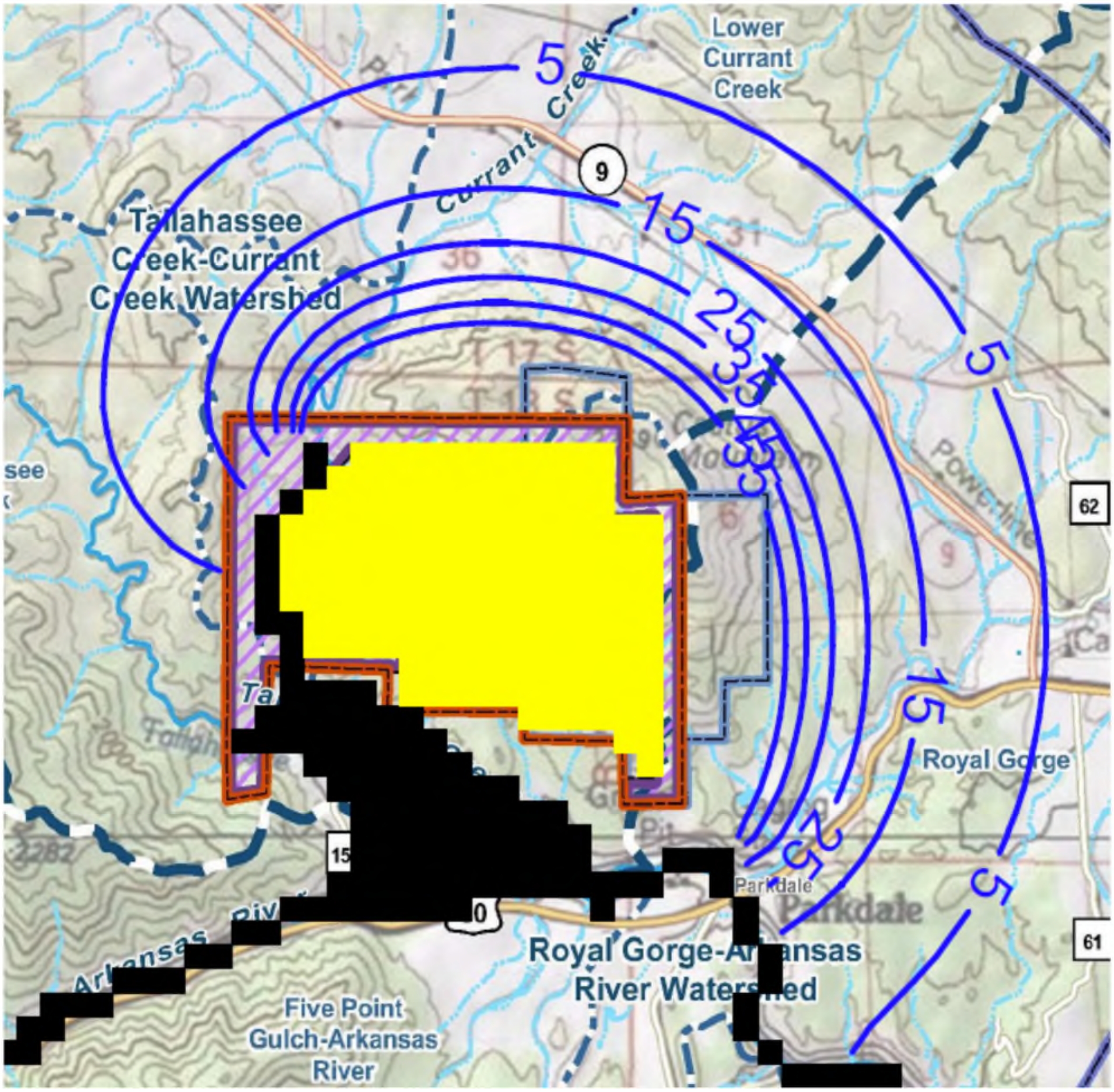

Figure 3. Modeled Drawdown for Alternative A

The yellow field within the mining area for Alternative A indicates the locations of drain cells. The black lines and black field south and east of the Sale Area are the locations of no flow cells where the surface topography is below the elevation of the planned pit floor.

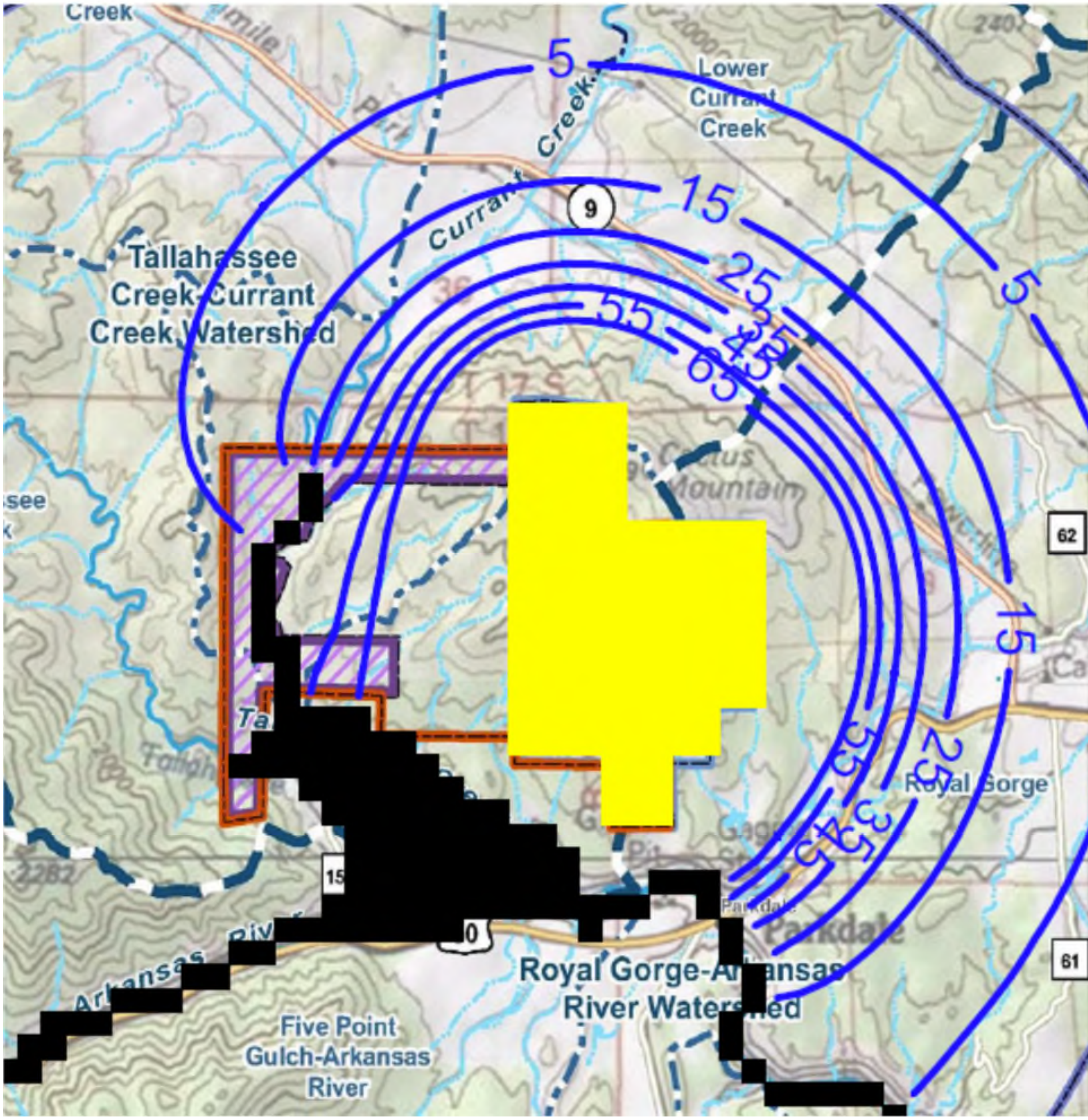

Figure 4. Modeled Drawdown for Alternative C

The yellow field within the mining area for Alternative C indicates the locations of drain cells. The black lines and black field south and east of the Sale Area are the locations of no flow cells where the surface topography is below the elevation of the planned pit floor.

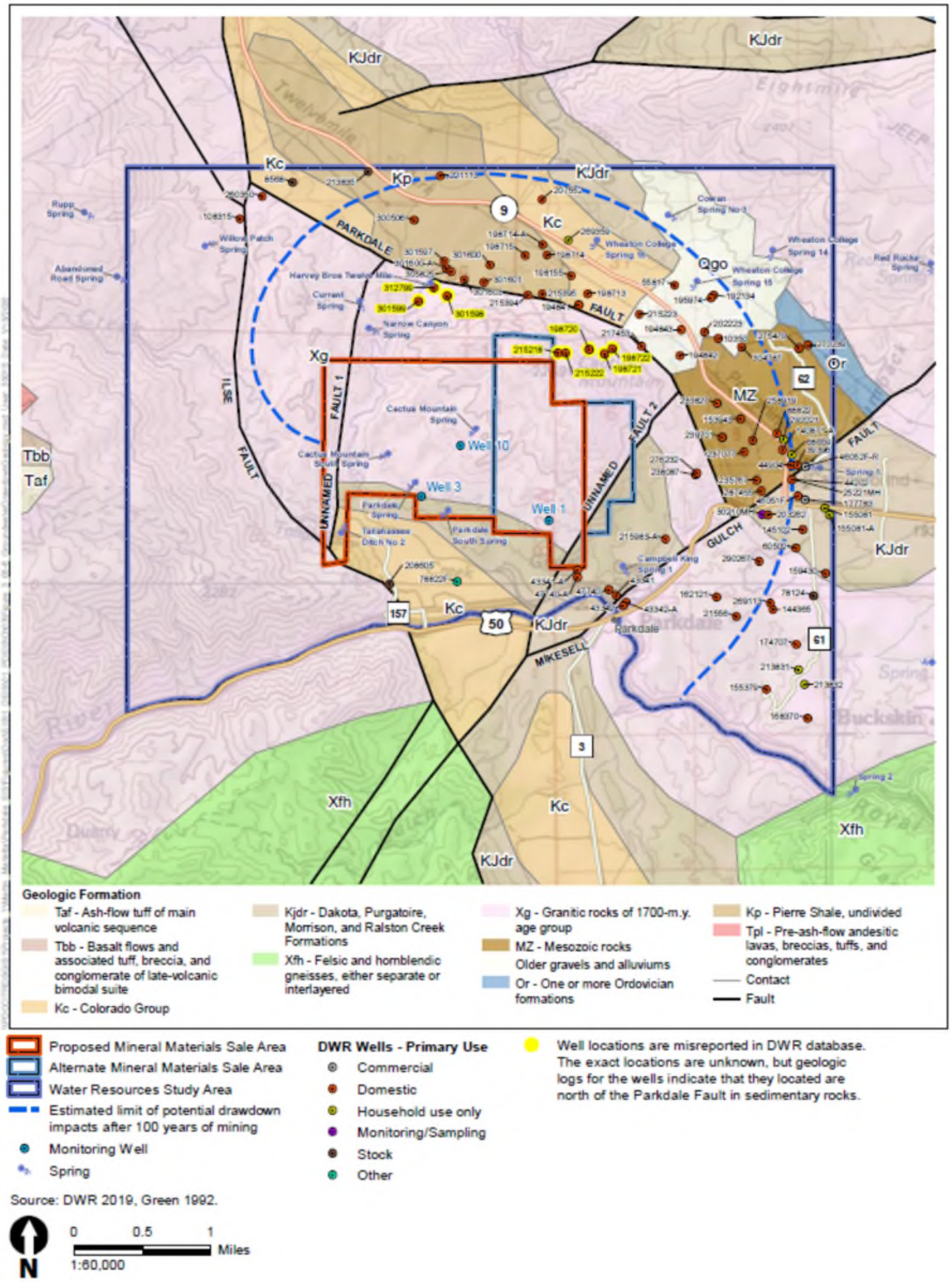

Figure 5. Geology within the Modeled Area

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7. REFERENCES

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Whetstone Associates

To:	Scott Duncan	**4189A**
From:	Scott Effner, P.G.	
Date:	April 10, 2020	
Subject:	Baseflow Reduction Analysis - Parkdale Quarry EIS	

1. OVERVIEW

This memorandum documents Darcy calculations of the potential reduction in groundwater baseflow to Currant and Tallahassee creeks from the proposed Parkdale Quarry expansion.

Where: Q=KIA

Q is the calculated baseflow to the stream

K is the average hydraulic conductivity of bedrock in the Sale Area

I is the groundwater gradient

A is the area of the stream channel

2. ASSUMPTIONS

- The average hydraulic conductivity of bedrock from site-specific tests is equal to 0.0039 ft/d (ERM 2019).
- The pre-mining groundwater gradient is equal to the measured gradient of 0.089 ft/ft between Wells 3 and 10 on August 29, 2019.
  - Water level elevations for Wells 3 and 10 were 6,026.56 and 6,252.87 feet, respectively
  - The distance between wells is 2,535 feet
- The post-mining gradient of 0.024 ft/ft is equal to the slope of the pit floor as shown on Figure 8 of the Mining and Reclamation Plan (Martin Marietta 2019)
- The length of Currant Creek where it forms the western edge of the mining area extending to Tallahassee Creek is 1.51 miles (7,985 feet) and the width of the stream is 5 feet (source Google Earth)
- The length of Tallahassee Creek from Currant Creek to the Arkansas River is 1.78 miles (9,425 feet) and the width of the stream is 10 feet (source Google Earth)
- Low flow in Current Creek is assumed to be 0.1 cfs (≈45 gpm). The observed range of flows at USGS station 07094090 on Currant Creek above the Project at Highway 9 is 0.3 to 31 cfs.
- Low flow in Tallahassee Creek is assumed to be 0.5 cfs (≈225 gpm). The observed range of flows at USGS station 382917105225200 on Tallahassee Creek above the Arkansas River is 0.14 to 172 cfs.

3. CALCULATIONS

Table 1. Currant Creek

K (ft/d)	I (ft/ft)	Length (ft)	Width (ft)	Q (cfd)	Q (cfs)	Q (gpm)
Pre-Mining Baseflow Calculation						
0.0039	0.089	7985	5	13.90	0.00016	0.072
Post Mining Baseflow Calculation						
0.0039	0.024	7985	5	3.75	0.00004	0.019
Reduction in Baseflow						
				10.15	0.00012	0.053
Baseflow Reduction as a Percentage of Stream Flow Under Assumed Low-Flow Conditions = 0.12%						

Table 2. Tallahassee Creek

K (ft/d)	I (ft/ft)	Length (ft)	Width (ft)	Q (cfd)	Q (cfs)	Q (gpm)
Pre-Mining Baseflow Calculation						
0.0039	0.089	9425	10	32.81	0.00038	0.170
Post Mining Baseflow Calculation						
0.0039	0.024	9425	10	8.86	0.00010	0.046
Reduction in Baseflow						
				23.96	0.00028	0.124
Baseflow Reduction as a Percentage of Stream Flow Under Assumed Low-Flow Conditions = 0.06%						

4. REFERENCES

ERM 2019. Interim Hydrogeologic Assessment, Parkdale Quarry Expansion Area, prepared by Environmental Resources Management (ERM) for Martin Marietta Materials, Project No. 0488586, August 20, 2019. 192 p.

Martin Marietta 2019. Parkdale Quarry Expansion Mineral Materials Sale COC-078119 Mining and Reclamation Plan. 30p.

Final Environmental Impact Statement

Parkdale Quarry Expansion Project

Appendix G

Well Data

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Permit	Current Status	Contact Name	DIV	WD	County	PM	Township
25221MH	Well Constructed	MASSEY, LEE	2	12	FREMONT	S	18.0 S
30210MH	Well Constructed	SHIPPEY, RONALD	2	12	FREMONT	S	18.0 S
78124	Well Constructed	BARTLESON	2	12	FREMONT	S	18.0 S
88822	Well Constructed	LITTLEFIELD, GEORGE L	2	12	FREMONT	S	18.0 S
140871-A	Well Constructed	CROWFOOT, FLOYD	2	12	FREMONT	S	18.0 S
145102	Well Constructed	PRUETT, FLOYD D	2	12	FREMONT	S	18.0 S
153943	Well Constructed	NUTLY, ALBERT J.	2	12	FREMONT	S	18.0 S
43341-A	Well Constructed	AJET	2	12	FREMONT	S	18.0 S
153943	Well Constructed	NUTLY, MARY ANN	2	12	FREMONT	S	18.0 S
155081	Well Constructed	KRESKI, JOHN	2	12	FREMONT	S	18.0 S
155081-A	Well Constructed	MORENO LEIDY SASTOQUE	2	12	FREMONT	S	18.0 S
155379	Well Constructed	BURKHOLDER NORMAN L & CONNIE J	2	12	FREMONT	S	18.0 S
47740-A	Well Constructed	KING ALEXANDER CAMPBELL	2	12	FREMONT	S	18.0 S
159430	Well Constructed	TOLLIS, GENE P	2	12	FREMONT	S	18.0 S
162121	Well Constructed	BROWN, MARK N	2	12	FREMONT	S	18.0 S
168370	Well Constructed	JOHNSON CURTIS & BLACKE HELENE	2	12	FREMONT	S	18.0 S
174707	Well Constructed	TOLLIS, ERNIE P	2	12	FREMONT	S	18.0 S
177783	Well Constructed	KRIZMAN, ARTHUR	2	12	FREMONT	S	18.0 S
192134	Well Constructed	BOWERS SPENCER & LINDSEY	2	12	FREMONT	S	17.0 S
46051F	Well Constructed	CAMP SCHIRADO LLC	2	12	FREMONT	S	18.0 S
194842	Well Constructed	DUNCAN, GEORGIA L	2	12	FREMONT	S	18.0 S
194843	Well Constructed	EMBRY, JACK	2	12	FREMONT	S	17.0 S
194841	Well Constructed	SKEPI, ESAT	2	12	FREMONT	S	17.0 S
194841	Well Constructed	ROFOFSKY, DAVID W.	2	12	FREMONT	S	17.0 S
195974	Well Constructed	KUEHL, ROBERT N	2	12	FREMONT	S	17.0 S
198721	Well Constructed	WILTSE DONALD CHARLES	2	12	FREMONT	S	18.0 S
198714	Well Constructed	EMBRY, DON J	2	12	FREMONT	S	17.0 S
198722	Well Constructed	WILTSE DONALD CHARLES	2	12	FREMONT	S	18.0 S
198715	Well Constructed	BEDFORD RUSSELL & SHARON LEE	2	12	FREMONT	S	17.0 S
198155	Well Constructed	MOSER MICHAEL & SWENSUN PHYLLIS	2	12	FREMONT	S	17.0 S
198713	Well Constructed	BAXTER, PAUL	2	12	FREMONT	S	17.0 S
202223	Well Constructed	ROBINSON, SAMUEL G	2	12	FREMONT	S	17.0 S
203262	Well Constructed	SHIPPEY, RONALD	2	12	FREMONT	S	18.0 S
207552	Well Constructed	MILLS ART & PATRICIA	2	12	FREMONT	S	17.0 S
208605	Well Constructed	COOPER DONALD E & MARTHA J	2	12	FREMONT	S	18.0 S
213831	Well Constructed	LESKOSKY, BERNICE P	2	12	FREMONT	S	18.0 S
213835	Well Constructed	MARCHAND GARY JOANN & HELEN	2	12	FREMONT	S	17.0 S
213832	Well Constructed	LESKOSKY, BERNICE P	2	12	FREMONT	S	18.0 S
215223	Well Constructed	BAUM, DOUGLAS W	2	12	FREMONT	S	17.0 S
198714-A	Well Constructed	IGLESIAS, FIDEL	2	12	FREMONT	S	17.0 S
215395	Well Constructed	DYE, WILLIAM E	2	12	FREMONT	S	17.0 S
215222	Well Constructed	GARETT, CAROL M	2	12	FREMONT	S	18.0 S
215394	Well Constructed	BRADSHAW DEAN & PATRICIA	2	12	FREMONT	S	17.0 S
215218	Well Constructed	BEAN, KEITH D	2	12	FREMONT	S	18.0 S
217453	Well Constructed	AMMEL HARVEY D & DEANNA L	2	12	FREMONT	S	18.0 S
221113	Well Constructed	KEELER, JOHN	2	12	FREMONT	S	17.0 S
233827	Well Constructed	CROSBY, JACKIE	2	12	FREMONT	S	18.0 S
235767	Well Constructed	NORHOLM, COLLEEN	2	12	FREMONT	S	18.0 S
237077	Well Constructed	SCHOMCKER DENNIS & KATHLEEN	2	12	FREMONT	S	18.0 S
238087	Well Constructed	HEYEN RON & JEANETTE	2	12	FREMONT	S	18.0 S
239701	Well Constructed	ASQUITH, JOHN	2	12	FREMONT	S	18.0 S
239701	Well Constructed	CARROLL, JANICE	2	12	FREMONT	S	18.0 S
46052F-R	Well Replaced	CAMP SCHIRADO LLC	2	12	FREMONT	S	18.0 S
258919	Well Constructed	SIMS JONATHAN M & PASLEY WHITNEY N	2	12	FREMONT	S	18.0 S
260350	Well Constructed	MARCHAND RANCH	2	12	FREMONT	S	17.0 S
43342-A	Well Constructed	WILLIAMS, BLAIR	2	12	FREMONT	S	18.0 S
270239	Well Constructed	TATUM MATTHEW C & KATIA	2	12	FREMONT	S	18.0 S
275470	Well Constructed	LYNN, STUART C.	2	12	FREMONT	S	18.0 S
275470	Well Constructed	LYNN, SALLY J.	2	12	FREMONT	S	18.0 S
276232	Well Constructed	LEWIS-MARTIN, CLAIRE	2	12	FREMONT	S	18.0 S
215983-A	Well Constructed	CLARK, JAMES	2	12	FREMONT	S	18.0 S
287455	Well Constructed	PHILLIPS, MICHAEL F	2	12	FREMONT	S	18.0 S
290267	Well Constructed	ELDRED JACQUE & MARKUS	2	12	FREMONT	S	18.0 S
292021	Well Constructed	CHALMERS HUGH & ROXANE	2	12	FREMONT	S	18.0 S
78822F	Well Constructed	FRONT RANGE AGGREGATES LLC	2	12	FREMONT	S	18.0 S
300506	Well Constructed	BARGER, TROY C	2	12	FREMONT	S	17.0 S
301600	Well Replaced	FEDIE, MARK	2	12	FREMONT	S	17.0 S

Permit	Range	Township_D	Range_D	Section	Q10	Q40	Q160	CoordsEW	CoordsEW Dir	CoordsNS
25221MH	71.0 W	-18	-71	8		NE	NE			
30210MH	71.0 W	-18	-71	8		SW	NE			
78124	71.0 W	-18	-71	8		SE	SE	16	E	150
88822	71.0 W	-18	-71	5		SE	SE	1086	E	1150
140871-A	71.0 W	-18	-71	5		SE	SE	900	E	500
145102	71.0 W	-18	-71	8		SE	NE	300	E	2600
153943	71.0 W	-18	-71	5		NW	SW	2170	W	1740
43341-A	71.0 W	-18	-71	7		SE	SW	4224	E	3960
153943	71.0 W	-18	-71	5		NW	SW	2170	W	1740
155081	71.0 W	-18	-71	9		SW	NW	600	W	1800
155081-A	71.0 W	-18	-71	9		SW	NW	760	W	2080
155379	71.0 W	-18	-71	17		NW	SE	2900	W	3500
47740-A	71.0 W	-18	-71	7		SW	SW	890	W	1040
159430	71.0 W	-18	-71	9		SW	SW	500	W	1000
162121	71.0 W	-18	-71	8		SW	SW	1100	W	100
168370	71.0 W	-18	-71	17		SE	SE	660	E	660
174707	71.0 W	-18	-71	17		SE	NE	845	E	1745
177783	71.0 W	-18	-71	8		SE	NE	150	E	1450
192134	71.0 W	-17	-71	32		NW	SW	900	W	1520
46051F	71.0 W	-18	-71	8		NE	NE	400	E	1300
194842	71.0 W	-18	-71	6		NE	NE	400	E	800
194843	71.0 W	-17	-71	31		SE	SE	400	E	200
194841	71.0 W	-17	-71	31		SE	SW	2500	W	1162
194841	71.0 W	-17	-71	31		SE	SW	2500	W	1162
195974	71.0 W	-17	-71	32		NW	SW	800	W	1400
198721	71.0 W	-18	-71	6		NE	NW	1850		450
198714	71.0 W	-17	-71	31		SW	NW	1250	W	2050
198722	71.0 W	-18	-71	6		NE	NW	2300	W	450
198715	71.0 W	-17	-71	31		SW	NW	400	W	2050
198155	71.0 W	-17	-71	31		NE	SW	2200	W	2300
198713	71.0 W	-17	-71	31		NW	SE	2850	W	1600
202223	71.0 W	-17	-71	32		SW	SW	500	W	100
203262	71.0 W	-18	-71	8		SW	NE	1600	E	2000
207552	71.0 W	-17	-71	30		SW	SW	1000	W	100
208605	72.0 W	-18	-72	11		SE	SE	530	E	725
213831	71.0 W	-18	-71	17		NE	SE	850	E	2550
213835	72.0 W	-17	-72	26		SE	SE	400	E	1120
213832	71.0 W	-18	-71	17		NE	SE	660	E	1980
215223	71.0 W	-17	-71	31		SW	SE	2000	E	800
198714-A	71.0 W	-17	-71	31		SW	NW	1070	W	1640
215395	71.0 W	-17	-71	31		NW	SW	1100	W	1600
215222	71.0 W	-18	-71	6		NW	NW	500	W	550
215394	71.0 W	-17	-71	31		NW	SW	525	W	1550
215218	71.0 W	-18	-71	6		NW	NW	200	W	550
217453	71.0 W	-18	-71	6		NW	NE	1910	E	390
221113	72.0 W	-17	-72	25		SE	SW	2400	W	1000
233827	71.0 W	-18	-71	5		NE	SW	1200	W	2700
235767	71.0 W	-18	-71	8		NW	NE	1980	E	660
237077	71.0 W	-18	-71	5		SE	SW	2400	W	450
238087	71.0 W	-18	-71	8		NW	NW	525	W	375
239701	71.0 W	-18	-71	5		SE	SW	1500	W	1050
239701	71.0 W	-18	-71	5		SE	SW	1500	W	1050
46052F-R	71.0 W	-18	-71	8		NE	NE	59	E	169
258919	71.0 W	-18	-71	5		SW	SE	2025	E	900
260350	72.0 W	-17	-72	26		NW	SW	854	W	85
43342-A	71.0 W	-18	-71	18		NW	NE	2415	E	10
270239	71.0 W	-18	-71	4		SW	NW	336	W	546
275470	71.0 W	-18	-71	5		NE	NE	26	E	646
275470	71.0 W	-18	-71	5		NE	NE	26	E	646
276232	71.0 W	-18	-71	8		NW	NW	582	W	321
215983-A	71.0 W	-18	-71	7		NE	SE	749	E	2383
287455	71.0 W	-18	-71	8		NW	NE	1814	E	1055
290267	71.0 W	-18	-71	8		NW	SE	2043	E	1481
292021	71.0 W	-18	-71	5		SE	SE	850	E	900
78822F	72.0 W	-18	-72	12		SE	SW	1744	W	672
300506	72.0 W	-17	-72	36		NE	NW	1377	W	739
301600	72.0 W	-17	-72	36		SE	NE	960	E	2438

Permit	CoordsNS Dir	UTM x	UTM y	Latitude	Longitude	Location Accuracy
25221MH		469494.8	4261460.6	38.500984	-105.349843	Spotted from quarters
30210MH		469146.6	4261050.6	38.497277	-105.353818	Spotted from quarters
78124	S	469751.4	4260092	38.488659	-105.346841	Spotted from section lines
88822	S	469316.4	4262008	38.505911	-105.351913	Spotted from section lines
140871-A	S	469385.4	4261812.1	38.504148	-105.351113	Spotted from section lines
145102	N	469621.5	4260873.6	38.495698	-105.348365	Spotted from section lines
153943	S	468893.2	4262176.6	38.507416	-105.356774	Spotted from section lines
43341-A	N	466965.9	4260396.1	38.491301	-105.378794	Spotted from section lines
153943	S	468893.2	4262176.6	38.507416	-105.356774	Spotted from section lines
155081	N	469882.1	4261126.1	38.497983	-105.345387	Spotted from section lines
155081-A	N	469935.6	4261043.1	38.497237	-105.34477	Spotted from section lines
155379	N	469198.2	4258982.1	38.478638	-105.353135	Spotted from section lines
47740-A	S	466964.3	4260310.1	38.490526	-105.378809	Spotted from section lines
159430	S	469894.3	4260352.6	38.491012	-105.345214	Spotted from section lines
162121	S	468607.2	4260077.1	38.488485	-105.35996	Spotted from section lines
168370	S	469676.9	4258639.6	38.475568	-105.347633	Spotted from section lines
174707	N	469546.1	4259516.1	38.483462	-105.34917	Spotted from section lines
177783	N	469647.8	4261224.6	38.498862	-105.348078	Spotted from section lines
192134	S	468571.6	4263644	38.52063	-105.360529	Spotted from section lines
46051F	N	469569.2	4261268.1	38.499252	-105.348981	Spotted from section lines
194842	N	468172.4	4262925.1	38.514136	-105.365075	Spotted from section lines
194843	S	468189.8	4263233.1	38.516912	-105.36489	Spotted from section lines
194841	S	466979.5	4263523.1	38.519481	-105.378786	Spotted from section lines
194841	S	466979.5	4263523.1	38.519481	-105.378786	Spotted from section lines
195974	S	468542.5	4263606.6	38.520291	-105.360861	Spotted from section lines
198721	N	467283.4	4262946.5	38.514296	-105.375273	User supplied
198714	N	466610	4264114.6	38.524798	-105.383053	Spotted from section lines
198722	N	467376.8	4263005.6	38.514832	-105.374205	Spotted from section lines
198715	N	466350.9	4264111.6	38.524761	-105.386025	Spotted from section lines
198155	S	466894.8	4263869.6	38.522601	-105.379774	Spotted from section lines
198713	S	467088.8	4263657.1	38.520693	-105.377539	Spotted from section lines
202223	S	468465.1	4263207.6	38.516692	-105.361731	Spotted from section lines
203262	N	469215.5	4261046.1	38.497239	-105.353028	Spotted from section lines
207552	S	466546.7	4264769.1	38.530694	-105.38381	Spotted from section lines
208605	N	464881.6	4261476.6	38.500958	-105.402748	Spotted from section lines
213831	S	469570.2	4259214	38.480741	-105.348881	Spotted from section lines
213835	S	464497.9	4265099.1	38.533589	-105.407333	Spotted from section lines
213832	S	469642.9	4259041.1	38.479185	-105.34804	Spotted from section lines
215223	S	467695.6	4263414.6	38.51853	-105.370567	Spotted from section lines
198714-A	N	466557.6	4264239.1	38.525918	-105.38366	Spotted from section lines
215395	S	466555.4	4263655.6	38.52066	-105.383657	Spotted from section lines
215222	N	466827.8	4262957	38.514375	-105.380499	Spotted from section lines
215394	S	466379.9	4263640.1	38.520513	-105.38567	Spotted from section lines
215218	N	466736.4	4262954.1	38.514345	-105.381548	Spotted from section lines
217453	N	467722.4	4263035.1	38.515111	-105.370242	Spotted from section lines
221113	S	465350.8	4265051.1	38.53319	-105.397545	Spotted from section lines
233827	N	468613.3	4262362.6	38.509082	-105.359993	Spotted from section lines
235767	N	469077	4261451.1	38.500884	-105.354634	Spotted from section lines
237077	S	468931.7	4261785.6	38.503894	-105.356315	Spotted from section lines
238087	N	468355.4	4261520.1	38.501481	-105.362913	Spotted from section lines
239701	S	468672.2	4261961.1	38.505466	-105.359299	Spotted from section lines
239701	S	468672.2	4261961.1	38.505466	-105.359299	Spotted from section lines
46052F-R	N	469654	4261615.1	38.502382	-105.348024	Spotted from section lines
258919	S	469035	4261925	38.505153	-105.355137	Spotted from section lines
260350	S	463251.8	4264804.5	38.530883	-105.421614	Spotted from section lines
43342-A	N	467538.3	4260013.5	38.487873	-105.372213	Spotted from section lines
270239	N	469685.1	4263054	38.51535	-105.34773	Spotted from section lines
275470	N	469577	4263013	38.51498	-105.34897	User supplied
275470	N	469577	4263013	38.51498	-105.34897	User supplied
276232	N	468371.9	4261537	38.50163	-105.36272	Spotted from section lines
215983-A	S	468007	4260763	38.494645	-105.366873	Spotted from section lines
287455	N	469134.3	4261332	38.499813	-105.353972	Spotted from section lines
290267	S	469110.9	4260497.5	38.492291	-105.354203	Spotted from section lines
292021	S	469393.1	4261934	38.505246	-105.35103	Spotted from section lines
78822F	S	465546.7	4260255.8	38.489983	-105.395061	User supplied
300506	N	465037	4264525	38.528436	-105.401119	User supplied
301600	N	465934.2	4263996	38.523704	-105.3908	Spotted from section lines

Permit	Parcel Name	Address	City	State	Postal Code
25221MH					
30210MH					
78124					
88822					
140871-A	CROWFOOT/NIMMO				
145102					
153943		321 COUNTY RD 353A	CANON CITY	CO	81212
43341-A					
153943		321 COUNTY RD 353A	CANON CITY	CO	81212
155081					
155081-A					
155379					
47740-A					
159430					
162121					
168370					
174707					
177783					
192134	KUEHL RANCHETTES				
46051F					
194842	CACTUS MOUNTAIN RANCH				
194843	CACTUS MOUNTAIN RANCH				
194841	CACTUS MOUNTAIN RANCH				
194841	CACTUS MOUNTAIN RANCH				
195974	KUEHL RANCHETTES				
198721	CACTUS MOUNTAIN ESTATES				
198714	CACTUS MOUNTAIN ESTATES				
198722	CACTUS MOUNTAIN ESTATES				
198715	CACTUS MOUNTAIN ESTATES				
198155	CACTUS MOUNTAIN				
198713	CACTUS MOUNTAIN ESTATES				
202223	KUEHL RANCHETTES				
203262					
207552					
208605					
213831					
213835					
213832					
215223	CACTUS MOUNTAIN ESTATES				
198714-A	CACTUS MOUNTAIN ESTATES				
215395	CACTUS MOUNTAIN ESTATES				
215222	CACTUS MOUNTAIN ESTATES				
215394	CACTUS MOUNTAIN ESTATES				
215218	CACTUS MOUNTAIN ESTATES				
217453	CACTUS MOUNTAIN ESTATES				
221113		3700 STATE HWY 9	CANON CITY	CO	81212
233827					
235767	STAR RANCH				
237077	STAR RANCH				
238087	STAR RANCH				
239701	STAR RANCH				
239701	STAR RANCH				
46052F-R					
258919					
260350					
43342-A					
270239					
275470		1094 COUNTY ROAD 62	CANYON CITY	CO	81212
275470		1094 COUNTY ROAD 62	CANYON CITY	CO	81212
276232	STAR RANCH				
215983-A					
287455	STAR RANCH				
290267	ROYAL GORGE BLUFFS				
292021	CROWFOOT/NIMMO				
78822F					
300506	DOUBLE CREEK RANCH				
301600	DOUBLE CREEK RANCH				

Permit	Location Type	Permit Category	Permit Issued	First Beneficial Use
25221MH	Well (Application/Permit)	Monitoring Hole (Notice of Intent)	1995-02-28	
30210MH	Well (Application/Permit)	Monitoring Hole (Notice of Intent)	1997-03-04	
78124	Well (Application/Permit)	Residential	1975-02-20	
88822	Well (Application/Permit)	Residential	1977-03-16	1967-11-21
140871-A	Well (Application/Permit)	Residential	1985-08-20	
145102	Well (Application/Permit)	Residential	1987-08-25	
153943	Well (Application/Permit)	Residential	1989-04-28	1967-01-15
43341-A	Well (Application/Permit)	Residential	1989-07-10	
153943	Well (Application/Permit)	Residential	1989-04-28	1967-01-15
155081	Well (Application/Permit)	Residential	1989-08-22	1954-08-31
155081-A	Well (Application/Permit)	Residential	1989-08-22	
155379	Well (Application/Permit)	Residential	1989-09-22	
47740-A	Well (Application/Permit)	Residential	1990-05-30	
159430	Well (Application/Permit)	Residential	1991-02-19	
162121	Well (Application/Permit)	Residential	1991-10-23	
168370	Well (Application/Permit)	Residential	1993-02-02	
174707	Well (Application/Permit)	Residential	1993-11-19	
177783	Well (Application/Permit)	Residential	1994-05-06	
192134	Well (Application/Permit)	Residential	1995-12-27	
46051F	Well (Application/Permit)	General Purpose	1996-02-01	1996-04-01
194842	Well (Application/Permit)	Residential	1996-05-09	
194843	Well (Application/Permit)	Residential	1996-05-09	
194841	Well (Application/Permit)	Residential	1996-05-09	
194841	Well (Application/Permit)	Residential	1996-05-09	
195974	Well (Application/Permit)	Residential	1996-06-24	
198721	Well (Application/Permit)	Residential	1996-10-03	
198714	Well (Application/Permit)	Residential	1996-10-03	
198722	Well (Application/Permit)	Residential	1996-10-03	
198715	Well (Application/Permit)	Residential	1996-10-03	
198155	Well (Application/Permit)	Residential	1996-09-13	
198713	Well (Application/Permit)	Residential	1996-10-03	
202223	Well (Application/Permit)	Residential	1997-04-17	
203262	Well (Application/Permit)	Residential	1997-06-11	
207552	Well (Application/Permit)	Residential	1998-01-15	1950-12-31
208605	Well (Application/Permit)	Residential	1998-03-17	1960-12-31
213831	Well (Application/Permit)	Residential	1998-11-12	
213835	Well (Application/Permit)	Residential	1998-11-12	1936-12-31
213832	Well (Application/Permit)	Residential	1998-11-12	
215223	Well (Application/Permit)	Residential	1999-01-20	
198714-A	Well (Application/Permit)	Residential	1999-02-11	
215395	Well (Application/Permit)	Residential	1999-01-28	
215222	Well (Application/Permit)	Residential	1999-01-20	
215394	Well (Application/Permit)	Residential	1999-01-28	
215218	Well (Application/Permit)	Residential	1999-01-20	
217453	Well (Application/Permit)	Residential	1999-05-12	
221113	Well (Application/Permit)	Residential	1999-10-08	
233827	Well (Application/Permit)	Residential	2001-06-05	
235767	Well (Application/Permit)	Residential	2001-08-28	
237077	Well (Application/Permit)	Residential	2001-10-23	
238087	Well (Application/Permit)	Residential	2001-12-04	
239701	Well (Application/Permit)	Residential	2002-03-27	
239701	Well (Application/Permit)	Residential	2002-03-27	
46052F-R	Well (Application/Permit)	General Purpose	2003-07-25	
258919	Well (Application/Permit)	Residential	2004-08-27	
260350	Well (Application/Permit)	Residential	2004-11-15	
43342-A	Well (Application/Permit)	Residential	2006-05-02	
270239	Well (Application/Permit)	Residential	2006-08-21	
275470	Well (Application/Permit)	Residential	2007-10-01	
275470	Well (Application/Permit)	Residential	2007-10-01	
276232	Well (Application/Permit)	Residential	2007-12-17	
215983-A	Well (Application/Permit)	Residential	2009-09-11	
287455	Well (Application/Permit)	Residential	2012-02-01	
290267	Well (Application/Permit)	Residential	2013-02-01	
292021	Well (Application/Permit)	Residential	2013-07-22	
78822F	Well (Application/Permit)	Gravel Pit	2015-02-09	
300506	Well (Application/Permit)	Residential	2016-03-18	
301600	Well (Application/Permit)	Residential	2016-06-16	

Permit	Permit Expires	Well Constructed	Pump Installed	Well Plugged	Associated Aquifers
25221MH	1995-05-28	1995-03-14			ALL UNNAMED AQUIFERS
30210MH	1997-06-04	1997-03-21			ALL UNNAMED AQUIFERS
78124		1975-10-14			ALL UNNAMED AQUIFERS
88822					ALL UNNAMED AQUIFERS
140871-A	1987-08-20	1985-10-08	1995-09-15		ALL UNNAMED AQUIFERS
145102		1988-09-22			ALL UNNAMED AQUIFERS
153943					ALL UNNAMED AQUIFERS
43341-A		1989-06-15	1989-06-16		ALL UNNAMED AQUIFERS
153943					ALL UNNAMED AQUIFERS
155081					ALL UNNAMED AQUIFERS
155081-A		1989-06-15	1989-06-16		ALL UNNAMED AQUIFERS
155379	1991-09-22	1989-10-21			ALL UNNAMED AQUIFERS
47740-A		1990-05-29			ALL UNNAMED AQUIFERS
159430		1991-03-08	1992-05-12		ALL UNNAMED AQUIFERS
162121		1992-11-15			ALL UNNAMED AQUIFERS
168370		1993-03-11	1994-08-17		ALL UNNAMED AQUIFERS
174707	1995-11-19		1994-01-04		ALL UNNAMED AQUIFERS
177783	1996-05-06	1993-10-07			ALL UNNAMED AQUIFERS
192134	1997-12-27	1996-04-30	1996-05-30		ALL UNNAMED AQUIFERS
46051F	1997-02-01	1995-03-14	1997-03-10		ALL UNNAMED AQUIFERS
194842	1998-05-09	1996-06-10	1997-05-18		ALL UNNAMED AQUIFERS
194843	1998-05-09	1996-06-07	1997-02-28		ALL UNNAMED AQUIFERS
194841	1998-05-09	1996-08-30			ALL UNNAMED AQUIFERS
194841	1998-05-09	1996-08-30			ALL UNNAMED AQUIFERS
195974	1998-06-24	1996-06-05	1996-07-01		ALL UNNAMED AQUIFERS
198721	1998-10-03	1997-05-12			ALL UNNAMED AQUIFERS
198714	1998-10-03	1998-09-18			ALL UNNAMED AQUIFERS
198722	1998-10-03		1997-10-20		ALL UNNAMED AQUIFERS
198715	1998-10-03	1998-10-02	1998-10-19		ALL UNNAMED AQUIFERS
198155	1998-09-13	1996-09-18	1997-04-19		ALL UNNAMED AQUIFERS
198713	1998-10-03	1998-09-25			ALL UNNAMED AQUIFERS
202223	1999-04-17		1997-06-10		ALL UNNAMED AQUIFERS
203262	1999-06-11	1997-03-21	2002-07-16		ALL UNNAMED AQUIFERS
207552		1968-06-15			ALL UNNAMED AQUIFERS
208605		1960-12-31			ALL UNNAMED AQUIFERS
213831	2000-11-12	2000-05-26	2005-06-23		ALL UNNAMED AQUIFERS
213835					ALL UNNAMED AQUIFERS
213832	2000-11-12	1987-07-13			ALL UNNAMED AQUIFERS
215223	2001-01-20	1999-01-30	1999-03-16		ALL UNNAMED AQUIFERS
198714-A	2001-02-11	1999-02-13	1999-03-11		ALL UNNAMED AQUIFERS
215395	2001-01-28	1999-02-02	2002-02-08		ALL UNNAMED AQUIFERS
215222	2001-01-20	1999-01-28	1999-03-22		ALL UNNAMED AQUIFERS
215394	2001-01-28	1999-02-01	2000-04-20		ALL UNNAMED AQUIFERS
215218	2001-01-20	1999-01-29	1999-03-19		ALL UNNAMED AQUIFERS
217453	2001-05-12	1992-04-06			ALL UNNAMED AQUIFERS
221113	2001-10-08	1999-11-09			ALL UNNAMED AQUIFERS
233827	2003-06-05	2001-07-31			ALL UNNAMED AQUIFERS
235767	2003-08-28	2001-12-27			ALL UNNAMED AQUIFERS
237077	2003-10-23	2001-10-31			ALL UNNAMED AQUIFERS
238087	2003-12-04	2002-01-03			ALL UNNAMED AQUIFERS
239701	2004-03-27	2002-05-02			ALL UNNAMED AQUIFERS
239701	2004-03-27	2002-05-02			ALL UNNAMED AQUIFERS
46052F-R	2004-07-25	2003-08-20	2003-08-24		ALL UNNAMED AQUIFERS
258919	2006-08-27	2004-10-06			ALL UNNAMED AQUIFERS
260350	2006-11-15	2005-01-17	2005-01-21		ALL UNNAMED AQUIFERS
43342-A	2008-05-02	2006-07-14			ALL UNNAMED AQUIFERS
270239	2008-08-21	2006-10-10	2007-01-11		ALL UNNAMED AQUIFERS
275470	2009-10-01	2008-01-16	2008-04-11		ALL UNNAMED AQUIFERS
275470	2009-10-01	2008-01-16	2008-04-11		ALL UNNAMED AQUIFERS
276232	2009-12-17	2008-01-08	2008-01-31		ALL UNNAMED AQUIFERS
215983-A	2011-09-11	2009-09-18	2009-09-24		ALL UNNAMED AQUIFERS
287455	2014-02-01	2012-02-28			ALL UNNAMED AQUIFERS
290267	2015-02-01	2013-10-22			ALL UNNAMED AQUIFERS
292021		2004-03-26			ALL UNNAMED AQUIFERS
78822F		2004-10-18	2004-12-04		ALL UNNAMED AQUIFERS
300506	2018-03-18	2016-04-13			ALL UNNAMED AQUIFERS
301600	2018-06-16	2016-08-25		2016-10-06	ALL UNNAMED AQUIFERS

Permit	Associated Uses	Elevation	Well Depth	Top Perforated Casing	Bottom Perforated Casing	Yield
25221MH	Monitoring/Sampling		380	60	380	
30210MH	Monitoring/Sampling		380	40	380	
78124	Stock		200	38	200	
88822	Domestic, Stock					
140871-A	Domestic					
145102	Domestic, Stock		350	40	350	
153943	Domestic, Stock					
43341-A	Domestic		80	40	80	10
153943	Domestic, Stock					
155081	Household use only		264			
155081-A	Household use only		247	204	264	2
155379	Domestic		158	20	158	
47740-A	Domestic, Industrial		320	200	320	
159430	Domestic, Stock		360	80	360	1
162121	Domestic, Stock		250			
168370	Domestic		300	255	295	2
174707	Domestic		200			1
177783	Commercial		175	60	175	
192134	Domestic		175	115	175	13
46051F	Domestic		380	60	380	2.25
194842	Domestic, Stock		395	335	395	5
194843	Domestic, Stock		475	415	475	2
194841	Domestic, Stock		475	405	455	
194841	Domestic, Stock		475	405	455	
195974	Domestic		395	335	395	10
198721	Domestic		300	220	280	
198714	Domestic		750			
198722	Domestic		300			5
198715	Domestic	0	550	450	550	1.5
198155	Domestic		125	105	125	8
198713	Domestic		275	215	275	
202223	Domestic		225			7
203262	Domestic, Stock		380	40	380	1
207552	Domestic		628	254	355	
208605	Stock		110			
213831	Household use only		550	470	530	4
213835	Stock					
213832	Household use only		300	200	300	
215223	Domestic		550	410	550	7
198714-A	Domestic		350	290	350	6
215395	Domestic		600	500	600	12
215222	Domestic		700	560	700	1.5
215394	Domestic		350	270	330	1.75
215218	Domestic		675	575	675	1.25
217453	Domestic, Storage		335	160	335	
221113	Domestic, Stock		32	21	32	
233827	Domestic		180	80	180	
235767	Domestic		200	120	200	
237077	Domestic		215	175	215	
238087	Domestic		515	315	515	
239701	Domestic		315	255	315	
239701	Domestic		315	255	315	
46052F-R	Commercial		100	60	80	12
258919	Domestic		225	185	225	
260350	Domestic		480	400	480	7
43342-A	Domestic		240	160	240	
270239	Domestic, Stock		280	200	280	10
275470	Domestic, Stock		460	380	460	7.5
275470	Domestic, Stock		460	380	460	7.5
276232	Domestic, Stock		580	500	580	8
215983-A	Domestic		290	210	290	12
287455	Domestic		320	260	320	
290267	Domestic, Stock		400	320	400	
292021	Household use only					
78822F	Other				35	
300506	Domestic		775			
301600	Domestic		500	300	500	

Permit	Static Water Level	Static Water Level Date	WDID	sociated Case Numb	Modified
25221MH	65				04/18/1995 12:00:00 AM
30210MH	50				05/09/1997 12:00:00 AM
78124	42				12/15/1975 12:00:00 AM
88822					03/10/1977 12:00:00 AM
140871-A					10/26/1995 12:00:00 AM
145102	50				07/06/2010 12:00:00 AM
153943					09/07/2018 01:34:00 PM
43341-A	37				02/01/1990 12:00:00 AM
153943					09/07/2018 01:34:00 PM
155081					08/09/1989 12:00:00 AM
155081-A	235				04/14/2016 12:00:00 AM
155379	25				11/22/1989 12:00:00 AM
47740-A	60				07/03/1990 12:00:00 AM
159430	85				07/10/1992 12:00:00 AM
162121	100				01/13/1992 12:00:00 AM
168370	120				08/22/1994 12:00:00 AM
174707	41				01/24/1994 12:00:00 AM
177783	30				05/02/1994 12:00:00 AM
192134	90				07/16/1996 12:00:00 AM
46051F	60		1205606		07/16/2003 12:00:00 AM
194842	136				07/30/1997 12:00:00 AM
194843	64				04/25/1997 12:00:00 AM
194841	70				07/11/2019 01:49:00 PM
194841	70				07/11/2019 01:49:00 PM
195974	6				07/16/1996 12:00:00 AM
198721	55				01/28/2005 12:00:00 AM
198714					11/30/1998 12:00:00 AM
198722	105				12/02/1997 12:00:00 AM
198715	362				12/21/1998 12:00:00 AM
198155	25				04/15/1998 12:00:00 AM
198713	50				07/17/2018 12:37:00 PM
202223	80				10/16/1996 12:00:00 AM
203262	50				12/26/2013 12:00:00 AM
207552	5		1208304		10/24/1997 12:00:00 AM
208605			1208308		01/16/1998 12:00:00 AM
213831	200				07/21/2005 12:00:00 AM
213835			1205551		08/13/1998 12:00:00 AM
213832	60				11/05/1998 12:00:00 AM
215223	135				04/15/1999 12:00:00 AM
198714-A	50				03/19/1999 12:00:00 AM
215395	190				04/12/2002 12:00:00 AM
215222	225				04/15/1999 12:00:00 AM
215394	38				06/12/2000 12:00:00 AM
215218	178				04/15/1999 12:00:00 AM
217453	130				05/03/1999 12:00:00 AM
221113	15				08/07/2018 04:31:00 PM
233827	80				08/15/2001 12:00:00 AM
235767	10				02/07/2002 12:00:00 AM
237077	102				12/03/2001 12:00:00 AM
238087					03/08/2002 12:00:00 AM
239701	128				09/05/2018 02:22:00 PM
239701	128				09/05/2018 02:22:00 PM
46052F-R	7		1205607		06/09/2014 12:00:00 AM
258919	1				11/15/2004 12:00:00 AM
260350	30				03/05/2014 12:00:00 AM
43342-A	90				08/17/2006 12:00:00 AM
270239	43				02/06/2007 12:00:00 AM
275470	0				10/16/2019 06:47:00 AM
275470	0				10/16/2019 06:47:00 AM
276232	100				12/15/2009 12:00:00 AM
215983-A	40				11/30/2009 12:00:00 AM
287455	10				01/15/2014 12:00:00 AM
290267	45				11/14/2013 12:00:00 AM
292021					05/06/2013 12:00:00 AM
78822F	30		1205065		02/10/2015 12:00:00 AM
300506					05/08/2017 12:00:00 AM
301600	10				04/04/2017 12:00:00 AM

Permit	More Information	Location	IDKey
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30210MH	https://dwr.state.co.us/Tools/WellPermits/0030210	(38.497277, -105.353818)	0030210 90865
78124	https://dwr.state.co.us/Tools/WellPermits/0057935	(38.488659, -105.346841)	0057935 221010
88822	https://dwr.state.co.us/Tools/WellPermits/0078591A	(38.505911, -105.351913)	0078591A 139530
140871-A	https://dwr.state.co.us/Tools/WellPermits/0256699B	(38.504148, -105.351113)	0256699B 94229
145102	https://dwr.state.co.us/Tools/WellPermits/0263499	(38.495698, -105.348365)	0263499 17709
153943	https://dwr.state.co.us/Tools/WellPermits/0298963	(38.507416, -105.356774)	0298963 393540
43341-A	https://dwr.state.co.us/Tools/WellPermits/0298903	(38.491301, -105.378794)	0298903 156556
153943	https://dwr.state.co.us/Tools/WellPermits/0298963	(38.507416, -105.356774)	0298963 393541
155081	https://dwr.state.co.us/Tools/WellPermits/0300895A	(38.497983, -105.345387)	0300895A 89856
155081-A	https://dwr.state.co.us/Tools/WellPermits/0300895B	(38.497237, -105.34477)	0300895B 150103
155379	https://dwr.state.co.us/Tools/WellPermits/0304008	(38.478638, -105.353135)	0304008 141915
47740-A	https://dwr.state.co.us/Tools/WellPermits/0312268	(38.490526, -105.378809)	0312268 223582
159430	https://dwr.state.co.us/Tools/WellPermits/0321527	(38.491012, -105.345214)	0321527 273139
162121	https://dwr.state.co.us/Tools/WellPermits/0330646B	(38.488485, -105.35996)	0330646B 3801
168370	https://dwr.state.co.us/Tools/WellPermits/0348451	(38.475568, -105.347633)	0348451 253268
174707	https://dwr.state.co.us/Tools/WellPermits/0361132	(38.483462, -105.34917)	0361132 205273
177783	https://dwr.state.co.us/Tools/WellPermits/0366520	(38.498862, -105.348078)	0366520 110926
192134	https://dwr.state.co.us/Tools/WellPermits/0393018	(38.52063, -105.360529)	0393018 152848
46051F	https://dwr.state.co.us/Tools/WellPermits/0395254A	(38.499252, -105.348981)	0395254A 356256
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198714	https://dwr.state.co.us/Tools/WellPermits/0405665C	(38.524798, -105.383053)	0405665C 43760
198722	https://dwr.state.co.us/Tools/WellPermits/0405665K	(38.514832, -105.374205)	0405665K 311763
198715	https://dwr.state.co.us/Tools/WellPermits/0405665D	(38.524761, -105.386025)	0405665D 30500
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207552	https://dwr.state.co.us/Tools/WellPermits/0422989	(38.530694, -105.38381)	0422989 123743
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213835	https://dwr.state.co.us/Tools/WellPermits/0434434B	(38.533589, -105.407333)	0434434B 220338
213832	https://dwr.state.co.us/Tools/WellPermits/0437874	(38.479185, -105.34804)	0437874 328633
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215395	https://dwr.state.co.us/Tools/WellPermits/0440016E	(38.52066, -105.383657)	0440016E 298771
215222	https://dwr.state.co.us/Tools/WellPermits/0440016A	(38.514375, -105.380499)	0440016A 50811
215394	https://dwr.state.co.us/Tools/WellPermits/0440016B	(38.520513, -105.38567)	0440016B 317488
215218	https://dwr.state.co.us/Tools/WellPermits/0440016D	(38.514345, -105.381548)	0440016D 17261
217453	https://dwr.state.co.us/Tools/WellPermits/0445027	(38.515111, -105.370242)	0445027 248894
221113	https://dwr.state.co.us/Tools/WellPermits/0450736	(38.53319, -105.397545)	0450736 391917
233827	https://dwr.state.co.us/Tools/WellPermits/0476598	(38.509082, -105.359993)	0476598 328544
235767	https://dwr.state.co.us/Tools/WellPermits/0481004	(38.500884, -105.354634)	0481004 215760
237077	https://dwr.state.co.us/Tools/WellPermits/0482349	(38.503894, -105.356315)	0482349 339906
238087	https://dwr.state.co.us/Tools/WellPermits/0484828	(38.501481, -105.362913)	0484828 225257
239701	https://dwr.state.co.us/Tools/WellPermits/0488962	(38.505466, -105.359299)	0488962 393396
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46052F-R	https://dwr.state.co.us/Tools/WellPermits/0512665	(38.502382, -105.348024)	0512665 356256
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270239	https://dwr.state.co.us/Tools/WellPermits/3606244	(38.51535, -105.34773)	3606244 115417
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276232	https://dwr.state.co.us/Tools/WellPermits/3623960	(38.50163, -105.36272)	3623960 256444
215983-A	https://dwr.state.co.us/Tools/WellPermits/3642638	(38.494645, -105.366873)	3642638 289364
287455	https://dwr.state.co.us/Tools/WellPermits/3653791	(38.499813, -105.353972)	3653791 110717
290267	https://dwr.state.co.us/Tools/WellPermits/3658346A	(38.492291, -105.354203)	3658346A 284300
292021	https://dwr.state.co.us/Tools/WellPermits/3659855	(38.505246, -105.35103)	3659855 216737
78822F	https://dwr.state.co.us/Tools/WellPermits/3667100	(38.489983, -105.395061)	3667100 337172
300506	https://dwr.state.co.us/Tools/WellPermits/3673437	(38.528436, -105.401119)	3673437 202210
301600	https://dwr.state.co.us/Tools/WellPermits/3674526	(38.523704, -105.3908)	3674526 179511

Permit	Received From	Received Date	Publish Date	Received Projection	File Name
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30210MH	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
78124	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
88822	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
140871-A	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
145102	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
153943	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
43341-A	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
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260350	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
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270239	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
275470	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
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287455	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
290267	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
292021	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
78822F	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
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Permit	File Path
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78124	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
88822	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
140871-A	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
145102	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
153943	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
43341-A	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
153943	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
155081	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
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155379	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
47740-A	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
159430	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
162121	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
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177783	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
192134	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
46051F	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
194842	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
194843	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
194841	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
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195974	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
198721	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
198714	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
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198715	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
198155	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
198713	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
202223	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
203262	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
207552	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
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213835	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
213832	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
215223	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
198714-A	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
215395	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
215222	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
215394	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
215218	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
217453	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
221113	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
233827	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
235767	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
237077	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
238087	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
239701	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
239701	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
46052F-R	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
258919	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
260350	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
43342-A	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
270239	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
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275470	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
276232	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
215983-A	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
287455	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
290267	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
292021	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
78822F	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
300506	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/
301600	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well/

Permit	Website
25221MH	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
30210MH	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
78124	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
88822	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
140871-A	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
145102	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
153943	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
43341-A	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
153943	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
155081	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
155081-A	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
155379	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
47740-A	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
159430	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
162121	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
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177783	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
192134	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
46051F	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
194842	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
194843	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
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195974	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
198721	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
198714	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
198722	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
198715	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
198155	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
198713	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
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213831	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
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215223	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
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215395	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
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215394	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
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217453	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
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233827	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
235767	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
237077	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
238087	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
239701	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
239701	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
46052F-R	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
258919	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
260350	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
43342-A	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
270239	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
275470	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
275470	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
276232	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
215983-A	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
287455	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
290267	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
292021	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
78822F	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
300506	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
301600	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb

Permit	Current Status	Contact Name	DIV	WD	County	PM	Township
301597	Well Constructed	TABISH MARK & WENDY	2	12	FREMONT	S	17.0 S
301601	Well Constructed	FEDIE, MARK	2	12	FREMONT	S	17.0 S
301598	Well Constructed	SANDERS, JAMES W.	2	12	FREMONT	S	17.0 S
301603	Well Constructed	FEDIE, MARK	2	12	FREMONT	S	17.0 S
301598	Well Constructed	SANDERS, NANCY	2	12	FREMONT	S	17.0 S
301600-A	Well Constructed	CABAY, HEATHER L.	2	12	FREMONT	S	17.0 S
301600-A	Well Constructed	CABAY, JASON J.	2	12	FREMONT	S	17.0 S
144365	Well Constructed	ALVIES, DIANE	2	12	FREMONT	S	18.0 S
44904	Well Constructed	MASSEY, JAN E	2	12	FREMONT	S	18.0 S
21556	Well Constructed	FREDICKSON WALKER & BOMBERG	2	12	FREMONT	S	18.0 S
10350	Well Constructed	GOWDY, BENITA F	2	12	FREMONT	S	18.0 S
44202	Well Constructed	TYLER, ROGER	2	12	FREMONT	S	18.0 S
8568	Well Constructed	BARTGIS KELLY D & PAMELA J	2	12	FREMONT	S	17.0 S
47740	Well Constructed	CF&I STEEL CORPORATION	2	12	FREMONT	S	18.0 S
39396	Well Constructed	MASSEY, JAN E	2	12	FREMONT	S	18.0 S
43341	Well Constructed	CF & I STEEL CORP	2	12	FREMONT	S	18.0 S
43342	Well Constructed	CF & I STEEL CORP	2	12	FREMONT	S	18.0 S
55817	Well Constructed	MOUNT, IMOGEAN	2	12	FREMONT	S	17.0 S
108315	Well Constructed	BARTGIS KELLY D & PAMELA D	2	12	FREMONT	S	17.0 S
60502	Well Constructed	STEWART, LEONARD	2	12	FREMONT	S	18.0 S
68659	Well Constructed	WINKIEWICZ, FRANK	2	12	FREMONT	S	18.0 S
304787	Well Constructed	CAIN, DANIEL E	2	12	FREMONT	S	18.0 S
46052F-R	Well Constructed	SCHIRADO, RHONDA J.	2	12	FREMONT	S	18.0 S
305825	Well Constructed	BARRY, KENNETH J.	2	12	FREMONT	S	17.0 S
269359	Well Constructed	OWENS RICHARD W & KRISTY ANN	2	12	FREMONT	S	17.0 S
301599	Well Constructed	HOUDEK, GRETCHEN	2	12	FREMONT	S	17.0 S
198720	Well Constructed	ANDERSON, DONALD	2	12	FREMONT	S	18.0 S
198720	Well Constructed	SLEZAK, SUSAN	2	12	FREMONT	S	18.0 S
269113	Well Constructed	ALVIES, DIANE	2	12	FREMONT	S	18.0 S
312799	Well Constructed	PARKER, CHRISTOPHER A.	2	12	FREMONT	S	17.0 S

Permit	Range	Township_D	Range_D	Section	Q10	Q40	Q160	CoordsEW	CoordsEW Dir	CoordsNS
301597	72.0 W	-17	-72	36				2595	W	2305
301601	72.0 W	-17	-72	36				1176	E	2059
301598	72.0 W	-17	-72	36				2589	E	1514
301603	72.0 W	-17	-72	36		NW	SE	1935	E	2162
301598	72.0 W	-17	-72	36				2589	E	1514
301600-A	72.0 W	-17	-72	36						
301600-A	72.0 W	-17	-72	36						
144365	71.0 W	-18	-71	17		NW	NE	1625	E	400
44904	71.0 W	-18	-71	8		NE	NE	600	E	100
21556	71.0 W	-18	-71	17		NE	NW			
10350	71.0 W	-18	-71	5		NE	NE	1041	W	185
44202	71.0 W	-18	-71	8		NE	NE			
8568	72.0 W	-17	-72	26		SE	SW			
47740	71.0 W	-18	-71	7		SW	SW	2090	W	500
39396	71.0 W	-18	-71	8		NE	NE	372	E	100
43341	71.0 W	-18	-71	7		SE	SW	2360	W	280
43342	71.0 W	-18	-71	18		NW	NE	2530	E	140
55817	71.0 W	-17	-71	31		NE	SE			
108315	72.0 W	-17	-72	34		NE	NE	50	E	800
60502	71.0 W	-18	-71	8		NE	SE			
68659	71.0 W	-18	-71	5		SE	SE	570	E	310
304787	71.0 W	-18	-71	5		NW	NE			
46052F-R	71.0 W	-18	-71	8		NE	NE			
305825	72.0 W	-17	-72	36		NW	SE			
269359	71.0 W	-17	-71	31		SW	NW			
301599	72.0 W	-17	-72	36		SE	SW			
198720	71.0 W	-18	-71	6		NE	NW			
198720	71.0 W	-18	-71	6		NE	NW			
269113	71.0 W	-18	-71	17		NW	NE			
312799	72.0 W	-17	-72	36		NE	SW			

Permit	CoordsNS Dir	UTM x	UTM y	Latitude	Longitude	Location Accuracy
301597	N	465393.8	4264043	38.524106	-105.397001	Spotted from section lines
301601	S	465864.5	4263795.5	38.521894	-105.39159	Spotted from section lines
301598	S	465430.6	4263630.5	38.520391	-105.396559	Spotted from section lines
301603	S	465633.7	4263827.5	38.522174	-105.394239	Spotted from section lines
301598	S	465430.6	4263630.5	38.520391	-105.396559	Spotted from section lines
301600-A		465418	4263957	38.523332	-105.39672	Spotted from quarters
301600-A		465418	4263957	38.523332	-105.39672	Spotted from quarters
144365	N	469273.7	4259925.1	38.487139	-105.352311	Spotted from section lines
44904	N	469488	4261632.1	38.502529	-105.349929	Spotted from section lines
21556		468841.6	4259847.1	38.486421	-105.357262	Spotted from quarters
10350	N	468626.5	4263126.5	38.51597	-105.35988	Spotted from section lines
44202		469494.8	4261460.6	38.500984	-105.349843	Spotted from quarters
8568		463604.7	4264973.6	38.532422	-105.417574	Spotted from quarters
47740	S	467335.5	4260161	38.489196	-105.374545	Spotted from section lines
39396	N	469557.5	4261633.6	38.502545	-105.349132	Spotted from section lines
43341	S	467420	4260097.1	38.488623	-105.373574	Spotted from section lines
43342	N	467504.7	4259972.6	38.487504	-105.372597	Spotted from section lines
55817		468111.8	4263759.6	38.521654	-105.365808	Spotted from quarters
108315	N	462985.3	4264539.6	38.528485	-105.424657	Spotted from section lines
60502		469539.3	4260652.6	38.493704	-105.349298	Spotted from quarters
68659	S	469489.6	4261756.5	38.503651	-105.349916	Spotted from section lines
304787		468901	4263025	38.515068	-105.356732	GPS
46052F-R		469654	4261615	38.502387	-105.348034	GPS
305825		465478	4263918	38.522989	-105.396039	GPS
269359		466860.3	4264288.5	38.526376	-105.380203	User supplied
301599		465089	4263565	38.519793	-105.400484	User supplied
198720		467102.6	4262996.5	38.514742	-105.377355	User supplied
198720		467102.6	4262996.5	38.514742	-105.377355	User supplied
269113		469244	4260003	38.487846	-105.352665	User supplied
312799		465271	4263730	38.521287	-105.398405	User supplied

Permit	Parcel Name	Address	City	State	Postal Code
301597	DOUBLE CREEK RANCH				
301601	DOUBLE CREEK RANCH				
301598	DOUBLE CREEK RANCH				
301603	DOUBLE CREEK RANCH				
301598	DOUBLE CREEK RANCH				
301600-A	DOUBLE CREEK RANCH				
301600-A	DOUBLE CREEK RANCH				
144365					
44904					
21556					
10350					
44202					
8568					
47740					
39396					
43341					
43342					
55817					
108315					
60502					
68659					
304787					
46052F-R		43595 US HWY 50	CANON CITY	CO	81212
305825	DOUBLE CREEK RANCH				
269359		2520 STATE HWY 9	CANON CITY	CO	81212
301599	DOUBLE CREEK RANCH	1111 HORSESHOE DR	CANON CITY	CO	81212
198720	CACTUS MOUNTAIN ESTATES	34 CACTUS DR W	CANON CITY	CO	81212
198720	CACTUS MOUNTAIN ESTATES	34 CACTUS DR W	CANON CITY	CO	81212
269113					
312799	DOUBLE CREEK RANCH	38 DOUBLE CREEK RD	CANYON CITY	CO	81212

Permit	Location Type	Permit Category	Permit Issued	First Beneficial Use
301597	Well (Application/Permit)	Residential	2016-06-16	
301601	Well (Application/Permit)	Residential	2016-06-16	
301598	Well (Application/Permit)	Residential	2016-06-16	
301603	Well (Application/Permit)	Residential	2016-06-16	
301598	Well (Application/Permit)	Residential	2016-06-16	
301600-A	Well (Application/Permit)	Residential	2017-01-26	
301600-A	Well (Application/Permit)	Residential	2017-01-26	
144365	Well (Application/Permit)	Residential		1986-07-14
44904	Well (Application/Permit)	Residential	1971-03-18	
21556	Well (Application/Permit)	Residential		1964-09-23
10350	Well (Application/Permit)	Residential		1961-08-28
44202	Well (Application/Permit)	Residential		1971-01-14
8568	Well (Application/Permit)	Residential		1961-04-30
47740	Well (Application/Permit)	Residential		1947-01-07
39396	Well (Application/Permit)	Residential	1969-09-22	1969-09-26
43341	Well (Application/Permit)	Residential		1947-01-07
43342	Well (Application/Permit)	Residential		1972-01-07
55817	Well (Application/Permit)	Residential	1972-04-06	1974-03-21
108315	Well (Application/Permit)	Residential		1979-09-08
60502	Well (Application/Permit)	Residential	1972-05-09	1973-03-20
68659	Well (Application/Permit)	Residential	1973-05-01	1973-05-01
304787	Well (Construction Report)	Residential	2017-03-09	
46052F-R	Well (Construction Report)	General Purpose	2017-07-12	
305825	Well (Construction Report)	Residential	2017-06-19	
269359	Well (Construction Report)	Residential	2006-06-14	
301599	Well (Construction Report)	Residential	2016-06-16	
198720	Well (Construction Report)	Residential	1996-10-03	
198720	Well (Construction Report)	Residential	1996-10-03	
269113	Well (Construction Report)	Residential	2006-05-30	
312799	Well (Construction Report)	Residential	2019-03-15	

Permit	Permit Expires	Well Constructed	Pump Installed	Well Plugged	Associated Aquifers
301597	2018-06-16	2016-09-15			ALL UNNAMED AQUIFERS
301601	2018-06-16	2016-08-31			ALL UNNAMED AQUIFERS
301598	2018-06-16	2017-03-17			ALL UNNAMED AQUIFERS
301603	2018-06-16	2016-09-12			ALL UNNAMED AQUIFERS
301598	2018-06-16	2017-03-17			ALL UNNAMED AQUIFERS
301600-A	2019-01-26	2017-03-15			ALL UNNAMED AQUIFERS
301600-A	2019-01-26	2017-03-15			ALL UNNAMED AQUIFERS
144365					ALL UNNAMED AQUIFERS
44904					ALL UNNAMED AQUIFERS
21556					ALL UNNAMED AQUIFERS
10350					ALL UNNAMED AQUIFERS
44202					ALL UNNAMED AQUIFERS
8568					ALL UNNAMED AQUIFERS
47740		1990-05-29			ALL UNNAMED AQUIFERS
39396		1969-09-26			ALL UNNAMED AQUIFERS
43341					ALL UNNAMED AQUIFERS
43342					ALL UNNAMED AQUIFERS
55817		1974-03-21			ALL UNNAMED AQUIFERS
108315					ALL UNNAMED AQUIFERS
60502		1973-03-20			ALL UNNAMED AQUIFERS
68659		1973-05-24			ALL UNNAMED AQUIFERS
304787	2019-03-09	2017-04-20			ALL UNNAMED AQUIFERS
46052F-R	2018-07-12	2017-07-17			DAKOTA
305825	2019-06-19	2017-09-14			ALL UNNAMED AQUIFERS
269359	2008-06-14	2006-10-13	2018-03-28		ALL UNNAMED AQUIFERS
301599	2018-06-16		2018-04-20		ALL UNNAMED AQUIFERS
198720	1998-10-03	1997-05-12	2018-06-25		ALL UNNAMED AQUIFERS
198720	1998-10-03	1997-05-12	2018-06-25		ALL UNNAMED AQUIFERS
269113	2008-05-30	2006-06-08	2019-06-05		ALL UNNAMED AQUIFERS
312799	2021-03-15	2019-06-27	2019-07-19		ALL UNNAMED AQUIFERS

Permit	Associated Uses	Elevation	Well Depth	Top Perforated Casing	Bottom Perforated Casing	Yield
301597	Domestic		100	40	100	
301601	Domestic		600	60	580	
301598	Domestic		100	21	100	
301603	Domestic		200	40	200	
301598	Domestic		100	21	100	
301600-A	Domestic		100	21	100	
301600-A	Domestic		100	21	100	
144365	Domestic					
44904	Domestic		22			
21556	Domestic					
10350	Domestic					
44202	Domestic					
8568	Stock					
47740	Domestic		320	200	320	
39396	Domestic		220	180	220	
43341	Domestic					
43342	Domestic					
55817	Domestic, Stock		173			
108315	Domestic					
60502	Domestic, Stock		80	40	80	
68659	Household use only		50	10	50	
304787	Domestic		175			
46052F-R	Commercial		250			
305825	Domestic, Irrigation		100			
269359	Household use only		320	240	320	3
301599	Domestic		100	24	100	15
198720	Domestic		280	220	280	5
198720	Domestic		280	220	280	5
269113	Domestic, Stock		360	280	360	3
312799	Domestic, Stock		100			3.5

Permit	Static Water Level	Static Water Level Date	WDID	sociated Case Numb	Modified
301597	10				10/25/2016 12:00:00 AM
301601	46				10/04/2016 12:00:00 AM
301598	14				09/11/2019 04:39:00 PM
301603					10/25/2016 12:00:00 AM
301598	14				09/11/2019 04:39:00 PM
301600-A	11				03/15/2018 03:33:00 PM
301600-A	11				03/15/2018 03:33:00 PM
144365					
44904	20				10/12/1995 12:00:00 AM
21556					
10350					03/12/2008 12:00:00 AM
44202					
8568					
47740	60				07/03/1990 12:00:00 AM
39396	35				10/08/1969 12:00:00 AM
43341					
43342					
55817					03/16/1974 12:00:00 AM
108315					
60502	20				05/21/1973 12:00:00 AM
68659	10				07/05/1973 12:00:00 AM
304787	50				08/02/2017 10:17:00 AM
46052F-R	29		1205607	07CW0128	08/02/2017 10:31:00 AM
305825	16				10/12/2017 02:19:00 PM
269359	85				04/09/2018 01:23:00 PM
301599	12				03/06/2019 11:59:00 AM
198720	100				10/03/2018 06:40:00 AM
198720	100				10/03/2018 06:40:00 AM
269113	110				07/10/2019 08:55:00 AM
312799	22				09/17/2019 12:12:00 PM

Permit	More Information	Location	IDKey
301597	https://dwr.state.co.us/Tools/WellPermits/3674531	(38.524106, -105.397001)	3674531 234833
301601	https://dwr.state.co.us/Tools/WellPermits/3674529	(38.521894, -105.39159)	3674529 179511
301598	https://dwr.state.co.us/Tools/WellPermits/3674524	(38.520391, -105.396559)	3674524 42913
301603	https://dwr.state.co.us/Tools/WellPermits/3674530	(38.522174, -105.394239)	3674530 179511
301598	https://dwr.state.co.us/Tools/WellPermits/3674524	(38.520391, -105.396559)	3674524 399779
301600-A	https://dwr.state.co.us/Tools/WellPermits/3678038	(38.523332, -105.39672)	3678038 384403
301600-A	https://dwr.state.co.us/Tools/WellPermits/3678038	(38.523332, -105.39672)	3678038 384402
144365	https://dwr.state.co.us/Tools/WellPermits/9086935	(38.487139, -105.352311)	9086935 351138
44904	https://dwr.state.co.us/Tools/WellPermits/9085964	(38.502529, -105.349929)	9085964 190736
21556	https://dwr.state.co.us/Tools/WellPermits/9085750	(38.486421, -105.357262)	9085750 123421
10350	https://dwr.state.co.us/Tools/WellPermits/9085616	(38.51597, -105.35988)	9085616 114140
44202	https://dwr.state.co.us/Tools/WellPermits/9085951	(38.500984, -105.349843)	9085951 318201
8568	https://dwr.state.co.us/Tools/WellPermits/9085600	(38.532422, -105.417574)	9085600 303552
47740	https://dwr.state.co.us/Tools/WellPermits/9086011	(38.489196, -105.374545)	9086011 279523
39396	https://dwr.state.co.us/Tools/WellPermits/9085905	(38.502545, -105.349132)	9085905 190736
43341	https://dwr.state.co.us/Tools/WellPermits/9085942	(38.488623, -105.373574)	9085942 173734
43342	https://dwr.state.co.us/Tools/WellPermits/9085943	(38.487504, -105.372597)	9085943 173734
55817	https://dwr.state.co.us/Tools/WellPermits/9086087	(38.521654, -105.365808)	9086087 197839
108315	https://dwr.state.co.us/Tools/WellPermits/9086763	(38.528485, -105.424657)	9086763 341072
60502	https://dwr.state.co.us/Tools/WellPermits/9086131	(38.493704, -105.349298)	9086131 40826
68659	https://dwr.state.co.us/Tools/WellPermits/9086241	(38.503651, -105.349916)	9086241 122170
304787	https://dwr.state.co.us/Tools/WellPermits/3678593	(38.515068, -105.356732)	3678593 285193
46052F-R	https://dwr.state.co.us/Tools/WellPermits/3680613	(38.502387, -105.348034)	3680613 370599
305825	https://dwr.state.co.us/Tools/WellPermits/3680224	(38.522989, -105.396039)	3680224 369537
269359	https://dwr.state.co.us/Tools/WellPermits/3604319	(38.526376, -105.380203)	3604319 86051
301599	https://dwr.state.co.us/Tools/WellPermits/3674525	(38.519793, -105.400484)	3674525 402088
198720	https://dwr.state.co.us/Tools/WellPermits/0405665I	(38.514742, -105.377355)	0405665I 394578
198720	https://dwr.state.co.us/Tools/WellPermits/0405665I	(38.514742, -105.377355)	0405665I 394577
269113	https://dwr.state.co.us/Tools/WellPermits/3604372	(38.487846, -105.352665)	3604372 163751
312799	https://dwr.state.co.us/Tools/WellPermits/3690612	(38.521287, -105.398405)	3690612 401334

Permit	Received From	Received Date	Publish Date	Received Projection	File Name
301597	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
301601	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
301598	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
301603	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
301598	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
301600-A	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
301600-A	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
144365	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
44904	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
21556	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
10350	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
44202	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
8568	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
47740	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
39396	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
43341	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
43342	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
55817	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
108315	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
60502	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
68659	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
304787	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
46052F-R	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
305825	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
269359	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
301599	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
198720	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
198720	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
269113	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit
312799	Colorado DWR	2019-10-22	2019-10-22	CCS - NAD83	DWR_Well_Application_Permit

Permit	File Path
301597	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well
301601	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well
301598	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well
301603	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well
301598	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well
301600-A	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well
301600-A	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well
144365	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well
44904	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well
21556	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well
10350	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well
44202	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well
8568	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well
47740	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well
39396	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well
43341	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well
43342	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well
55817	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well
108315	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well
60502	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well
68659	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well
304787	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well
46052F-R	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well
305825	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well
269359	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well
301599	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well
198720	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well
198720	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well
269113	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well
312799	\\PDCCITRDSGIS1\Projects_1\Martin_Marietta\Parkdale_EIS\Transfer\Incoming\ColoradoDNR\20191022_WellApplications\DWR_Well

Permit	Website
301597	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
301601	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
301598	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
301603	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
301598	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
301600-A	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
301600-A	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
144365	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
44904	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
21556	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
10350	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
44202	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
8568	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
47740	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
39396	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
43341	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
43342	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
55817	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
108315	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
60502	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
68659	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
304787	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
46052F-R	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
305825	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
269359	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
301599	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
198720	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
198720	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
269113	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb
312799	https://data.colorado.gov/Water/DWR-Well-Application-Permit/wumm-7awb