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October 24, 2019

New Mexico Oil Conservation Division, District 1
1625 N. French Drive
Hobbs, NM 88240

Re: CVU 106/136
Remedial Plan #: 1RP-2642 and 1RP-3244
2018 Annual Vegetation Monitoring Report
Lea County, New Mexico

Dear whom it concerns,

Please find enclosed for your files, copies of the following report:

- CVU 106/136 2018 Annual Vegetation Monitoring Report

The submittal was prepared by Arcadis U.S., Inc. (Arcadis) on behalf of Chevron Environmental Management Company (CEMC).

Please do not hesitate to call Scott Foord with Arcadis at 713-953-4853 or myself at 832-854-5601, should you have any questions.

Sincerely,

Jason Michelson

Encl. CVU 106/136 2018 Annual Vegetation Monitoring Report

C.C. Amy Barnhill, Chevron/MCBU

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ARCADIS Design & Consultancy for natural and built assets

Chevron Environmental Management Company

2018 ANNUAL VEGETATION MONITORING REPORT

CVU 106/136

Lea County, New Mexico

1RP-2642-0 and 1RP-3244

October 2019

Scott Foord
Project Manager

2018 ANNUAL VEGETATION MONITORING REPORT

CVU 106/136
Lea County, New Mexico
1RP-2642-0 and 1RP-3244

Prepared for:

Chevron Environmental Management Company

Prepared by:

Arcadis U.S., Inc.
10205 Westheimer Road
Suite 800
Houston
Texas 77042
Tel 713 953 4800
Fax 713 977 4620

Our Ref.:

N/A

Date:

October 24, 2019

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APPENDICES

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1 INTRODUCTION

1.1 Introduction

Arcadis has prepared this report that provides a description of vegetation monitoring activities that were performed at the Central Vacuum Unit (CVU) #106/136 site in 2018. The Chevron CVU 106/136 site (hereafter referred to as the "Site"), is located in Section 6 (Unit N), Township 18 South, Range 35 East, in Lea County, New Mexico (Figure 1). The Site is situated on land leased to Chevron by the New Mexico State Land Office (NMSLO).

The vegetation monitoring was performed at the Site to assess the established vegetation and any potential erosion at the Site. The vegetation monitoring was proposed by Chevron Environmental Management Company (CEMC) and approved by the New Mexico Oil Conservation Division (NMOCD) and New Mexico State Land Office NMSLO. Arcadis performed project management, general oversight of the monitoring activities, and documentation of the fieldwork.

1.2 Regulatory Requirements

Based on information available from the Petroleum Recovery Research Center Pit Rule Mapping Portal (PPRC Mapping Portal), the depth to groundwater at the Site is estimated to be between 60 and 103 feet below ground surface (bgs). Arcadis is currently working on two sites (Buckeye Compressor Station and Buckeye Vacuum) located less than a mile from the Site. The depth to groundwater at these sites is approximately 130 feet bgs.

Although the nearest private domestic water and public/municipal water sources are greater than 200 feet and 1,000 feet respectively from the release site, the Site is located within 200 horizontal feet of a playa feature. Consequently, the preliminary total ranking score is 20 (see table below). Based on this, the site-specific screening criteria to be applied by NMOCD for chloride at the Site is 600 parts per million (ppm).

2 SITE HISTORY

The Central Vacuum Unit No. 106 (CVU-106) and the Central Vacuum Unit No. 136 (CVU-136) are both located in Unit E, Section 6, Township 18S, Range 35E of Lea County, approximately 15 miles southwest of Lovington, New Mexico, along Highway 238 (Figure 1).

GHD Services, Inc. (GHD – former consultant) combined the CVU-106 and CVU-136 release sites into a single area for investigation and delineation. Consolidation of these two units into a single Site delineation effort was based on:

- Their co-located nature (release sites are comingled).
- Similar nature of released material (produced water with reported chloride concentrations of 53,000 ppm).
- Identical historical NMOCD RRALs for chloride of 250 ppm.

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- Near-contemporaneous release dates.

The first consultant to evaluate the Site was Crain Environmental (Crain). Crain conducted field assessment activities at the CVU-106 and CVU-136 sites between August and November 2010. Crain's assessments included Site visits, soil sample collection, analytical laboratory analyses, and preliminary determinations of impacts to environmental media. In addition, remedial activities were conducted at the CVU-106 release site. GHD met with Ms. Crain on April 21, 2011 to review and transfer the file material for each Site and discuss Site histories. Additional information regarding the Crain Assessments is provided below. A Site visit was performed on October 22, 2013 by GHD. During the Site visit, boring locations were flagged for utility locating purposes. In addition, the Site was walked to observe Site features. During the Site visit, it appeared that a drilling pit was located to the north of the comingled release area. The Site was transitioned to Arcadis in October 2019.

2.1 Central Vacuum Unit #106 (CVU-106) Injection Line Release

Chevron submitted a C-141 Release Notification and Corrective Action Form (C-141) to the NMOCD dated August 5, 2010. The NMOCD assigned a Remediation Permit number of 1RP-2642-0 to the CVU-106 release. A release of 300 barrels (bbls) of produced water from a corroded buried injection line occurred on August 2, 2010. None of the released fluid was reported to have been recovered. The C-141 reported that the released produced water had a concentration of 53,000 ppm and impacted an area of surface soils approximately 200 feet by 30 feet.

Crain collected three surface soil samples on August 12, 2010 to a depth of approximately 6 inches across the length of the apparent impacted area. These samples were laboratory-analyzed for chloride (Cl-) concentrations. Chloride results ranged from 5,040 mg/Kg (ppm) to 27,600 ppm.

The apparent impacted area was subsequently excavated to a depth of approximately 2 feet. The dimensions of the irregularly shaped excavation area were approximately 263 feet by 106 feet. An additional 17 soil samples were collected by Crain at a depth of approximately six inches across the floor of the excavation. They were taken from different locations than those sampled in August. Two background samples were also collected at a depth of 6 inches and at 1 foot below grade from a location southwest of the excavation area. Samples were collected on September 16, 2010 and analyzed for chloride. Results ranged from <16 ppm to 27,200 ppm with only five samples having chloride concentrations below 250 ppm (historical RRAL) located at the northeast, northwest and southeast corners of the existing excavation.

Additional samples (grab samples) were also collected by Crain from the floor of the excavation, ranging from 6 inches to 8 feet in depth. Chloride concentrations in these samples ranged from 16 ppm to 13,600 ppm with the majority of the samples having concentrations above 250 ppm. Finally, soil boring BH-1 was advanced in the floor of the excavation to a depth of 30 feet below ground surface (bgs) at soil sample location SS-5, located just north of the CVU-106 well pad. Samples were collected by Crain on 5-foot vertical intervals. Samples analyzed from this boring had chloride concentrations of 250 ppm or greater with the exception of the sample collected at 30 feet bgs, which had a reported chloride concentration of 96 ppm.

During excavation of the produced water-impacted soils, an undefined area was encountered exhibiting visible evidence of hydrocarbon contamination. The indicated depth and extent of this contamination

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suggested the release may have occurred, at least in part, within the area of an abandoned pit that had not been identified previously. No assessment of this pit was performed.

2.2 Central Vacuum Unit #136 (CVU-136) Injection Line Release

Chevron submitted a C-141 Form to NMOCD dated November 5, 2010, describing a release of 276.56 bbls of produced water. The release occurred on October 30, 2010 from a corroded buried injection line. Approximately 200 bbls of the release were reported to have been recovered. The C-141 reported the dimensions of stained soil to be approximately 200 feet by 200 feet. Additionally, it was noted that the CVU-136 injection line released fluid directly adjacent to, and comingled with, the CVU-106 release area. It should be noted that the release did not originate from the CVU-136 well, but from an injection line leak that occurred near the CVU-106 injection well.

Crain collected four surface soil samples to a depth of approximately 6 inches across the apparent stained soil area. These samples were submitted for laboratory analysis of chloride. Chloride results ranged from 11,000 ppm to 13,600 ppm.

The apparent stained soil area was described by Crain to be roughly 300 feet by 208 feet, and the release was described as having comingled with the CVU-106 chloride impacted area.

3 2013 – 2017 SITE ASSESSMENT SUMMARY

Assessment activities performed at the Site between 2013 and 2015 are summarized in the report titled “Soil Assessment Report” dated December 4, 2015. The results from these assessments indicated the following:

- The geophysical survey assessed the horizontal extent of the chloride in the soil.
- The soil borings that were advanced at the site appears to confirm the horizontal extent of chloride in the soil.
- The soil boring advanced to 70 feet bgs (MW 1) indicated that chloride concentrations in the soil did not extend beyond 60 feet bgs. Based on the data from this boring, it does not appear that the chloride concentrations extended to the groundwater table, estimated at greater than 100 feet bgs.

Soil sample and geophysical survey assessments provide evidence that chloride concentrations above the RRAL did not reach the groundwater table. Consequently, GHD recommended the installation of a liner to prevent further lateral and vertical migration of chlorides. After a discussion with the NMOCD on November 10, 2015, the agreed plan of action for the Site was the installation of a plastic liner in the area of impacted soil.

Assessment activities performed at the Site in 2017 are summarized in the report titled “2017 Interim Remediation and Reclamation Report” dated July 25, 2018. The results from these assessments indicated the following:

- Installation of 20 mil polyethylene liner in the area of impacted soil.
- Placement of PVC pipe ‘leak detection system’ prior to liner.

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- 2,680 yd of caliche and 1,720 yd of topsoil layered on top of liner.
- Seeding of topsoil with seed mix BLM No. 2 without lovegrass.

In follow up to the remedial and reclamation activities, the site will be visited on a semi-annual basis to assess the establishment of vegetative growth and look for erosion issues.

4 2018 VEGETATION MONITORING ACTIVITIES

4.1 June - 2018

The first half vegetation-monitoring event occurred on June 26, 2018 (eight months following the initial reseeding activities). Grasses and flowering shrubs had just begun surfacing through the topsoil. Those that had appeared were green and thriving on the Site (Appendix A: Photos 1 and 2). The vegetation is patchy, but otherwise appears to be in the same condition as within the surrounding area. Regional water conditions are moderate to severe drought based on the USGS Vegetation Drought Response Index for June 2018 (Figure 2).

4.2 December - 2018

The second half vegetation-monitoring event occurred on December 18, 2018 (fourteen months following the initial reseeding activities). The majority of the vegetation has dried out and gone dormant due to worsening drought conditions in the region and seasonal conditions (Appendix A: Photos 3 and 4). Only a few patches of grass remain green and present on the Site. The vegetation within the remediated area continues to fill in compared to past monitoring events but remains slightly patchy. Regional water conditions are pre-drought to severe drought for available locations based on the USGS Vegetation Drought Response Index for December 2018 (Figure 3).

5 DISCUSSION AND CONCLUSION

Based on the semi-annual site visits conducted in June and December 2018, efforts to revegetate the Site to natural conditions have been successful in lieu of regional drought conditions. Vegetative growth on-Site is beginning to mirror the vegetative growth conditions observed off-Site. Slow growth is due to the regional drought conditions confirmed over the last year in USGS Vegetation Drought Response Indexes. Arcadis, on behalf of CEMC, will continue to monitor the vegetative growth at the site throughout the year 2019.

07/09/2021 APPROVED

Bradford Billings

Bradford Billings Envi.Spec.A EMNRD/OCD

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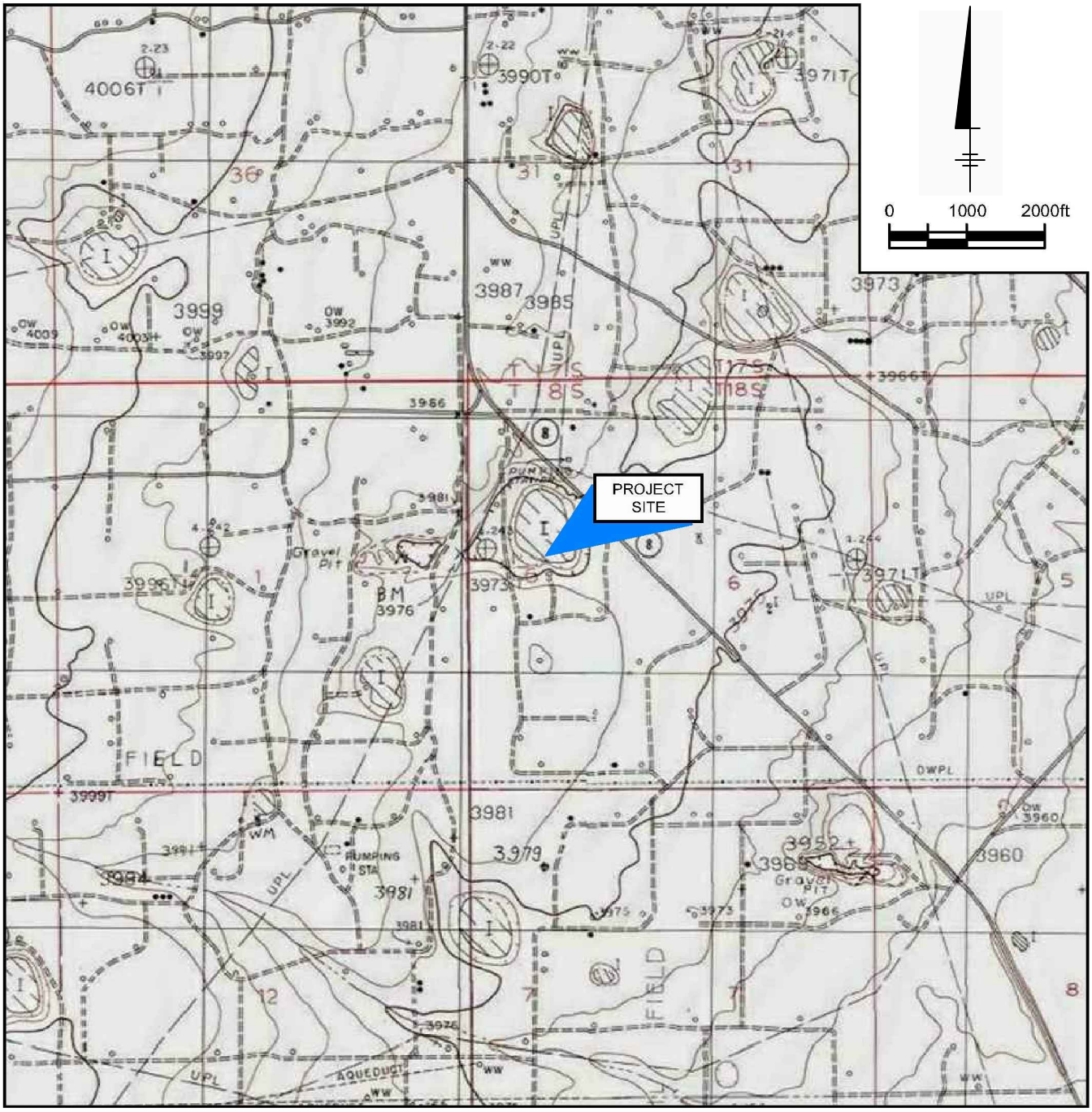
FIGURES



SOURCE: USGS 7.5 MINUTE QUAD
"BUCKEYE AND LOVINGTON SW, NEW MEXICO"

LAT/LONG: 32.7779° NORTH, 103.5021° WEST
COORDINATE: NAD83 DATUM, U.S. FOOT
STATE PLANE ZONE - NEW MEXICO EAST

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
CVU No.136 AND CVU No.106
LEA COUNTY, NEW MEXICO

SITE LOCATION MAP

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FIGURE
1

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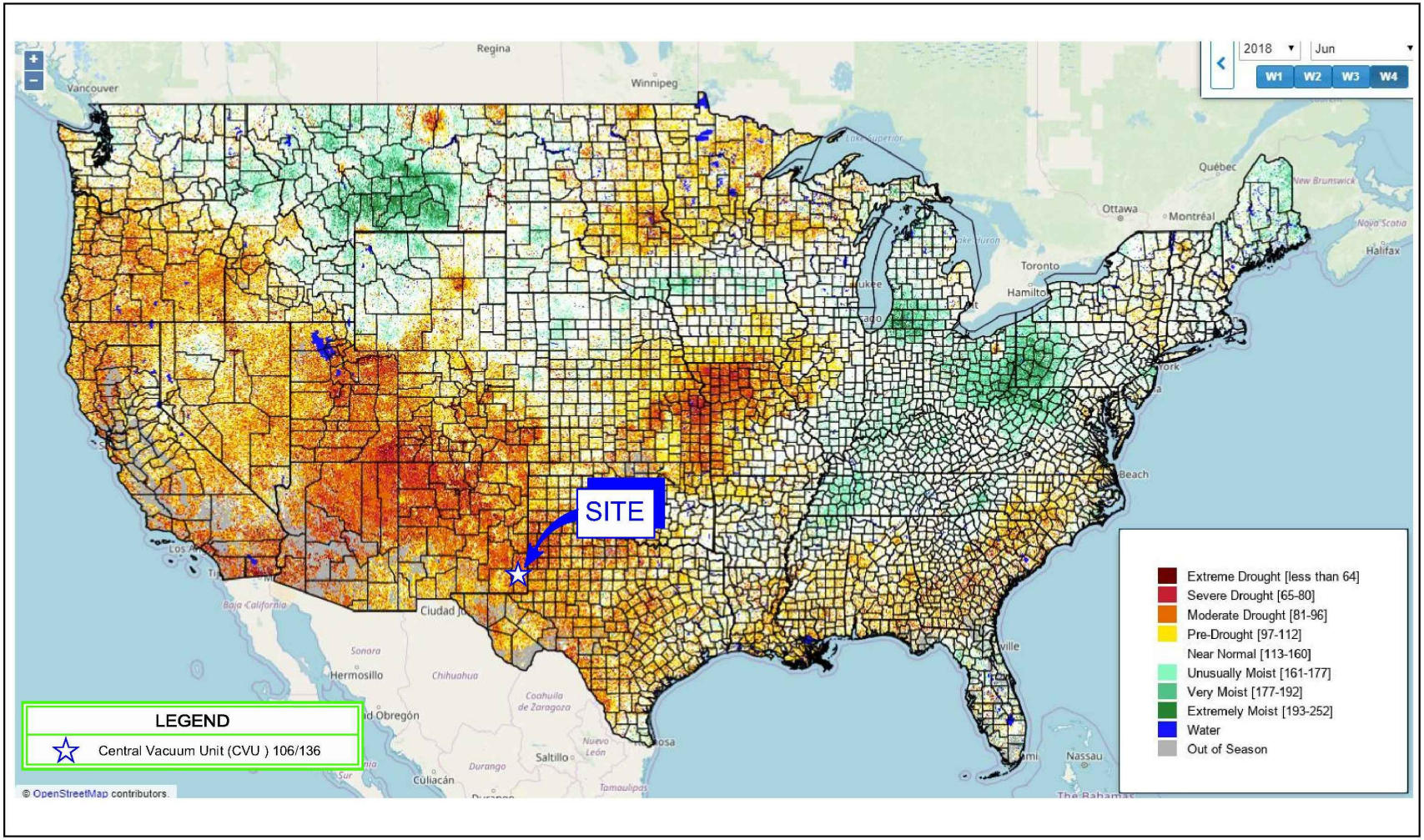

Source: United States Geologic Survey

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
CVU No.136 AND CVU No.106
LEA COUNTY, NEW MEXICO

USGS VEGETATION DROUGHT RESPONSE INDEX - JUNE 2018

NOT TO SCALE

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FIGURE
2

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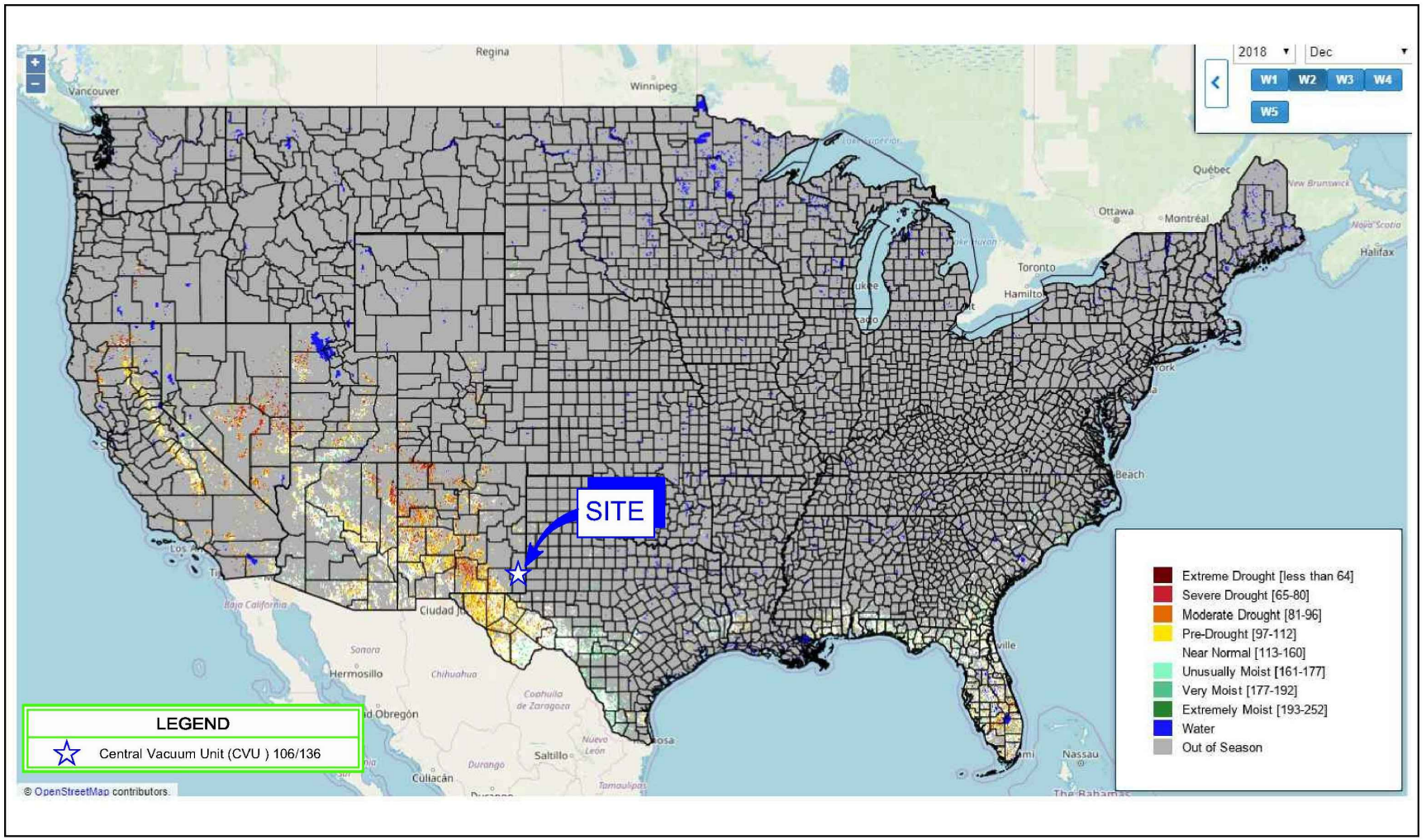

Source: United States Geologic Survey

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
CVU No.136 AND CVU No.106
LEA COUNTY, NEW MEXICO

USGS VEGETATION DROUGHT RESPONSE INDEX - DECEMBER 2018

NOT TO SCALE

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FIGURE
3

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APPENDIX A

Photo Log

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Project Photographs

Vegetative Growth Monitoring |
Lea County, New Mexico

Photo: 1

Description:

First vegetation-monitoring event that occurred on June 26, 2018 (eight months after reseeding which occurred in October 2017). Plants have begun growing on-Site. Site vegetation is green and active similar to the surrounding vegetation.

Photo: 2

Description:

Additional view of first vegetation monitoring event (June 26, 2018). Both grass and flowering shrubs have begun to grow within the remediated area on the Site.

ARCADIS Design & Consultancy for natural and built assets

Project Photographs

Vegetative Growth Monitoring |
Lea County, New Mexico

Photo: 3

Description:

Second vegetation monitoring event that occurred on December 18, 2018 (fourteen months following reseeding). Vegetation on-Site vegetation appears dormant, mirroring off-Site conditions.

Photo: 4

Description:

Additional view of second vegetation-monitoring event (December 18, 2018). Another view showing the on and off-Site vegetation yellowed, likely dormant due to season. Note the snow/ice on the ground.

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State of New Mexico
Energy, Minerals and Natural Resources
Oil Conservation Division
1220 S. St Francis Dr.
Santa Fe, NM 87505

CONDITIONS

Operator: Arcadis U.S., Inc 630 Plaza Drive Highlands Ranch, CO 80129	OGRID: 329073
	Action Number: 2078
	Action Type: [C-141] Release Corrective Action (C-141)

CONDITIONS

Created By	Condition	Condition Date
bbillings	One report can be used for multiple Incident numbers but each incident number must be placed in portal on its own Report, even if report is a duplicate.	7/9/2021