Location Checklist

Operator / #	EXTRACTION OIL & GAS INC / 10459			
Location ID & Name	321430 DODD MB-62N69W/33NESE			
County	Boulder, CO			
Well Information	Well Name:	DODD MB #33-9		
	Well API #:	05-013-06426		
	Lat/Long as Drilled:	40.092670 / -105.114900		
	Plug Date & Form 6s Doc #:	12/03/2018 & 401868666		
Facility Entities	X Tank Battery (Off-Site)		Pits	
	X Wells	X	On-Location Flowlines (Form 42) Doc #: 401902758	
	Domestic Taps	X	Off-Location Flowlines (Form 44) Doc #: 402419033	
Equipment On-Site	X None		Debris	
	Pit mouse/rat holes, cellars backfilled			
Access Road	X Regraded	X	Contoured	
	Culverts removed	X	Gravel removed	
	Pre-Existing (Must provide supporting documentation)			
Reclamation Status	X Location and associated disturbances reclaimed			
	Subsidence			
Spills or Releases (Form 19)	X No		Yes	
Remediation (Form 27/27A)	X No		Yes	
On-Location Flowlines	No	X	Yes	
Off-Location Flowlines	No	X	Yes	
Inspection Corrective Actions	X No		Yes	
Sundry Notice	Form 4 Doc # & Date:	400956952 & 02/16/2016		
	Purpose:	Interim reclamation complete, site ready for inspection		
	Comments:	None		
	Attachments:	Inspection Photos Doc # 400956956		
Drone Information	Make & Model	DJI M300/DJI Mavic 3 Multispectral		
	Image Processing Software	Pix4dfields – RGB/Multispectral Imagery & Pix4dmatic – RGB Imagery		
	Pilot Name & FAA Certificate #	Sam Streeter, #4100157		
	Date of FAA Certificate Issuance	23 Dec 2023		

SITE-SPECIFIC QUALITY ASSURANCE & QUALITY CONTROL AUDIT

Final Reclamation Complete Notice – Cropland Drone Imagery

PERMIT CLOSURE REPORT – CROPLAND

Location ID 321430
Location Name DODD MB-62N69W/33NESE

Report Date

27 Sep 2024

Soil Sage has conducted a thorough data audit as part of our Quality Assurance and Quality Control (QA/QC) protocols. This report was developed in accordance with the ECMC Operator Guidance – Operator supplied cropland drone imagery and information for submitting a final reclamation complete notice.

Crop Year and Type

Crop 2024 – Wheat

Quality Assurance & Quality Control Audit

Auditor	Soil Sage
Audit Date	19 Feb 2024

Audit Methodology

The following source materials were consulted during the QA and QC audit process:

- ✓ Site Permit Closures provided by CIVITAS Resources
- ✓ Colorado Oil & Gas Information System – COGIS Database
- ✓ On-site Evaluation and Proprietary Soil Sage Drone Imagery data collection
- ✓ Review of legacy imagery for site location and facility parameters

All pertinent data, imagery, and materials are included at the end of this report.

Site Description

Name	DODD MB-62N69W/33NESE			
Location ID	321430			
Operator / #	EXTRACTION OIL & GAS INC / 10459			
Field	WATTENBERG / 90750			
County, State	Boulder, CO			
Lat/Long	40.092670 / -105.114900			
		Planned Location	X	As Drilled
Facility Status	CL	**Location**		NESE 33 2N69W
Facility Status Date	12/03/2018			
Facility Entities	X	Tank Battery (Off-Site)		Pits
	X	Wells	X	Off-Location Flowlines (**Form 44**)
		Domestic Taps	X	On-Location Flowlines (**Form 42**)
		Electric Utilities		
Equipment on Site	X	No		Yes
		If yes, list:		
		Pit mouse/rat holes, cellars backfilled		
Access Road	X	Regraded	X	Contoured
		Culverts Removed	X	Gravel Removed
		Pre-Existing: must provide supporting documentation		
Environment Incidents & Remediation	X	None		Spill or Release (**Form 19**)
		Remediation (**Form 27/27A**)		
Variance Requests	**No Variance Requests were detected during this QA & QC Audit.**			
Inspection Corrective Actions (CA)s	**No Corrective Actions (CA)s were detected during the QA & QC Audit.**			
	Complete ECMC Inspection Search Results: Link			
Sundry Notice (Form 4)	**Form 4s were detected during the QA & QC Audit.** See individual scout card data for details.			
On Location Flowlines (Form 42)	**Form 42s were detected during the QA & QC Audit.** See individual scout card data for details.			

Off-Location Flowlines (Form 44)	**Form 44 Doc # & Date:** 402419033 & 04/20/2021 ○ **Purpose:** Off-Location Flowline Abandonment Verification ○ **Abandonment Date:** 12/13/2018 ○ **ECMC Approval Date & Signee:** 04/20/2021 by Julie Murphy ○ **Operator Comments:** This form is being submitted as a December 1, 2020, update to include a GIS shapefile and description of the integrity management plan and corrosion protection plan for these flowlines. ○ **Note:** This Form 44 includes data for two Off-Location Flowlines: 461034 and 461033. This Location is connected to 461034 below. **Flowline Facility Information** ○ **ECMC Flowline ID:** 461034 ○ **Operator Flowline ID:** 01306426FL ○ **Status & Date:** AC & 04/20/2021 ○ **Flowline Type:** Wellhead Line ○ **Type of Fluids Transported:** Multiphase ○ **Start Point Location ID:** 321430 ○ **Start Point Riser Lat/Long:** 40.092667 / -105.114874 (DODD MB #33-9 Well) ○ **Equipment at Start Point:** Well ○ **End Point Location ID:** 460744 ○ **End Point Riser Lat/Long:** 40.089215 / -105.115188 (Dodd 1-33, MB33-9 Production Facilities) ○ **Equipment at End Point Riser:** Separator
Field Inspection Form (Form INSP)	**Form INSP Doc # & Date:** 691401343 & 11/01/2018 ○ **Status Summary:** NO FOLLOW UP INSPECTION REQUIRED ○ **Inspected Facilities:** DODD MB 33-9 Well ○ **Inspection Status:** SI ○ **Inspection Date & Inspector:** 11/01/2018 by Tom Beardslee ○ **Comments:** See related inspection document #691401341 for information concerning shared facilities. At time of inspection well is TA status. MIT DOC#401705899 was approved 7/18/2018. ○ **Attachments:** Inspection Photos Doc # 691401344

COGIS Tank Facilities Information (Scout Card)	**No Tank Battery documents were detected during this QA/QC Audit.** However, the Tank Battery is referenced in Field Inspection Document # 691401343 and is at Location ID 460744, which is still active at the time of this Audit. This is a shared production facility with one well at Location ID 321286.
COGIS Well Information (Scout Card)	**Well Name**: DODD MB #33-9 **API#**: 05-013-06426 **FACILITY ID**: 206931 ○ **Status & Date**: PA & 12/03/2018 ○ **Lat/Long As Drilled**: 40.092670 / -105.114900 ○ **Form 6 Doc # & Date:** 401868666 & 12/13/2019 ○ **Form 42 Doc # & Date:** 401902758 & 01/11/2019 **Purpose:** FLOWLINES ABANDONED - per RULE 1103. Date completed: 12/13/2018. ○ **Form 4 Doc # & Date:** 400956952 & 02/16/2016 **Purpose:** Interim reclamation complete, site ready for inspection. Per Rule 1003.e(3) describe interim reclamation procedure in Comments below or provide as an attachment and attach required location photographs. **Attachments:** Inspection Photos Doc # 400956956

ECMC Abbreviations: Location & Facility Status Codes, Inspection Types & Statuses and ECMC Help.

Audit Key Findings – Designation Land Use Observations

PREVIOUS LAND USE	CURRENT LAND USE
Reference Imagery for Infrastructure: DRCOG 2010	**Remotely Sensed Imagery:** 24 Jan 2024; 19 May 2024
Designation: Oil & Gas Facility	**Designation:** Cropland

The following imagery sources were reviewed during this audit:

EarthExplorer, DRCOG 2002 - 2014, NAIP Imagery 2011, 2013, 2015, 2017, 2019, 2021, ESRI Maxar and Remotely Sensed Imagery Sep 2022

Site Observation Notes

No additional information.

In accordance with ECMC guidance, this cropland evaluation has demonstrated that this location has been returned to its original condition and crops are reflective of the cropland reference areas.

Closure Information

Location ID 321430 DODD MB-62N69W/33NESE is in Boulder County, Colorado near the intersection of Highway 287 and Mineral Road. There is one plugged and abandoned well (Dodd MB #33-9 API #05-013-06426). There is an Off-Location Flowline between this well and the production facility at Location ID 460744.

Dodd MB #33-9 well (API #05-013-06426) was plugged and abandoned on December 3rd, 2018. The access road was reclaimed at this time. The related production facility, Location ID 460744, remains active for a well that is currently shut in at Location ID 321286 (API # 05-013-06092).

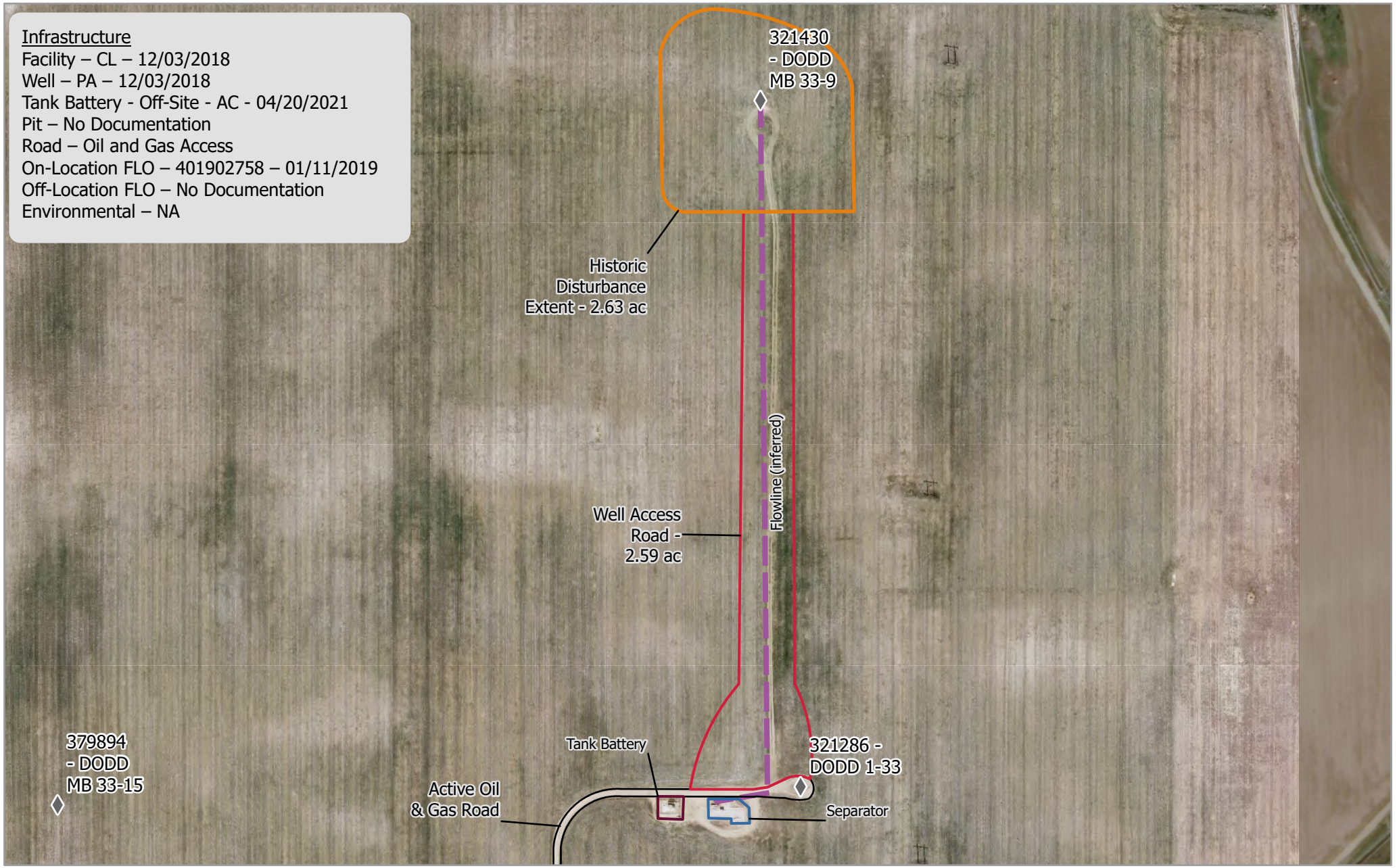
Soil Sage drone imagery confirms that no equipment was left on site at this location after reclamation activities occurred.

Summary Acreage Table

Description	Acres
Historic Disturbance Extent	5.22
Access Road	2.59
Flowline	Not Included
Tank Battery	Off-Site (Loc ID 460744)
Well Pad	2.63

Drone Information

Make	DJI
Model	M300/Mavic 3 Multispectral
Image Processing Software	Pix4dfields – RGB/Multispectral Imagery & Pix4dmatic – RGB Imagery
Pilot Name	Sam Streeter
Pilot FAA Certificate Number	4100157
Date of FAA Certificate Issuance	23 Dec 2023



CIV - 321430- DODD MB 33-9
Map Extent - Pre-Plugging Overview

Imagery: DRCOG
Imagery Date: March 2010
Map Date: 17 Sep 2024
Datum: WGS 1984 UTM Zone 13N
POC: Soil Sage

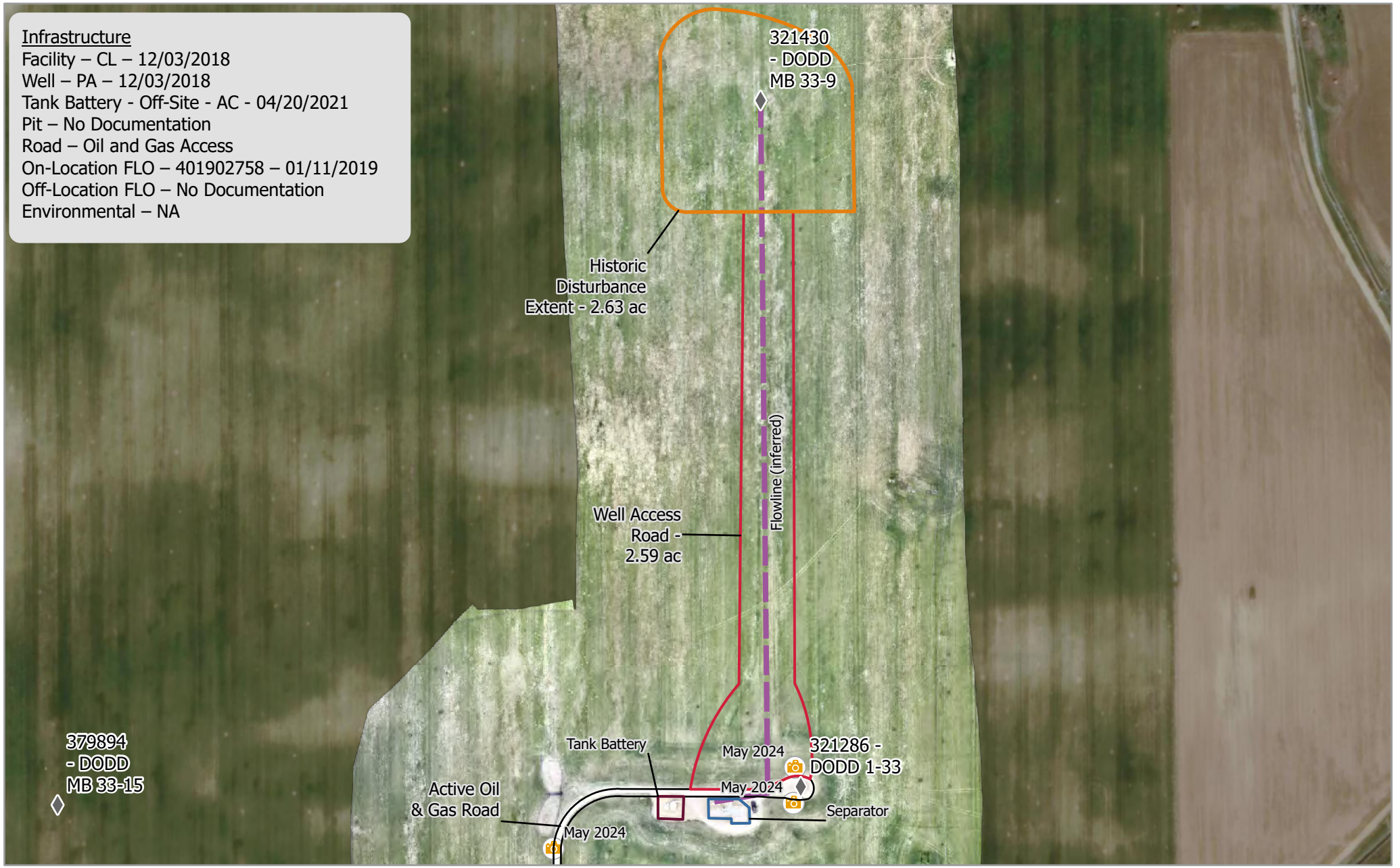
Wells
Flowline
Historic Disturbance Extent
Well Access Road
Active Oil & Gas Road
Tank Battery
Separator

0 40 80 160 Meters

Total Disturbance: 5.22 Acres
Scale: 1:2,800

Pad Location: 40.092670 -105.114900

N



CIV - 321430- DODD MB 33-9
Map Extent - Post-Plugging Overview

Imagery: RS Orthomosaic
Imagery Date: 19 May 2024
Map Date: 17 Sep 2024
Datum: WGS 1984 UTM Zone 13N
POC: Soil Sage

- Wells
- Observation Points
- Flowline
- Historic Disturbance Extent
- Well Access Road
- Active Oil & Gas Road
- Tank Battery
- Separator

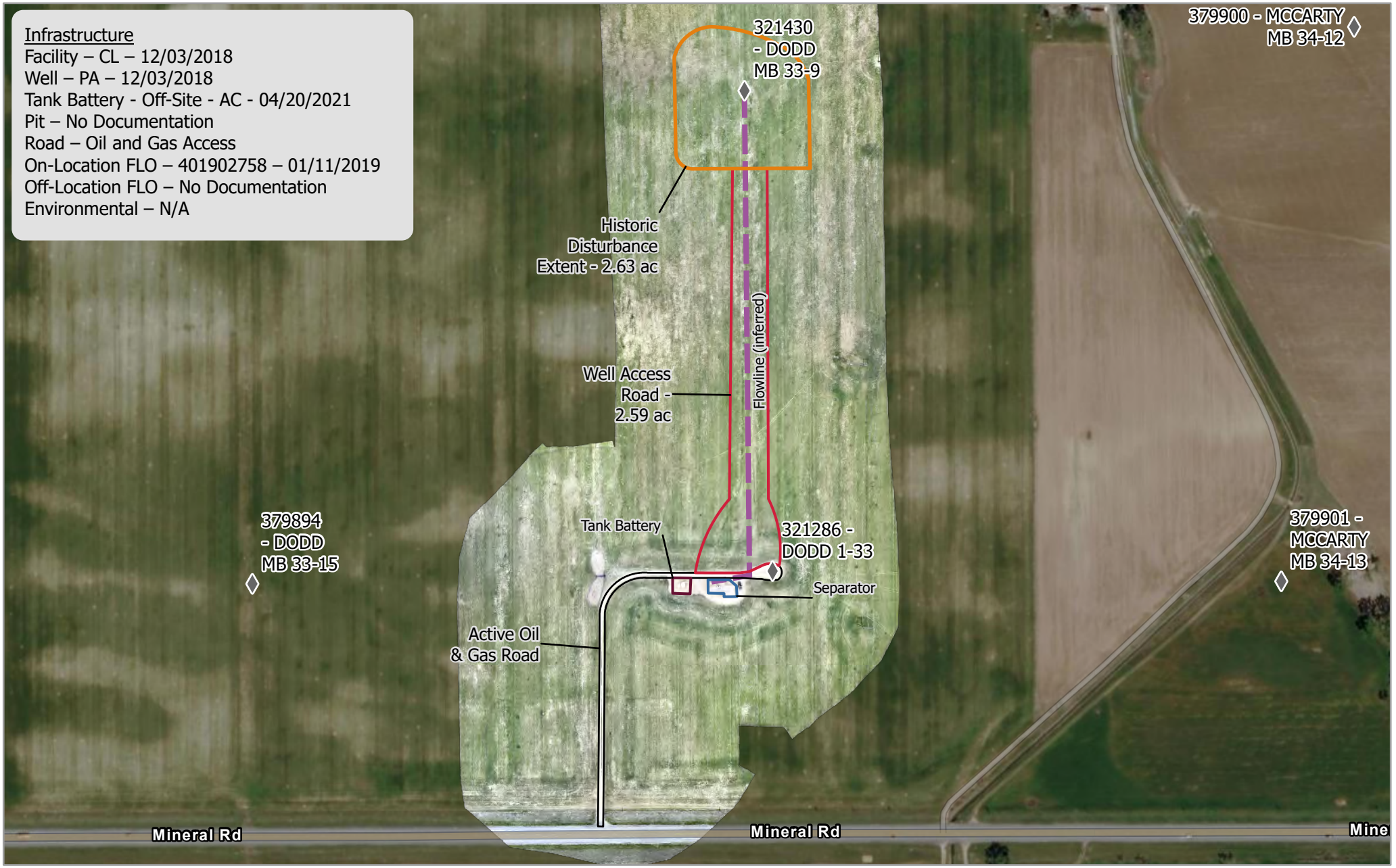
0 40 80 160 Meters

Total Disturbance:
5.22 Acres

Scale: 1:2,800

Pad Location:
40.092670
-105.114900

N



CIV - 321430- DODD MB 33-9
Map Extent - Access Road Overview

Imagery: RS Orthomosaic
Imagery Date: 19 May 2024
Map Date: 17 Sep 2024
Datum: WGS 1984 UTM Zone 13N
POC: Soil Sage

Wells
Flowline
Historic Disturbance Extent
Well Access Road
Active Oil & Gas Road
Tank Battery
Separator

0 60 120 240 Meters

Total Disturbance: 5.22 Acres
Scale: 1:4,000

Pad Location: 40.092670 -105.114900

N

Cardinal Directional Drone Photos & Reference Area Photos

Site Investigation and Photos Date

19 May 2024

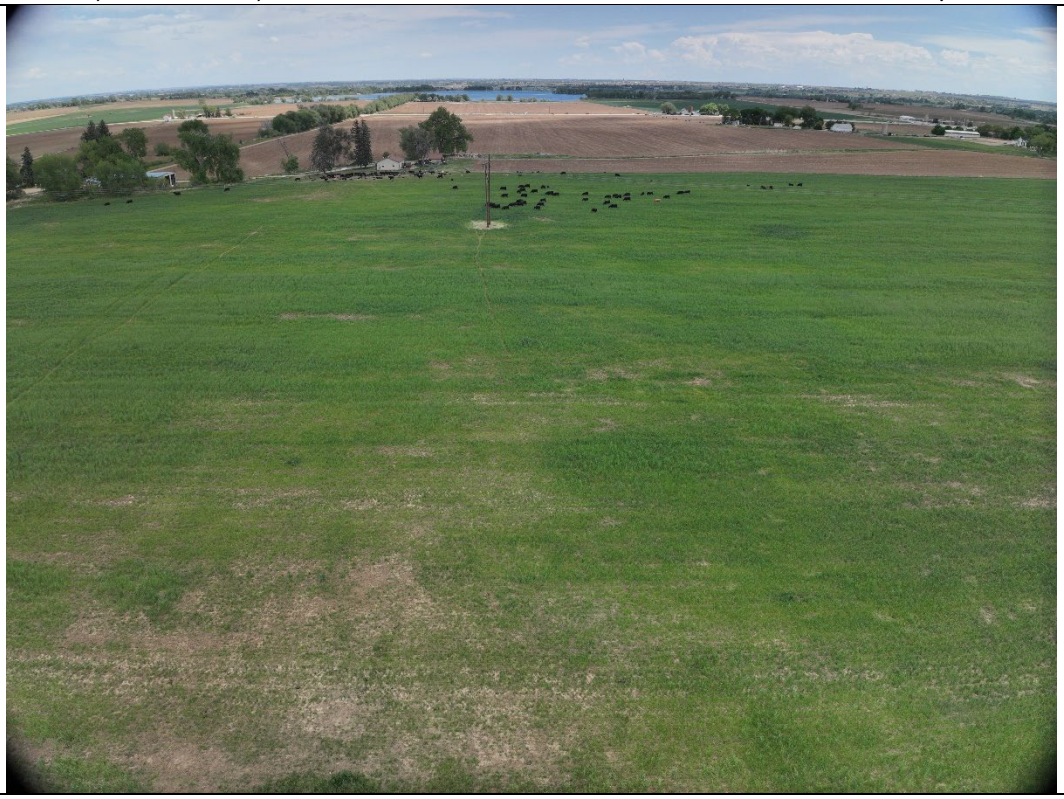
Drone Photo Height

200 feet

Cardinal directional photos of the site. Reference overview map.

In View – Well, Access Road, Flowline **NORTH** – 40.092095 / -105.115021

In View – Well, Access Road, Flowline **NORTH** – 40.089065 / -105.114826



In View – Well, Access Road, Flowline **EAST** – 40.092744 / -105.115808

In View – Tank Battery (Active Loc ID 460744), Access Road, Flowline **SOUTHEAST** – 40.088738 / -105.116677

In View – Well, Tank Battery (Active Loc ID 460744), Access Road, Flowline **SOUTH –** 40.093344 / -105.11493

In View – Well, Access Road, Flowline **WEST –** 40.092809 / -105.114164

In View – Cattle Pen West of Tank Battery **WEST –** 40.089246 / -105.115539

Well – Handheld Photographic Evidence

Site Investigation and Photos Date

19 May 2024

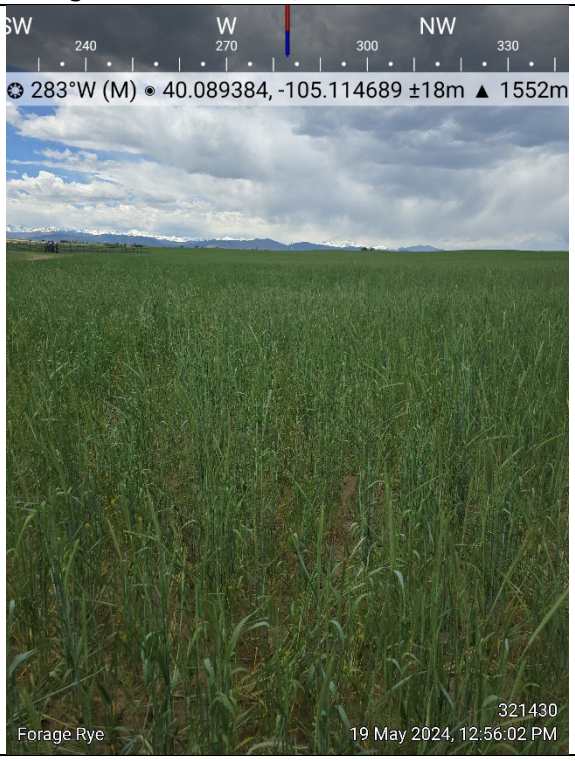
Handheld photos taken from Location ID 460744 to the south looking towards Location ID 321430, Dodd MB #33-9 wellhead. No handheld photos taken from Dodd MB #33-9 wellhead location due to crop height.

	
Forage Rye – 40.089226/-105.114695	Reference Forage Rye – 40.089251/-105.114694

Looking North – 40.08938/-105.114678

Looking East – 40.089389/-105.114677

Looking Southeast – 40.089251/-105.114677

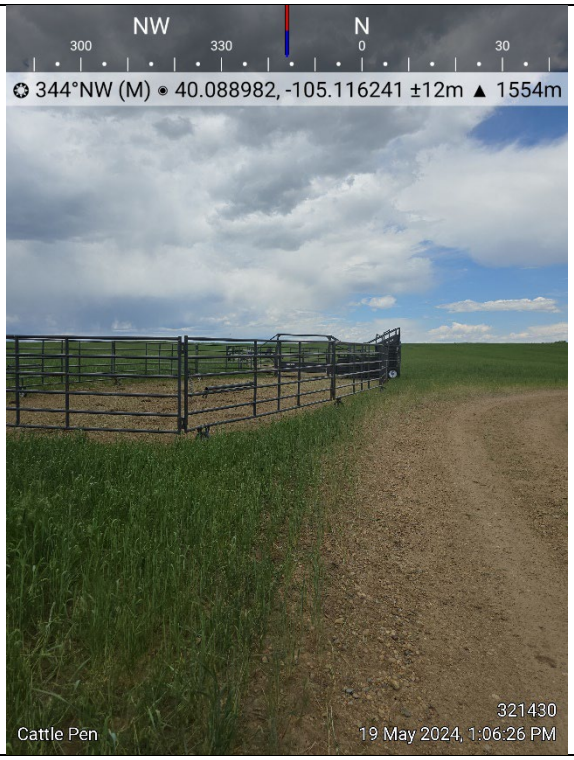


Looking West – 40.089384/-105.114689

Non-Oil & Gas Related Infrastructure – Handheld Photographic Evidence

Site Investigation and Photos Date

19 May 2024

	
Cattle Pen on Oil & Gas Access Road, west of Production Facilities – 40.088982 / -105.116241	

Cardinal Directional Drone Photos Showing No Equipment Remaining

Site Investigation and Photos Date
24 Jan 2024

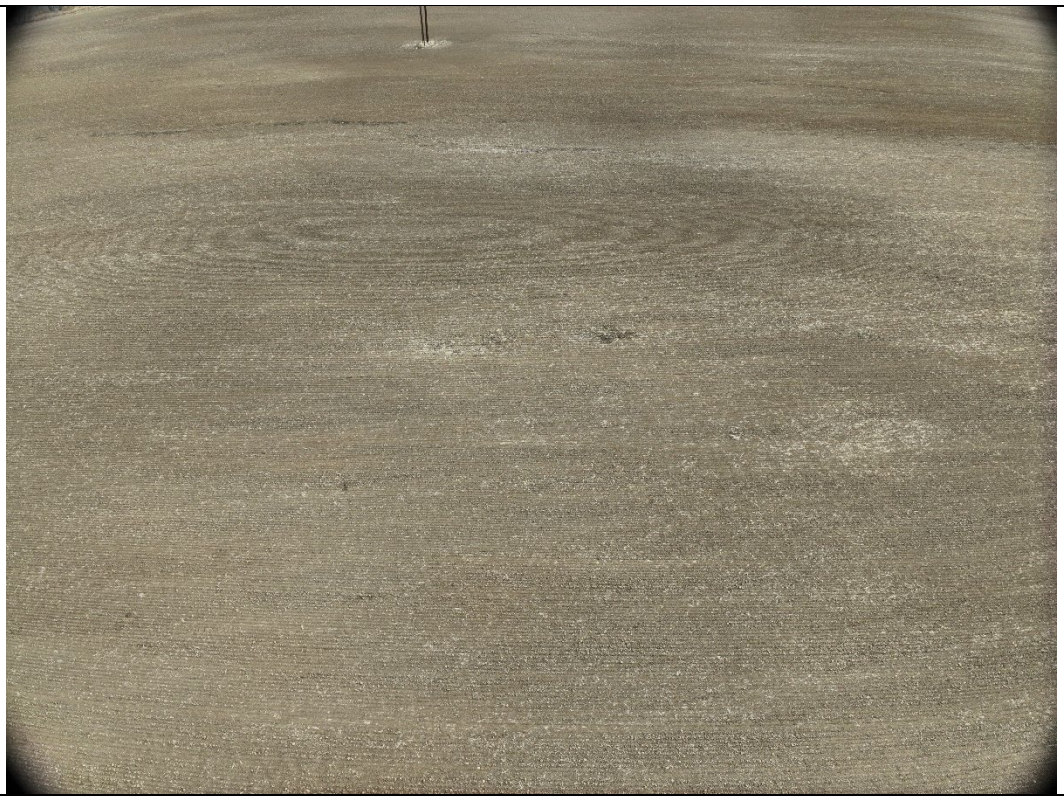
Drone Photo Height
100 feet

Cardinal directional photos of the site. Reference overview map.

In View – Well, Access Road, Flowline **NORTH** – 40.092281 / -105.114848

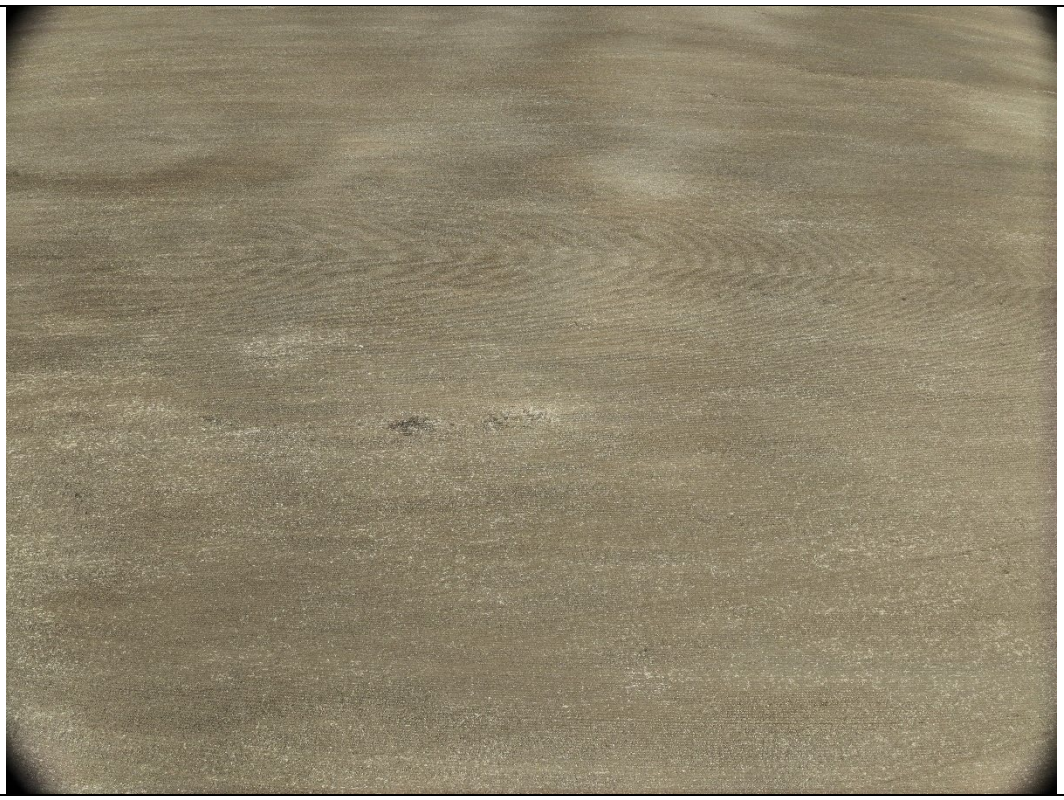
In View – Well, (Active Loc ID 460744), Access Road, Flowline **NORTH** – 40.088793 / -105.114984

In View – Well **NORTH** – 40.092500 / -105.114872



In View – Well, Access Road, Flowline **EAST** – 40.092631 / -105.115420

In View – Well, (Active Loc ID 460744), Access Road, Flowline **SOUTH** – 40.093319 / -105.114937



In View – Well, Access Road, Flowline **WEST** – 40.092725 / -105.114314

In View – Tank Battery (Active Loc ID 460744), Access Road, Flowline **NORTH** – 40.088676 / -105.115087

In View – Tank Battery (Active Loc ID 460744), Access Road, Flowline **EAST** – 40.089251 / -105.115873

In View – Tank Battery (Active Loc ID 460744), Access Road, Flowline **SOUTH** – 40.089895 / -105.115089

In View – Tank Battery (Active Loc ID 460744), Access Road, Flowline **WEST** – 40.089180 / -105.114140

ATTACHMENTS

Maps and Figures

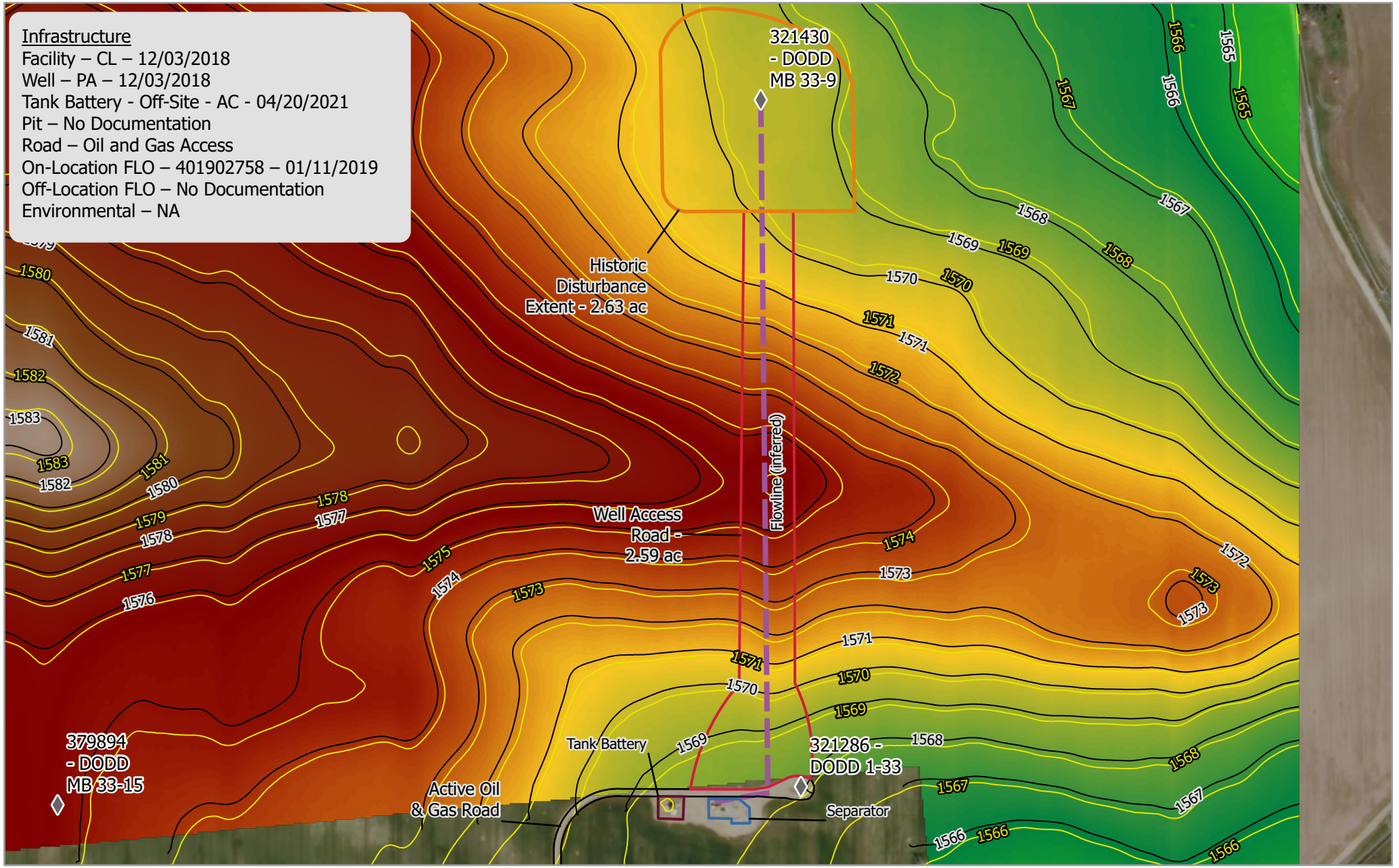
Area Maps

Elevation & Contours
Hydrology

Background Information

Natural Resources Conservation Service (NRCS) Map Unit Description

Reference Soil Document



CIV - 321430- DODD MB 33-9
Map Extent - Elevation & Contours

Imagery: USGS and DRCOG Elevation
Imagery Date: 2014, 2020
Map Date: 17 Sep 2024
Datum: WGS 1984 UTM Zone 13N
POC: Soil Sage

- Wells
- Flowline
- 1 Meter Contours (2020)
- 1 Meter Contours (2014)
- Historic Disturbance Extent
- Well Access Road
- Active Oil & Gas Road
- Tank Battery
- Separator

Elevation
Meters
1592
1555

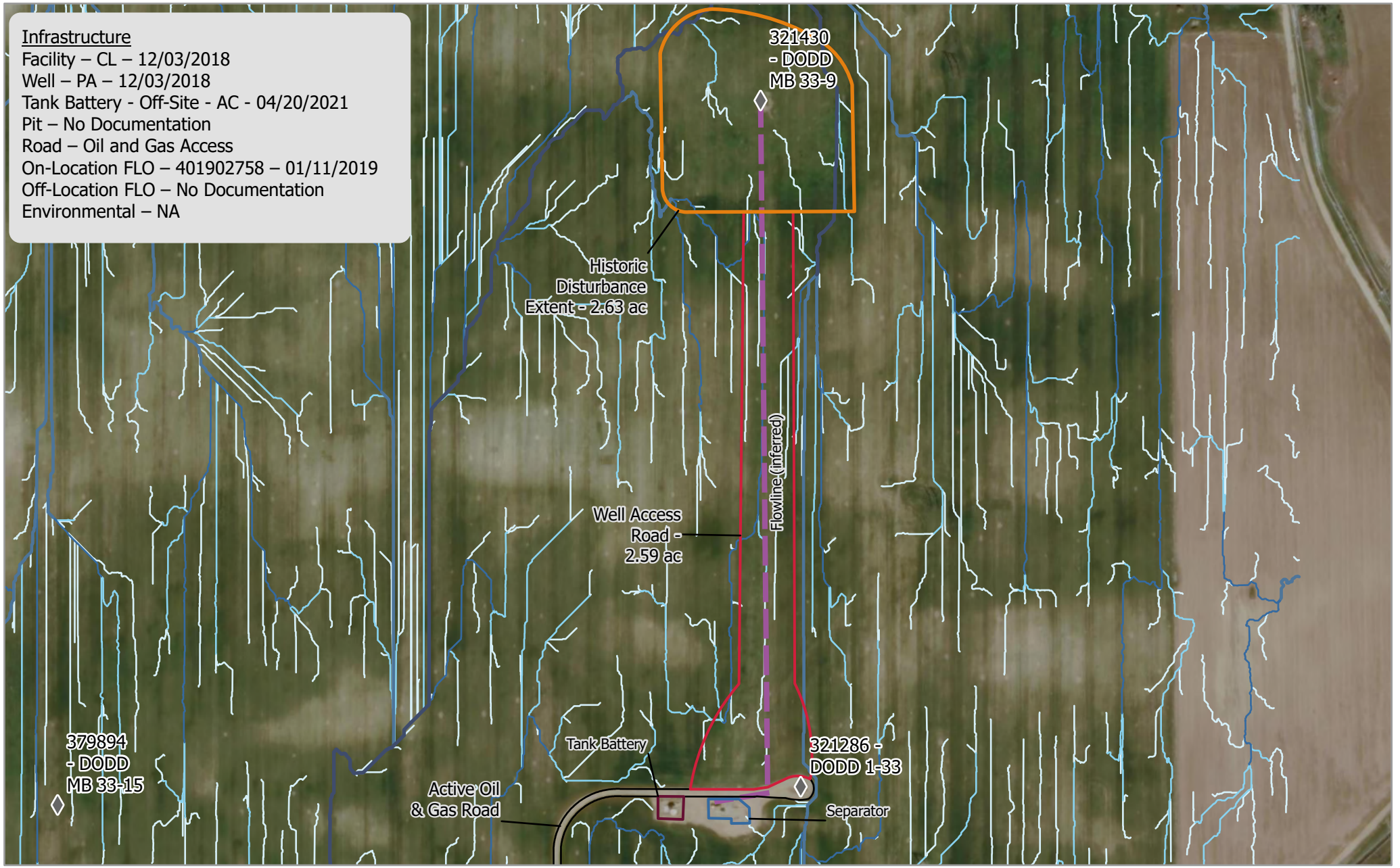
0 40 80 160 Meters

Total Disturbance:
5.22 Acres

Scale: 1:2,800

Pad Location:
40.092670
-105.114900

N



CIV - 321430- DODD MB 33-9
Map Extent - Hydrology

Imagery: DRCOG Elevation
Imagery Date: 2020
Map Date: 17 Sep 2024
Datum: WGS 1984 UTM Zone 13N
POC: Soil Sage

Wells
Flowline
Historic Disturbance Extent
Well Access Road
Active Oil & Gas Road
Tank Battery
Separator
Stream Order
1
2
3
4
5

0 40 80 160 Meters

Total Disturbance: 5.22 Acres
Scale: 1:2,800

Pad Location: 40.092670 -105.114900

N

Soil Properties

USDA Soil Description

Reference Soil Information

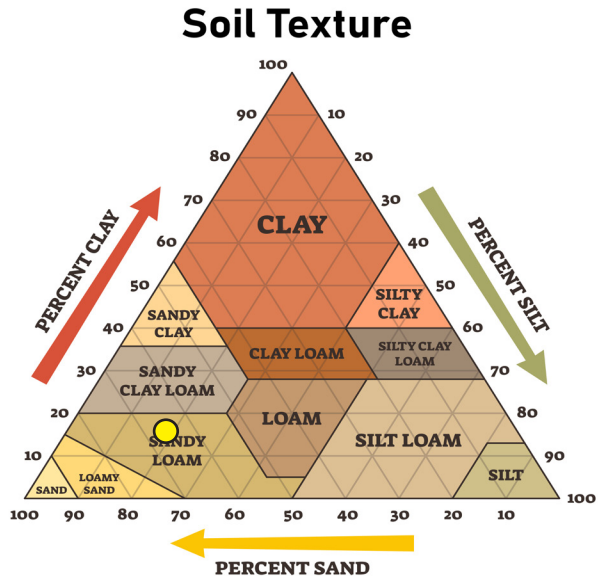
The location of the site is contained within four soil types, Ascalon Sandy Loam, Asalon-Otero Complex at two different slopes and Weld Loam.

Map Unit AcA Reference Soil information - Ascalon sandy loam

This soil is formed from wind-reworked alluvium and/or calcareous sandy eolian deposits. Landform is interfluves. Ecological Site Description is Sandy Plains. Soils are well-drained with a moderate water holding capacity, and slope 0 to 3 percent.

	Physical			Chemical			
Depth (in)	**Texture**	**Bulk Density**	**Particle Size Percent sand, silt, clay**	**pH**	**EC**	**SAR**	**OM%**
0-6	Sandy Loam	1.52	67-19-14	7.0	0.1	0.0	1.00
6-12	Sandy Clay Loam	1.51	57-18-25	7.2	0.1	0.0	0.60
12-19	Sandy Clay Loam	1.51	57-18-25	7.4	0.1	0.0	0.48
19-35	Sandy Clay Loam	1.48	62-15-23	8.2	0.1	0.0	0.22
35-80	Sandy Loam	1.62	75-11-14	8.2	0.1	0.0	0.10

Soil Texture Triangle reflect the 0-10 in depth



Erosion Potential (10 inches)

- K Factor, Whole soil - .20. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

- Wind Erodibility Group – 4L. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible.

Soil Properties

USDA Soil Description

Reference Soil Information

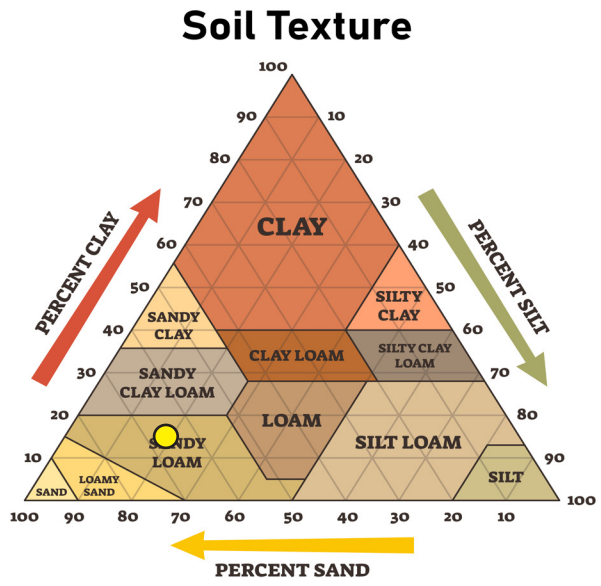
The location of the site is contained within four soil types, Ascalon Sandy Loam, Asalon-Otero Complex at two different slopes and Weld Loam.

Map Unit AoC Reference Soil information - Ascalon-Otero complex

This soil is formed from wind-reworked alluvium and/or calcareous sandy eolian deposits. Landform is interfluves. Ecological Site Description is Sandy Plains. Soils are well-drained with a moderate water holding capacity, and slope 3 to 5 percent.

	Physical			Chemical			
Depth (in)	**Texture**	**Bulk Density**	**Particle Size Percent sand, silt, clay**	**pH**	**EC**	**SAR**	**OM%**
0-8	Sandy Loam	1.54	67-19-14	7.0	0.1	0.0	1.00
8-12	Sandy Clay Loam	1.59	57-18-25	7.2	0.1	0.0	0.60
12-19	Sandy Clay Loam	1.60	57-18-25	7.4	0.1	0.0	0.48
19-26	Sandy Loam	1.72	65-21-14	8.2	0.1	0.0	0.10
26-80	Sandy Loam	1.73	75-11-14	8.2	0.1	0.0	0.10

Soil Texture Triangle reflect the 0-10 in depth



Erosion Potential (10 inches)

- K Factor, Whole soil - .20. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

- Wind Erodibility Group – 3. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible.

Soil Properties

USDA Soil Description

Reference Soil Information

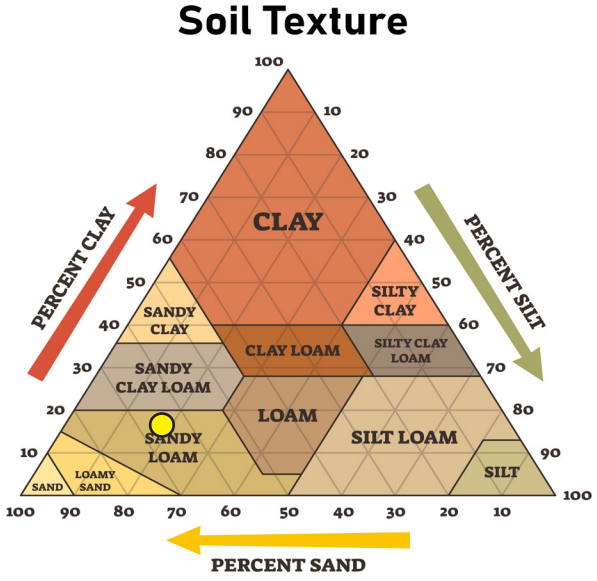
The location of the site is contained within four soil types, Ascalon Sandy Loam, Asalon-Otero Complex at two different slopes and Weld Loam.

Map Unit AoD Reference Soil information - Ascalon-Otero complex

This soil is formed from wind-reworked alluvium and/or calcareous sandy eolian deposits. Landform is interfluves. Ecological Site Description is Sandy Plains. Soils are well-drained with a moderate water holding capacity, and slope 5 to 7 percent.

	Physical			Chemical			
Depth (in)	**Texture**	**Bulk Density**	**Particle Size Percent sand, silt, clay**	**pH**	**EC**	**SAR**	**OM%**
0-8	Sandy Loam	1.54	67-19-14	7.0	0.1	0.0	1.00
8-12	Sandy Clay Loam	1.59	57-18-25	7.2	0.1	0.0	0.60
12-19	Sandy Clay Loam	1.60	57-18-25	7.4	0.1	0.0	0.48
19-26	Sandy Loam	1.72	65-21-14	8.2	0.1	0.0	0.10
26-80	Sandy Loam	1.73	75-11-14	8.2	0.1	0.0	0.10

Soil Texture Triangle reflect the 0-10 in depth



Erosion Potential (10 inches)

- K Factor, Whole soil - .20. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

- Wind Erodibility Group – 3. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible.

Soil Properties

USDA Soil Description

Reference Soil Information

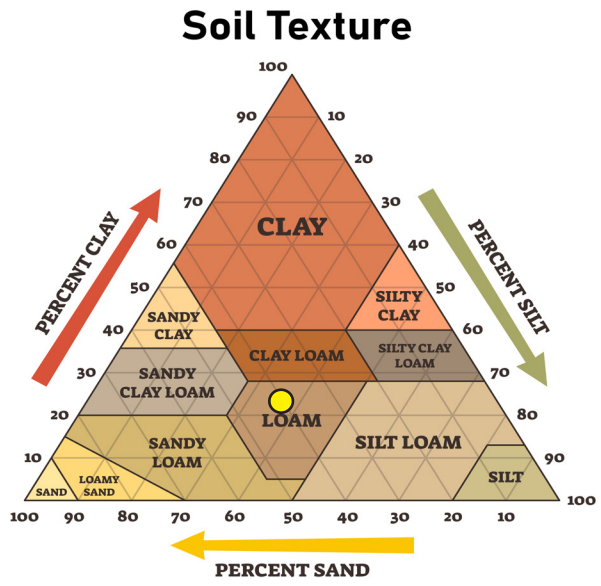
The location of the site is contained within four soil types, Ascalon Sandy Loam, Asalon-Otero Complex at two different slopes and Weld Loam.

Map Unit WIB Reference Soil information - Weld loam

This soil is formed from calcareous loess. Landform is interfluves. Ecological Site Description is Loamy Plains. Soils are well-drained with a high water holding capacity, and slope 1 to 3 percent.

	Physical			Chemical			
Depth (in)	**Texture**	**Bulk Density**	**Particle Size Percent sand, silt, clay**	**pH**	**EC**	**SAR**	**OM%**
0-8	Loam	1.46	40-38-23	7.0	0.1	0.0	2.00
8-12	Clay	1.34	29-30-42	7.4	0.1	0.0	1.60
12-15	Clay Loam	1.36	31-31-38	7.6	0.1	0.0	1.00
15-28	Loam	1.48	38-36-26	8.3	0.1	0.0	0.50
28-60	Silt Loam	1.48	26-52-22	8.5	0.5	0.0	0.25
60-80	Silt Loam	1.48	27-54-19	8.5	0.5	0.0	0.10

Soil Texture Triangle reflect the 0-10 in depth



Erosion Potential (10 inches)

- K Factor, Whole soil - .43. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

- Wind Erodibility Group – 6. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible.

Soil Reference Information

There is a general relationship of soil bulk density to root growth based on soil texture. Bulk densities ideal for root growth are less than 1.60 g/cc for sandy textures, less than 1.40 g/cc for loamy textures, and less than 1.10 g/cc for clayey textures. Bulk densities that restrict root growth are greater than 1.80 g/cc for sandy textures, 1.65 g/cc for loamy textures, and 1.47 g/cc for clayey textures.

Vegetation

Reference vegetation – Sandy Plains Ecology

Climate

Average Annual Precipitation 14 to 17 inches annually - average 15 inches

Average Annual Air Temperature ranges from 50 to 52 degrees F

Drought conditions in effect

Long-term effects of these latest drought events have yet to be determined. Growth of native cool-season plants begin about April 1 and continue to mid-June. Native warm-season plants begin growth about May 1 and continue to about August 15. Regrowth of cool-season plants occur in September in most years, depending on moisture.

Reference dynamics

The Reference State is characterized by 70-85% grasses and grass-like plants, 10-15% forbs, and 5-15% woody plants. The dominant tall warm season grasses are prairie sandreed, sand bluestem and switchgrass. Blue grama dominates the understory. Important cool season grasses and grass-likes are needle and thread and sun sedge. Key forbs and shrubs are American vetch, pacific peavine (manystem pea), purple prairie clover, and spreading buckwheat.

Drought has increased mortality of blue grama in some locations.

Well suited for carbon sequestration.

Reference Vegetation – Sandy Plains Ecology

At Risk Plant Community

Key species from the Reference Plant Community, sand bluestem, prairie sandreed, switchgrass, leadplant and western sandcherry have decreased in frequency and production. Blue grama has increased. Sand dropseed, Fendler threeawn, hairy goldaster, croton, slimflower scurfpea, western ragweed, stickleaf, heath aster, lupine, loco, milkvetch and plains pricklypear cactus have increased. Soils that have a sandy loam or coarser subsoil will show an increase in sand sagebrush.

The risk of losing key warm-season tallgrasses, important forbs and shrubs is a major concern. Blue grama is increasing at the expense of the tallgrasses and deep-rooted shrubs. Water cycle, nutrient cycle and energy flow may become impaired due to a shift in root structure and species composition. Less litter is being produced.

Vegetation

Sandy Plains Ecosystem Vegetative Community Composition

Common Name	Scientific Name
Blue Grama	*Bouteloua gracilis*
Prairie Sandreed	*Calamovilfa longifolia*
Sand Bluestem	*Andropogon hallii*
Switchgrass	*Panicum virgatum*
Needle and Thread	*Hesperostipa comata*
Western Wheatgrass	*Pascopyrum smithii*
Little Bluestem	*Schizachyrium scoparium*
Indiangrass	*Sorghastrum nutans*
Sideoats Grama	*Bouteloua curtipendula*
Sand Dropseed	*Sporobolus cryptandrus*
Indian Ricegrass	*Achnatherum hymenoides*
Buffalograss	*Bouteloua dactyloides*
Thin Paspalum	*Paspalum setaceum*
Purple Prairie Clover	*Dalea purpurea*
Upright Prairie Coneflower	*Ratibida columnifera*
Scarlet Globemallow	*Sphaeralcea coccinea*
American Vetch	*Vicia americana*
White Heath Aster	*Symphyotrichum ericoides*
Winged Buckwheat	*Eriogonum alatum*
White sagebrush	*Artemisia ludoviciana*

Vegetation

Reference vegetation – Loamy Plains Ecology

Climate

Average Annual Precipitation 14 to 17 inches annually

Average Annual Air Temperature 50 degrees F

Drought conditions in effect

Long-term effects of these latest drought events have yet to be determined. Growth of native cool-season plants begin about April 1 and continue to mid-June. Native warm-season plants begin growth about May 1 and continue to about August 15. Regrowth of cool-season plants occur in September in most years, depending on moisture.

Reference dynamics

The Reference State is characterized by co-dominant warm-season shortgrass (blue grama), and cool-season midgrass (western wheatgrass, green needlegrass). The Warm-Season Shortgrass State is characterized by a warm-season short bunchgrass (blue grama) and stoloniferous grass (buffalograss). The Increased Bare Ground State is characterized by early successional warm-season bunchgrass (Fendler threeawn), cool-season short bunchgrass (squirreltail), annual grasses, and annual forbs.

Drought has increased mortality of blue grama and buffalo grasses in some locations

The major grasses in the Reference Plant Community include western wheatgrass, green needlegrass, and blue grama. Western wheatgrass is a major cool-season grass in this plant community and is a valuable forage plant in late spring and/or early summer. Sub-dominant grasses include needle and thread, buffalograss, and sand dropseed. Major forbs include American vetch, upright prairie coneflower, scarlet globemallow, and dotted blazingstar (dotted gayfeather). A minor amount of shrubs such as fourwing saltbush and winterfat may also occur.

Well suited for carbon sequestration

Vegetation

Reference Vegetation – Loamy Plains Ecology

At Risk Plant Community

Key species from the Reference Plant Community, such as green needlegrass, western wheatgrass, American vetch, fourwing saltbush, and winterfat have been reduced in production. Blue grama and buffalograss have increased in abundance, are beginning to dominate the community, and will begin to exhibit a sod-bound appearance. Sand dropseed, red threeawn, sixweeks fescue, plains pricklypear, hairy false goldenaster, and bottlebrush squirreltail also have increased. This plant community is at risk of losing the cool-season grasses, key forbs such as American vetch and purple prairie clover, and key shrubs.

Total aboveground biomass has been reduced. Reduction of rhizomatous wheatgrass, nitrogen-fixing forbs, and the shrub component, and increased warm-season shortgrasses have begun to alter the biotic integrity of this community. Water and nutrient cycles may be impaired.

Loamy Plains Ecosystem Vegetative Community Composition

Common Name	Scientific Name
Western Wheatgrass	*Pascopyrum smithii*
Green Needlegrass	*Nassella viridula*
Indian Ricegrass	*Achnatherum hymenoides*
Needle and Thread	*Hesperostipa comata*
Blue Grama	*Bouteloua gracilis*
Buffalograss	*Bouteloua dactyloides*
Sand Dropseed	*Sporobolus cryptandrus*
Sideoats Grama	*Bouteloua curtipendula*
Little Bluestem	*Schizachyrium scoparium*
Little Barley	*Hordeum pusillum*
Sixweeks Fescue	*Vulpia octoflora*
American Vetch	*Vicia americana*
Purple Prairie Clover	*Dalea purpurea var. purpurea*
White Locoweed	*Oxytropis sericea*
Slimflower Scurfpea	*Psoralidium tenuiflorum*
Scarlet Globemallow	*Sphaeralcea coccinea*
Broadbeard Beardtongue	*Penstemon angustifolius*
Lacy Tansyaster	*Machaeranthera pinnatifida ssp. pinnatifida var. pinnatifida*
Dotted Blazing Star	*Liatris punctata*
Upright Prairie Coneflower	*Ratívida columnifera*
Rush Skeletonplant	*Lygodesmia juncea*