

SITE-SPECIFIC QUALITY ASSURANCE & QUALITY CONTROL AUDIT



Permit Closure Type – Final

PERMIT CLOSURE REPORT – RANGELAND

Location ID 423225

Location Name State Whitetail 44-1

Report Date

6 September 2023

Soil Sage has conducted a thorough data audit as part of our Quality Assurance and Quality Control (QA/QC) protocols. The audit revealed this site has gone through a land use change.

Initial Job Assignment

Client	CIVITAS Resources
Work Assignment	Civitas Monitoring
Date	6 Dec 2022

Quality Assurance & Quality Control Audit

Auditor	Soil Sage
Audit Date	24 Jul 2023

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	State Whitetail 44-1		
Location ID	423225		
Operator / #	BONANZA CREEK ENERGY OPERATING COMPANY LLC / 8960		
Field	WATTENBERG / 90750		
County, State	WELD, CO		
Lat/Long	40.511170 / -104.263390		
	Planned Location	X	As Drilled
Facility Status	CL	Location	SESE 1 6N62W
Facility Status Date	01/07/2015	Access Road	Oil & Gas Access
Facility Entities	Tank Battery		Pits
	X Wells		Off-Location Flowlines (Form 44)
	Domestic Taps		On-Location Flowlines (Form 42)
Equipment Remaining on Site	X None		Debris or Non-Oil & Gas
	List of Equipment:		
Environment Incidents & Remediation	X None		Spill or Release (Form 19)
	Remediation (Form 27/27A)		
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)	No Form 4s were detected during the QA & QC Audit.		
On Location Flowlines (Form 42)	No Form 42s were detected during the QA & QC Audit.		
Off-Location Flowlines (Form 44)	No Form 44s were detected during the QA & QC Audit.		
Field Inspection Form (Form INSP)	No Field Inspection Forms were detected during the QA & QC Audit.		
COGIS Tank Facilities Information (Scout Card)	No Tank Battery documents were detected during this QA/QC Audit.		
COGIS Well Information (Scout Card)	<p>Well Name: State Whitetail #44-1</p> <p>API#: 05-123-33540</p> <p>FACILITY ID: 423221</p> <ul style="list-style-type: none"> ○ Status & Date: PA & 01/07/2015 		

	<ul style="list-style-type: none"> ○ Lat/Long As Drilled: 40.511170 / -104.263390 ○ Form 6 Doc # & Date: 400832235 & 07/07/2016
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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: USDA NAIP 2011	Remotely Sensed Imagery: 17 May 2023
Designation: Oil & Gas Facility	Designation: Rangeland

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

Closure Information

Well State Whitetail #44-1 was drilled and surface casing was set, but the well was never drilled any deeper, according to Form 5 Doc #[2587516](#).

ATTACHMENTS

Documents

Recommendation

Maps and Figures

Area Maps

Previous Infrastructure Overview

Current Site Overview

Elevation & Contours

Slope

Hydrology

NAIP NDVI Composite

NDVI

NDRE

Background Information

Natural Resources Conservation Service (NRCS) Map Unit Description

Reference Soil Document

Recommendations

Monitoring Change Over Time

Location ID – 423225 State Whitetail 44-1

Date of Sampling – 17 May 2023

Vegetation Ecological Analysis

Observation Point	Bare Ground	Grass	Forbs	Shrubs	Litter	Weeds	Field Notes
Well Recovery	40	25	0	0	35	0	Pad area has ant hills and cactus. It is similar to surrounding bare areas.
Road Recovery	40	20	20	0	20	0	Forbs are cactus
Reference	10	30	20	0	40	0	Dry, low veg, and cactus

Vegetation Indices

Vegetation Indices NDVI and NDRE are provided as reference information. The disturbance extent and reference extents that fall within the same soil types. Typical land use was observed in this area with similar vegetation properties.

Recommendation

Due to the presence of weeds in the reclaim extent that exceeds the percentage of observed weeds in the reference extent, apply herbicide to the reclaim extent to target the presence of Russian thistle, sunflowers, Western Ragweed and Western Tansy Mustard. After herbicide has successfully killed weedy species, interseed the area with the recommended seed mix. While the seed mix is getting established, continue to monitor weed pressure and spray as needed.

Reference Extent Vegetation Observations

Percent cover is determined using random sampling methods within the vegetation extent and using a sampling hoop of 0.5 sq meters in size.

Native or Endemic in the surrounding area

Common Name	Scientific Name	Percentage
Prickly Pear Cactus	<i>Opuntia</i> spp.	20%
Needle and Thread	<i>Hesperostipa comata</i>	30%

Recovery Extent Vegetation Observations

Native or Endemic

Common Name	Scientific Name	Percentage
Prickly Pear Cactus	<i>Opuntia</i> spp.	20%
Needle and Thread	<i>Hesperostipa comata</i>	25%

Weed Summary Reference

No weeds were found in the reference area.

Weed Summary Recovery

No weeds were found in the recovery area.

Weed Inventory Criteria

- Each site is assessed for noxious weeds and common weeds.
- Data are aggregated using point locations coupled with percent cover assessments and area measurements as needed.
- Governance - Colorado Department of Agriculture - Colorado Noxious Weeds List, effective October 2020
- List A - Designated for eradication, List B - Designed to stop the continued spread, List C - Facilitate more integrated effective weed management, Watch List - Determined to pose a potential threat to agriculture and natural productivity.
- Common - designates weeds that do not fall within the Colorado Department of Agriculture lists.
- Other - designates other identified weeds at the site.

Weed Pressure

At the time of the site inspection no weed pressure in reclaim extent and reference extent was observed.

Hydrology

Hydrology – Stream Orders 1 – 5 are present - dominant streams are orders are 1, 2 and 3. Order 3-5 are present in locations that have the potential for soil erosion represented by gullying and riling that follow the elevation gradient from high to low within the current reclaim extent. These could be major runoff areas for gullying and soil erosion with heavy precipitation events. The soil texture in the area is primarily a fin sandy loam. Stream flow is primarily from east to west along the elevation gradient. Contour lines do not indicate a disruption to the landscape in the reclaim extent.

Ponding - potential ponding can occur where water follows the elevation gradients in low lying areas primarily to the south of the existing disturbance extent where the gradient is lower. The flow direction is from North to South to a natural landscape depression.

Soil/Erosion

Exposed soils have low susceptibility to water erosion and in the moderately high susceptible group for wind erosion due to ecosystem dynamics and vegetative cover.

Site Recommendation and Re-Evaluation

This site statically does meet the revegetation target rate for the disturbance and road extents. The reclaim area vegetation cover is 45% and the reference extent cover is 50%. Target recovery is 35%.

Recommend for this site for closure.

Seed Mix

Vegetation Seed Mix

No additional reclamation procedures are recommended at this time.

Seed mix provided as reference for the ecological dynamics of the area.

Sandy Plains Ecosystem

	Common Name	Scientific Name	#PLS/acre	% of Mix
Grasses	Blue Grama	<i>Bouteloua gracilis</i>	2.0	8.3
	Prairie Sandreed	<i>Calamovilfa longifolia</i>	3.0	12.5
	Sand Bluestem	<i>Andropogon hallii</i>	4.0	16.7
	Switchgrass	<i>Panicum virgatum L.</i>	2.0	8.3
	Needle and Thread	<i>Hesperostipa comata</i>	0.2	0.8
	Western Wheatgrass	<i>Pascopyrum smithii</i>	5.0	20.8
	Sideoats Grama	<i>Bouteloua curtipendula</i>	2.0	8.3
Forbs/Legumes	Purple Prairie Clover	<i>Dalea purpurea</i>	0.2	0.8
	Scarlet Globemallow	<i>Sphaeralcea coccinea</i>	0.1	0.4
	Buckwheat	<i>Eriogonum spp.</i>	5.0	20.8
	Fourwing Saltbrush	<i>Atriplex canescens</i>	0.5	2.1
Total			24.0	100.0

NOTE: The above seed mix is based on the soil type and landscape position. The surrounding area has similar soil properties, and this seed mix is subject to change based on land use type.

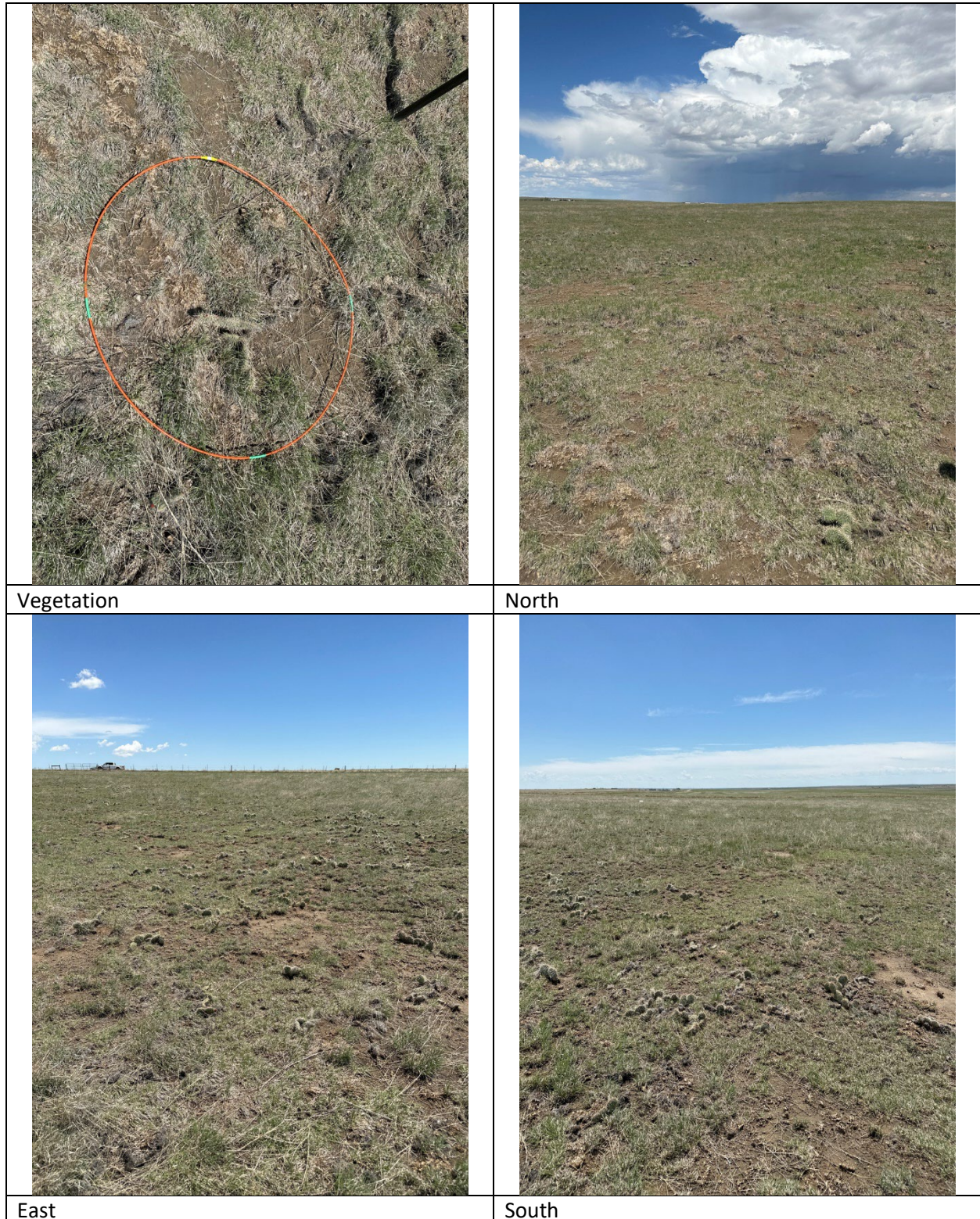
Reclaim Area Protocol

Time Frame	Activity	Specifications	Site Totals
May 2023	Monitoring	No actions	
Fall 2023	Recommend for Closure		

Site Photos

Reference



40.510934 / -104.262235



Soil Sage





	
West	

Native or Endemic

	
Prickly Pear Cactus – <i>Opuntia</i> spp. and Needle and Thread – <i>Hesperostipa comata</i>	Needle and Thread – <i>Hesperostipa comata</i>

Recovery – Well Pad

40.511210 / -104.263371

	
Vegetation	North
	
East	South

Soil Sage



West





Native or Endemic



Needle and Thread – *Hesperostipa comata*

Recovery – Access Road



40.511168 / -104.262570

 A close-up photograph of the soil sage vegetation. A circular area is highlighted with a red and green border, showing a dense cluster of green, needle-like plants growing in a sandy, brown soil. A black pole is visible in the upper right corner of the frame.	 A wide-angle photograph looking north across a flat, open field. The ground is covered with sparse, low-lying green vegetation and patches of brown soil. The horizon is flat, and the sky is blue with scattered white clouds.
Vegetation	North
 A wide-angle photograph looking east across the field. The terrain is flat with sparse green vegetation and brown soil. In the distance, a few small structures and a fence line are visible on the horizon under a clear blue sky.	 A wide-angle photograph looking south across the field. The landscape is flat with sparse green vegetation and brown soil. The horizon is flat, and the sky is blue with a few wispy clouds.
East	South

Soil Sage

	
West	

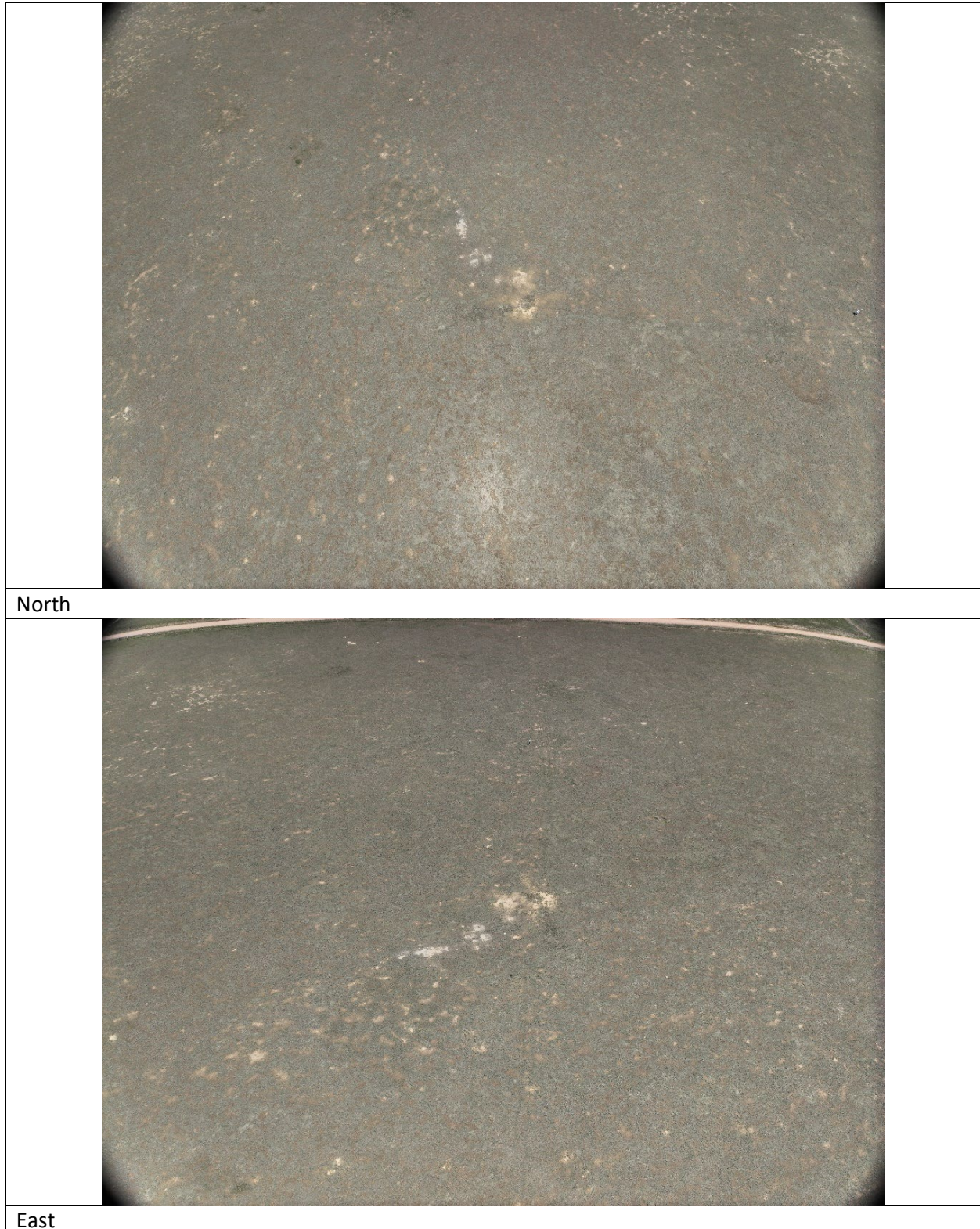
Native or Endemic

	
Prickly Pear Cactus – <i>Opuntia</i> spp.	Needle and Thread – <i>Hesperostipa comata</i>

Site Overview Photos

Date – 17 May 2023

Cardinal Direction – in order from NESW



Soil Sage



South



West

Site Overview Photos

Date – 07 Sep 2022

Cardinal Direction – in order from NESW



North



East

Soil Sage



South

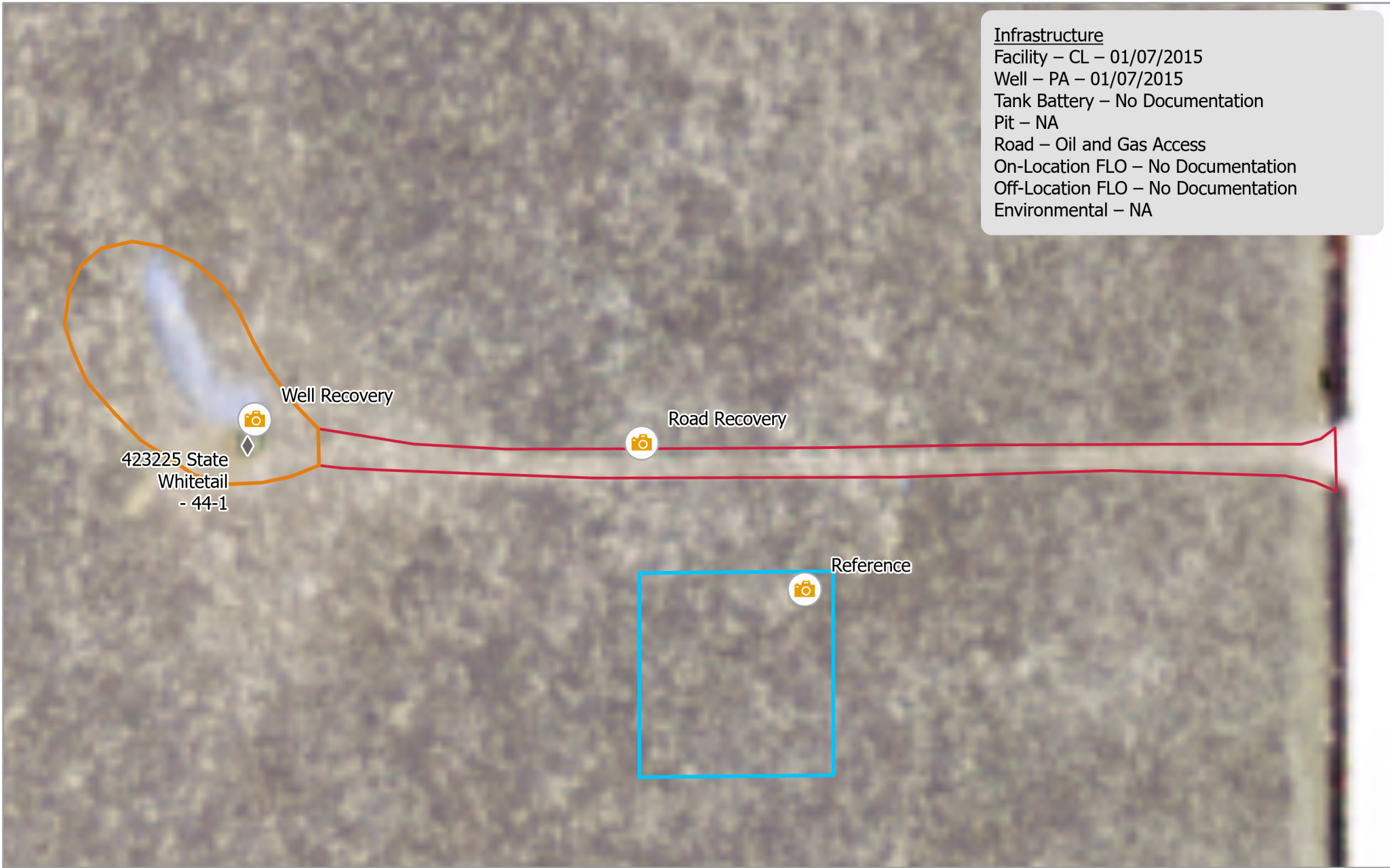


West

Soil Sage



Overhead



Infrastructure
Facility – CL – 01/07/2015
Well – PA – 01/07/2015
Tank Battery – No Documentation
Pit – NA
Road – Oil and Gas Access
On-Location FLO – No Documentation
Off-Location FLO – No Documentation
Environmental – NA

CIV - 423225- State Whitetail 44-1
Map Extent - USDA NAIP 2011

Imagery: USDA NAIP
Imagery Date: 03 Jul 2011
Map Date: 01 Aug 2023
Datum: WGS 1984 UTM Zone 13N
POC: Soil Sage

Legend

- | | |
|--------------------|--------------------|
| Wells | Disturbance Extent |
| Observation Points | Access Road Extent |
| | Reference Extent |

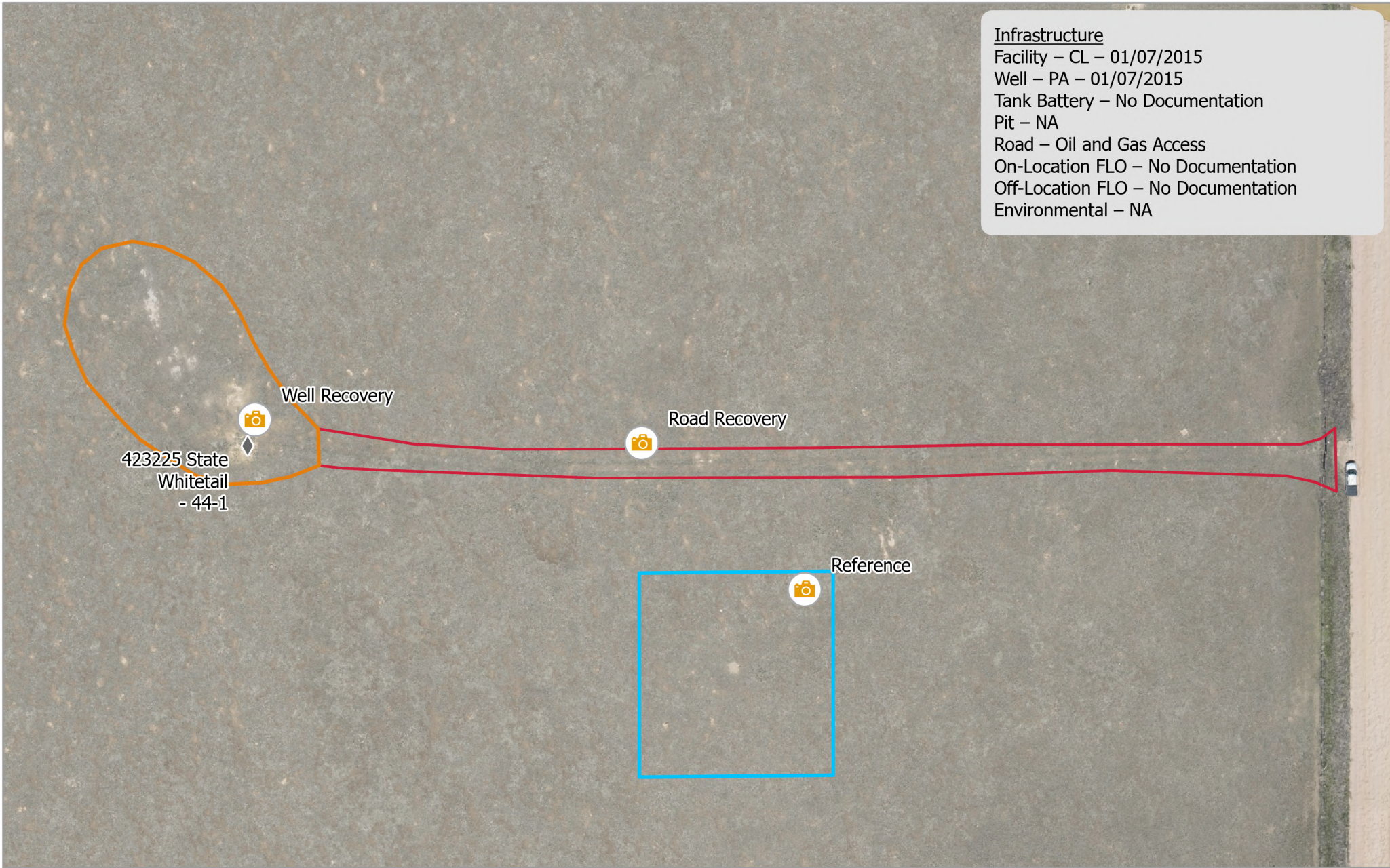
0 25 50 Meters

Scale: 1:900

Pad Location:
40.511170
-104.263390



Service Credits - Mapbox, Microsoft



Infrastructure
Facility – CL – 01/07/2015
Well – PA – 01/07/2015
Tank Battery – No Documentation
Pit – NA
Road – Oil and Gas Access
On-Location FLO – No Documentation
Off-Location FLO – No Documentation
Environmental – NA

CIV - 423225- State Whitetail 44-1
Map Extent - Overview

Imagery: RS Orthomosaic & DSM
Imagery Date: 17 May 2023
Map Date: 01 Aug 2023
Datum: WGS 1984 UTM Zone 13N
POC: Soil Sage

Legend

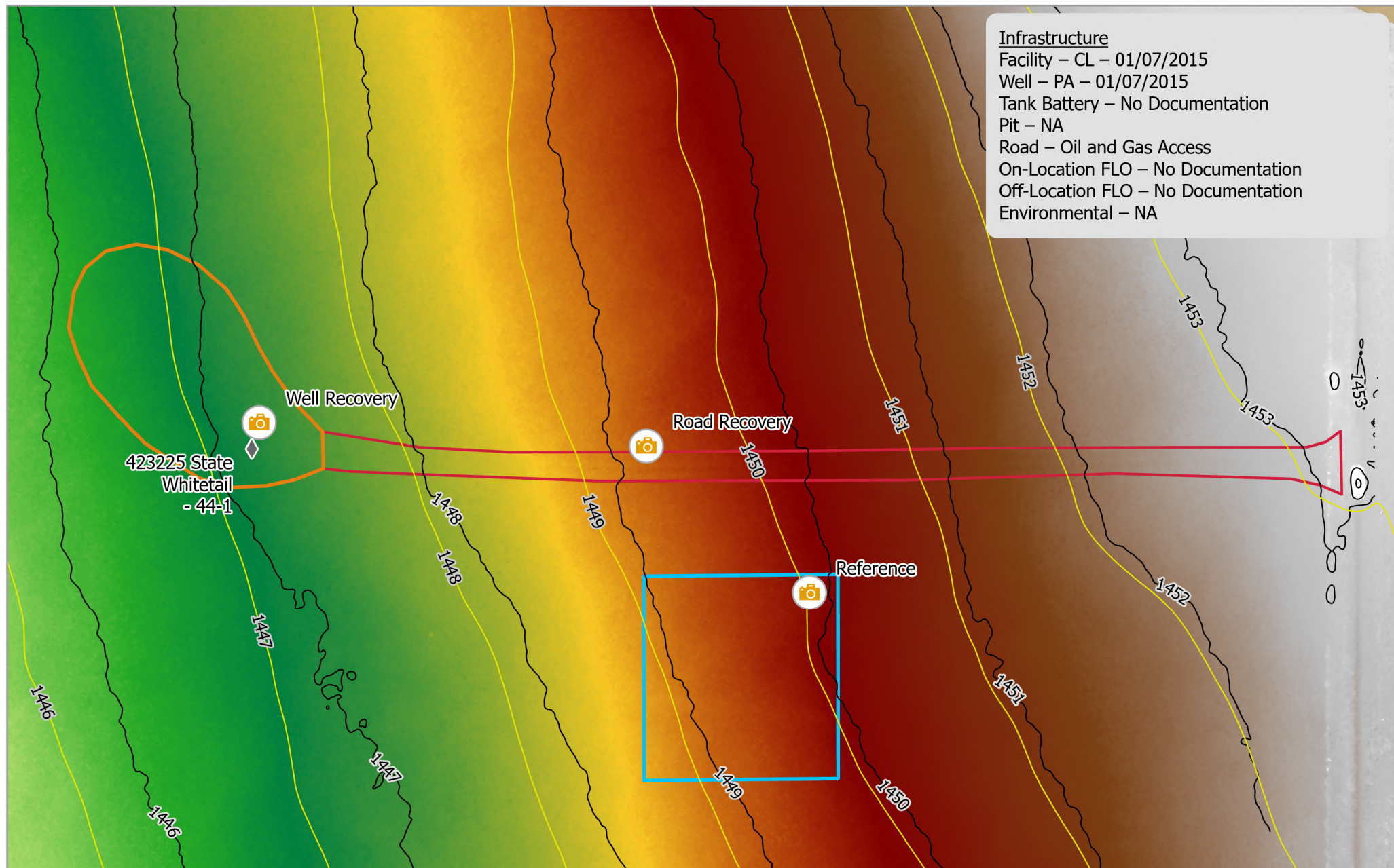
- | | |
|----------------------|--------------------|
| ◆ Wells | Disturbance Extent |
| 📷 Observation Points | Access Road Extent |
| | Reference Extent |

0 25 50 Meters

Total Disturbance:
0.52 Acres
Scale: 1:900

Pad Location:
40.511170
-104.263390

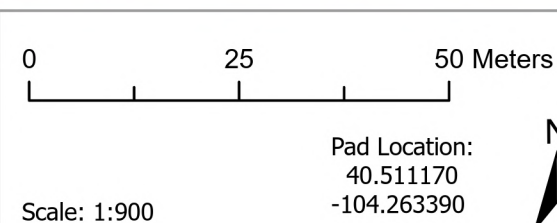
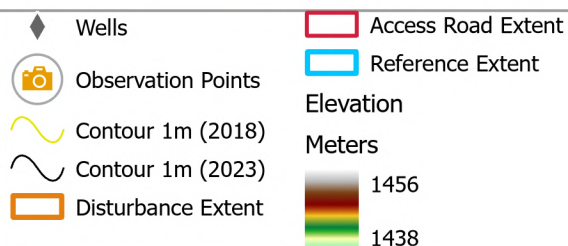


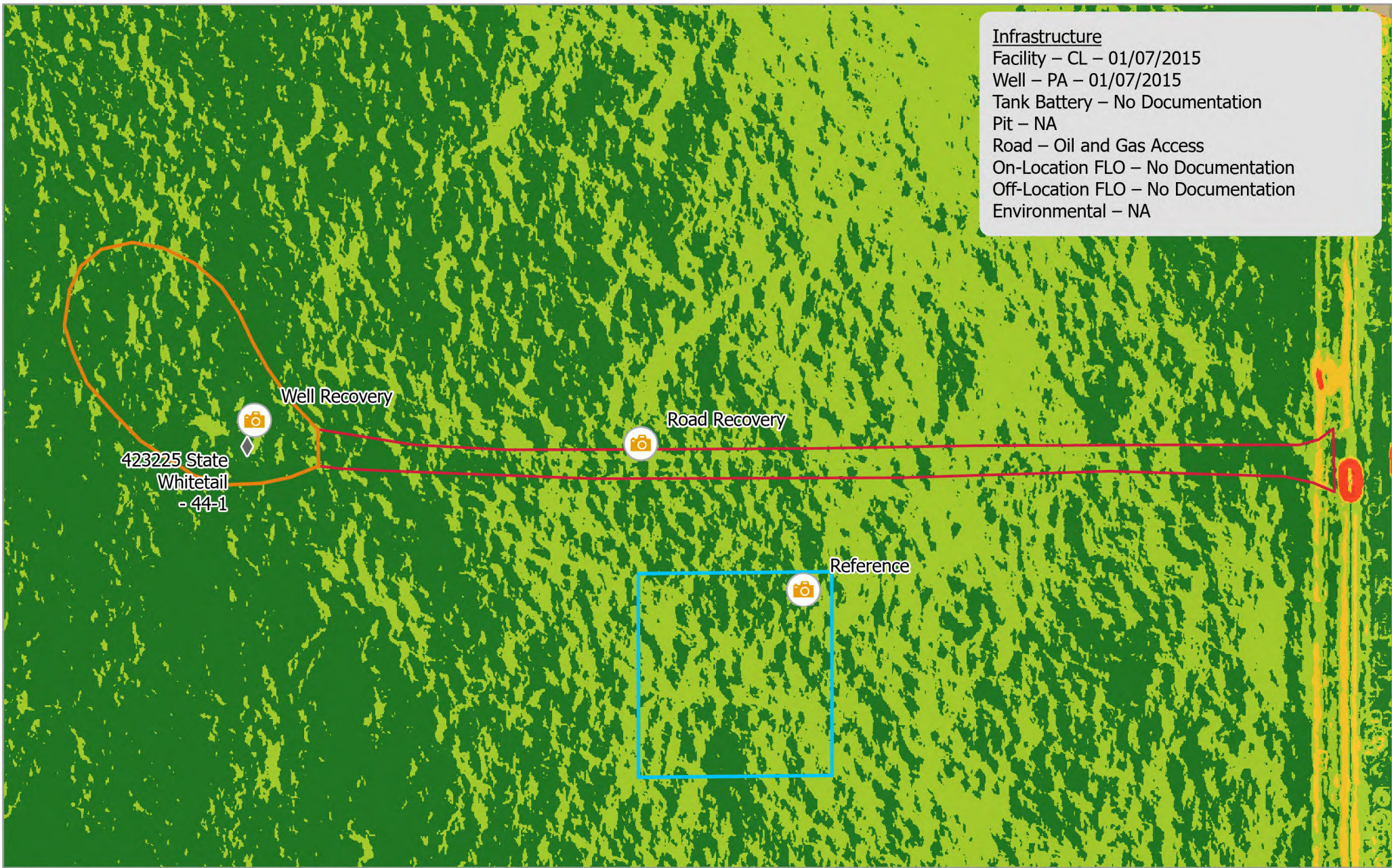


Service Credits - Mapbox, Microsoft

CIV - 423225- State Whitetail 44-1 Map Extent - Elevations & Contours

Imagery: RS Orthomosaic & DSM
 Imagery Date: 17 May 2023
 Map Date: 01 Aug 2023
 Datum: WGS 1984 UTM Zone 13N
 POC: Soil Sage





Infrastructure
 Facility – CL – 01/07/2015
 Well – PA – 01/07/2015
 Tank Battery – No Documentation
 Pit – NA
 Road – Oil and Gas Access
 On-Location FLO – No Documentation
 Off-Location FLO – No Documentation
 Environmental – NA

**CIV - 423225- State Whitetail 44-1
 Map Extent - Slope**

Imagery: RS Orthomosaic & DSM
 Imagery Date: 17 May 2023
 Map Date: 01 Aug 2023
 Datum: WGS 1984 UTM Zone 13N
 POC: Soil Sage

◆ Wells	Slope Value 0 - 5 5 - 15 15 - 50 50 - 100
📷 Observation Points	
📏 Disturbance Extent	
📏 Access Road Extent	
📏 Reference Extent	

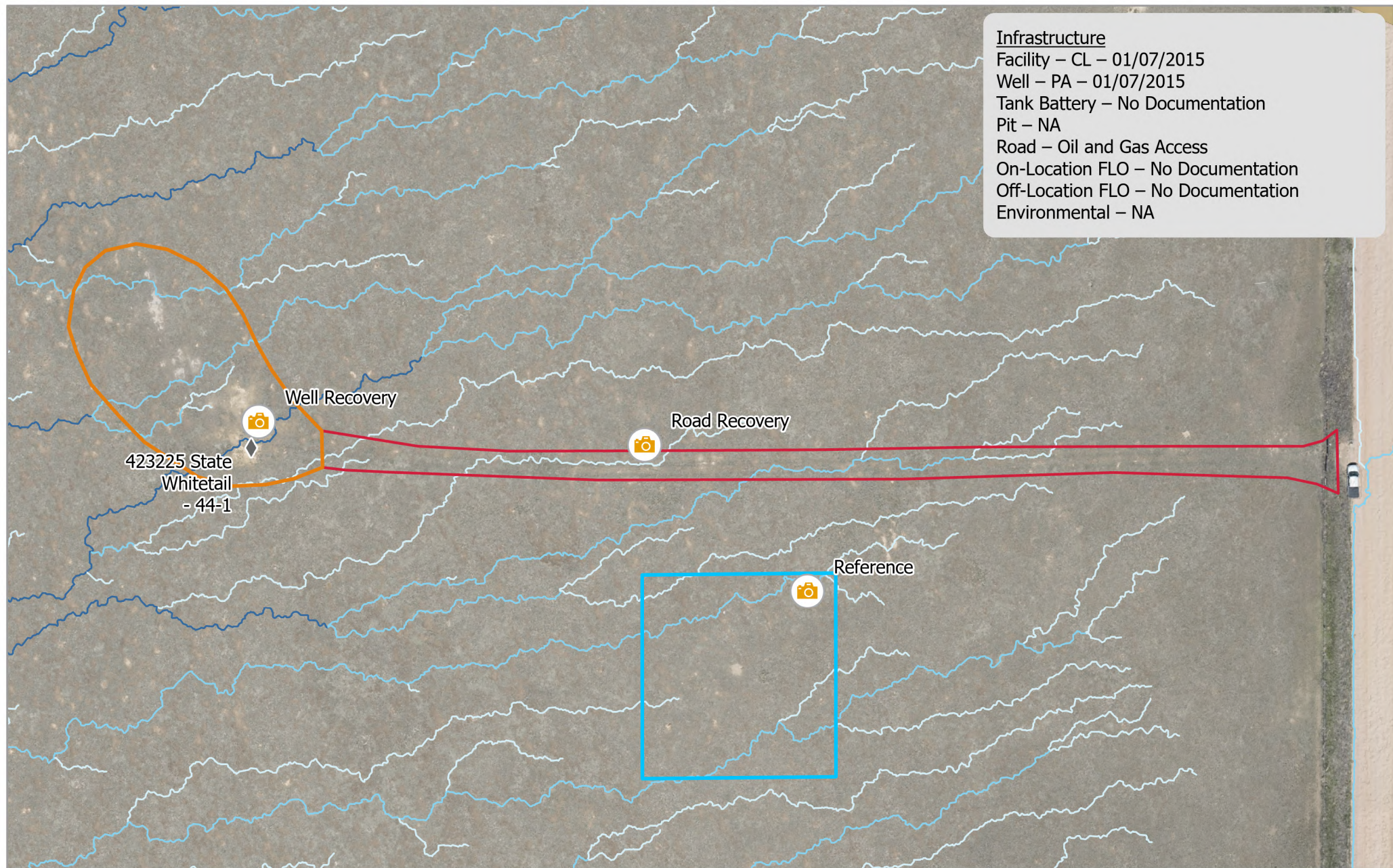
0 25 50 Meters

Scale: 1:900

Pad Location:
 40.511170
 -104.263390

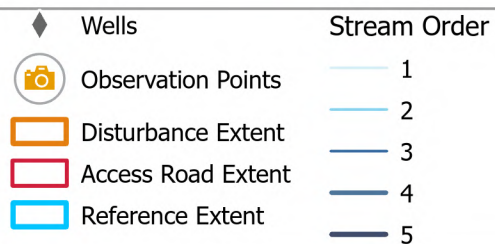
N





CIV - 423225- State Whitetail 44-1 Map Extent - Hydrology

Imagery: RS Orthomosaic & DSM
 Imagery Date: 17 May 2023
 Map Date: 01 Aug 2023
 Datum: WGS 1984 UTM Zone 13N
 POC: Soil Sage

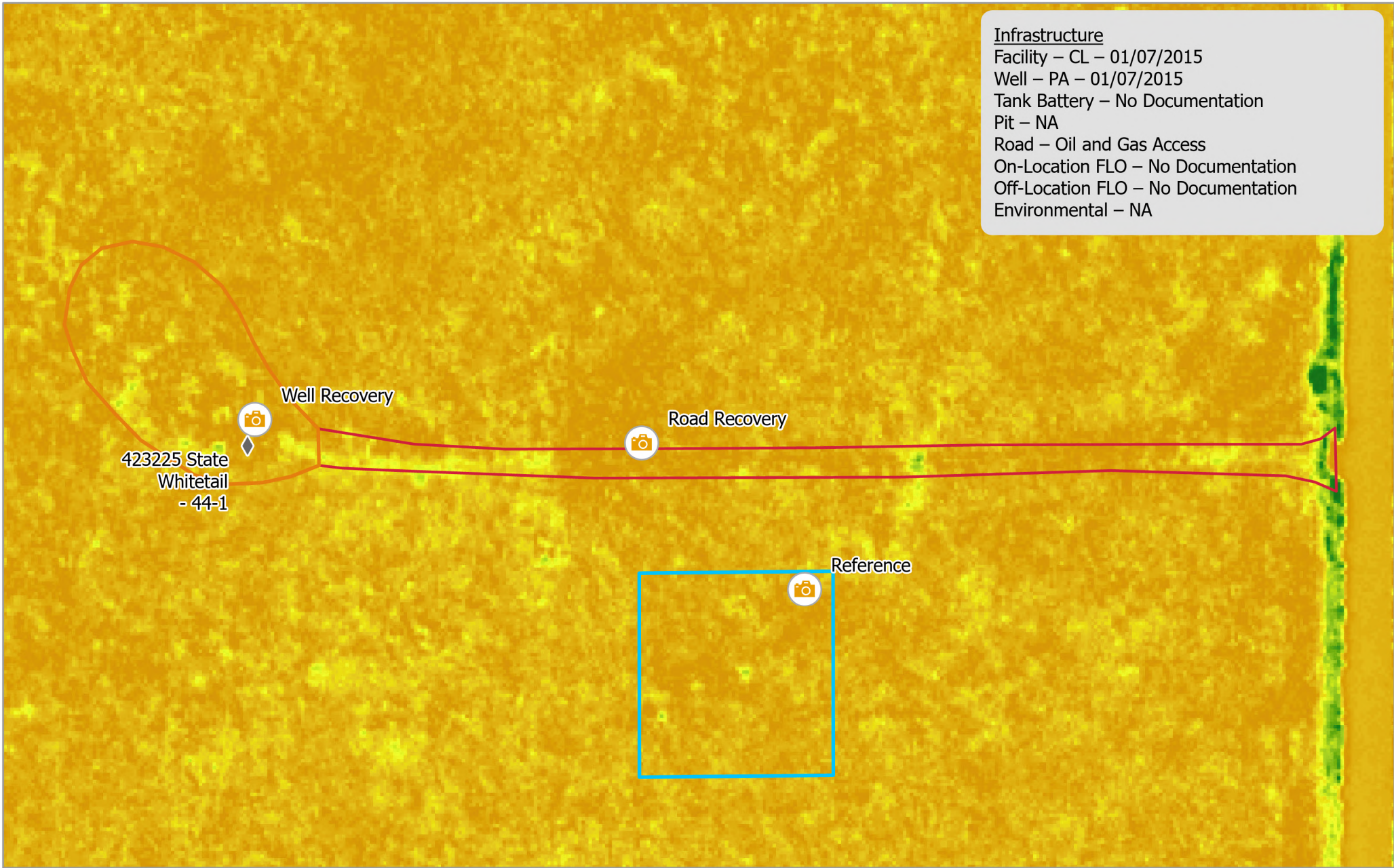


0 25 50 Meters

Scale: 1:900

Pad Location:
 40.511170
 -104.263390





Infrastructure
Facility – CL – 01/07/2015
Well – PA – 01/07/2015
Tank Battery – No Documentation
Pit – NA
Road – Oil and Gas Access
On-Location FLO – No Documentation
Off-Location FLO – No Documentation
Environmental – NA

CIV - 423225- State Whitetail 44-1
Map Extent - NAIP NDVI Composite

Imagery: USDA NAIP
Imagery Date: 2011-2021
Map Date: 01 Aug 2023
Datum: WGS 1984 UTM Zone 13N
POC: Soil Sage

Legend

- | | |
|----------------------|--------------------|
| ◆ Wells | Disturbance Extent |
| 📷 Observation Points | Access Road Extent |
| | Reference Extent |

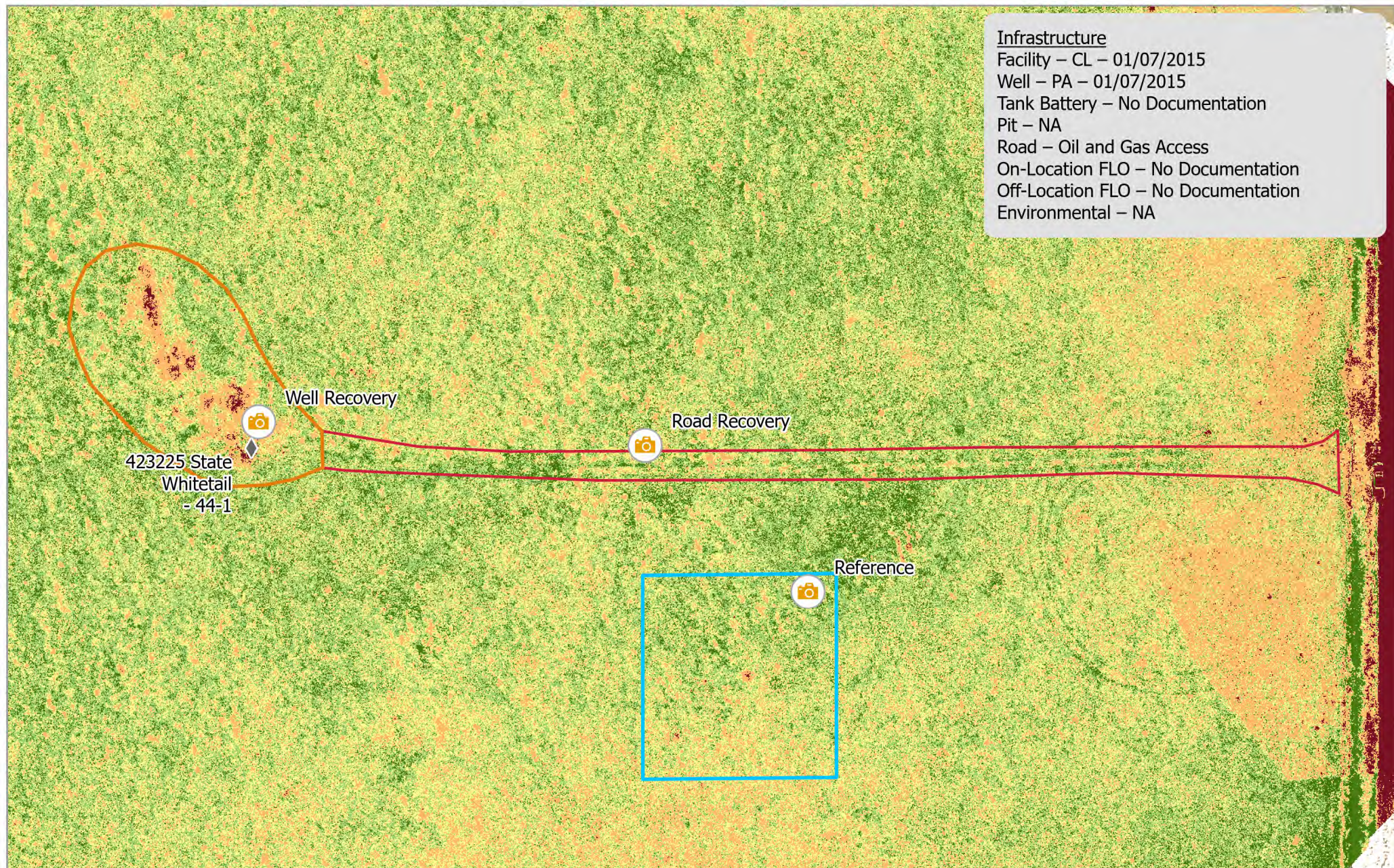
0 25 50 Meters

Scale: 1:900

Pad Location:
40.511170
-104.263390



Service Credits - Mapbox, Microsoft, Esri,
USDA Farm Service Agency



Infrastructure
 Facility – CL – 01/07/2015
 Well – PA – 01/07/2015
 Tank Battery – No Documentation
 Pit – NA
 Road – Oil and Gas Access
 On-Location FLO – No Documentation
 Off-Location FLO – No Documentation
 Environmental – NA

CIV - 423225- State Whitetail 44-1 **Map Extent - NDVI**

Imagery: RS Multispectral
 Imagery Date: 17 May 2023
 Map Date: 01 Aug 2023
 Datum: WGS 1984 UTM Zone 13N
 POC: Soil Sage

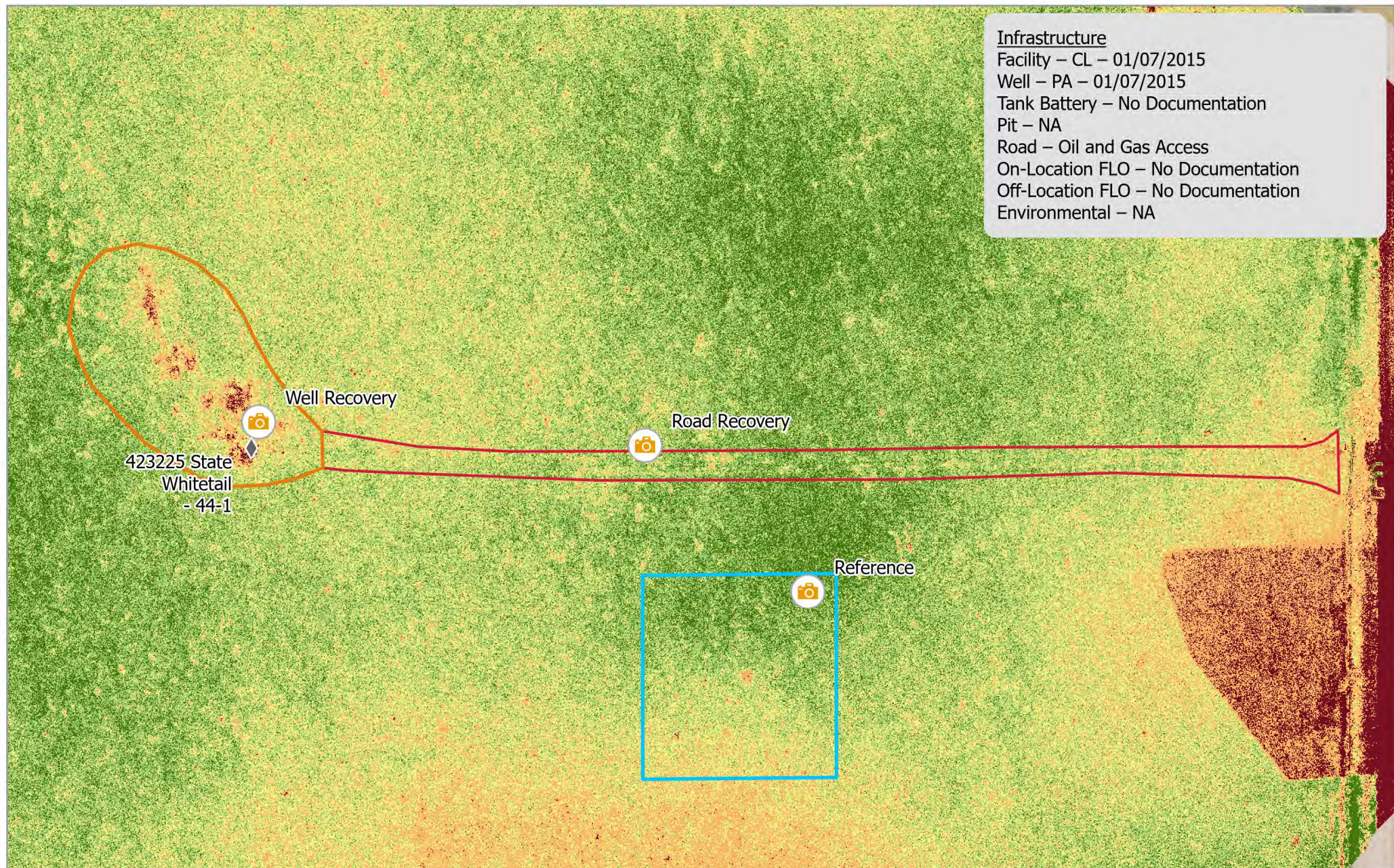
- | | |
|----------------------|-----------|
| ◆ Wells | NDVI |
| 📷 Observation Points | Classes |
| 🔲 Disturbance Extent | 1-Veg |
| 🔴 Access Road Extent | 2-Veg |
| 🔵 Reference Extent | 3-Non Veg |
| | 4-Non Veg |
| | 5-Non Veg |

0 25 50 Meters

Scale: 1:900

Pad Location:
 40.511170
 -104.263390





Infrastructure
 Facility – CL – 01/07/2015
 Well – PA – 01/07/2015
 Tank Battery – No Documentation
 Pit – NA
 Road – Oil and Gas Access
 On-Location FLO – No Documentation
 Off-Location FLO – No Documentation
 Environmental – NA

CIV - 423225- State Whitetail 44-1 **Map Extent - NDRE**

Imagery: RS Multispectral
 Imagery Date: 17 May 2023
 Map Date: 01 Aug 2023
 Datum: WGS 1984 UTM Zone 13N
 POC: Soil Sage

◆ Wells	NDRE
📷 Observation Points	Classes
🔲 Disturbance Extent	1-Veg
🔴 Access Road Extent	2-Veg
🔵 Reference Extent	3-Non Veg
	4-Non Veg
	5-Non Veg

0 25 50 Meters

Scale: 1:900

Pad Location:
 40.511170
 -104.263390



Soil Properties

USDA Soil Description

Reference Soil Information

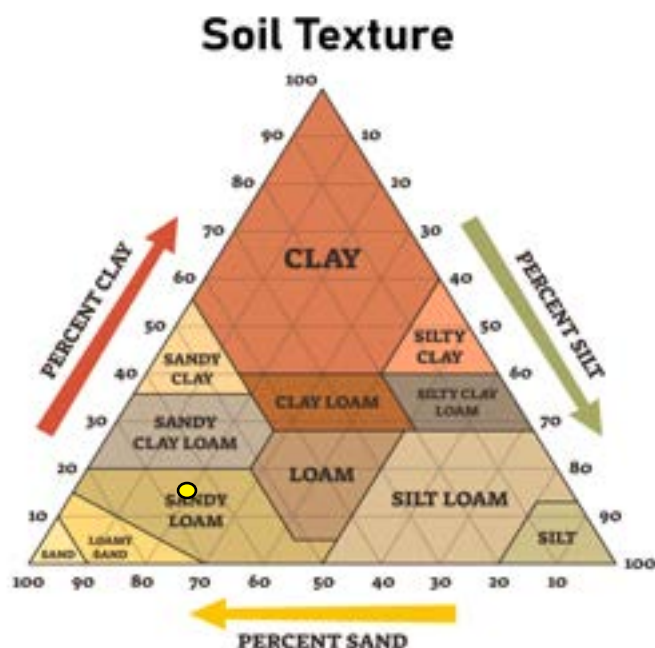
The location of the site is contained within two soil types, Olney fine sandy loam and Terry fine sandy loam.

Map Unit 47 Reference Soil information - Olney fine sandy loam

This soil is formed from mixed deposit outwash. Landform is plains, with the Sandy Plains Ecological Site. Soils are well drained with a moderate water holding capacity, and slope 1-3 percent.

Depth (in)	Physical			Chemical			
	Texture	Bulk Density	Partical Size Percent sand, silt, clay	pH	EC	SAR	OM%
0-10	Fine Sandy Loam	1.43	65-20-15	7.2	0.0	0.0	0.75
10-20	Sandy Clay Loam	1.33	56-17-27	7.2	0.0	0.0	0.75
20-30	Sandy Clay Loam	1.41	62-22-16	8.3	1.0	0.0	0.25
30-40	Fine Sandy Loam	1.50	64-26-10	8.5	1.0	0.0	0.25
40-50	Fine Sandy Loam	1.50	64-26-10	8.5	1.0	0.0	0.25
50 +	Fine Sandy Loam	1.50	64-26-10	8.5	1.0	0.0	0.25

Soil Texture Triangle reflect the 0-10 in depth



Erosion Potential (10 inches)

- K Factor, Whole soil - .24. 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

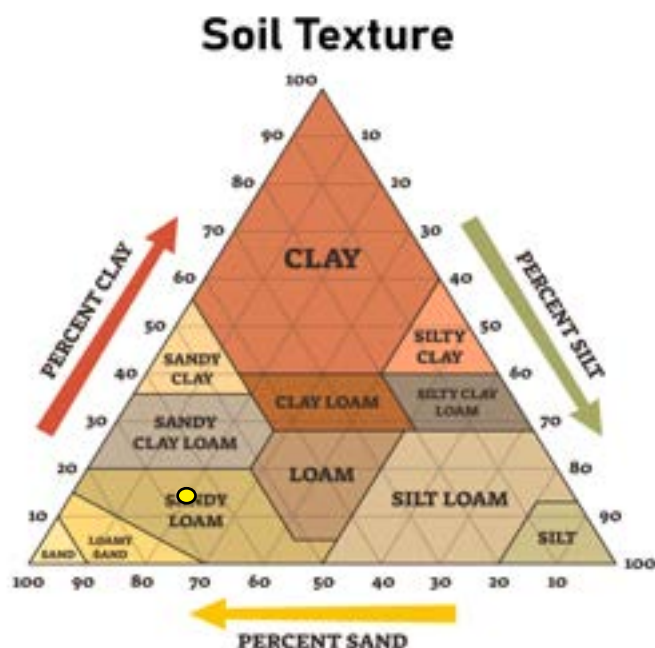
The location of the site is contained within two soil types, Olney fine sandy loam and Terry fine sandy loam.

Map Unit 63 Reference Soil information - Terry fine sandy loam

This soil is formed from residuum weathered from sandstone. Landform is plains, with the Sandy Plains Ecological Site. Soils are well drained with a low water holding capacity, and slope 3-9 percent.

Depth (in)	Physical			Chemical			
	Texture	Bulk Density	Partical Size Percent sand, silt, clay	pH	EC	SAR	OM%
0-10	Fine Sandy Loam	1.43	66-20-14	7.2	0.0	0.0	1.05
10-20	Fine Sandy Loam	1.43	66-21-13	7.4	0.2	0.0	0.75
20-30	Fine Sandy Loam	1.43	63-26-11	8.2	1.0	0.0	0.75
30-40	Fine Sandy Loam	1.43	63-26-11	8.2	1.0	0.0	0.75
40-50	Weathered Bedrock						
50 +							

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