

SITE-SPECIFIC QUALITY ASSURANCE & QUALITY CONTROL AUDIT



Permit Closure Type – Final

PERMIT CLOSURE REPORT – RANGELAND

Location ID 305223

Location Name DOW LAURA-65N63W/28NESE

Report Date

31 May 2023

Soil Sage has conducted a thorough data audit as part of our Quality Assurance and Quality Control (QA/QC) protocols.

Initial Job Assignment

Client	CIVITAS Resources
Work Assignment	CPW Centennial Valley State Wildlife Area Reclamation Report
Date	April 26, 2023

Quality Assurance & Quality Control Audit

Auditor	Soil Sage
Audit Date	05/05/2023

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	DOW LAURA-65N63W/28NESE		
Location ID	305223		
Operator / #	HIGHPOINT OPERATING CORPORATION / 10071		
Field	WATTENBERG 90750		
County, State	WELD		
Lat/Long	40.367970 / -104.433210		
	Planned Location	X	As Drilled
Facility Status	CL	Location	NESE 28 5N63W
Facility Status Date	02/09/2014	Access Road	Oil & Gas Access
Facility Entities	X	Tank Battery	Pits
	X	Wells	X Off-Location Flowlines (Form 44)
		Domestic Taps	X 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	<p>Corrective Actions (CA)s were detected during the QA & QC Audit.</p> <p>CA Overall Status: 1 of 1 CAs have not been completed</p> <p>Originating Field Inspection Doc # & Date: 697504619 & 04/28/2023</p> <ul style="list-style-type: none"> See "Field Inspection Form" section of this report below for details. <p>Complete COGCC Inspection Search Results: Link</p>		
Sundry Notice (Form 4)	No Form 4s were detected during the QA & QC Audit.		
On Location Flowlines (Form 42)	Form 42s exist for Related Facilities – See individual scout card data for report details.		
Off-Location Flowlines (Form 44)	No Form 44s were detected during the QA & QC Audit.		
Field Inspection Form (Form INSP)	<p>Form INSP Doc # & Date: 697504619 & 04/28/2023</p> <ul style="list-style-type: none"> Status Summary: Follow Up Inspection Required, Corrective Action Response Requested Inspected Facilities: Well DOW LAURA #14-27, access road, and Off-Site Tank Battery (assigned COGCC Location ID 435364) Inspection Status: RI – Reclamation Inspection (Final) Inspection Date & Inspector: 04/20/2023 by Chris Binschus 		

	<ul style="list-style-type: none"> ○ Complaint #: 403379491 ○ Nature of Complaint: CPW (landowner) had concerns about failed reclamation that was previously performed by BONANZA CREEK approximately three years ago. ○ Comments: Note-this is a shared location with Location ID 331381. The well/tank battery location and access road consisted mostly of weeds with little perennial vegetation that is not reflective of reference areas. Refer to the attached photos. Due to the lack of desirable vegetation establishment, COGCC is requiring soil sampling. Operator shall take samples along portions of the failed reclamation and background reference samples for comparison. Operator shall take discrete samples at six (6) inches intervals to a minimum depth of two (2) feet. See COGCC Comments Section for details on analytics. Note- Operator may need to install temporary fencing to facilitate on-going grazing operations. ○ Corrective Action: Comply with Rule 1004 to conduct additional reclamation. For soil samples, submit results via Form 4 Sundry Notice to the attention of Chris Binschus no later than two weeks after receiving results. Soil samples shall be overlaid on an aerial map depicting where soil sample locations and reference samples were taken. ○ CA Dates: 04/20/2023 ○ Overall Final Reclamation: Fail <p>Attachments: Inspection Photos Doc # 697504620</p>
COGIS Tank Facilities Information (Scout Card)	<p>Tank Battery Name: DOW LAURA 14-27 TANK BATTERY/435364 FACILITY ID: 435364</p> <ul style="list-style-type: none"> ○ Status & Date: AC & 12/09/2013 ○ Lat/Long: 40.368656 / -104.433099 ○ COGCC documents: No documents were detected during the QA & QC Audit, however, this off-site Tank Battery for Well DOW LAURA #14-27 <p>Note: This is the primary Tank Battery listing for this Location 305223. The QA & QC Audit detected a second COGCC Location ID for tank battery: FACILITY ID: 450357, Name: DOW LAURA 14-27 TANK BATTERY, Status & Date: 07/26/2017, and same Lat/Long: 40.368656 / -104.433099.</p> <p>Note: This off-site Tank Battery is also the site of a release (SPILL/RELEASE 450598) and associated Remediation Workplan (Remediation Project #</p>

[10781](#)). Details follow:

Site Investigation and Remediation Workplan

Remediation Project #: [10781](#)

Form 27A Supplemental Doc & Date: [401659032](#) & 07/04/2018

- **Purpose:** Closure of Remediation Project, Spill/Release Remediation, Remediation of impacted ground water

- **Final Resolution:** Case Resolved

Form 27 Initial Doc # & Date: [401309678](#) & 12/12/2017

- **Purpose:** Spill/Release Remediation, Remediation of impacted ground water
- **Operator Comments:** Over an extended period of time, oil slowly leaked out of a pin hole in the bottom of a production tank. Upon discovery, the facility was decommissioned and removed. A trackhoe was used to delineate the extent of the release and remove all of the impacted soil. All of the impacted soil was removed via trackhoe and confirmed by laboratory analysis. Five groundwater monitoring wells have been installed and will be sampled on a quarterly basis and analyzed for TPH and BTEX.
- **Remediation Summary:** The excavation was backfilled to a depth of 2' bgs with fill material and then filled to surface grade with topsoil. Following plugging and abandonment of the well, the remaining road base will be stripped and the soil will be cross ripped to a depth of 18" to alleviate compaction. The location will be crimped with straw and seeded with a CPW approved seed mix.
- **Type of Waste Requiring Remediation:** E&P Waste, Oil
- **Impacted Media:** Soil
- **Impacted Type:** Undetermined
- **Site Investigation Plan Start Date:** 05/13/2017

Spill or Release

FACILITY ID: 450598

- **Status & Date:** 07/26/2017
- **Lat/Long:** 40.368608 / -104.433400

Form 19 Resolving Doc # & Date: [401354763](#) & 12/12/2017

- **Date Closed:** 07/26/2017
- **Request for Closure:** Work is proceeding under an approved Form 27 Remediation Workplan

	<ul style="list-style-type: none"> ○ Remediation Project #: 10781 ○ Operator Comments: All soil samples came back compliant with the COGCC Table 910-1 soil standards. Five groundwater monitoring wells were installed to determine if the groundwater was impacted. The monitoring well locations and results have been submitted in a separate Form 27. <p>Form 19 Initial Doc # & Date: 401281883 & 05/15/2017</p> <ul style="list-style-type: none"> ○ Date of Discovery: 05/11/2017 ○ Spill Type: Recent Spill ○ Reference Location Facility ID & Type: Tank Battery 435361 ○ Operator: BONANZA CREEK ENERGY OPERATING COMPANY LLC ○ Operator Comments: A hole on the bottom edge of a production tank released approximately 10 bbls of oil, inside an earthen containment berm. Upon discovery a vac truck was called out to bottom out the tank to prevent further impact. During spill delineation, groundwater was encountered at approximately 3' bgs. A 3" pump and 500 bbl frac tank have been set on location to help control groundwater intrusion during remedial efforts. Once all of the impacted soil has been removed, confirmation soil samples will be collected and submitted for laboratory analysis. ○ Note: Additional spill and release details were provided within the 10 day Condition of Approval (COA) in a subsequent Form 19 Doc # 401287664. Site Map Doc # 401287744.
COGIS Well Information (Scout Card)	<p>Well Name: DOW LAURA #14-27</p> <p>API#: 05-123-22672</p> <p>FACILITY ID: 275791</p> <ul style="list-style-type: none"> ○ Status & Date: PA & 02/09/2014 ○ Lat/Long As Drilled: 40.367970 / -104.433210 ○ Form 6 Subsequent Doc # & Date: 400566631 & 05/19/2014 ○ Form 42 Doc # & Date: 400638461 & 07/02/2014 <p>Purpose: Flowlines Abandoned on 02/21/2014</p>

COGCC Abbreviations: [Location & Facility Status Codes](#), [Inspection Types & Statuses](#) and [COGCC Help](#).

Audit Key Findings – Designation Land Use Observations

PREVIOUS LAND USE	CURRENT LAND USE
Reference Imagery for Infrastructure: Landsat/Copernicus 2016	Remotely Sensed Imagery: 05/02/2023
Designation: Oil and 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

Landowner Colorado Parks and Wildlife (CPW) filed a complaint on 04/20/2023 stating concerns about failed reclamation activities at the Centennial Valley State Wildlife Area performed by operator BONANZA CREEK ENERGY OPERATING COMPANY LLC approximately three years ago. In response, COGCC Reclamation Specialist Chris Binschus performed a Reclamation Inspection of the area that failed and identified a Corrective Action (CA) requiring the operator to perform soil sampling.

The inspection for this Location (305223) includes plugged and abandoned Well DOW LAURA #14-27, access road, and off-site Tank Battery (435364). The inspection noted these areas consisted mostly of weeds with little perennial vegetation that is not reflective of reference areas. It also noted this is a shared location with 331381.

Our post-inspection audit revealed an oil release at the tank battery Location 435364 on 05/11/2017. The release is reported under Spill or Release ID 450598 (case closed on 07/26/2017) and remediated under a Remediation Workplan RPN# 10781 (case resolved on 07/04/2018).

This is a shared location with Location [331381](#).

Site Photos

Site Investigation and Photos Date

05/02/2023

Cardinal directional photos of the site



North



East



South



West

ATTACHMENTS

Maps and Figures

Location Maps

CPW Overview Roads and Reclamation Extents

Area Maps

Previous Infrastructure Overview

Current Site Overview

Elevation & Contours

Slope

Hydrology

NDVI Composite

NDVI

Reports

Reclamation Report

Soil Analytics

Overview Table

Lab Reports

Reference Soil and Vegetation

Observations

Background Information

Natural Resources Conservation Service (NRCS) Map Unit Description

Reference Soil and Ecological Description

Supplemental Data

The following information was provided by Civitas.

Topsoil Analytical Report

Seed Mix

SITE-SPECIFIC RECLAMATION PLAN



Permit Closure Type – Final

Failed Reclamation Inspection

Site Description

Name	DOW LAURA-65N63W/28NESE
Location ID	305223
Operator / #	BONANZA CREEK ENERGY OPERATING COMPANY LLC / 8960
Field	WATTENBERG / 90750
County, State	WELD, CO

Report Date

31 May 2023

Revision 29 September 2023

Site Evaluation

Investigator: Soil Sage

Investigation Date: 2-4 May 2023

Reference Soil Information: This site is comprised within one soil type, Map Unit 10 - Ellicott-Ellicott sandy-skeletal complex, 0 to 3 percent slopes, sandy texture surface and at depth. These soils are formed from noncalcareous, stratified sandy alluvium. Landform is drainageways, flood plains on intermittent streams. Excessively drained with a very low available water holding capacity. Depth ranges from 0 – 10 inches, the pH is 6.5 and the organic matter is 0.35%.

Soil chemical properties within the rooting zone to 50 inches is described in the Soil Properties – USDA Soil Properties section of this report.

Current Land Use in Reference Area: Range land

Observations

The Northern section is intermixed leased grazing land and “native” ecosystem along the South Platte River. The reclaimed areas have residual gravel and excessive applications of manure which have impacted the recovery of the sites.

Weed pressure has occurred along the roads and patchy areas at each site.

Debris remains along the roads and sites in the form of silt fencing, waddles and oil and gas operational equipment. Reference the observation document for specifics.

Site Soils

During the field investigation, Soil Sage collected soil samples every six inches from 0 – 24 inches within the site and reference locations within the map unit. These soils were analyzed to establish current soil

physicochemical properties for reclamation planning. See spreadsheet attachment Table 1 for site specific soil characterizations and associated reference soils. Reference USDA Soils and Ecological Site Description for historical properties.

Recommendations

Data of Sampling – 2-4 May 2023

Vegetation

Spring vegetation characteristics were present, newly emerging grasses and weeds are the primary vegetation during the site visit.

Ecological Site observations serve as the baseline vegetation cover.

Table represents the present cover observations.

Sample Number	Bare Ground	Grass	Forbs	Shrubs	Litter	Weeds	Field Notes
12	5	5	0	0	85	5	Veg similar, spray for weeds

Weeds

Weed Summary Reference

Common Name	Weed List Type	Percent Cover (%)
Field Bindweed	List C	5

Weed Inventory Criteria

- Each site is accessed 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 - Designated to stop the continued spread, List C - Facilitate more integrated effective weed management, Watch List - Determined to pose a potential threat to ag 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

Site Characteristics

Hydrology

Hydrology – Stream Orders 1 – 6 are present - dominant streams are orders are 1, 2 and 3. Order 3 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.

Ponding - potential ponding can occur where water follows the elevation gradients in low lying area.

Reference Hydrology and Elevation and Contour Maps

Soil/Erosion

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

Summary Acreage Table

Description	Acres
Historic Disturbance Extent	2.65
Current Reclaim Extent	0.55
Road	*
Reference Extent	0.71

Total Disturbance Extent is for four Locations: 305223, 331381, 435361, and 435364.

*Road is accounted for in the Location 331381 Report.

Reference Extent is the same Reference Extent as Locations 331381, 453361, and 435364 - North Reference Document and Site Overview Reference Map.

Summary Reclamation Acreage Table

Description	Acres
Reclaim Extent	0.55

Reference Reclaim Map

Summary Cubic Yards of Soils

Description	Cubic Yards
Reclaim Extent remove 6 inches	148
Reclaim Extent replace 6 inches	148

Reference Reclaim and Road Maps

Site Recommendation and Re-Evaluation

North Side

Road: 12 inches remove and replace

Pad: 6 inches remove and replace

Replacement Soil

Texture: Sandy Loam

Organic Matter: 1%

pH: 7.0 - 8.3

Nitrate N: less than 50 ppm

Sodium: less than 150 ppm

Chloride Cl: less than 100 ppm

Sulfate S: less than 100 ppm

Soil tests must be submitted to Luke Kelly (lkelly@civiresources.com) AND Sam Streeter (sam@soilsage.com) for approval prior to use on the project. Certified Weed Free Straw must be used, and evidence must be supplied to Luke Kelly and Sam Streeter. Soil Sage will be performing inspections during reclamation activities and after work is complete to ensure success. On-site access must be coordinated with Colorado Parks and Wildlife (CPW) before work commences. Schedule of reclamation activities (approximate) must be submitted before reclamation starts and any changes to the schedule must be communicated via email to Luke Kelly and Sam Streeter.

Seed Mix

Vegetation Seed Mix

Additional reclamation procedures are recommended at this time.

Seed mixed provided by surface owner

Reference Seed Mix

Soil Amendments

New soil specifications are outlined above with NPK and OM recommendations.

Soil Analytics

Soil analytics provided to Civitas by Lone Tree Services

Soils imported by Lone Tree Services

Reference – Topsoil Report for 22-272-0302

Site Monitoring

Continue monitoring for vegetative recovery and weed control.

Pre-Reclamation Activities and Notes:

- There are active and abandoned midstream assets in both the northern and southern parts of the reclamation area.
- Remove silt fencing, waddles and remaining oil and gas operational equipment.

Reclaim Area Protocol

Time Frame	Activity	Specifications	Site Totals
Prior to Reclamation Activities	Pre-Reclamation	Remove trash, silt fencing, waddles, and oil and gas operational equipment	Refer to the observation document for the area
Spring 2023	Remove and Replace Soil	Texture: Sandy Loam Organic Matter: 1% pH: 7.0 - 8.3 Nitrate N: less than 50 ppm Sodium: less than 150 ppm Chloride Cl: less than 100 ppm Sulfate S: less than 100 ppm	0.55 Acres
Seedbed Prep	Rip	Cross rip to 18 inches, do not rip below 18 inches. Evidence of seasonably high-water table found as shallow as 18 inches. Do not interact with this layer	
	Disc	Disc the site to a depth of 6.0-inches using a disk and harrow, field cultivator, vibrashank, or another alternative suitable to site conditions	
Seeding	Seed	Provided by Surface Owner	Reference Seed Mix
	Straw	Spread certified weed free straw	
	Crimp	Crimp Straw to a depth of 3 inches without cutting the mulch fiber	
Monitoring	Continuous	Site should be monitored post reclamation to ensure success	
Weed Management		Due to the seed bank of cheatgrass, thistle and kochia monthly monitoring is recommended with appropriate herbicide control	

Site Photos – Soil 11 – S11

Lat/Long: 40.367965 / -104.433192

Nearest Facility #: 305223

Date Range: 2-4 May 2023

Photo locations correspond with the overview map and vegetation table.

	
Soil Picture 1	Soil Picture 2 Vegetation at Soil Location





Site Photos – Vegetation 12 – V12

Lat/Long: 40.367968 / -104.43312

Nearest Facility #: 305223

Date Range: 2-4 May 2023

Photo locations correspond with the overview map and vegetation table.

	
Veg	Veg - North
	
Veg - East	Veg - South

	
Veg – West	Field Bindweed – <i>Convolvulus arvensis</i> – Colorado List C Noxious Weed

TABLE 1: Soil Report

Client	Civitas	Date	17-May-23
Operator	Bonanza Creek	Ward	20230512
Location ID - Name	CPW North Side		
Type	Well, Tank Battery, Roads, Reference		

SOIL SAGE

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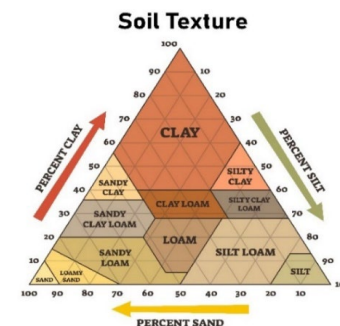
Soil Profile				Physical Properties				Location Ref
Location	Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	Partical Size			Texture Hydro	
				Sand %	Silt %	Clay %		
Soil - 11.1	0	6	6	67	14	19	Sandy Loam	
Soil - 11.2	6	12	6	67	16	17	Sandy Loam	
Soil - 11.3	12	18	6	63	18	19	Sandy Loam	
Soil - 11.4	18	24	6	63	18	19	Sandy Loam	

Site Average

Location	Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	Sand %	Silt %	Clay %	Texture Hydro	Location Ref
Soil - 5.1 REF	0	6	6	87	6	7	Loamy Sand	MU10
Soil - 5.2 REF	6	12	6	90	5	5	Sand	MU10
Soil - 5.3 REF	12	18	6	90	5	5	Sand	MU10
Soil - 5.4 REF	18	24	6	90	4	6	Sand	MU10
Soil - 6.1 REF	0	6	6	74	14	12	Sandy Loam	MU10
Soil - 6.2 REF	6	12	6	75	12	13	Sandy Loam	MU10
Soil - 6.3 REF	12	18	6	83	6	11	Loamy Sand	MU10
Soil - 6.4 REF	18	24	6	68	14	18	Sandy Loam	MU10
Soil - 10.1 REF	0	6	6	69	18	13	Sandy Loam	MU10
Soil - 10.2 REF	6	12	6	69	18	13	Sandy Loam	MU10
Soil - 10.3 REF	12	18	6	69	18	13	Sandy Loam	MU10
Soil - 10.4 REF	18	24	6	85	8	7	Loamy Sand	MU10
Soil - 15.1 REF	0	6	6	41	30	29	Clay Loam	MU10
Soil - 15.2 REF	6	12	6	53	22	25	Sandy Clay Loam	MU10
Soil - 15.3 REF	12	18	6	89	6	5	Sand	MU10
Soil - 15.4 REF	18	24	6	91	4	5	Sand	MU10

Site Ref Average

Sand	Silt	Clay
76	12	12



Soil Profile				Chemical Properties					
Location	Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	pH	ECe	CEC	Excess Lime	Organic Matter	SAR
				Sat Paste	mmhos/cm	meq/100g	CaCO3 Rating	(LOI) %	Sat Paste
Soil - 11.1	0	6	6	7.5	0.5	19.1	LOW	2.3	0.7
Soil - 11.2	6	12	6	7.8	0.63	18.5	LOW	1.8	3.1
Soil - 11.3	12	18	6	7.7	1.51	18.4	NONE	1.9	4.9
Soil - 11.4	18	24	6	7.5	5.61	20.7	NONE	1.6	6.4
Site Average				7.6	2.1	19.2		1.9	3.8

	Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	pH Sat Paste	ECe mmhos/cm	CEC meq/100g	Excess Lime CaCO3 Rating	Organic Matter (LOI) %	SAR Sat Paste
Soil - 5.1 REF	0	6	6	8.1	0.18	7.5	NONE	0.5	0.2
Soil - 5.2 REF	6	12	6	8.3	0.15	4.4	NONE	0.3	0.1
Soil - 5.3 REF	12	18	6	8.2	0.16	3.7	NONE	0.3	0.2
Soil - 5.4 REF	18	24	6	8.3	0.17	5.2	NONE	0.3	0.2
Soil - 6.1 REF	0	6	6	7.1	0.54	8.6	NONE	1.5	0.1
Soil - 6.2 REF	6	12	6	7.5	0.47	9	NONE	1.1	0.2
Soil - 6.3 REF	12	18	6	7.9	0.44	17.3	LOW	0.7	0.5
Soil - 6.4 REF	18	24	6	8	0.49	23.2	HIGH	1.2	1
Soil - 10.1 REF	0	6	6	7	2.17	9.5	NONE	1.3	3.1
Soil - 10.2 REF	6	12	6	7.2	1.88	11.4	NONE	1.4	3.4
Soil - 10.3 REF	12	18	6	7.6	1.19	9.4	NONE	1.1	3.1
Soil - 10.4 REF	18	24	6	7.9	0.58	5.3	NONE	0.6	2.8
Soil - 15.1 REF	0	6	6	7.7	1.57	26.9	HIGH	3.4	1.4
Soil - 15.2 REF	6	12	6	7.5	1.98	21	NONE	2.6	2.5
Soil - 15.3 REF	12	18	6	8	0.29	2.7	NONE	0.3	1.4
Soil - 15.4 REF	18	24	6	8	0.3	2	NONE	0.2	1.2
Site Ref Average				7.8	0.79	10.4		1.1	1.3

Location	Soil Profile Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	Extraction Method			Nitrate - N Lbs/A		Nitrate- N ppm	Phosphorus P ppm	Potassium K ppm
				KCL	M3	NH4OAc					
				Nitrate-N ppm	Phosphorus P ppm	Potassium K ppm					
Soil - 11.1	0	6	6	4	65	375	7	0-12	4	65	375
Soil - 11.2	6	12	6	2.5	44	206	4	12-24	4.75	41.5	186.5
Soil - 11.3	12	18	6	4.6	45	193	8				
Soil - 11.4	18	24	6	4.9	38	180	9				
Site Average				4	48	239	7				

	Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	Phosphorus	Potassium	Nitrate - N					
				Nitrate-N	P						
				ppm	ppm	ppm	Lbs/A				
Soil - 5.1 REF	0	6	6	2.1	15	92	4	0-12	2.1	15	92
Soil - 5.2 REF	6	12	6	0.5	9	25	1	12-24	0.5	9	24
Soil - 5.3 REF	12	18	6	<0.1	9	24	0				
Soil - 5.4 REF	18	24	6	0.5	9	24	1				
Soil - 6.1 REF	0	6	6	11.2	66	205	20	0-12	7.3	34	179
Soil - 6.2 REF	6	12	6	7.3	34	179	13	12-24	7	22	193.5
Soil - 6.3 REF	12	18	6	8.2	8	65	15				
Soil - 6.4 REF	18	24	6	10.7	5	52	51				
Soil - 10.1 REF	0	6	6	3.3	39	335	6	0-12	6.4	35	317
Soil - 10.2 REF	6	12	6	6.4	35	317	12	12-24	4.6	50	124.5
Soil - 10.3 REF	12	18	6	2.5	18	127	4				

Soil - 10.4 REF	18	24	6	0.7	31	42	3						
Soil - 15.1 REF	0	6	6	8.5	69	207	15		0-12	8.5	69	207	
Soil - 15.2 REF	6	12	6	4.4	25	116	8		12-24	0.85	8	20	
Soil - 15.3 REF	12	18	6	1	10	20	2						
Soil - 15.4 REF	18	24	6	0.7	6	20	1						

Site Ref Average

4.5 24 116 10

Plant Available

Location	Soil Profile			Plant Available			Hot Water	Ca-NO3	M3	AB-DTPA	Iron	Manganese	Zinc
	Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	NH4OAc Calcium	NH4OAc Magnesium	NH4OAc Sodium	Boron B	Chloride Cl	Sulfate S	Copper Cu	Fe	Mn	Zn
				Ca	Mg	Na							
				ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Soil - 11.1	0	6	6	2940	391	38	1.55	6.4	24.5	3.76	16.7	2.9	5.83
Soil - 11.2	6	12	6	2809	406	137	2	13.2	31.1	5.6	19.8	2.8	12.33
Soil - 11.3	12	18	6	2599	436	301	1.82	65.8	57.4	5.59	23.2	3.3	9.24
Soil - 11.4	18	24	6	2814	492	483	1.52	165.1	390.4	5.36	19.2	2.7	10.71
Site Average				2791	431	240	1.72	62.6	125.9	5.08	19.7	2.9	9.53

Reference	Soil Profile			Calcium	Magnesium	Sodium	Boron B	Chloride Cl	Sulfate S	Copper Cu	Iron Fe	Manganese Mn	Zinc Zn
	Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	Ca	Mg	Na							
				ppm	ppm	ppm							
Soil - 5.1 REF	0	6	6	1169	131	68	0.27	1	3.2	0.4	7.8	1.4	0.31
Soil - 5.2 REF	6	12	6	746	73	7	0.21	0.2	2.9	0.22	5.6	1.2	0.31
Soil - 5.3 REF	12	18	6	604	69	6	0.19	0.2	2.5	0.18	5.4	1.3	0.24
Soil - 5.4 REF	18	24	6	849	100	8	0.17	0	3.7	0.21	6.1	1.1	0.18
Soil - 6.1 REF	0	6	6	1272	205	7	0.66	0.9	6.3	0.55	9.2	4	0.15
Soil - 6.2 REF	6	12	6	1318	227	14	0.62	0.9	4.6	0.49	5.3	2.7	1.32
Soil - 6.3 REF	12	18	6	2973	263	18	0.4	1.1	13.5	0.3	3.6	1.4	0.5
Soil - 6.4 REF	18	24	6	3848	435	44	0.62	1.6	17.6	0.5	4.5	1.3	0.12
Soil - 10.1 REF	0	6	6	1200	224	168	1.14	61.5	111.9	0.57	13.7	3.7	0.64
Soil - 10.2 REF	6	12	6	1503	264	194	1.23	60	99.2	0.49	10.2	3.1	0.81
Soil - 10.3 REF	12	18	6	1276	242	146	0.81	48.2	53.6	0.4	5.9	2	0.31
Soil - 10.4 REF	18	24	6	769	130	65	0.41	14.5	22.6	0.27	5	1.4	0.16
Soil - 15.1 REF	0	6	6	4091	636	148	2.12	6.5	145	5.2	10.5	2.6	3.12
Soil - 15.2 REF	6	12	6	2917	611	233	1.33	11.4	142.9	1.96	14.8	2.5	1.49
Soil - 15.3 REF	12	18	6	362	80	31	0.28	3.4	12.1	0.24	6	1.1	0.24
Soil - 15.4 REF	18	24	6	266	64	24	0.33	3.2	7.8	0.15	3.8	1.2	0.25
Site Ref Average				1573	235	74	0.67	13.4	40.6	0.76	7.3	2.0	0.63

SOIL REPORT

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Terms Defined

pH	A measure of the acidity or basicity (alkalinity) of a soil. pH is defined as the negative logarithm (base 10) of the activity of hydronium ion in a solution
ECe	The Electrical Conductivity of a saturated soil Extract that measures salinity
Alkalinity	Alkalinity indicates a solution's power to react with acid and buffer its pH - the power to keep its pH from changing. The higher the Alkalinity, the higher the buffering capacity against pH change.

CEC - Cation Exchange Capacity

CEC Ranges

Range 11-50

Range 1-10

The measure of how many cations can be retained on soil particle surfaces.

High Clay, more lime to correct a given pH, greater capacity to hold nutrients, physical effects of high clay content, high water-holding capacity

High Sand, Nitrogen and potassium leaching, less lime to correct a given pH, physical effects of high sand content, low water-holding capacity

Optimal pH range for plant growth

6.0 -7.0

Reference Key

Low

Medium

High

Optimal

Neutral

No Reference

Analytical Error

Typical Soil Concentrations sufficient for plant growth

Element	Symbol	mg/kg	percent	Relative number
		ppm		of atoms
Nitrogen	N	15,000	1.5	1,000,000
Potassium	K	10,000	1	250,000
Calcium	Ca	5,000	0.5	125,000
Magnesium	Mg	2,000	0.2	80,000
Phosphorus	P	2,000	0.2	60,000
Sulfur	S	1,000	0.1	30,000
Chlorine	Cl	100	--	3,000
Iron	Fe	100	--	2,000
Boron	B	20	--	2,000
Manganese	Mn	50	--	1,000
Zinc	Zn	20	--	300
Copper	Cu	6	--	100
Molybdenum	Mo	0.1	--	1
Nickel	Ni	0.1	--	1

Notes

Root Formation

Chlorophyll Formation

Proteins & NPK Uptake

Chlorophyll catalyst

Absorption Calcium

Photosynthesis & Respiration - correlated with %OM

Fixation of Organic Nitrogen

Source: E.Epstein, 1965



CIV - CPW North Side
Map Extent - Overview Reclaim & Road
Reclaim Extent

Imagery: RS Orthomosaic & DSM
 Imagery Date: 2 May 2023
 Map Date: 31 May 2023
 Datum: WGS 1984 UTM Zone 13N
 POC: Soil Sage

Legend

- ◆ Well
- Tank Battery
- Reclaim Extent
- Road Reclaim

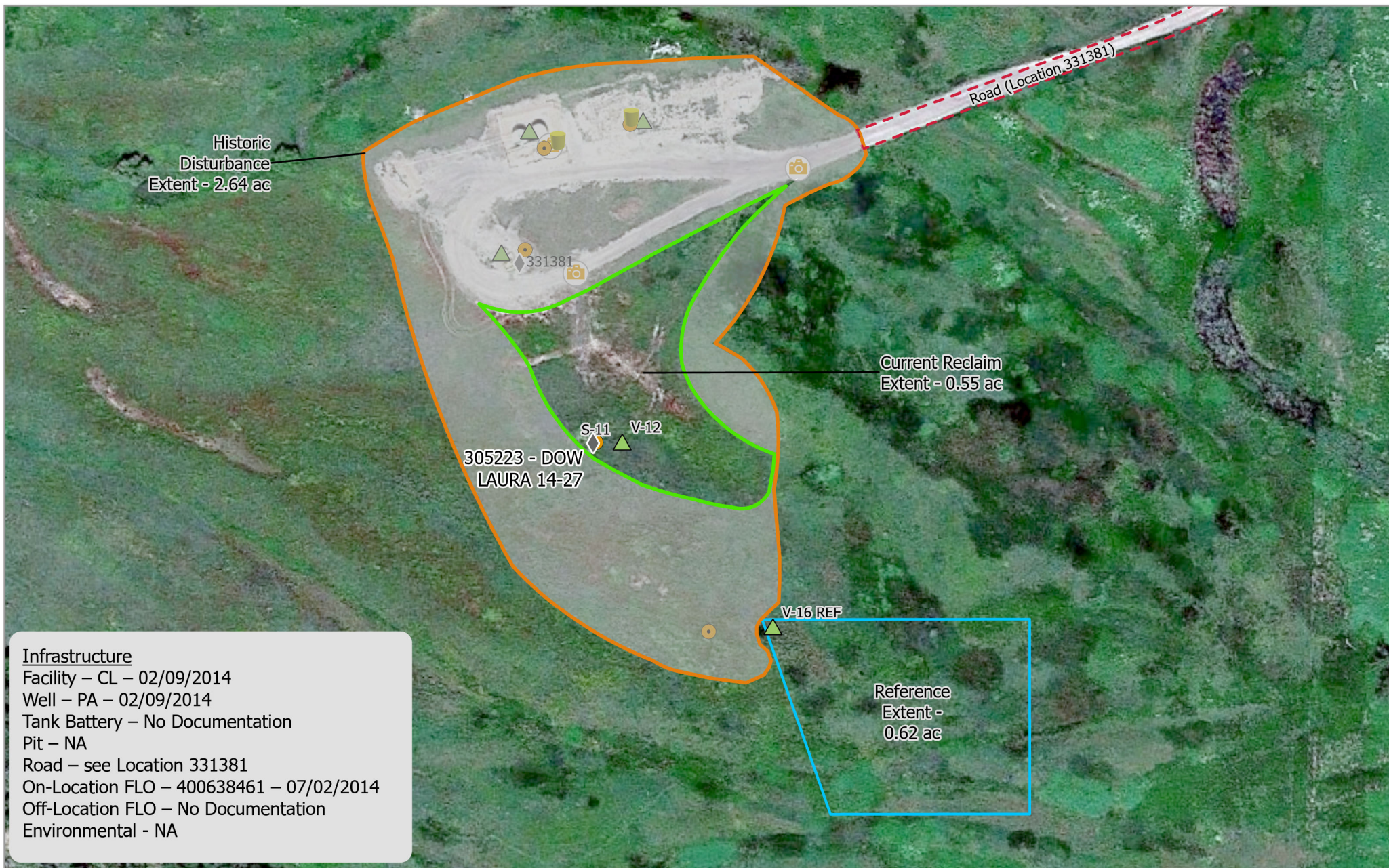
0 210 420 Meters

Reclaim Extent: 3.1 surface Acres
 Road: 7 surface Acres including buffer

Scale: 1:7,000



Service Credits - Maxar



CIV - 305223 - DOW LAURA 14-27
Map Extent - Landsat/Copernicus 2016

Imagery: Landsat/Copernicus
 Imagery Date: 14 Jun 2016
 Map Date: 18 Sep 2023
 Datum: WGS 1984 UTM Zone 13N
 POC: Soil Sage



0 30 60 Meters

Scale: 1:1,200

Pad Location:
 40.367970
 -104.433210



Service Credits -



Historic
Disturbance
Extent - 2.64 ac

Road (Location 331381)

Current Reclaim
Extent - 0.55 ac

305223 - DOW
LAURA 14-27

S-11 V-12

Reference
Extent -
0.62 ac

V-16 REF

Infrastructure

Facility – CL – 02/09/2014

Well – PA – 02/09/2014

Tank Battery – No Documentation

Pit – NA

Road – see Location 331381

On-Location FLO – 400638461 – 07/02/2014

Off-Location FLO – No Documentation

Environmental - NA

CIV - 305223 - DOW LAURA 14-27 Map Extent - Overview

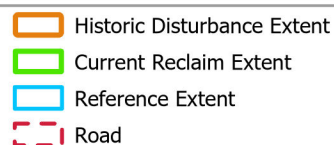
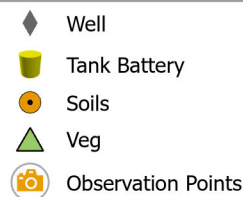
Imagery: RS Orthomosaic & DSM

Imagery Date: 2 May 2023

Map Date: 18 Sep 2023

Datum: WGS 1984 UTM Zone 13N

POC: Soil Sage



0 30 60 Meters

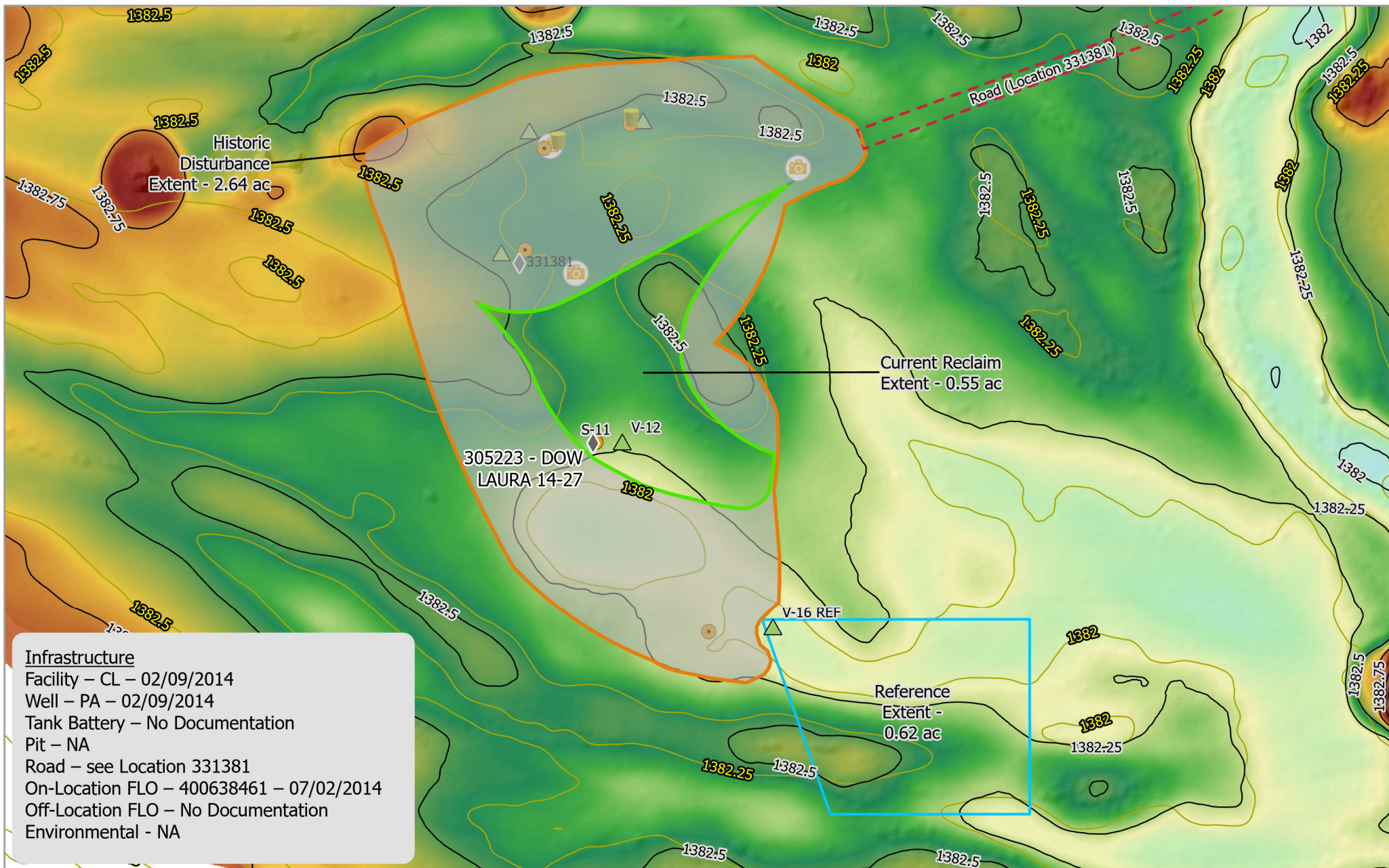
Scale: 1:1,200

Pad Location:
40.367970
-104.433210



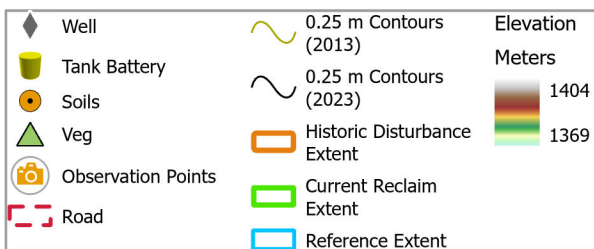
Service Credits -





CIV - 305223 - DOW LAURA 14-27 Map Extent - Elevation and Contours

Imagery: RS DSM, USGS
 Imagery Date: 2 May 2023, 2013
 Map Date: 18 Sep 2023
 Datum: WGS 1984 UTM Zone 13N
 POC: Soil Sage



0 30 60 Meters

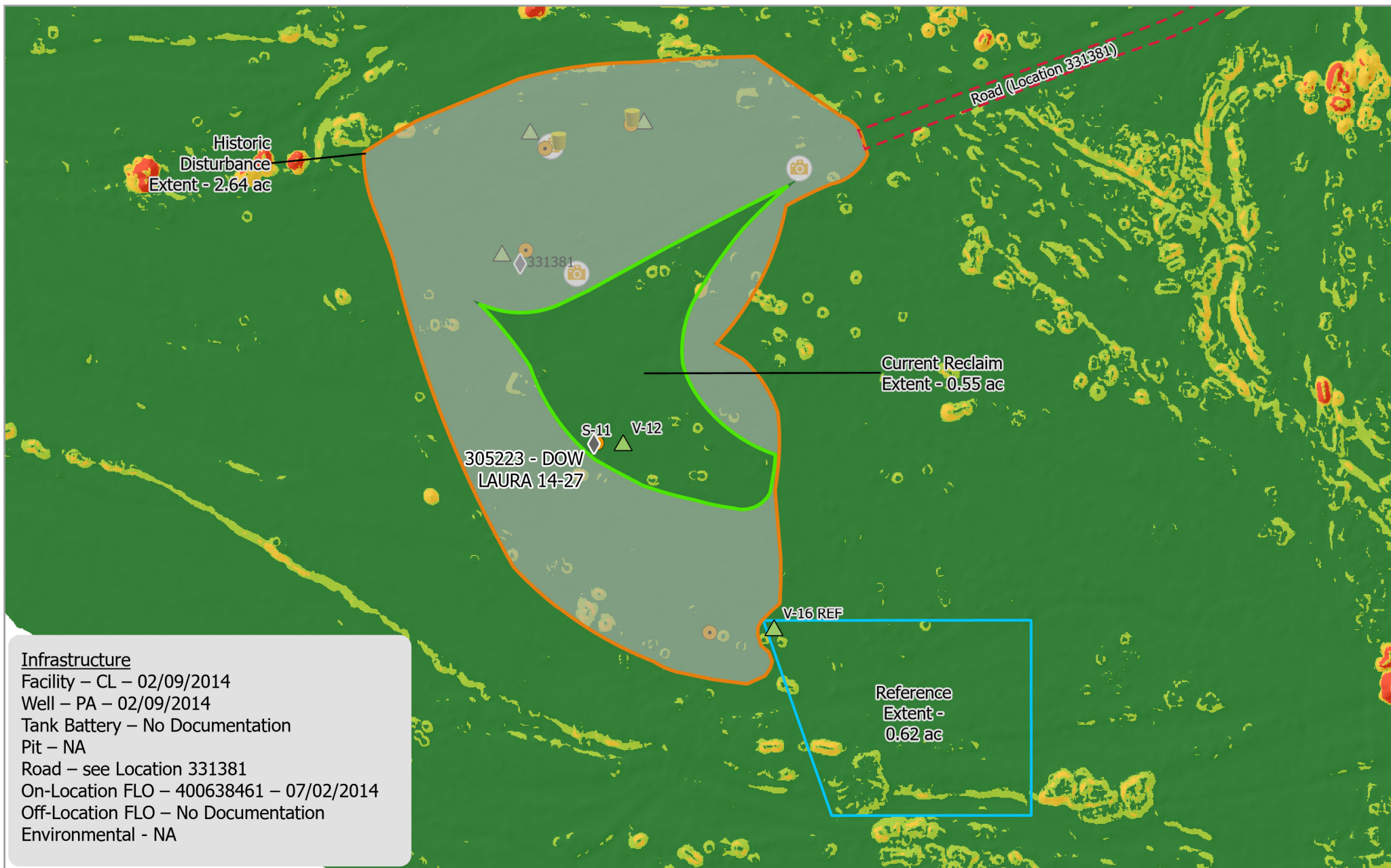
Scale: 1:1,200

Pad Location:
 40.367970
 -104.433210



Service Credits -

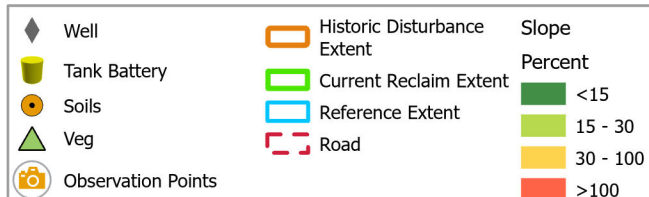




CIV - 305223 - DOW LAURA 14-27

Map Extent - Slope

Imagery: RS DSM
 Imagery Date: 2 May 2023
 Map Date: 18 Sep 2023
 Datum: WGS 1984 UTM Zone 13N
 POC: Soil Sage



0 30 60 Meters

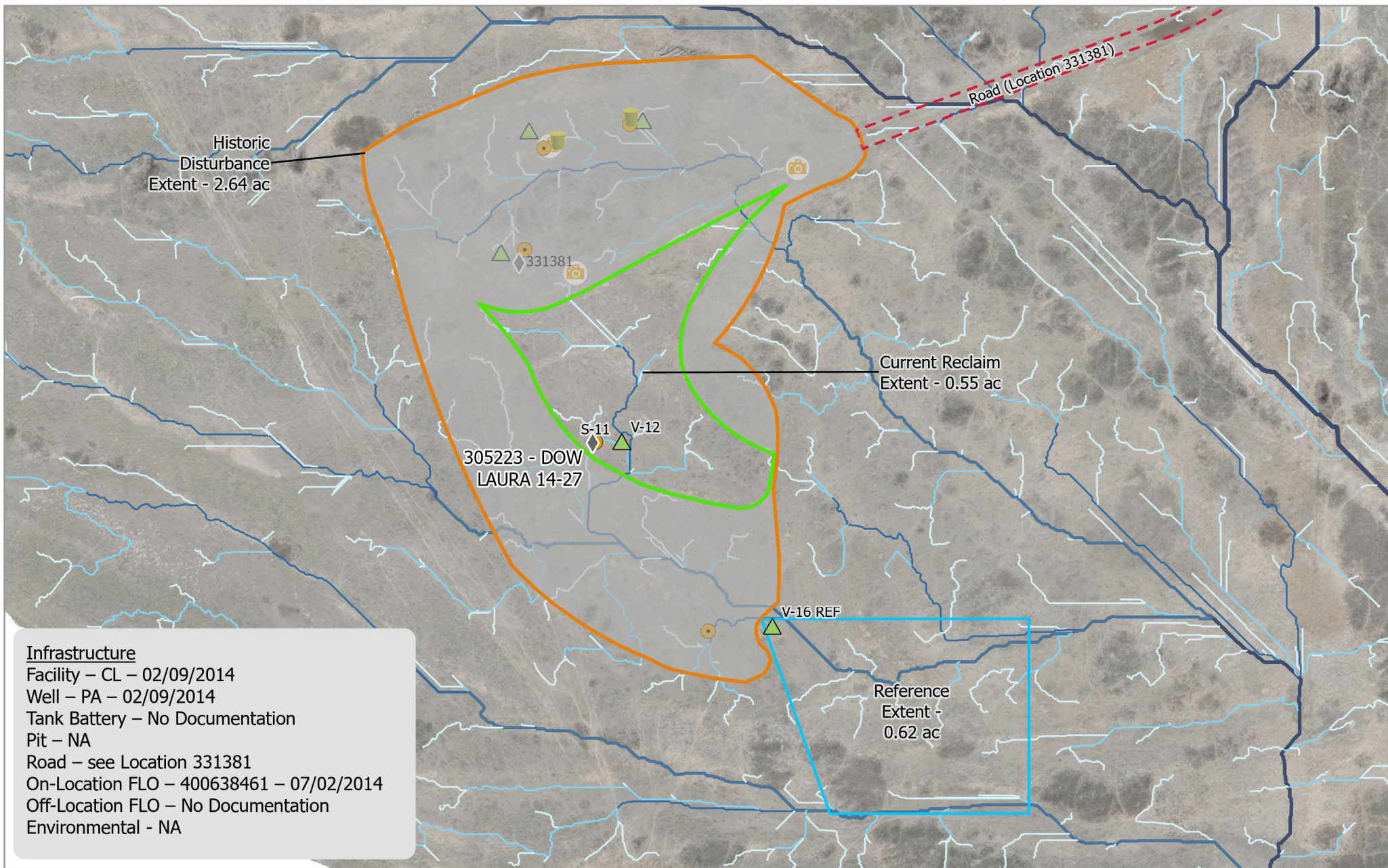
Scale: 1:1,200

Pad Location:
 40.367970
 -104.433210



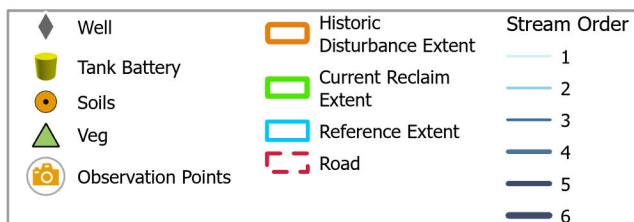
Service Credits -





CIV - 305223 - DOW LAURA 14-27 Map Extent - Hydrology

Imagery: RS Orthomosaic & DSM
 Imagery Date: 2 May 2023
 Map Date: 18 Sep 2023
 Datum: WGS 1984 UTM Zone 13N
 POC: Soil Sage



0 30 60 Meters

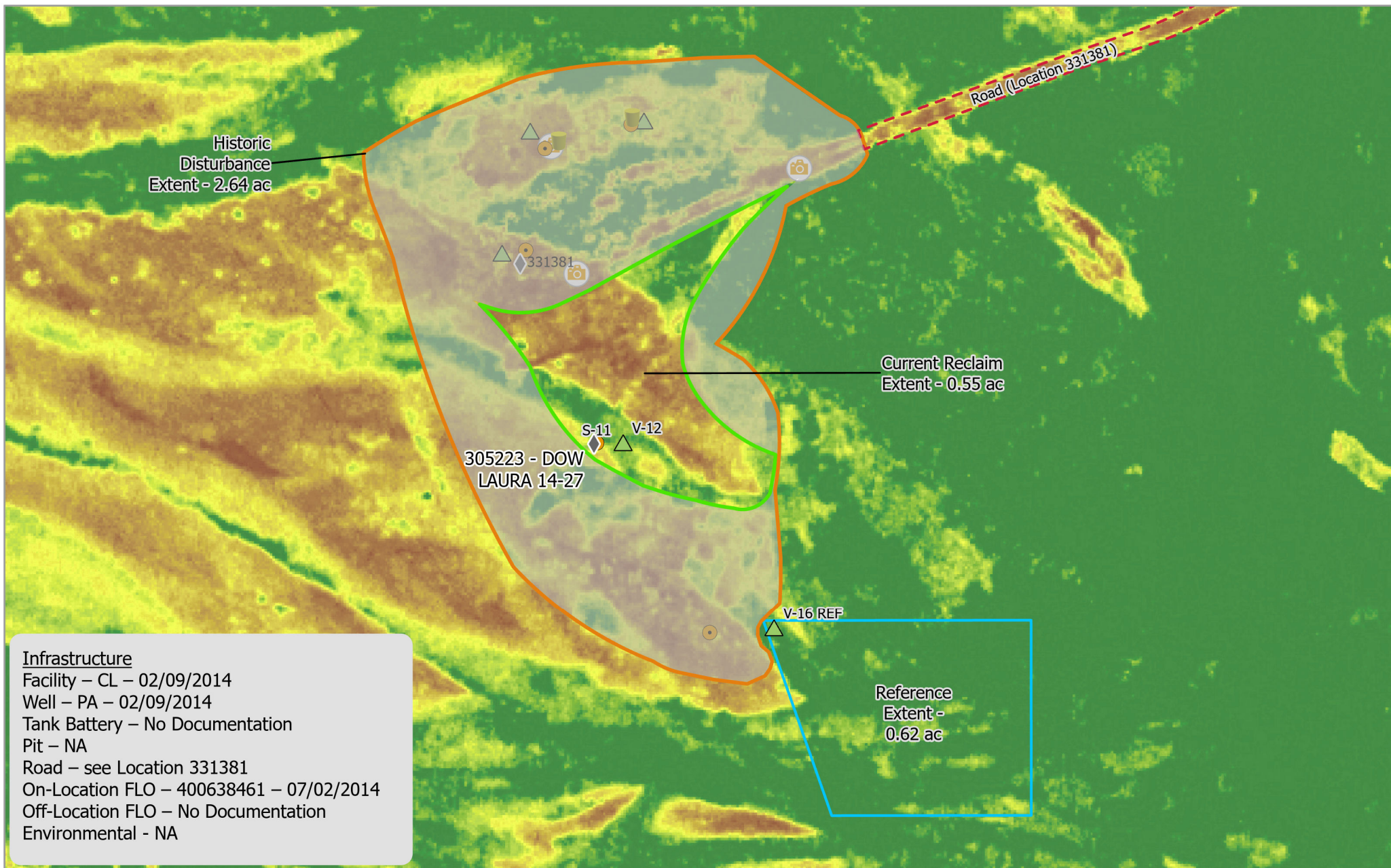
Scale: 1:1,200

Pad Location:
 40.367970
 -104.433210



Service Credits -





Infrastructure

Facility – CL – 02/09/2014

Well – PA – 02/09/2014

Tank Battery – No Documentation

Pit – NA

Road – see Location 331381

On-Location FLO – 400638461 – 07/02/2014

Off-Location FLO – No Documentation

Environmental - NA

CIV - 305223 - DOW LAURA 14-27 Map Extent - NAIP NDVI Composite

Imagery: USDA NAIP

Imagery Date: 2011-2021

Map Date: 18 Sep 2023

Datum: WGS 1984 UTM Zone 13N

POC: Soil Sage

- Well
- Tank Battery
- Soils
- Veg
- Observation Points

- Historic Disturbance Extent
- Current Reclaim Extent
- Reference Extent
- Road

0 30 60 Meters

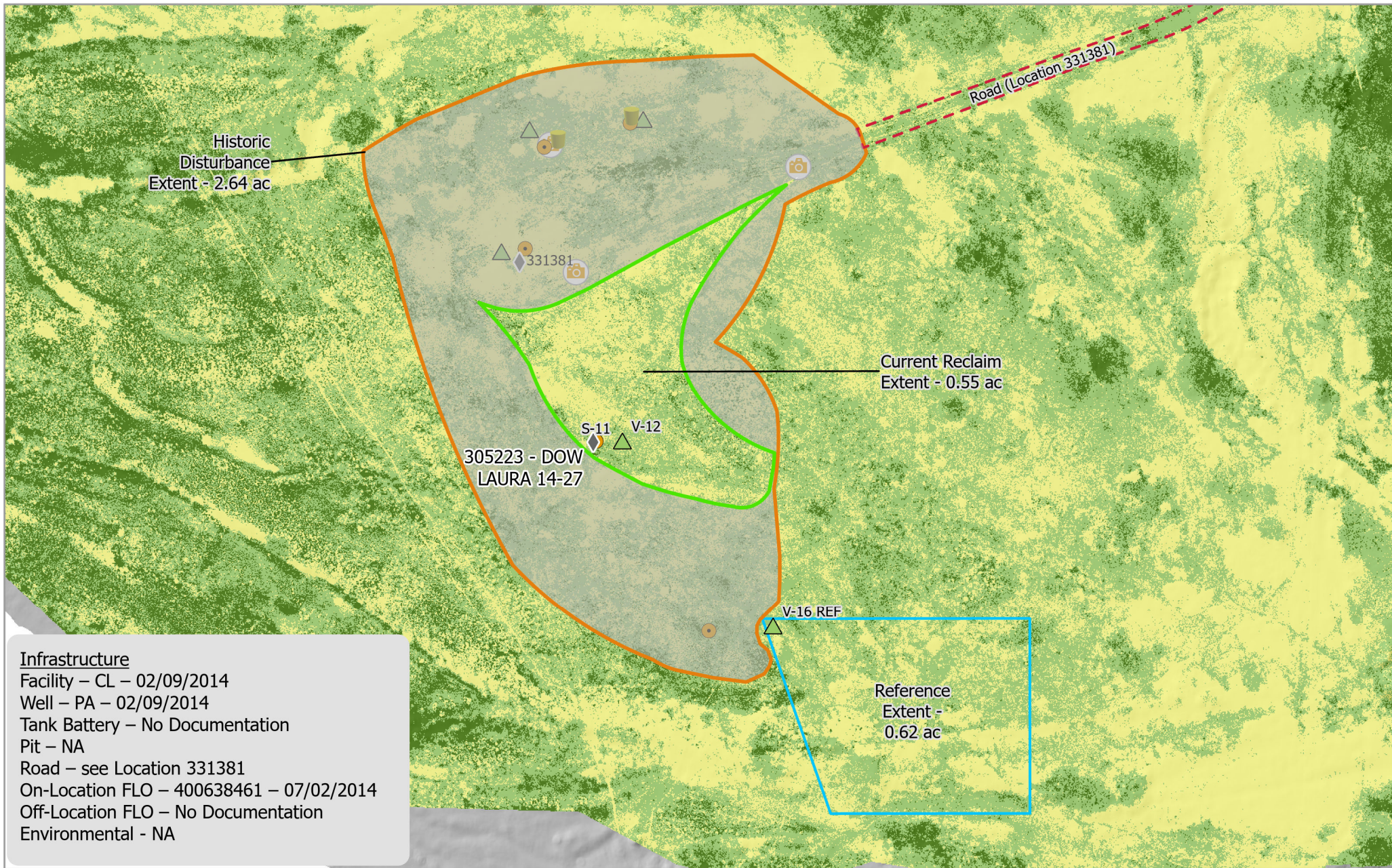
Scale: 1:1,200

Pad Location:
40.367970
-104.433210



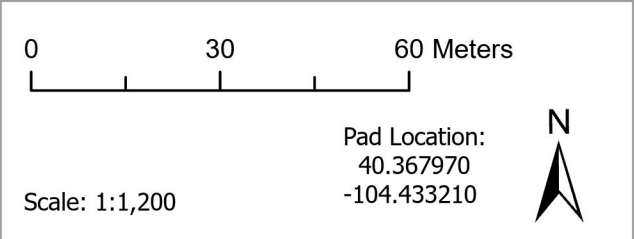
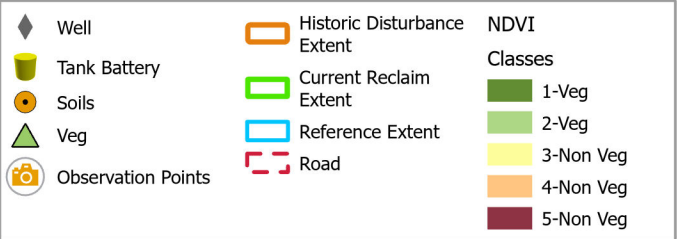
Service Credits - Esri, USDA Farm Service Agency





CIV - 305223 - DOW LAURA 14-27 **Map Extent - NDVI**

Imagery: RS Multispectral
 Imagery Date: 2 May 2023
 Map Date: 18 Sep 2023
 Datum: WGS 1984 UTM Zone 13N
 POC: Soil Sage



CPW Soil and Vegetation

North Side Reference



Site Soils

These soils were analyzed to establish current soil physicochemical properties.

Soil Analytical Spreadsheet

Map Unit(s) – 10

The CPW_North_SoilData_17MAY2023 - contains 4 soil references.

Overview of the 0-12 inches

- Soil texture is a Sandy Loam/Loamy Sand with intermixed Sandy Clay Loam
- pH 7.5
- ECe 1.1
- Organic Matter % - 1.5
- SAR 1.4
- N-P-K – 6-38-199
- Nitrate-N Lbs/A = 11
- Sodium – 105 ppm
- Chloride – 18 ppm
- Sulfate – 64 ppm

NOTE: The native soils have elevated sodium levels in 2 of the 4 samples in the top 12 inches which has a direct correlation to the higher ECe and SAR values.

Vegetation Analysis

Ecological Site observations serve as the baseline vegetation cover.

Table represents the present cover observations.

During the time of sampling the site contained bare ground no vegetation analysis performed.

Sample Number	Bare Ground	Grass	Forbs	Shrubs	Litter	Weeds	Field Notes
8	5	20	0	0	65	10	
11	20	15	5	0	50	10	
16	10	20	0	0	60	10	

Site Average for Vegetative Cover and Total Percent Cover based on field sampling.

Grasses	Forbs	Total Percent Cover	Site Target Recovery (80%)
18	5	23	18

Weeds

Weed Summary Reference based on 2-4 May 2023 Monitoring

Common Name	Weed List Type	Percent Cover (%)
Field Bindweed	List C Noxious	10
Tansy Mustard	Common Weed	10

Reference Soil and Vegetation Field Observation Photos



Site Photos – Soil 5 – S5 REF

Lat/Long: 40.376311 / -104.442836

Nearest Facility #: 331623 and 331251

Date Range: 2-4 May 2023

Photo locations correspond with the overview map and vegetation table.

	
Soil Picture 1	Soil Picture 2 Vegetation at Soil Location




Site Photos – Soil 6 – S6 REF

Lat/Long: 40.376343 / -104.443456

Nearest Facility #: 331623 and 331251

Date Range: 2-4 May 2023

Photo locations correspond with the overview map and vegetation table.

	
Soil Picture 1	Soil Picture 2 Vegetation at Soil Location
	

Site Photos – Soil 10 – S10 REF

Lat/Long: 40.370999 / -104.431953

Nearest Facility #: 305671, 331381 and 305223

Date Range: 2-4 May 2023

Photo locations correspond with the overview map and vegetation table.

	
Soil Picture 1	Soil Picture 2 Vegetation at Soil Location



Site Photos – Soil 15 – S15 REF

Lat/Long: 40.367564 / -104.432884

Nearest Facility #: 305223

Date Range: 2-4 May 2023

Photo locations correspond with the overview map and vegetation table.

	
Soil Picture 1	Soil Picture 2 Vegetation at Soil Location





Site Photos – Vegetation 8 – V8 REF

Lat/Long: 40.371947 / -104.438097

Nearest Facility #: 331413

Date Range: 2-4 May 2023

Photo locations correspond with the overview map and vegetation table.

	
Veg	Veg - North
	
Veg - East	Veg - South

	
<p>Veg – West</p>	<p>Grass ssp.</p>
	
<p>Field Bindweed – <i>Convolvulus arvensis</i> – Colorado List C Noxious Weed</p>	

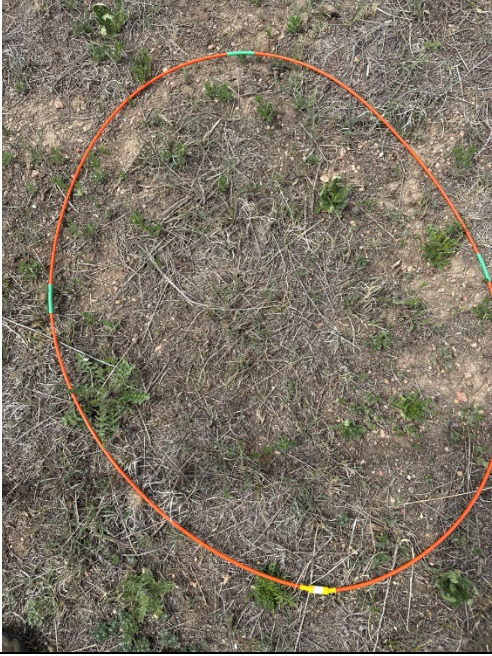



Site Photos – Vegetation 11 – V11 REF





Lat/Long: 40.371095 / -104.431946

Nearest Facility #:

Date Range: 2-4 May 2023

Photo locations correspond with the overview map and vegetation table.

	
Veg	Veg - North
	
Veg - East	Veg - South

	
<p>Veg – West</p>	<p>Tansy Mustard – <i>Descurainia pinata</i> – Common Weed</p>
	
<p>Grass ssp.</p>	<p>Tansy Mustard – <i>Descurainia pinata</i> – Common Weed</p>





Site Photos – Vegetation 16 – V16 REF

Lat/Long: 40.367575 / -104.432707

Nearest Facility #: 305223

Date Range: 2-4 May 2023

Photo locations correspond with the overview map and vegetation table.

	
Veg	Veg - North
	
Veg - East	Veg - South

	
<p>Veg – West</p>	<p>Grass ssp. and Field Bindweed – <i>Convolvulus arvensis</i> – Colorado List C Noxious Weed</p>
	
<p>Grass ssp. and Field Bindweed – <i>Convolvulus arvensis</i> – Colorado List C Noxious Weed</p>	<p>Grass ssp. and Field Bindweed – <i>Convolvulus arvensis</i> – Colorado List C Noxious Weed</p>

Soil Properties

USDA Soil Description

Reference Soil Information

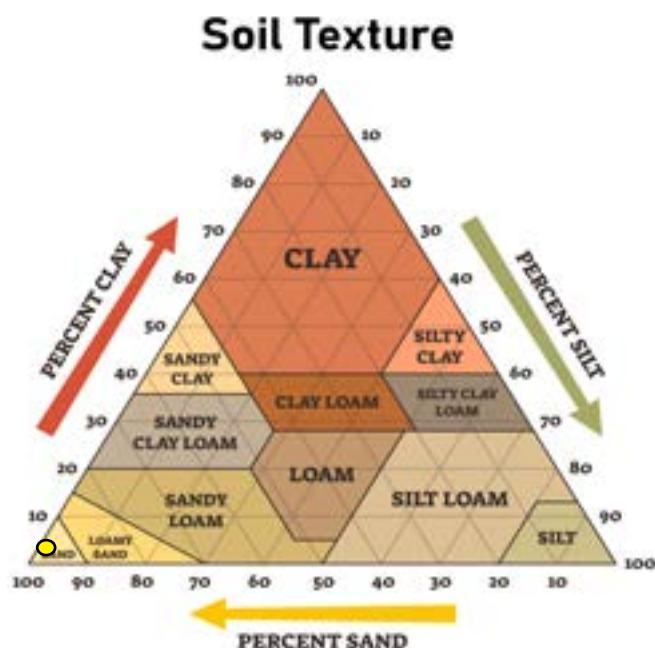
The location of the site is contained within one soil type, Ellicott-Ellicott sandy-skeletal complex.

Map Unit 10 Reference Soil information - Ellicott-Ellicott sandy-skeletal complex

This soil is formed from noncalcareous, stratified sandy alluvium. Landform is drainageways, flood plains on intermittent streams, with the Sandy Bottomland Ecological Site. Soils are excessively drained with a very low water holding capacity, and slope 0-3 percent.

Depth (in)	Physical			Chemical			
	Texture	Bulk Density	Partical Size Percent sand, silt, clay	pH	EC	SAR	OM%
0-10	Sand	1.65	95-3-2	6.5	0.1	0.0	0.35
10-20	Sand	1.64	95-4-1	7.0	0.1	0.0	0.25
20-30	Sand	1.63	95-4-1	7.2	0.1	0.0	0.25
30-40	Sand	1.63	95-4-1	7.6	0.1	0.0	0.25
40-50	Coarse Sand	1.66	95-4-1	7.6	0.1	0.0	0.25
50 +	Coard Sand	1.68	95-4-2	7.6	0.1	0.0	0.25

Soil Texture Triangle reflect the 0-10 in depth



Erosion Potential (10 inches)

- K Factor, Whole soil - .02. 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 – 1. 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 Bottomland Ecology

Climate

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

Average Annual Air Temperature ranges from 48 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 a dominance of warm-season tallgrasses (sand bluestem, prairie sandreed, and switchgrass). The Shrub State is dominated by sand sagebrush and a minor component of understory species (sand dropseed, Fendler threeawn). The Eroded State is characterized by annual forbs and grasses (sunflower, kochia, Russian thistle, cheatgrass) and early successional plants (sandhill muhly, sand dropseed, Fendler threeawn, and lemon scurfpea).

Drought has increased mortality of blue grama and other bunchgrasses significantly in some locales.

Principle dominants are sand bluestem, prairie sandreed, and switchgrass. Subdominant grasses include needle and thread, blue grama, little bluestem, and western wheatgrass. Significant forbs and shrubs are pacific peavine, evening primrose, prairie clovers, leadplant and western sandcherry. Cottonwoods may be present. The potential vegetation is about 70-85% grasses or grass-like plants, 8-15% forbs and 7-15% shrubs.

Carbon sequestration is greatly reduced.

Reference Vegetation – Sandy Bottomland Ecology

At Risk Plant Community

Key species from the Reference Plant Community, Sand bluestem, prairie sandreed, switchgrass, western sandcherry and leadplant have decreased in frequency and production. Blue grama and sand sagebrush have increased. Sand dropseed, Fendler threeawn, slimflower scurfpea, and Cuman ragweed (western ragweed) have also increased.

The risk of losing some of the tallgrass species, palatable forbs and shrubs. The reduction of tallgrass species, nitrogen-fixing forbs, key shrub component and increased warm-season shortgrass has altered the biotic integrity of this plant community. Nutrient cycle, water cycle and energy flow are at risk of becoming impaired.

Vegetation

Sandy Bottomland Ecosystem Vegetative Community Composition

Common Name	Scientific Name
Sand Bluestem	<i>Andropogon hallii</i>
Prairie Sandreed	<i>Calamovilfa longifolia</i>
Switchgrass	<i>Panicum virgatum</i>
Indiangrass	<i>Sorghastrum nutans</i>
Needle and Thread	<i>Hesperostipa comata</i> ssp. <i>comata</i>
Blue Grama	<i>Bouteloua gracilis</i>
Western Wheatgrass	<i>Pascopyrum smithii</i>
Little Bluestem	<i>Schizachyrium scoparium</i>
Sideoats Grama	<i>Bouteloua curtipendula</i>
Sand Dropseed	<i>Sporobolus cryptandrus</i>
Indian Ricegrass	<i>Achnatherum hymenoides</i>
Hairy Grama	<i>Bouteloua hirsuta</i>
Prairie Junegrass	<i>Koeleria macrantha</i>
Saltgrass	<i>Distichlis spicata</i>
Sixweeks Fescue	<i>Vulpia octoflora</i>
Sand Bluestem	<i>Andropogon hallii</i>
Switchgrass	<i>Panicum virgatum</i>
Indiangrass	<i>Sorghastrum nutans</i>
Manystem Pea	<i>Lathyrus polymorphus</i>
Dotted Blazing Star	<i>Liatris punctata</i>
Purple Prairie Clover	<i>Dalea purpurea</i> var. <i>purpurea</i>
Broadbeard Beardtongue	<i>Penstemon angustifolius</i>
Upright Prairie Coneflower	<i>Ratibida columnifera</i>
Scarlet Globemallow	<i>Sphaeralcea coccinea</i>
White Heath Aster	<i>Symphyotrichum ericoides</i> var. <i>ericoides</i>
Annual Buckwheat	<i>Eriogonum annuum</i>
White Sagebrush	<i>Artemisia ludoviciana</i>
Painted Milkvetch	<i>Atragalus ceramicus</i> var. <i>filifolius</i>

Change Detection

Normalized Difference Vegetation (NDVI)

Section will primarily focus on the NDVI imagery for vegetation reference and current analytics.

The composite NAIP NDVI imagery from 2010-2020, this data set does not contain the NDVI values to perform statistical analysis. The imagery foot print encompasses the site extent and a vegetation reference extent for vegetative analysis.

Remotely sensed data was gathered on 2 - 4 May 2023, which reflects the current vegetative cover statistics.

NDVI calculations used the Near Infrared from the multispectral sensors. The NDVI reflects the measurements from the plant's topmost layer of leaves, typically used during spring emergence into mid-season growth.

Ag Testing - Consulting

Account No. : 19356

Soil Analysis Report

DANIELS, JUDY
SOIL SAGE LLC
8323 DEPEW WAY
ARVADA

CO 80003

Invoice No. : 1401762
Date Received : 05/10/2023
Date Reported : 05/12/2023

Results For : CIV
Location : CPW2

Lab No. : 62418 Depth : 0 - 6
ID : CIV-CPW2-SOIL 5.1

1:1 Soil pH	8.6
Soluble Salts 1:1, mmho/cm	0.06
Excess Lime Rating	NONE
Organic Matter LOI, %	0.5
Nitrate-N KCl, ppm N	2.1
Nitrate-N, lbs N / Acre	4
Phosphorus M3, ppm P	15
Potassium NH ₄ OAc, ppm K	92
Sulfate M-3, ppm S	3.2
Zinc DTPA, ppm Zn	0.31
Iron DTPA, ppm Fe	7.8
Manganese DTPA, ppm Mn	1.4
Copper DTPA, ppm Cu	0.40
Calcium NH ₄ OAc, ppm Ca	1169
Magnesium NH ₄ OAc, ppm Mg	131
Sodium NH ₄ OAc, ppm Na	68
Chloride Ca-NO ₃ , ppm Cl	1.0
Boron Hot Water, ppm B	0.27

Sum of Cations, me/100g	% Saturation				
	H	K	Ca	Mg	Na
7.5	0	3	78	15	4

Saturated Soil Paste Analysis (SAR)

Saturation, %	49
Sat Paste pH	8.1
Sat Paste ECe, mmho/cm	0.18
HCO ₃ , ppm	73
Cl, ppm	4
Ca, ppm	30
Mg, ppm	5
Na, ppm	4
S, ppm	2.8
Sodium Adsorption Ratio	0.2

Reviewed By : Raymond Ward

5/17/2023

Copy : 1

Page 33 of 120

Ag Testing - Consulting

Account No. : 19356

Soil Analysis Report

**DANIELS, JUDY
SOIL SAGE LLC
8323 DEPEW WAY
ARVADA**

CO 80003

**Invoice No. : 1401762
Date Received : 05/10/2023
Date Reported : 05/12/2023**

**Results For : CIV
Location : CPW2**

Soil Texture	Sand, %	Silt, %	Clay, %
Loamy Sand	87	6	7

Ag Testing - Consulting

Account No. : 19356

Soil Analysis Report

DANIELS, JUDY
SOIL SAGE LLC
8323 DEPEW WAY
ARVADA

CO 80003

Invoice No. : 1401762
Date Received : 05/10/2023
Date Reported : 05/12/2023

Results For : CIV
Location : CPW2

Lab No. : 62419 Depth : 6 - 12
ID : CIV-CPW2-SOIL 5.2

1:1 Soil pH	8.7
Soluble Salts 1:1, mmho/cm	0.05
Excess Lime Rating	NONE
Organic Matter LOI, %	0.3
Nitrate-N KCl, ppm N	0.5
Nitrate-N, lbs N / Acre	1
Phosphorus M3, ppm P	9
Potassium NH ₄ OAc, ppm K	25
Sulfate M-3, ppm S	2.9
Zinc DTPA, ppm Zn	0.31
Iron DTPA, ppm Fe	5.6
Manganese DTPA, ppm Mn	1.2
Copper DTPA, ppm Cu	0.22
Calcium NH ₄ OAc, ppm Ca	746
Magnesium NH ₄ OAc, ppm Mg	73
Sodium NH ₄ OAc, ppm Na	7
Chloride Ca-NO ₃ , ppm Cl	0.2
Boron Hot Water, ppm B	0.21

Sum of Cations, me/100g	% Saturation				
	H	K	Ca	Mg	Na
4.4	0	1	84	14	1

Saturated Soil Paste Analysis (SAR)

Saturation, %	44
Sat Paste pH	8.3
Sat Paste E _{Ce} , mmho/cm	0.15
HCO ₃ , ppm	68
Cl, ppm	3
Ca, ppm	21
Mg, ppm	5
Na, ppm	3
S, ppm	1.5
Sodium Adsorption Ratio	0.1

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5/17/2023

Copy : 1

Page 35 of 120

Account No. : 19356

Soil Analysis Report

DANIELS, JUDY
SOIL SAGE LLC
8323 DEPEW WAY
ARVADA

CO 80003

Invoice No. : 1401762
Date Received : 05/10/2023
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Results For : CIV
Location : CPW2

Soil Texture	Sand, %	Silt, %	Clay, %
Sand	90	5	5

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Account No. : 19356

Soil Analysis Report

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8323 DEPEW WAY
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Invoice No. : 1401762
Date Received : 05/10/2023
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Results For : CIV
Location : CPW2

Lab No. : 62420 Depth : 12 - 18
ID : CIV-CPW2-SOIL 5.3

1:1 Soil pH	8.8
Soluble Salts 1:1, mmho/cm	0.05
Excess Lime Rating	NONE
Organic Matter LOI, %	0.3
Nitrate-N KCl, ppm N	< 0.1
Nitrate-N, lbs N / Acre	0
Phosphorus M3, ppm P	9
Potassium NH ₄ OAc, ppm K	24
Sulfate M-3, ppm S	2.5
Zinc DTPA, ppm Zn	0.24
Iron DTPA, ppm Fe	5.4
Manganese DTPA, ppm Mn	1.3
Copper DTPA, ppm Cu	0.18
Calcium NH ₄ OAc, ppm Ca	604
Magnesium NH ₄ OAc, ppm Mg	69
Sodium NH ₄ OAc, ppm Na	6
Chloride Ca-NO ₃ , ppm Cl	0.2
Boron Hot Water, ppm B	0.19

Sum of Cations, me/100g	% Saturation				
	H	K	Ca	Mg	Na
3.7	0	2	81	16	1

Saturated Soil Paste Analysis (SAR)

Saturation, %	30
Sat Paste pH	8.2
Sat Paste E _{Ce} , mmho/cm	0.16
HCO ₃ , ppm	76
Cl, ppm	3
Ca, ppm	24
Mg, ppm	6
Na, ppm	3
S, ppm	1.4
Sodium Adsorption Ratio	0.2

Reviewed By : Raymond Ward

5/17/2023

Copy : 1

Page 37 of 120

Account No. : 19356

Soil Analysis Report

DANIELS, JUDY
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8323 DEPEW WAY
ARVADA

CO 80003

Invoice No. : 1401762
Date Received : 05/10/2023
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Results For : CIV
Location : CPW2

Soil Texture	Sand, %	Silt, %	Clay, %
Sand	90	5	5

Ag Testing - Consulting

Account No. : 19356

Soil Analysis Report

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8323 DEPEW WAY
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Invoice No. : 1401762
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Results For : CIV
Location : CPW2

Lab No. : 62421 Depth : 18 - 24
ID : CIV-CPW2-SOIL 5.4

1:1 Soil pH	8.7
Soluble Salts 1:1, mmho/cm	0.05
Excess Lime Rating	NONE
Organic Matter LOI, %	0.3
Nitrate-N KCl, ppm N	0.5
Nitrate-N, lbs N / Acre	1
Phosphorus M3, ppm P	9
Potassium NH ₄ OAc, ppm K	24
Sulfate M-3, ppm S	3.7
Zinc DTPA, ppm Zn	0.15
Iron DTPA, ppm Fe	6.1
Manganese DTPA, ppm Mn	1.1
Copper DTPA, ppm Cu	0.21
Calcium NH ₄ OAc, ppm Ca	849
Magnesium NH ₄ OAc, ppm Mg	100
Sodium NH ₄ OAc, ppm Na	8
Chloride Ca-NO ₃ , ppm Cl	0.0
Boron Hot Water, ppm B	0.17

Sum of Cations, me/100g	% Saturation				
	H	K	Ca	Mg	Na
5.2	0	1	82	16	1

Saturated Soil Paste Analysis (SAR)

Saturation, %	33
Sat Paste pH	8.3
Sat Paste ECe, mmho/cm	0.17
HCO ₃ , ppm	77
Cl, ppm	3
Ca, ppm	24
Mg, ppm	7
Na, ppm	4
S, ppm	1.8
Sodium Adsorption Ratio	0.2

Reviewed By : Raymond Ward

5/17/2023

Copy : 1

Page 39 of 120

Account No. : 19356

Soil Analysis Report

DANIELS, JUDY
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ARVADA

CO 80003

Invoice No. : 1401762
Date Received : 05/10/2023
Date Reported : 05/12/2023

Results For : CIV
Location : CPW2

Soil Texture	Sand, %	Silt, %	Clay, %
Sand	90	4	6

Ag Testing - Consulting

Account No. : 19356

Soil Analysis Report

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Date Received : 05/10/2023
Date Reported : 05/12/2023

Results For : CIV
Location : CPW2

Lab No. : 62422 Depth : 0 - 6
ID : CIV-CPW2-SOIL 6.1

1:1 Soil pH	7.9
Soluble Salts 1:1, mmho/cm	0.13
Excess Lime Rating	NONE
Organic Matter LOI, %	1.5
Nitrate-N KCl, ppm N	11.2
Nitrate-N, lbs N / Acre	20
Phosphorus M3, ppm P	66
Potassium NH ₄ OAc, ppm K	205
Sulfate M-3, ppm S	6.3
Zinc DTPA, ppm Zn	1.32
Iron DTPA, ppm Fe	9.2
Manganese DTPA, ppm Mn	4.0
Copper DTPA, ppm Cu	0.55
Calcium NH ₄ OAc, ppm Ca	1272
Magnesium NH ₄ OAc, ppm Mg	205
Sodium NH ₄ OAc, ppm Na	7
Chloride Ca-NO ₃ , ppm Cl	0.9
Boron Hot Water, ppm B	0.66

Sum of Cations, me/100g	% Saturation				
	H	K	Ca	Mg	Na
8.6	0	6	74	20	0

Saturated Soil Paste Analysis (SAR)

Saturation, %	41
Sat Paste pH	7.1
Sat Paste E _{Ce} , mmho/cm	0.54
HCO ₃ , ppm	150
Cl, ppm	4
Ca, ppm	77
Mg, ppm	20
Na, ppm	3
S, ppm	6.9
Sodium Adsorption Ratio	0.1

Reviewed By : Raymond Ward

5/17/2023

Copy : 1

Page 41 of 120

Account No. : 19356

Soil Analysis Report

DANIELS, JUDY
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8323 DEPEW WAY
ARVADA

CO 80003

Invoice No. : 1401762
Date Received : 05/10/2023
Date Reported : 05/12/2023

Results For : CIV
Location : CPW2

Soil Texture	Sand, %	Silt, %	Clay, %
Sandy Loam	74	14	12

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Account No. : 19356

Soil Analysis Report

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Date Received : 05/10/2023
Date Reported : 05/12/2023

Results For : CIV
Location : CPW2

Lab No. : 62423 Depth : 6 - 12
ID : CIV-CPW2-SOIL 6.2

1:1 Soil pH	8.0
Soluble Salts 1:1, mmho/cm	0.10
Excess Lime Rating	NONE
Organic Matter LOI, %	1.1
Nitrate-N KCl, ppm N	7.3
Nitrate-N, lbs N / Acre	13
Phosphorus M3, ppm P	34
Potassium NH ₄ OAc, ppm K	179
Sulfate M-3, ppm S	4.6
Zinc DTPA, ppm Zn	0.50
Iron DTPA, ppm Fe	5.3
Manganese DTPA, ppm Mn	2.7
Copper DTPA, ppm Cu	0.49
Calcium NH ₄ OAc, ppm Ca	1318
Magnesium NH ₄ OAc, ppm Mg	227
Sodium NH ₄ OAc, ppm Na	14
Chloride Ca-NO ₃ , ppm Cl	0.9
Boron Hot Water, ppm B	0.62

Sum of Cations, me/100g	% Saturation				
	H	K	Ca	Mg	Na
9.0	0	5	73	21	1

Saturated Soil Paste Analysis (SAR)

Saturation, %	33
Sat Paste pH	7.5
Sat Paste E _{Ce} , mmho/cm	0.47
HCO ₃ , ppm	135
Cl, ppm	8
Ca, ppm	66
Mg, ppm	17
Na, ppm	8
S, ppm	7.9
Sodium Adsorption Ratio	0.2

Reviewed By : Raymond Ward

5/17/2023

Copy : 1

Page 43 of 120

Account No. : 19356

Soil Analysis Report

DANIELS, JUDY
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ARVADA

CO 80003

Invoice No. : 1401762
Date Received : 05/10/2023
Date Reported : 05/12/2023

Results For : CIV
Location : CPW2

Soil Texture	Sand, %	Silt, %	Clay, %
Sandy Loam	75	12	13

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Account No. : 19356

Soil Analysis Report

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Invoice No. : 1401762
Date Received : 05/10/2023
Date Reported : 05/12/2023

Results For : CIV
Location : CPW2

Lab No. : 62424 Depth : 12 - 18
ID : CIV-CPW2-SOIL 6.3

1:1 Soil pH	8.6
Soluble Salts 1:1, mmho/cm	0.13
Excess Lime Rating	LOW
Organic Matter LOI, %	0.7
Nitrate-N KCl, ppm N	8.2
Nitrate-N, lbs N / Acre	15
Phosphorus M3, ppm P	8
Potassium NH ₄ OAc, ppm K	65
Sulfate M-3, ppm S	13.5
Zinc DTPA, ppm Zn	0.12
Iron DTPA, ppm Fe	3.6
Manganese DTPA, ppm Mn	1.4
Copper DTPA, ppm Cu	0.30
Calcium NH ₄ OAc, ppm Ca	2973
Magnesium NH ₄ OAc, ppm Mg	263
Sodium NH ₄ OAc, ppm Na	18
Chloride Ca-NO ₃ , ppm Cl	1.1
Boron Hot Water, ppm B	0.40

Sum of Cations, me/100g	% Saturation				
	H	K	Ca	Mg	Na
17.3	0	1	86	13	0

Saturated Soil Paste Analysis (SAR)

Saturation, %	29
Sat Paste pH	7.9
Sat Paste ECe, mmho/cm	0.44
HCO ₃ , ppm	94
Cl, ppm	8
Ca, ppm	56
Mg, ppm	17
Na, ppm	15
S, ppm	10.2
Sodium Adsorption Ratio	0.5

Reviewed By : Raymond Ward

5/17/2023

Copy : 1

Page 45 of 120

Ag Testing - Consulting

Account No. : 19356

Soil Analysis Report

**DANIELS, JUDY
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8323 DEPEW WAY
ARVADA**

CO 80003

**Invoice No. : 1401762
Date Received : 05/10/2023
Date Reported : 05/12/2023**

**Results For : CIV
Location : CPW2**

Soil Texture	Sand, %	Silt, %	Clay, %
Loamy Sand	83	6	11

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Account No. : 19356

Soil Analysis Report

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8323 DEPEW WAY
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Results For : CIV
Location : CPW2

Lab No. : 62425 Depth : 8 - 24
ID : CIV-CPW2-SOIL 6.4

1:1 Soil pH	8.6
Soluble Salts 1:1, mmho/cm	0.20
Excess Lime Rating	HIGH
Organic Matter LOI, %	1.2
Nitrate-N KCl, ppm N	10.7
Nitrate-N, lbs N / Acre	51
Phosphorus M3, ppm P	5
Potassium NH ₄ OAc, ppm K	52
Sulfate M-3, ppm S	17.6
Zinc DTPA, ppm Zn	0.18
Iron DTPA, ppm Fe	4.5
Manganese DTPA, ppm Mn	1.3
Copper DTPA, ppm Cu	0.50
Calcium NH ₄ OAc, ppm Ca	3848
Magnesium NH ₄ OAc, ppm Mg	435
Sodium NH ₄ OAc, ppm Na	44
Chloride Ca-NO ₃ , ppm Cl	1.6
Boron Hot Water, ppm B	0.62

Sum of Cations, me/100g	% Saturation				
	H	K	Ca	Mg	Na
23.2	0	1	82	16	1

Saturated Soil Paste Analysis (SAR)

Saturation, %	48
Sat Paste pH	8.0
Sat Paste ECe, mmho/cm	0.49
HCO ₃ , ppm	116
Cl, ppm	6
Ca, ppm	50
Mg, ppm	19
Na, ppm	32
S, ppm	10.8
Sodium Adsorption Ratio	1.0

Reviewed By : Raymond Ward

5/17/2023

Copy : 1

Page 47 of 120

Account No. : 19356

Soil Analysis Report

**DANIELS, JUDY
SOIL SAGE LLC
8323 DEPEW WAY
ARVADA**

CO 80003

**Invoice No. : 1401762
Date Received : 05/10/2023
Date Reported : 05/12/2023**

**Results For : CIV
Location : CPW2**

Soil Texture	Sand, %	Silt, %	Clay, %
Sandy Loam	68	14	18

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Account No. : 19356

Soil Analysis Report

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8323 DEPEW WAY
ARVADA

CO 80003

Invoice No. : 1401762
Date Received : 05/10/2023
Date Reported : 05/12/2023

Results For : CIV
Location : CPW2

Lab No. : 62438 Depth : 0 - 6
ID : CIV-CPW2-SOIL 10.1

1:1 Soil pH	7.4
Soluble Salts 1:1, mmho/cm	0.81
Excess Lime Rating	NONE
Organic Matter LOI, %	1.3
Nitrate-N KCl, ppm N	3.3
Nitrate-N, lbs N / Acre	6
Phosphorus M3, ppm P	39
Potassium NH ₄ OAc, ppm K	335
Sulfate M-3, ppm S	111.9
Zinc DTPA, ppm Zn	0.64
Iron DTPA, ppm Fe	13.7
Manganese DTPA, ppm Mn	3.7
Copper DTPA, ppm Cu	0.57
Calcium NH ₄ OAc, ppm Ca	1200
Magnesium NH ₄ OAc, ppm Mg	224
Sodium NH ₄ OAc, ppm Na	168
Chloride Ca-NO ₃ , ppm Cl	61.5
Boron Hot Water, ppm B	1.14

Sum of Cations, me/100g	% Saturation				
	H	K	Ca	Mg	Na
9.5	0	9	63	20	8

Saturated Soil Paste Analysis (SAR)

Saturation, %	37
Sat Paste pH	7.0
Sat Paste ECe, mmho/cm	2.17
HCO ₃ , ppm	118
Cl, ppm	174
Ca, ppm	178
Mg, ppm	47
Na, ppm	183
S, ppm	252.5
Sodium Adsorption Ratio	3.1

Reviewed By : Raymond Ward

5/17/2023

Copy : 1

Page 73 of 120

Ag Testing - Consulting

Account No. : 19356

Soil Analysis Report

**DANIELS, JUDY
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8323 DEPEW WAY
ARVADA**

CO 80003

**Invoice No. : 1401762
Date Received : 05/10/2023
Date Reported : 05/12/2023**

**Results For : CIV
Location : CPW2**

Soil Texture	Sand, %	Silt, %	Clay, %
Sandy Loam	69	18	13

Ag Testing - Consulting

Account No. : 19356

Soil Analysis Report

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ARVADA

CO 80003

Invoice No. : 1401762
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Date Reported : 05/12/2023

Results For : CIV
Location : CPW2

Lab No. : 62439 Depth : 6 - 12
ID : CIV-CPW2-SOIL 10.2

1:1 Soil pH	7.8
Soluble Salts 1:1, mmho/cm	0.74
Excess Lime Rating	NONE
Organic Matter LOI, %	1.4
Nitrate-N KCl, ppm N	6.4
Nitrate-N, lbs N / Acre	12
Phosphorus M3, ppm P	35
Potassium NH ₄ OAc, ppm K	317
Sulfate M-3, ppm S	99.2
Zinc DTPA, ppm Zn	0.81
Iron DTPA, ppm Fe	10.2
Manganese DTPA, ppm Mn	3.1
Copper DTPA, ppm Cu	0.49
Calcium NH ₄ OAc, ppm Ca	1503
Magnesium NH ₄ OAc, ppm Mg	264
Sodium NH ₄ OAc, ppm Na	194
Chloride Ca-NO ₃ , ppm Cl	60.0
Boron Hot Water, ppm B	1.23

Sum of Cations, me/100g	% Saturation				
	H	K	Ca	Mg	Na
11.4	0	7	66	19	7

Saturated Soil Paste Analysis (SAR)

Saturation, %	43
Sat Paste pH	7.2
Sat Paste E _{Ce} , mmho/cm	1.88
HCO ₃ , ppm	140
Cl, ppm	151
Ca, ppm	141
Mg, ppm	39
Na, ppm	175
S, ppm	202.4
Sodium Adsorption Ratio	3.4

Reviewed By : Raymond Ward

5/17/2023

Copy : 1

Page 75 of 120

Account No. : 19356

Soil Analysis Report

DANIELS, JUDY
SOIL SAGE LLC
8323 DEPEW WAY
ARVADA

CO 80003

Invoice No. : 1401762
Date Received : 05/10/2023
Date Reported : 05/12/2023

Results For : CIV
Location : CPW2

Soil Texture	Sand, %	Silt, %	Clay, %
Sandy Loam	69	18	13

Ag Testing - Consulting

Account No. : 19356

Soil Analysis Report

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8323 DEPEW WAY
ARVADA

CO 80003

Invoice No. : 1401762
Date Received : 05/10/2023
Date Reported : 05/12/2023

Results For : CIV
Location : CPW2

Lab No. : 62440 Depth : 12 - 18
ID : CIV-CPW2-SOIL 10.3

1:1 Soil pH	8.3
Soluble Salts 1:1, mmho/cm	0.46
Excess Lime Rating	NONE
Organic Matter LOI, %	1.1
Nitrate-N KCl, ppm N	2.5
Nitrate-N, lbs N / Acre	4
Phosphorus M3, ppm P	18
Potassium NH ₄ OAc, ppm K	127
Sulfate M-3, ppm S	53.6
Zinc DTPA, ppm Zn	0.31
Iron DTPA, ppm Fe	5.9
Manganese DTPA, ppm Mn	2.0
Copper DTPA, ppm Cu	0.40
Calcium NH ₄ OAc, ppm Ca	1276
Magnesium NH ₄ OAc, ppm Mg	242
Sodium NH ₄ OAc, ppm Na	146
Chloride Ca-NO ₃ , ppm Cl	48.2
Boron Hot Water, ppm B	0.81

Sum of Cations, me/100g	% Saturation				
	H	K	Ca	Mg	Na
9.4	0	3	68	22	7

Saturated Soil Paste Analysis (SAR)

Saturation, %	40
Sat Paste pH	7.6
Sat Paste E _{Ce} , mmho/cm	1.19
HCO ₃ , ppm	95
Cl, ppm	107
Ca, ppm	80
Mg, ppm	22
Na, ppm	122
S, ppm	107.2
Sodium Adsorption Ratio	3.1

Reviewed By : Raymond Ward

5/17/2023

Copy : 1

Page 77 of 120

Account No. : 19356

Soil Analysis Report

DANIELS, JUDY
SOIL SAGE LLC
8323 DEPEW WAY
ARVADA

CO 80003

Invoice No. : 1401762
Date Received : 05/10/2023
Date Reported : 05/12/2023

Results For : CIV
Location : CPW2

Soil Texture	Sand, %	Silt, %	Clay, %
Sandy Loam	69	18	13

Ag Testing - Consulting

Account No. : 19356

Soil Analysis Report

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8323 DEPEW WAY
ARVADA

CO 80003

Invoice No. : 1401762
Date Received : 05/10/2023
Date Reported : 05/12/2023

Results For : CIV
Location : CPW2

Lab No. : 62441 Depth : 8 - 24
ID : CIV-CPW2-SOIL 10.4

1:1 Soil pH	8.7
Soluble Salts 1:1, mmho/cm	0.22
Excess Lime Rating	NONE
Organic Matter LOI, %	0.6
Nitrate-N KCl, ppm N	0.7
Nitrate-N, lbs N / Acre	3
Phosphorus M3, ppm P	31
Potassium NH ₄ OAc, ppm K	42
Sulfate M-3, ppm S	22.6
Zinc DTPA, ppm Zn	0.16
Iron DTPA, ppm Fe	5.0
Manganese DTPA, ppm Mn	1.4
Copper DTPA, ppm Cu	0.27
Calcium NH ₄ OAc, ppm Ca	769
Magnesium NH ₄ OAc, ppm Mg	130
Sodium NH ₄ OAc, ppm Na	65
Chloride Ca-NO ₃ , ppm Cl	14.5
Boron Hot Water, ppm B	0.41

Sum of Cations, me/100g	% Saturation				
	H	K	Ca	Mg	Na
5.3	0	2	72	20	5

Saturated Soil Paste Analysis (SAR)

Saturation, %	31
Sat Paste pH	7.9
Sat Paste E _{Ce} , mmho/cm	0.58
HCO ₃ , ppm	89
Cl, ppm	43
Ca, ppm	32
Mg, ppm	10
Na, ppm	71
S, ppm	46.4
Sodium Adsorption Ratio	2.8

Reviewed By : Raymond Ward

5/17/2023

Copy : 1

Page 79 of 120

Account No. : 19356

Soil Analysis Report

**DANIELS, JUDY
SOIL SAGE LLC
8323 DEPEW WAY
ARVADA**

CO 80003

**Invoice No. : 1401762
Date Received : 05/10/2023
Date Reported : 05/12/2023**

**Results For : CIV
Location : CPW2**

Soil Texture	Sand, %	Silt, %	Clay, %
Loamy Sand	85	8	7

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Account No. : 19356

Soil Analysis Report

DANIELS, JUDY
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ARVADA

CO 80003

Invoice No. : 1401762
Date Received : 05/10/2023
Date Reported : 05/12/2023

Results For : CIV
Location : CPW2

Lab No. : 62442 Depth : 0 - 6
ID : CIV-CPW2-SOIL 11.1

1:1 Soil pH	8.4
Soluble Salts 1:1, mmho/cm	0.21
Excess Lime Rating	LOW
Organic Matter LOI, %	2.3
Nitrate-N KCl, ppm N	4.0
Nitrate-N, lbs N / Acre	7
Phosphorus M3, ppm P	65
Potassium NH ₄ OAc, ppm K	375
Sulfate M-3, ppm S	24.5
Zinc DTPA, ppm Zn	5.83
Iron DTPA, ppm Fe	16.7
Manganese DTPA, ppm Mn	2.9
Copper DTPA, ppm Cu	3.76
Calcium NH ₄ OAc, ppm Ca	2940
Magnesium NH ₄ OAc, ppm Mg	391
Sodium NH ₄ OAc, ppm Na	38
Chloride Ca-NO ₃ , ppm Cl	6.4
Boron Hot Water, ppm B	1.55

Sum of Cations, me/100g	% Saturation				
	H	K	Ca	Mg	Na
19.1	0	5	77	17	1

Saturated Soil Paste Analysis (SAR)

Saturation, %	36
Sat Paste pH	7.5
Sat Paste E _{Ce} , mmho/cm	0.50
HCO ₃ , ppm	253
Cl, ppm	15
Ca, ppm	60
Mg, ppm	19
Na, ppm	23
S, ppm	8.8
Sodium Adsorption Ratio	0.7

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Copy : 1

Page 81 of 120

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Account No. : 19356

Soil Analysis Report

**DANIELS, JUDY
SOIL SAGE LLC
8323 DEPEW WAY
ARVADA**

CO 80003

**Invoice No. : 1401762
Date Received : 05/10/2023
Date Reported : 05/12/2023**

**Results For : CIV
Location : CPW2**

Soil Texture	Sand, %	Silt, %	Clay, %
Sandy Loam	67	14	19

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Soil Analysis Report

DANIELS, JUDY
SOIL SAGE LLC
8323 DEPEW WAY
ARVADA

CO 80003

Invoice No. : 1401762
Date Received : 05/10/2023
Date Reported : 05/12/2023

Results For : CIV
Location : CPW2

Lab No. : 62443 Depth : 6 - 12
ID : CIV-CPW2-SOIL 11.2

1:1 Soil pH	8.7
Soluble Salts 1:1, mmho/cm	0.26
Excess Lime Rating	LOW
Organic Matter LOI, %	1.8
Nitrate-N KCl, ppm N	2.5
Nitrate-N, lbs N / Acre	4
Phosphorus M3, ppm P	44
Potassium NH ₄ OAc, ppm K	206
Sulfate M-3, ppm S	31.1
Zinc DTPA, ppm Zn	12.33
Iron DTPA, ppm Fe	19.8
Manganese DTPA, ppm Mn	2.8
Copper DTPA, ppm Cu	5.60
Calcium NH ₄ OAc, ppm Ca	2809
Magnesium NH ₄ OAc, ppm Mg	406
Sodium NH ₄ OAc, ppm Na	137
Chloride Ca-NO ₃ , ppm Cl	13.2
Boron Hot Water, ppm B	2.00

Sum of Cations, me/100g	% Saturation				
	H	K	Ca	Mg	Na
18.5	0	3	76	18	3

Saturated Soil Paste Analysis (SAR)

Saturation, %	35
Sat Paste pH	7.8
Sat Paste ECe, mmho/cm	0.63
HCO ₃ , ppm	228
Cl, ppm	49
Ca, ppm	44
Mg, ppm	14
Na, ppm	93
S, ppm	17.9
Sodium Adsorption Ratio	3.1

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Page 83 of 120

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Account No. : 19356

Soil Analysis Report

**DANIELS, JUDY
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8323 DEPEW WAY
ARVADA**

CO 80003

**Invoice No. : 1401762
Date Received : 05/10/2023
Date Reported : 05/12/2023**

**Results For : CIV
Location : CPW2**

Soil Texture	Sand, %	Silt, %	Clay, %
Sandy Loam	67	16	17

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Soil Analysis Report

DANIELS, JUDY
SOIL SAGE LLC
8323 DEPEW WAY
ARVADA

CO 80003

Invoice No. : 1401762
Date Received : 05/10/2023
Date Reported : 05/12/2023

Results For : CIV
Location : CPW2

Lab No. : 62444 Depth : 12 - 18
ID : CIV-CPW2-SOIL 11.3

1:1 Soil pH	8.5
Soluble Salts 1:1, mmho/cm	0.63
Excess Lime Rating	NONE
Organic Matter LOI, %	1.9
Nitrate-N KCl, ppm N	4.6
Nitrate-N, lbs N / Acre	8
Phosphorus M3, ppm P	45
Potassium NH ₄ OAc, ppm K	193
Sulfate M-3, ppm S	57.4
Zinc DTPA, ppm Zn	9.24
Iron DTPA, ppm Fe	23.2
Manganese DTPA, ppm Mn	3.3
Copper DTPA, ppm Cu	5.59
Calcium NH ₄ OAc, ppm Ca	2599
Magnesium NH ₄ OAc, ppm Mg	436
Sodium NH ₄ OAc, ppm Na	301
Chloride Ca-NO ₃ , ppm Cl	65.8
Boron Hot Water, ppm B	1.82

Sum of Cations, me/100g	% Saturation				
	H	K	Ca	Mg	Na
18.4	0	3	70	20	7

Saturated Soil Paste Analysis (SAR)

Saturation, %	43
Sat Paste pH	7.7
Sat Paste E _{Ce} , mmho/cm	1.51
HCO ₃ , ppm	194
Cl, ppm	171
Ca, ppm	78
Mg, ppm	28
Na, ppm	197
S, ppm	104.3
Sodium Adsorption Ratio	4.9

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Copy : 1

Page 85 of 120

Account No. : 19356

Soil Analysis Report

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CO 80003

Invoice No. : 1401762
Date Received : 05/10/2023
Date Reported : 05/12/2023

Results For : CIV
Location : CPW2

Soil Texture	Sand, %	Silt, %	Clay, %
Sandy Loam	63	18	19

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Account No. : 19356

Soil Analysis Report

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Invoice No. : 1401762
Date Received : 05/10/2023
Date Reported : 05/12/2023

Results For : CIV
Location : CPW2

Lab No. : 62445 Depth : 18 - 24
ID : CIV-CPW2-SOIL 11.4

1:1 Soil pH	8.2
Soluble Salts 1:1, mmho/cm	1.64
Excess Lime Rating	NONE
Organic Matter LOI, %	1.6
Nitrate-N KCl, ppm N	4.9
Nitrate-N, lbs N / Acre	9
Phosphorus M3, ppm P	38
Potassium NH ₄ OAc, ppm K	180
Sulfate M-3, ppm S	390.4
Zinc DTPA, ppm Zn	10.71
Iron DTPA, ppm Fe	19.2
Manganese DTPA, ppm Mn	2.7
Copper DTPA, ppm Cu	5.36
Calcium NH ₄ OAc, ppm Ca	2814
Magnesium NH ₄ OAc, ppm Mg	492
Sodium NH ₄ OAc, ppm Na	483
Chloride Ca-NO ₃ , ppm Cl	165.1
Boron Hot Water, ppm B	1.52

Sum of Cations, me/100g	% Saturation				
	H	K	Ca	Mg	Na
20.7	0	2	68	20	10

Saturated Soil Paste Analysis (SAR)

Saturation, %	36
Sat Paste pH	7.5
Sat Paste E _{Ce} , mmho/cm	5.61
HCO ₃ , ppm	153
Cl, ppm	465
Ca, ppm	496
Mg, ppm	189
Na, ppm	664
S, ppm	877.0
Sodium Adsorption Ratio	6.4

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Page 87 of 120

Account No. : 19356

Soil Analysis Report

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Invoice No. : 1401762
Date Received : 05/10/2023
Date Reported : 05/12/2023

Results For : CIV
Location : CPW2

Soil Texture	Sand, %	Silt, %	Clay, %
Sandy Loam	63	18	19

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Results For : CIV
Location : CPW2

Lab No. : 62458 Depth : 0 - 6
ID : CIV-CPW2-SOIL 15.1

1:1 Soil pH	8.3
Soluble Salts 1:1, mmho/cm	0.63
Excess Lime Rating	HIGH
Organic Matter LOI, %	3.4
Nitrate-N KCl, ppm N	8.5
Nitrate-N, lbs N / Acre	15
Phosphorus M3, ppm P	69
Potassium NH ₄ OAc, ppm K	207
Sulfate M-3, ppm S	145.0
Zinc DTPA, ppm Zn	3.12
Iron DTPA, ppm Fe	10.5
Manganese DTPA, ppm Mn	2.6
Copper DTPA, ppm Cu	5.20
Calcium NH ₄ OAc, ppm Ca	4091
Magnesium NH ₄ OAc, ppm Mg	636
Sodium NH ₄ OAc, ppm Na	148
Chloride Ca-NO ₃ , ppm Cl	6.5
Boron Hot Water, ppm B	2.12

Sum of Cations, me/100g	% Saturation				
	H	K	Ca	Mg	Na
26.9	0	2	76	20	2

Saturated Soil Paste Analysis (SAR)

Saturation, %	57
Sat Paste pH	7.7
Sat Paste E _{Ce} , mmho/cm	1.57
HCO ₃ , ppm	165
Cl, ppm	21
Ca, ppm	198
Mg, ppm	61
Na, ppm	88
S, ppm	230.0
Sodium Adsorption Ratio	1.4

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5/17/2023

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Page 113 of 120

Account No. : 19356

Soil Analysis Report

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Invoice No. : 1401762
Date Received : 05/10/2023
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Results For : CIV
Location : CPW2

Soil Texture	Sand, %	Silt, %	Clay, %
Clay Loam	41	30	29

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Invoice No. : 1401762
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Results For : CIV
Location : CPW2

Lab No. : 62459 Depth : 6 - 12
ID : CIV-CPW2-SOIL 15.2

1:1 Soil pH	8.1
Soluble Salts 1:1, mmho/cm	0.69
Excess Lime Rating	NONE
Organic Matter LOI, %	2.6
Nitrate-N KCl, ppm N	4.4
Nitrate-N, lbs N / Acre	8
Phosphorus M3, ppm P	25
Potassium NH ₄ OAc, ppm K	116
Sulfate M-3, ppm S	142.9
Zinc DTPA, ppm Zn	1.49
Iron DTPA, ppm Fe	14.8
Manganese DTPA, ppm Mn	2.5
Copper DTPA, ppm Cu	1.96
Calcium NH ₄ OAc, ppm Ca	2917
Magnesium NH ₄ OAc, ppm Mg	611
Sodium NH ₄ OAc, ppm Na	233
Chloride Ca-NO ₃ , ppm Cl	11.4
Boron Hot Water, ppm B	1.33

Sum of Cations, me/100g	% Saturation				
	H	K	Ca	Mg	Na
21.0	0	1	70	24	5

Saturated Soil Paste Analysis (SAR)

Saturation, %	44
Sat Paste pH	7.5
Sat Paste E _{Ce} , mmho/cm	1.98
HCO ₃ , ppm	122
Cl, ppm	35
Ca, ppm	200
Mg, ppm	72
Na, ppm	162
S, ppm	317.4
Sodium Adsorption Ratio	2.5

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5/17/2023

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Page 115 of 120

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Soil Analysis Report

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CO 80003

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**Results For : CIV
Location : CPW2**

Soil Texture	Sand, %	Silt, %	Clay, %
Sandy Clay Loam	53	22	25

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Results For : CIV
Location : CPW2

Lab No. : 62460 Depth : 12 - 18
ID : CIV-CPW2-SOIL 15.3

1:1 Soil pH	8.6
Soluble Salts 1:1, mmho/cm	0.11
Excess Lime Rating	NONE
Organic Matter LOI, %	0.3
Nitrate-N KCl, ppm N	1.0
Nitrate-N, lbs N / Acre	2
Phosphorus M3, ppm P	10
Potassium NH ₄ OAc, ppm K	20
Sulfate M-3, ppm S	12.1
Zinc DTPA, ppm Zn	0.24
Iron DTPA, ppm Fe	6.0
Manganese DTPA, ppm Mn	1.1
Copper DTPA, ppm Cu	0.24
Calcium NH ₄ OAc, ppm Ca	362
Magnesium NH ₄ OAc, ppm Mg	80
Sodium NH ₄ OAc, ppm Na	31
Chloride Ca-NO ₃ , ppm Cl	3.4
Boron Hot Water, ppm B	0.28

Sum of Cations, me/100g	% Saturation				
	H	K	Ca	Mg	Na
2.7	0	2	68	25	5

Saturated Soil Paste Analysis (SAR)

Saturation, %	43
Sat Paste pH	8.0
Sat Paste E _{Ce} , mmho/cm	0.29
HCO ₃ , ppm	68
Cl, ppm	7
Ca, ppm	21
Mg, ppm	8
Na, ppm	31
S, ppm	21.6
Sodium Adsorption Ratio	1.4

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5/17/2023

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Page 117 of 120

Account No. : 19356

Soil Analysis Report

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CO 80003

Invoice No. : 1401762
Date Received : 05/10/2023
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Results For : CIV
Location : CPW2

Soil Texture	Sand, %	Silt, %	Clay, %
Sand	89	6	5

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Date Received : 05/10/2023
Date Reported : 05/12/2023

Results For : CIV
Location : CPW2

Lab No. : 62461 Depth : 18 - 24
ID : CIV-CPW2-SOIL 15.4

1:1 Soil pH	8.7
Soluble Salts 1:1, mmho/cm	0.11
Excess Lime Rating	NONE
Organic Matter LOI, %	0.2
Nitrate-N KCl, ppm N	0.7
Nitrate-N, lbs N / Acre	1
Phosphorus M3, ppm P	6
Potassium NH ₄ OAc, ppm K	20
Sulfate M-3, ppm S	7.8
Zinc DTPA, ppm Zn	0.25
Iron DTPA, ppm Fe	3.8
Manganese DTPA, ppm Mn	1.2
Copper DTPA, ppm Cu	0.15
Calcium NH ₄ OAc, ppm Ca	266
Magnesium NH ₄ OAc, ppm Mg	64
Sodium NH ₄ OAc, ppm Na	24
Chloride Ca-NO ₃ , ppm Cl	3.2
Boron Hot Water, ppm B	0.33

Sum of Cations, me/100g	% Saturation				
	H	K	Ca	Mg	Na
2.0	0	3	66	26	5

Saturated Soil Paste Analysis (SAR)

Saturation, %	< 0
Sat Paste pH	8.0
Sat Paste E _{Ce} , mmho/cm	0.30
HCO ₃ , ppm	66
Cl, ppm	11
Ca, ppm	22
Mg, ppm	9
Na, ppm	27
S, ppm	20.9
Sodium Adsorption Ratio	1.2

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5/17/2023

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Page 119 of 120

Account No. : 19356

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Date Received : 05/10/2023
Date Reported : 05/12/2023

Results For : CIV
Location : CPW2

Soil Texture	Sand, %	Silt, %	Clay, %
Sand	91	4	5

Grass Seeding Planned and Applied Worksheet

Grass Seeding PART I - Planned

Cooperator	Area 3 SWA Sandy soil seed mix			Date	
Tract/Field No				Acres	
Soil Survey Area				Map Unit (s)	1
Contract No.				CIN	
Seeding dates	Nov 1 - Apr 30			Purpose	Other
Seedbed preparation	No Till			Seed rate	20
Drill type	no-till grass			Acres to be seeded	1.00
Planting depth-Drill spacing (in)	.25 ----7-10inches				
Planned fertilizer application (lb/ac)	N	P ₂ O ₅	K ₂ O	A Nutrient Management Plan is not required for the establishment of vegetative conservation practices.	
Planned weed control activities	Description	Herbicide		Attach WIN-PST Soil-Pesticide Interaction Risk Report for all chemical suppression activities	
	Date(s)	as needed			
Planned residue cover or mulch	Type	Other NRCS approved cover			
	Amount (lb/ac)				
	Application method				

Seed Mix Recommendation, † ‡

Common name N=native, I=introduced	Genus, species	Recommended Cultivar	% of seed mix	Pounds (lbs) pure live seed (PLS)
Grasses, forbs				
Switchgrass	Native <i>Panicum virgatum</i>	Blackwell	20.0	0.45
Little bluestem	Native <i>Schizachyrium scoparium</i>	Aldous, cimm.,camper, blaze	12.5	0.42
Yellow indiagrass	Native <i>Sorghastrum nutans</i>	cheyenne	15.0	0.77
Sand bluestem	Native <i>Andropogon hallii</i>	chet	15.0	1.19
Prairie sandreed	Native <i>Calimovilfa longifolia</i>	Goshen	4.0	0.13
Indian ricegrass	Native <i>Achnatherum hymenoides</i>	Paloma, Rimrock	2.0	0.12
Blanketflower	Native <i>Gaillardia aristata</i>		3.0	0.13
Maxmilian sunflower	Native <i>Helianthus maximiliani</i>		3.0	0.15
Prairie Coneflower	Native <i>Ratibida columnifera</i>		3.0	0.03
Purple prairie clover	Native <i>Dalea purpurea purpurea</i>		2.0	0.06
Annual sunflower	Native <i>Helianthus annuus</i>		2.0	0.29
Small burnet	roduce <i>Sanguisorba minor</i>		3.0	0.62
Alfalfa	roduce <i>Medicago sativa</i>		3.0	0.12
Sainfoin	roduce <i>Onobrychis vicifolia</i>		3.0	0.87
Yellow sweetclover	roduce <i>Melilotus officinale</i>		2.0	0.07
Western Yarrow	Native <i>Achillea lanulosa</i>		2.0	0.01
Blue flax	Native <i>Linum lewisii</i>		2.0	0.06
Black-eyed Susan	Native <i>Rudbeckia hirta</i>		3.5	0.02

Shrubs

Fourwing Saltbush	Native <i>Atriplex canescens</i>			0.10
skunkbush sumac	Native <i>Rhus trilobata</i>			0.17
0				0.00
Shrubs				0.27
Grasses, Forbs				5.49
Total lbs PLS				5.76
Seed Rate (lbs PLS/acre)				5.76

† Certified Seed is required for all NRCS cost share programs

‡ Complete a Tree and Shrub Establishment 612 Job Sheet for bare-root shrub plantings

Additional Recommendations

All native legumes must be inoculated. Seed MUST be sorted by size and type (e.g., large hard, small, fluffy).

REPORT NUMBER

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TODAY'S DATE

Oct 10, 2022**QUANDARY CONSULTANTS**

Michael Dinkel
10603 E 6th pl
Aurora CO 80010

IDENTIFICATION

MIKE DINKEL**SOIL ANALYSIS REPORT**

LAB NUMBER	SAMPLE IDENTIFICATION	ORGANIC MATTER L.O. I.	PHOSPHORUS						NEUTRAL AMMONIUM ACETATE (EXCHANGEABLE)								pH		CATION EXCHANGE CAPACITY C.E.C.	PERCENT BASE SATURATION (COMPUTED)					
			P ₁ (WEAK 1:7 ppm		P ₂ (STRONG 1:7 ppm		OLSEN BICARBONATE P ppm	K		Mg		Ca		Na		SOIL pH 1:1				BUFFER INDEX	% K	% Mg	% Ca	% H	% Na
			RATE		RATE			RATE		RATE		RATE		RATE			RATE				meq/100g				
400		percent	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE			meq/100g							
37771	5501	2.0	L	150	VH	154	VH			427	VH	534	VH	3299	H	43		7.7		22.2	4.9	20.0	74.3	0.0	0.8
37772	5502	1.6	L	107	VH	131	VH			499	VH	478	VH	2727	H	135	VH	7.8		19.5	6.6	20.4	70.0	0.0	3.0
37773	5503	2.0	L	88	VH	156	VH			353	VH	354	VH	2466	H	35		8.1		16.3	5.6	18.1	75.4	0.0	0.9
37774	5504	1.9	L	107	VH	131	VH			347	VH	422	VH	2758	H	54		7.9		18.4	4.8	19.1	74.8	0.0	1.3

LAB NUMBER	NITRATE-N (FIA)										SULFUR S ICAP		ZINC Zn DTPA		MANGANESE Mn DTPA		IRON Fe DTPA		COPPER Cu DTPA		BORON B SORB. DTPA		EXCESS LIME RATE	SOLUBLE SALTS 1:1 mmhos/ cm		RATE
	SURFACE			SUBSOIL 1			SUBSOIL 2			Total lbs/A																
	ppm	lbs/A	depth (in)	ppm	lbs/A	depth (in)	ppm	lbs/A	depth (in)																	
400																										
37771	75	270	0-12							270	28	VH	0.5	VL	2	VL	7	L	0.5	L	0.5	L	M	0.8	L	
37772	101	364	0-12							364	33	VH	3.7	H	7	L	12	M	1.2	M	1.0	M	M	1.2	M	
37773	14	50	0-12							50	21	H	3.3	H	5	L	23	H	1.2	M	0.9	M	M	0.4	L	
37774	30	108	0-12							108	27	VH	5.4	H	3	VL	25	VH	1.3	H	1.0	M	M	0.5	L	

REV.10/17

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MIKE DINKEL

PAGE 2/8

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Michael Dinkel

10603 E 6th pl

Aurora CO 80010

ADDITIONAL SOIL ANALYSIS

Labnum *400*	Sample ID	E.C. EC electrode mmhos/cm
37771	5501 <i>Depth: 0-12</i>	2.0
37772	5502 <i>Depth: 0-12</i>	3.4
37773	5503 <i>Depth: 0-12</i>	0.7
37774	5504 <i>Depth: 0-12</i>	1.0

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MIKE DINKEL**SODIUM ADSORPTION RATIO REPORT**

Method Lab Number Units	Sample Id	CALCULATED Sodium Adsorption Ratio	SATURATED PASTE EXTRACTION		
			Sodium (Water Soluble) mg/L	Magnesium (Water Soluble) mg/L	Calcium (Water Soluble) mg/L
400377715501		0.5	37	64	257
400377725502		2.0	166	98	334
400377735503		0.6	25	20	78
400377745504		0.9	43	31	122

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Aurora CO 80010

IDENTIFICATION

MIKE DINKEL**SOIL FERTILITY RECOMMENDATIONS (POUNDS PER ACRE)**

YOUR SAMPLE NUMBER (LAB NUMBER)	INTENDED CROP	YIELD GOAL	PREVIOUS CROP	SOIL AMENDMENTS				N NITROGEN	P ₂ O ₅ PHOSPHATE	K ₂ O POTASH	Mg MAGNE- SIUM	S SULFUR	Zn ZINC	Mn MANGA- NESE	Fe IRON	Cu COPPER	B BORON
				LIME LBS/A OF	LIME TON	GYPSTUM TONS/A	ELEMENTAL SULFUR LBS/A										
5501 (40037771)	BROME/ORCHRD GRS-ton	3.0	UNKNOWN					--	--	--	--	--	0.8	--	--	--	--
5502 (40037772)	BROME/ORCHRD GRS-ton	3.0	UNKNOWN			0.2	OR 30	--	--	--	--	--	--	--	--	--	--
5503 (40037773)	BROME/ORCHRD GRS-ton	3.0	UNKNOWN					--	--	--	--	--	--	--	--	--	--
5504 (40037774)	BROME/ORCHRD GRS-ton	3.0	UNKNOWN					--	--	--	--	--	--	--	--	--	--

REV. 12/03


The above analytical results apply only to the sample(s) submitted. Samples are retained a maximum of 30 days.

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QUANDARY CONSULTANTS**Michael Dinkel****10603 E 6th pl****Aurora CO 80010****IDENTIFICATION****MIKE DINKEL****SOIL HEALTH ASSESSMENT****ANALYTICAL LABORATORY FINDINGS**

SAMPLE IDENTIFICATION		5501				
LABORATORY NUMBER		40037771				
ANALYTE	UNITS	RESULTS	LOW	MEDIUM	OPTIMUM	VERY HIGH
H3A EXTRACTION						
ORTHOPHOSPHATE-P	ppm	169.5				
PHOSPHORUS	ppm	177				
POTASSIUM	ppm	169				
MAGNESIUM	ppm	344				
CALCIUM	ppm	2818				
SODIUM	ppm	41				
IRON	ppm	23				
ALUMINUM	ppm	81				
WATER SOLUBLE						
NITRATE-N	ppm	75				
AMMONIACAL-N	ppm	1.5				
ORTHOPHOSPHATE-P	ppm	12.35				
CARBON	ppm	130.7				
TOTAL NITROGEN	ppm	77.6				
1 DAY CO ₂ C BURST		119.00				
ORGANIC CARBON	ppm	130.7				
ORGANIC NITROGEN	ppm	1.1				
ORGANIC C/N RATIO		118.8				
ADDITIONAL NITROGEN CREDIT IDENTIFIED VIA HANEY TEST:			N/A. Sample depth not 0-6"			
NITROGEN RECOMMENDATIONS MAY INCLUDE ADDITIONAL NITROGEN CREDITS BASED ON PREVIOUS CROPS AND NITROGEN MINERALIZATION RATES.						
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SOIL HEALTH CALCULATION

13.3 

The **H3A Soil Extractant** was developed by Haney*. This extract is designed to mimic organic acids produced by living plant root systems. These organic acids increase nutrient availability in the root zone.

The **Water Soluble Extract** provides a snapshot of nutrients that are immediately available to the plants.

The **CO₂ Burst** test is very good indicator of soil health. This test measures the amount of CO₂ naturally released from the soil due to the activity of the soil microbes through microbial respiration. This test is very dependent on the amount of carbon that is available to the soil microbes and the form that the carbon is in. As the available carbon increases in your soil the Microbial respiration will increase.

Organic Carbon is the available total water extractable organic carbon from your soil. This pool of carbon is roughly 80 times smaller than the Soil Organic Matter. The organic carbon pool reflects the energy/food source that is driving the soil microbes.

The **Organic Nitrogen** pool is replenished by fresh plant residues, manure, composts, and dying soil microbes.

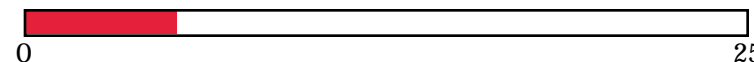
The **Organic C/N ratio** is a critical component of the nutrient cycle. A soil C/N ratio above 20 generally indicates that Nitrogen will be tied up and not available to plants. The ideal range for the Organic C/N ratio will be from 8:1 to 15:1.

The **Soil Health Calculation** uses the CO₂ Burst, Organic Carbon, Organic Nitrogen, and the C/N ratio to generate the soil health number. This calculation looks at the balance of soil carbon and nitrogen and their relationship to microbial activity. This number represents the overall health of your system. Soil values will range from 0 to 25. A soil with a value below 7 would be considered low. You want to see this number increase as you make changes and adjustments. Keeping track of this number will allow you to gauge the effects of your management practices over time.

*Modifications to the New Soil Extractant H3A-1: A Multinutrient Extractant
 R.L. Haney (a); E.B. Haney (b); L.R. Hossner (c); J.G. Arnold (a)

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SAMPLE IDENTIFICATION		5502				
LABORATORY NUMBER		40037772				
ANALYTE	UNITS	RESULTS	LOW	MEDIUM	OPTIMUM	VERY HIGH
H3A EXTRACTION						
ORTHOPHOSPHATE-P	ppm	135.3				
PHOSPHORUS	ppm	140				
POTASSIUM	ppm	260				
MAGNESIUM	ppm	350				
CALCIUM	ppm	2791				
SODIUM	ppm	139				
IRON	ppm	43				
ALUMINUM	ppm	64				
WATER SOLUBLE						
NITRATE-N	ppm	101				
AMMONIACAL-N	ppm	1.2				
ORTHOPHOSPHATE-P	ppm	9.75				
CARBON	ppm	122.0				
TOTAL NITROGEN	ppm	103.9				
1 DAY CO ₂ C BURST						
ORGANIC CARBON	ppm	122.0				
ORGANIC NITROGEN	ppm	1.7				
ORGANIC C/N RATIO		71.8				
ADDITIONAL NITROGEN CREDIT IDENTIFIED VIA HANEY TEST:			N/A. Sample depth not 0-6"			
NITROGEN RECOMMENDATIONS MAY INCLUDE ADDITIONAL NITROGEN CREDITS BASED ON PREVIOUS CROPS AND NITROGEN MINERALIZATION RATES.						
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SOIL HEALTH CALCULATION**5.2**

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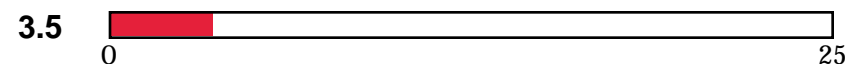
The **Organic C/N ratio** is a critical component of the nutrient cycle. A soil C/N ratio above 20 generally indicates that Nitrogen will be tied up and not available to plants. The ideal range for the Organic C/N ratio will be from 8:1 to 15:1.

The **Soil Health Calculation** uses the CO₂ Burst, Organic Carbon, Organic Nitrogen, and the C/N ratio to generate the soil health number. This calculation looks at the balance of soil carbon and nitrogen and their relationship to microbial activity. This number represents the overall health of your system. Soil values will range from 0 to 25. A soil with a value below 7 would be considered low. You want to see this number increase as you make changes and adjustments. Keeping track of this number will allow you to gauge the effects of your management practices over time.

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R.L. Haney (a); E.B. Haney (b); L.R. Hossner (c); J.G. Arnold (a)

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SAMPLE IDENTIFICATION		5503				
LABORATORY NUMBER		40037773				
ANALYTE	UNITS	RESULTS	LOW	MEDIUM	OPTIMUM	VERY HIGH
H3A EXTRACTION						
ORTHOPHOSPHATE-P	ppm	141.2				
PHOSPHORUS	ppm	148				
POTASSIUM	ppm	203				
MAGNESIUM	ppm	298				
CALCIUM	ppm	2922				
SODIUM	ppm	38				
IRON	ppm	26				
ALUMINUM	ppm	45				
WATER SOLUBLE						
NITRATE-N	ppm	16				
AMMONIACAL-N	ppm	2.1				
ORTHOPHOSPHATE-P	ppm	10.87				
CARBON	ppm	106.9				
TOTAL NITROGEN	ppm	21.4				
1 DAY CO ₂ C BURST						
ORGANIC CARBON	ppm	106.9				
ORGANIC NITROGEN	ppm	3.3				
ORGANIC C/N RATIO		32.4				
ADDITIONAL NITROGEN CREDIT IDENTIFIED VIA HANEY TEST: N/A. Sample depth not 0-6"						
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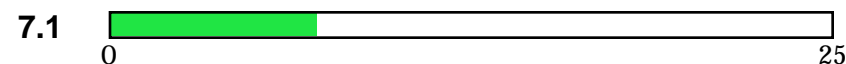
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SAMPLE IDENTIFICATION		5504				
LABORATORY NUMBER		40037774				
ANALYTE	UNITS	RESULTS	LOW	MEDIUM	OPTIMUM	VERY HIGH
H3A EXTRACTION						
ORTHOPHOSPHATE-P	ppm	185.7				
PHOSPHORUS	ppm	196				
POTASSIUM	ppm	176				
MAGNESIUM	ppm	317				
CALCIUM	ppm	2521				
SODIUM	ppm	60				
IRON	ppm	45				
ALUMINUM	ppm	78				
WATER SOLUBLE						
NITRATE-N	ppm	34				
AMMONIACAL-N	ppm	0.7				
ORTHOPHOSPHATE-P	ppm	11.27				
CARBON	ppm	160.3				
TOTAL NITROGEN	ppm	37.2				
1 DAY CO ₂ C BURST		52.00				
ORGANIC CARBON	ppm	160.3				
ORGANIC NITROGEN	ppm	2.5				
ORGANIC C/N RATIO		64.1				
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