

# SITE-SPECIFIC QUALITY ASSURANCE & QUALITY CONTROL AUDIT



## Permit Closure Type – Final

## PERMIT CLOSURE REPORT – RANGELAND

**Location ID** 319519

**Location Name** HIPPIN-61N68W 32NWNW

\*Note that the spelling of the well name is HIPPEN in all documentation dating back to 1993 but COGCC Location Name is HIPPIN\*

### Report Date

28 Mar 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

|                        |                          |
|------------------------|--------------------------|
| <b>Client</b>          | CIVITAS Resources        |
| <b>Work Assignment</b> | 179 Site Permit Closures |
| <b>Date</b>            | July 20, 2022            |

### Quality Assurance & Quality Control Audit

|                   |            |
|-------------------|------------|
| <b>Auditor</b>    | Soil Sage  |
| <b>Audit Date</b> | 12/21/2022 |

### 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

|  |   |                                    |  |
|--|---|------------------------------------|--|
| <b>Name</b>                                    | HIP PIN-61N68W 32NWNW   |                                    |  |
| <b>Location ID</b>                             | <a href="#">319519</a>  |                                    |  |
| <b>Operator / #</b>                            | EXTRACTION OIL & GAS INC / 10459  |                                    |  |
| <b>Field</b>                                   | WATTENBERG / 90750  |                                    |  |
| <b>County, State</b>                           | WELD, CO  |                                    |  |
| <b>Lat/Long</b>                                | 40.012070 / -105.033290   |                                    |  |
|  | Planned Location  | X                                  | As Drilled                                 |
| <b>Facility Status</b>                         | CL  | <b>Location</b>                    | NWNW 32 1N68W                              |
| <b>Facility Status Date</b>                    | 12/05/2015  | <b>Access Road</b>                 | Pre-Existing                               |
| <b>Facility Entities</b>                       | X   | Tank Battery                       | Pits                                       |
|  | X   | Wells                              | Off-Location Flowlines ( <b>Form 44</b> )  |
|  |   | Domestic Taps                      | X On-Location Flowlines ( <b>Form 42</b> ) |
| <b>Equipment Remaining on Site</b>             | X   | None                               | Debris or Non-Oil & Gas                    |
|  |   | List of Equipment:                 |  |
| <b>Environment Incidents &amp; Remediation</b> | X   | None                               | Spill or Release ( <b>Form 19</b> )        |
|  |   | Remediation ( <b>Form 27/27A</b> ) |  |
| <b>Inspection Corrective Actions (CA)s</b>     | <p><b>Corrective Actions (CA)s Overall Status:</b> 0 of 1 Completed</p> <ul style="list-style-type: none"> <li>○ <b>Overall Status:</b> Unknown</li> <li>○ <b>No CA Resolving Documents were found for this inspection during this QA &amp; QC Audit.</b></li> </ul> <p><b>Originating Field Inspection Report (FIR) Doc #</b><a href="#">682404366</a> &amp; 01/14/2019</p> <ul style="list-style-type: none"> <li>○ 1 CA, CA Date: 09/08/2018</li> </ul> <p><b>Complete COGCC Inspection Search Results:</b> <a href="#">Link</a></p> |                                    |  |
| <b>Sundry Notice (Form 4)</b>                  | <b>Form 4s exist for Related Facilities</b> – See individual scout card data for report details.  |                                    |  |
| <b>On Location Flowlines (Form 42)</b>         | <b>Form 42s exist for Related Facilities</b> – See individual scout card data for report details.   |                                    |  |
| <b>Off-Location Flowlines (Form 44)</b>        | <b>No Form 44s were detected during this QA &amp; QC Audit.</b>   |                                    |  |
| <b>Field Inspection Form (Form INSP)</b>       | <p><b>Form INSP Doc # &amp; Date:</b> <a href="#">682404366</a> &amp; 01/14/2019</p> <ul style="list-style-type: none"> <li>○ <b>Status Summary:</b> This is a Follow Up Inspection, Follow Up Inspection Required &amp; Corrective Action Response Requested</li> <li>○ <b>Inspected Facilities:</b> Location HIP PIN-61N68W 32NWNW</li> <li>○ <b>Inspection Status:</b> RI</li> </ul>   |                                    |  |

|   |   |
|---|---|
|   | <ul style="list-style-type: none"> <li>○ <b>Inspection Date &amp; Inspector:</b> 01/02/2019 by Chris Binschus</li> <li>○ <b>Comments:</b> This is a follow-up Final Reclamation inspection at the tank battery associated with two wells Hippen 1-32 (API # <a href="#">123-11395</a>) and Pezoldt 1-32 (API # <a href="#">123-15040</a>). Pezoldt was the last well plugged on 9/08/2017. This tank battery location is not in compliance with Rule 1004. Reclamation rules require reclamation activities to be conducted within twelve months of plugging on non-cropland. The last associated well was plugged 9/08/2017. Operator has performed the previous corrective action to remove the abandoned riser but has failed to perform final reclamation activities per Rule 1004. Refer to the attached inspection photo.</li> <li>○ <b>Corrective Action:</b> Comply with Rule 1004. Corrective action is being back-dated to when all final reclamation activities should have been completed.<br/><b>CA Date:</b> 09/08/2018</li> <li>○ <b>Overall Final Reclamation:</b> <b>Fail</b></li> <li>○ <b>Reference:</b> Inspection Photo Doc #<a href="#">682404368</a></li> </ul> <p><b>Form INSP Doc # &amp; Date:</b> <a href="#">682403377</a> &amp; 03/30/2018</p> <ul style="list-style-type: none"> <li>○ <b>Status Summary:</b> Follow Up Inspection Required &amp; Corrective Action Response Requested</li> <li>○ <b>Inspected Facilities:</b> Well HIPPEN 1-32</li> <li>○ <b>Inspection Status:</b> RI</li> <li>○ <b>Inspection Date &amp; Inspector:</b> 03/07/2018 by Chris Binschus</li> <li>○ <b>Comments:</b> This location is not in compliance with Rule 1004.a. Operator failed to perform final reclamation activities at the battery location and one abandoned riser remains. In addition, aerial imagery illustrates equipment was left at the battery location at least eighteen months post plugging operations. Appears final reclamation activities were conducted at the well location. No visual evidence of equipment at the well location. Undesirable weedy vegetation (Kochia) appears to be establishing throughout portions of the disturbance area. Germination of desirable vegetation did not appear uniform throughout the disturbance area. Operator shall continue to monitor and manage this site which may include additional reclamation activities.</li> <li>○ <b>Reference:</b> Inspection Photos Doc #<a href="#">682403398</a></li> </ul> |
| <p><b>FIR Resolution Form (Form FIRR)</b></p> | <p><b>Form FIRR Doc # &amp; Date:</b> <a href="#">401573088</a> &amp; 03/14/2018</p> <ul style="list-style-type: none"> <li>○ <b>Purpose:</b> Factual Review Request</li> </ul>   |

|   |  |
|---|--|
|   | <ul style="list-style-type: none"> <li>○ <b>Operator Comment:</b> The removal of the battery occurred within the 12-month deadline of the plugging of the Pezoldt 1-32. Ongoing monitoring and maintenance at the Hippen 1-32 still continues and the location was reseeded in the Fall on 2017. Extraction would like it noted that we have not submitted a Form 4 for approval of final reclamation because we are still maintaining the location.</li> <li>○ <b>COGCC Decision:</b> <b>Not Approved</b></li> <li>○ <b>COGCC Supervisor Comment:</b> Location is clearly out of compliance with the 1004 rules. As Extraction indicates the second well was PA on 9/8/2017 therefore all gathering line risers and flowline risers and surface equipment etc. should have been removed by 12/8/2017. Inspection was conducted on 3/7/2018, risers remained. Extraction should carefully review the rules.</li> <li>○ <b>Date Corrective Actions Completed:</b> No Date Listed</li> </ul> |
| <b>COGIS Tank Facilities Information (Scout Card)</b> | <p><b>No Tank Battery forms were detected during this QA &amp; QC Audit.</b></p> <p>The shared Tank Battery associated with this site can be seen in Final Reclamation Inspection Photos Doc #<a href="#">682403398</a>. Tank Battery is shared with PEZOLDT #1-32 (API #<a href="#">05-123-15040</a>).</p>  |
| <b>COGIS Well Information (Scout Card)</b>            | <p><b>Well Name:</b> HIPPEN #1-32</p> <p><b>API#:</b> <a href="#">05-123-11395</a></p> <p><b>FACILITY ID:</b> 243603</p> <ul style="list-style-type: none"> <li>○ <b>Status &amp; Date:</b> PA &amp; 12/05/2015</li> <li>○ <b>Lat/Long As Drilled:</b> 40.012070 / -105.033290</li> <li>○ <b>Form 42 Doc # &amp; Date:</b> <a href="#">401576038</a> &amp; 03/15/2018<br/><b>Purpose:</b> Flowlines Abandoned per RULE 1103 on 12/05/2015</li> <li>○ <b>Form 6 Subsequent Doc # &amp; Date:</b> <a href="#">401087295</a> &amp; 11/03/2017</li> <li>○ <b>Form 4 Doc # &amp; Date:</b> <a href="#">400963328</a> &amp; 01/04/2016<br/><b>Purpose:</b> Interim Reclamation Complete, site ready for inspection<br/><b>COGCC Approval Signee:</b> Chris Binschus</li> <li>○ <b>Form 42 Doc # &amp; Date:</b> <a href="#">400938023</a> &amp; 11/16/2015<br/><b>Purpose:</b> Start of Plugging Operations – 48-Hour Notice Required</li> </ul>   |

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<br>2006 | Remotely Sensed Imagery<br>September 17, 2022 |
| Designation<br>Well Pad                      | Designation<br>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

Hippin 1-32 has passed the target vegetation recovery. Hippin 1-32 shared a tank battery with Pezoldt 1-32. The COGIS indicates the status of Pezoldt 1-32 is CL as of 9/8/2017, Location ID 327689. The operator is still monitoring Pezoldt 1-32 and associated tank battery for reclamation recovery.

In addition, the most recent Inspection from 1/2/2019 has one CA that has not been responded to.

### Summary Acreage Table

| Description                     |             |
|---------------------------------|-------------|
| <b>Total Disturbance Extent</b> | <b>.22</b>  |
| ○ Access Road                   | Included    |
| ○ Flowline                      | Not defined |
| ○ Tank Battery                  | Off-site    |
| ○ Well Pad                      | Included    |

# ATTACHMENTS

## Recommendation

*Monitoring – Field Site Visit 17 Sept 2022*

Vegetation Evaluation and Site Imagery

## Site Evaluation

*Site Reference*

*Natural Resources Conservation Service (NRCS) Map Unit Description*

Reference Soil Document

*Ecological Site Descriptions*

## Maps and Figures

*Area Maps*

Previous Infrastructure Overview

Current Site Overview

Hydrology

Elevation & Contours

Slope

NDVI

NDRE

NAIP NDVI Composite

## Recommendations

### Monitoring Change Over Time

#### Field Visit – 17 Sep 2022

### Vegetation

Due to the time of year these data were gathered, most of the vegetation had senescence, leaving a small amount of green vegetation that was detected. The site evaluation results indicate the reference vegetative recovery target for NDVI reflected .9% for green vegetation and the reference vegetation recovery target for NDRE reflected .03%. The recovery status for the reclaim extent was at .2% deficit for NDVI and .2% surplus for NDRE. These data are based on fall vegetation plant growth.

The site evaluation indicates the presents of weeds within the reclaim extent that have a percent cover of 1%, reflecting an actual **.4% deficit** in the recovery rate for NDVI in the fall observation.

The target recovery was based on one reference extents that fall within the same soil types. Typical land use was observed in this area similar vegetation properties.

#### **Recommendation**

The vegetation indices indicate most of the vegetation, at the time of sampling, was in the senescence stage of plant development which is represented by class 3 of the vegetation indices. The field observation coupled with the vegetation indices, indicate the site has achieved the target recovery and recommended for closure.

#### **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*

Western Wheatgrass - - 40%

*Invasive – List C*

Field bindweed – *Convolvulus arvensis* – 20%

#### **Recovery Extent Vegetation Observations**

*Native or Endemic in the surrounding area*

Crested Wheatgrass – *Agropyron cristatum*- 20%

*Invasive –*

Russian Thistle – *Salsola tragus* – 1%

# Change Detection

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## 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 17 Sep 2022, which reflects the current vegetative cover statistics.

NDVI calculations used the Near Infrared and Red bands and the NDRE used the RedEdge band and 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. The NDRE reflects the measurements from permanent or later stage growth due to its ability to measure further down into the canopy. Both analytics were calculated to establish the baseline.

The percent cover calculations reflect the vegetation from the reference area and the reclaimed area. The data reflects 5 bands of reflectance. Classes reflect vegetative and non-vegetative areas. The recovery matrix, which is 80% of the reference vegetation were calculated. The recovery calculation indicate the current rate of recovery at the time of sampling.

All measurements are based on the reclaimed area, the reference area extent and the weed inventory at the time of analysis.

| NDVI - NDRE Stats    |            | Name          |           |                 |               |               |           |                 |  |
|----------------------|------------|---------------|-----------|-----------------|---------------|---------------|-----------|-----------------|--|
| Date                 | Hippin     | Reference     |           | Target Recovery | Target - Weed | Reclaimed     |           |                 |  |
| Type                 | NDVI Class | Percent Cover | Class Sum | 80%             | 20%           | Percent Cover | Class Sum | Deficit/Surplus |  |
| Veg                  | 1          | 0.00          |           |                 |               | 0.04          |           |                 |  |
| Veg                  | 2          | 1.11          | 1.11      | 0.89            | 0.71          | 0.48          | 0.51      | <b>-0.20</b>    |  |
| Non-Veg (Senescence) | 3          | 45.00         |           |                 |               | 27.98         |           |                 |  |
| Non-Veg              | 4          | 48.91         |           |                 |               | 65.06         |           |                 |  |
| Non-Veg              | 5          | 5.09          | 99.00     |                 |               | 6.62          | 71.68     |                 |  |

### NDVI Red Edge

| Date                 | Name       |               |           |                 |               |               |           |                 |  |
|----------------------|------------|---------------|-----------|-----------------|---------------|---------------|-----------|-----------------|--|
| Type                 | NDRE Class | Reference     | Class Sum | Target Recovery | Target - Weed | Reclaimed     | Class Sum | Deficit/Surplus |  |
|                      |            | Percent Cover |           | 80%             | 20%           | Percent Cover |           |                 |  |
| Veg                  | 1          | 0             |           |                 |               | 0.00          |           |                 |  |
| Veg                  | 2          | 0.05          | 0.05      | 0.04            | 0.035         | 0.20          | 0.20      | <b>0.16</b>     |  |
| Non-Veg (Senescence) | 3          | 26.44         |           |                 |               | 19.64         |           |                 |  |
| Non-Veg              | 4          | 64.03         |           |                 |               | 70.97         |           |                 |  |
| Non-Veg              | 5          | 9.59          | 73.62     |                 |               | 9.36          | 80.33     |                 |  |

| Weed Inventory       |       | Reclaimed     | Weed Cover |      | Reclaimed | NDVI   | Actual - Target % |  |
|----------------------|-------|---------------|------------|------|-----------|--------|-------------------|--|
| Type                 | Class | Percent Cover | Class Sum  | 1%   | Class Sum | Actual |                   |  |
| Veg                  | 1     | 0.04          |            |      |           |        |                   |  |
| Veg                  | 2     | 0.48          | 0.51       | 0.05 | 0.51      | 0.46   | <b>-0.43</b>      |  |
| Non-Veg (Senescence) | 3     | 27.98         |            |      |           |        |                   |  |
| Non-Veg              | 4     | 65.06         |            |      |           |        |                   |  |
| Non-Veg              | 5     | 6.62          | 71.68      |      |           |        |                   |  |

**Weed Summary Reference**

| Common Name    | Weed List Type | Percent Cover (%) |
|----------------|----------------|-------------------|
| Field Bindweed | List C         | 20                |

**Weed Summary Recovery**

| Common Name     | Weed List Type | Percent Cover (%) |
|-----------------|----------------|-------------------|
| Russian Thistle | Common         | 1                 |

**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 - Designed 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

**Weed Pressure**

Current weed pressure in reclaim extent presents with Russian Thistle. The weed pressure is lower than the reference extent where field bindweed is present. Monitoring is recommended to reduce the spread of weeds from the reference extent during the permit closure process..

**Hydrology**

Hydrology – Stream Orders 1 – 6 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. Soil texture in the area is primarily a clay loam. A major stream is present in the southern portion of the reclaim extent along the elevation gradient. A major stream is present along the new road due to change in the land use. Contour lines indicate a slight deviation from the previous contour, no major disruption in the gradient within the disturbance area has been detected.

Ponding - potential ponding can occurring were water follows the elevation gradients in low lying areas primarily to the west of the existing reclaim extent where the gradient is lower. The flow direction is primarily from east to west.

**Soil/Erosion**

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

## Site Recommendation and Re-Evaluation

This site statically does not meet the revegetation target rate within the reclaim extent. The weed pressure within the reclaim area is lower than the reference extent. Treatment of the Russian Thistle and monitor the spread of the Field Bindweed

Recommend this site for weed control and interseeding and reevaluation in 2023.

## Seed Mix

### Vegetation Seed Mix

*No Additional reclamation procedures are recommended at this time.*

### Loamy Plain Ecosystem

|                      | Common Name           | Scientific Name                     | #PLS/Acre   | % of Mix   |
|----------------------|-----------------------|-------------------------------------|-------------|------------|
|                      | Western Wheatgrass    | <i>Pascopyrum smithii</i>           | 6           | 24         |
|                      | Green needlegrass     | <i>Nassella viridula</i>            | 3           | 12         |
|                      | Indian Ricegrass      | <i>Achnatherum hymenoides</i>       | 1.5         | 6          |
|                      | Needle and Thread     | <i>Hesperostipa comata</i>          | 0.5         | 2          |
| <b>Grasses</b>       | Blue Grama            | <i>Bouteloua gracilis</i>           | 0.5         | 2          |
|                      | Buffalograss          | <i>Bouteloua dactyloides</i>        | 1           | 4          |
|                      | Sideoats Grama        | <i>Bouteloua curtipendula</i>       | 2           | 8          |
|                      | Little Bluestem       | <i>Schizachyrium Nees</i>           | 2           | 8          |
|                      | Sand Dropseed         | <i>Sporobolus Cryptandrus</i>       | 1           | 4          |
|                      | Arizona fescue        | <i>Festuca arizonica</i>            | 2           | 8          |
|                      | Purple prairie clover | <i>Dalea purpurea</i>               | 2           | 8          |
| <b>Legumes/Forbs</b> | Prairie Aster         | <i>Machaeranthera tanacetifolia</i> | 0.1         | 0          |
|                      | Prairie coneflower    | <i>Ratibida columnifera</i>         | 0.5         | 2          |
|                      | Buckwheat             | <i>Eriogonum spp.</i>               | 3           | 12         |
|                      | <b>Total</b>          |                                     | <b>25.1</b> | <b>100</b> |

**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

| <b>Time Frame</b>  | <b>Activity</b> | <b>Specifications</b>                     | <b>Site Totals</b> |
|--------------------|-----------------|---|--------------------|
| <b>Sep 2022</b>    | Monitoring      | Common weeds Present                      |                    |
| <b>Spring 2023</b> | Weed Monitoring | Monitor for and control preemergent weeds |                    |
| <b>Spring 2023</b> | Permit closure  | Recommend for permit closure              |                    |

## Site Photos

### *Reference*

40.011992, -105.033351



North



East

Soil Sage



South



West

Soil Sage



Vegetation – Western Wheatgrass and Field Bindweed



Site Photo – Surface salt visible on soil, runoff from neighboring property



Site Photo – Weed overflow from neighboring property

Invasive



Field bindweed – *Convolvulus arvensis*

Soil Sage

*Recovery*

40.012104, -105.033284



North



East

Soil Sage



South



West



Vegetation – Crested Wheatgrass

Soil Sage

Invasive



Russian Thistle – *Salsola tragus*

## Site Overview Photo's

Date – 17 Sep 2022

Cardinal Direction – in order from NESW



North

Soil Sage



East



South

Soil Sage



West

# SITE EVALUATION REPORT



## SITE DESCRIPTION

**CLIENT - CIVITAS Resources**

## SOIL SAGE

**DATE:** 28 Mar 2023

|                                     |                                     |                                     |                          |
|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|
| <b>Operator / #</b>                 | EXTRACTION OIL & GAS<br>INC - 10459 | <b>County / State</b>               | WELD, CO                 |
| <b>Location ID /<br/>Name</b>       | 319519 - HIPPIN-<br>61N68W32NWNW    | <b>Field ID</b>                     | WATTENBERG 90750         |
| <b>Facility Status</b>              | CL                                  | <b>Status Date</b>                  | 12/05/2015               |
| <b>Disturbance<br/>Extent</b>       | .22                                 | <b>Road Extent /<br/>Acres</b>      | Included                 |
| <b>Reclaimed<br/>Extent / Acres</b> | .22                                 | <b>Reference Extent<br/>/ Acres</b> | 0.21                     |
| <b>Reclaim Weed<br/>Percent</b>     | 1                                   | <b>Reference Weed<br/>Percent</b>   | 20                       |
|                                     |                                     | <b>Coordinates<br/>Lat/Long</b>     | 40.012070<br>-105.033290 |

## Reference Descriptions

### Imagery

Chronological

DRCOG - 2002

DRCOG - 2006

2022 – Remotely Sensed Imagery Ortho, DSM, NDVI, NDRE

### Map List

2002 - DRCOG

2006 - DRCOG

2022 – Remotely Sensed Imagery Ortho,  
DSM, NDVI, NDRE

2014 -2020 Elevation Contour

2020 Slope

2022 RS Overview

2022 RS Hydrology

2022 RS NDVI

2022 RS NDRE

# Landscape Summary

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## **2014 - USGS Elevation**

## **2020 - DRCOG Elevation**

- Slope - 0-5% slope range
- Contouring lines 1m
- Elevation gradients 1543 - 1608 m (5062 - 5276 ft)

## **2022** – Drone imagery from 17 Sep 2022 – orthomosaic and DSM

- Landuse mixed use, non-agricultural, reclaim extent present

## **2022** – Drone imagery from 17 Sep 2022 – NDVI /NDRE (vegetation analysis)

# Soil Properties

## USDA Soil Description

### Reference Soil Information

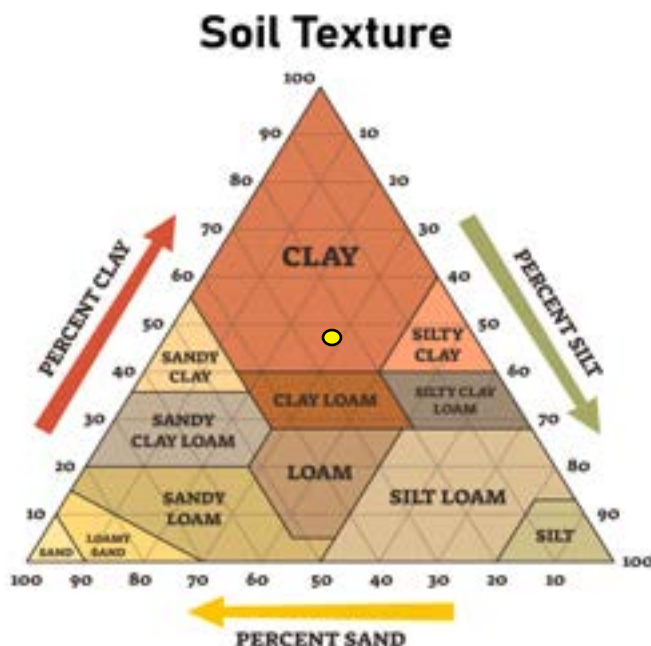
The location of the site is contained within one soil type, Midway-Shingle complex.

### Map Unit 36 Reference Soil information - Midway-Shingle complex

This soil is formed from calcareous residuum weathered from shale, residuum weathered from calcareous shale. Landform is hills, ridges, with the Shaly Plains Ecological Site. Soils are well drained with a very low to low water holding capacity, and slope 5-20 percent.

| Depth (in) | Physical                           |              |  | Chemical |     |     |      |
|------------|------------------------------------|--------------|--|----------|-----|-----|------|
|            | Texture                            | Bulk Density | Partical Size Percent sand, silt, clay | pH       | EC  | SAR | OM%  |
| 0-10       | Clay, Loam                         | 1.24         | 24-29-47                               | 7.8      | 3.6 | 4.4 | 0.97 |
| 10-20      | Clay, Weathered Bedrock, Clay Loam | 1.28         | 30-30-40                               | 8.5      | 5.0 | 8.0 | 0.25 |
| 20-30      | Unweathered Bedrock                |              |  |          |     |     |      |

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 – 4. 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

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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

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## Reference vegetation – Shaly 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.

### Ecological Dynamics

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

Recurrent drought has historically impacted the vegetation of this region. Changes in species composition will vary depending upon the duration and severity of the drought cycle, and prior grazing management. Recent drought events have significantly increased mortality of blue grama in some locales.

### Reference Plant Community

The Reference State is characterized by 65-80% grasses and grass-like plants, 10-15% forbs, and 10-20% woody plants. The principal dominant midgrasses are alkali sacaton, western wheatgrass, sideoats grama, and green needlegrass. Blue grama is the dominant shortgrass. Grasses and grass-likes of secondary importance are little bluestem, Indian ricegrass, needle and thread, prairie junegrass, and sun sedge. Key forbs and shrubs are American vetch, leafy false goldenweed, fourwing saltbrush, and winterfat.

Drought has increased mortality of blue grama in some locations.

### At Risk Plant Community

Blue grama has increased but has not yet developed into a sod bound condition. Sideoats grama is slightly reduced. Key species such as alkali sacaton, western wheatgrass, green needlegrass, American vetch, fourwing saltbush and winterfat have decreased. Forbs and shrubs such as scarlet globemallow, rubber rabbitbrush and broom snakeweed have increased. Plant frequency and vigor have decreased. Total aboveground carbon has been reduced due to decreases in forage and litter production. Reduction of rhizomatous wheatgrass, nitrogen fixing forbs, shrub component and increased warm season short grass has begun to alter the biotic integrity of this community. Water and nutrient cycles are at risk of becoming impaired.

# Vegetation

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## Reference Vegetation – Shaly Plains Ecology

### Warm-Season Shortgrass Dominant Plant Community

The key warm and cool season mid grasses such as alkali sacaton, western wheatgrass and green needlegrass are absent and have been replaced by increased amounts of red threeawn, ring muhly and sand dropseed. Only a remnant amount of sideoats grama, western wheatgrass, alkali sacaton, and shrubs occur. Blue grama and buffalograss dominate the community and have developed into a sod bound condition. Fendler threeawn, ring muhly, silky sophora, twogrooved milkvetch, and broom snakeweed have also increased. A significant amount of production and diversity has been lost when compared to the Reference Plant Community. Loss of cool season grasses, shrub component and nitrogen fixing forbs have negatively impacted energy flow and nutrient cycling. Soil loss is obvious where flow paths are connected. The plant community lacks diversity and exhibits a greatly impaired water cycle. Desertification is advancing.

## Shaly Plains Ecosystem Vegetative Community Composition

| Common Name                | Scientific Name                        |
|----------------------------|--|
| Western Wheatgrass         | <i>Pascopyrum smithii</i>              |
| Alkali Sacaton             | <i>Sporobolus airoides</i>             |
| Sideoats Grama             | <i>Bouteloua curtipendula</i>          |
| Blue Grama                 | <i>Bouteloua gracilis</i>              |
| Green Needlegrass          | <i>Nassella viridula</i>               |
| Little Bluestem            | <i>Schizachyrium scoparium</i>         |
| Indian Ricegrass           | <i>Achnatherum hymenoides</i>          |
| Saltgrass                  | <i>Distichlis spicata</i>              |
| Needle and Thread          | <i>Hesperostipa comata ssp. comata</i> |
| Buffalograss               | <i>Bouteloua dactyloides</i>           |
| Sand Dropseed              | <i>Sporobolus cryptandrus</i>          |
| American Vetch             | <i>Vicia americana</i>                 |
| Scarlet Globemallow        | <i>Sphaeralcea coccinea</i>            |
| Beardtongue                | <i>Penstemon</i>                       |
| Upright Prairie Coneflower | <i>Ratibida columnifera</i>            |
| White Sagebrush            | <i>Artemisia ludoviciana</i>           |
| Groundplum Milkvetch       | <i>Astragalus crassicaarpus</i>        |
| Purple Prairie Clover      | <i>Dalea purpurea var. purpurea</i>    |
| Povertyweed                | <i>Iva axillaris</i>                   |
| Dotted Blazing Star        | <i>Liatris punctata</i>                |



**Infrastructure**

Facility – CL – 12/05/2015  
 Well – PA – 12/05/2015  
 Tank Battery – No Docs  
 Pit – No Pit on Location  
 Road – Pre-Existing  
 On-Location FLO – 401576038 – 03/15/2018  
 Off-Location FLO – No Docs  
 Environmental – NA

Reclaim Extent - 0.22 ac  
 Recovery Point  
 319519 - HIPPEN 1-32  
 Reference Extent - 0.21 ac  
 Reference Point

**CIV - 319519 - HIPPEN 1-32  
 Map Extent - DRCOG 2002**

Imagery: DRCOG  
 Imagery Date: 2002  
 Map Date: 26 Mar 2023  
 Datum: WGS 1984 UTM Zone 13N  
 POC: Soil Sage

**Legend**

- ◆ Wells
- 📷 Reference Recovery Points
- 🟩 Reclaim Extent
- 🟦 Reference Extent
- 🟪 Tank Battery

0 60 120 Meters

Total Disturbance: 1.02 Acres  
 Scale: 1:2,200

Pad Location: 40.012070  
 -105.033290

N



Service Credits -



**Infrastructure**

Facility – CL – 12/05/2015  
 Well – PA – 12/05/2015  
 Tank Battery – No Docs  
 Pit – No Pit on Location  
 Road – Pre-Existing  
 On-Location FLO – 401576038 – 03/15/2018  
 Off-Location FLO – No Docs  
 Environmental – NA

**CIV - 319519 - HIPPEN 1-32**  
**Map Extent - DRCOG 2002**

Imagery: DRCOG  
 Imagery Date: 2002  
 Map Date: 26 Mar 2023  
 Datum: WGS 1984 UTM Zone 13N  
 POC: Soil Sage

**Legend**

- ◆ Wells
- 📷 Reference Recovery Points
- 🟩 Reclaim Extent
- 🟦 Reference Extent



Total Disturbance:  
 1.02 Acres  
 Scale: 1:700

Pad Location:  
 40.012070  
 -105.033290



Service Credits -





**CIV - 319519 - HIPPEN 1-32**  
**Map Extent - DRCOG 2006**

Imagery: DRCOG  
 Imagery Date: 2006  
 Map Date: 26 Mar 2023  
 Datum: WGS 1984 UTM Zone 13N  
 POC: Soil Sage

**Legend**

- ◆ Wells
- 📍 Reference Recovery Points
- 🟩 Reclaim Extent
- 🟦 Reference Extent
- 🟪 Tank Battery

0 60 120 Meters

Total Disturbance: 1.02 Acres  
 Scale: 1:2,200

Pad Location: 40.012070  
 -105.033290

N



Service Credits -



**Infrastructure**

Facility – CL – 12/05/2015  
 Well – PA – 12/05/2015  
 Tank Battery – No Docs  
 Pit – No Pit on Location  
 Road – Pre-Existing  
 On-Location FLO – 401576038 – 03/15/2018  
 Off-Location FLO – No Docs  
 Environmental – NA

**CIV - 319519 - HIPPEN 1-32  
 Map Extent - DRCOG 2006**

Imagery: DRCOG  
 Imagery Date: 2006  
 Map Date: 26 Mar 2023  
 Datum: WGS 1984 UTM Zone 13N  
 POC: Soil Sage

**Legend**

- ◆ Wells
- 📍 Reference Recovery Points
- 🟩 Reclaim Extent
- 🟦 Reference Extent

0 20 40 Meters

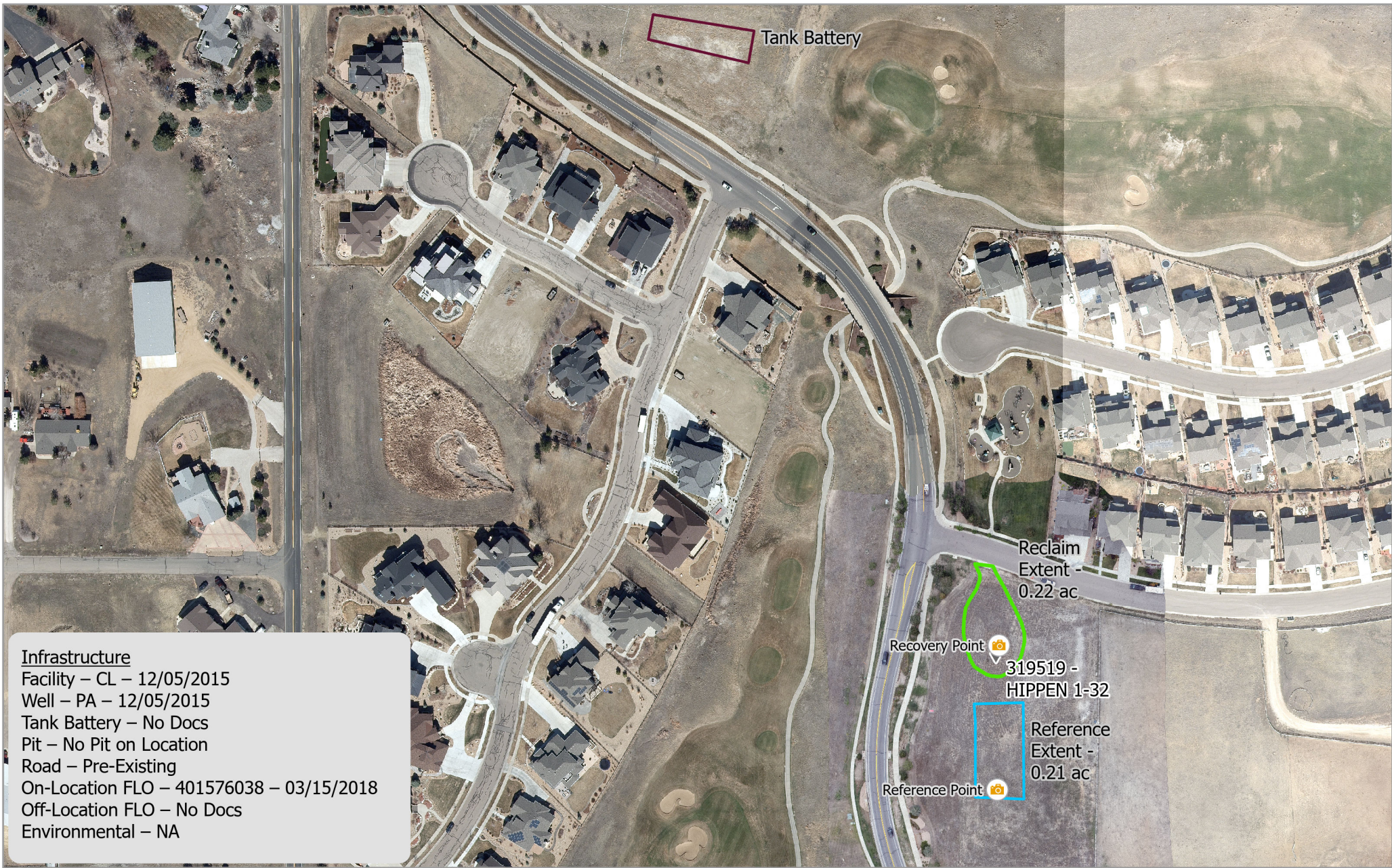
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 Scale: 1:700

Pad Location:  
 40.012070  
 -105.033290

N



Service Credits -



**Infrastructure**

Facility – CL – 12/05/2015  
 Well – PA – 12/05/2015  
 Tank Battery – No Docs  
 Pit – No Pit on Location  
 Road – Pre-Existing  
 On-Location FLO – 401576038 – 03/15/2018  
 Off-Location FLO – No Docs  
 Environmental – NA

Reclaim  
Extent -  
0.22 ac

Recovery Point

319519 -  
HIPPEN 1-32

Reference  
Extent -  
0.21 ac

Reference Point

**CIV - 319519 - HIPPEN 1-32**  
**Map Extent - Overview**

Imagery: RS Orthomosaic & DSM  
 Imagery Date: 17 Sep 2022  
 Map Date: 26 Mar 2023  
 Datum: WGS 1984 UTM Zone 13N  
 POC: Soil Sage

**Legend**

- ◆ Wells
- 📷 Reference Recovery Points
- 🟩 Reclaim Extent
- 🟦 Reference Extent
- 🟪 Tank Battery

0 60 120 Meters

Total Disturbance:  
1.02 Acres

Scale: 1:2,200

Pad Location:  
40.012070  
-105.033290



Service Credits -



**Infrastructure**

Facility – CL – 12/05/2015  
 Well – PA – 12/05/2015  
 Tank Battery – No Docs  
 Pit – No Pit on Location  
 Road – Pre-Existing  
 On-Location FLO – 401576038 – 03/15/2018  
 Off-Location FLO – No Docs  
 Environmental – NA

**CIV - 319519 - HIPPEN 1-32  
 Map Extent - Overview**

Imagery: RS Orthomosaic & DSM  
 Imagery Date: 17 Sep 2022  
 Map Date: 26 Mar 2023  
 Datum: WGS 1984 UTM Zone 13N  
 POC: Soil Sage

**Legend**

- Reference Recovery Points
- Wells
- Reclaim Extent
- Reference Extent



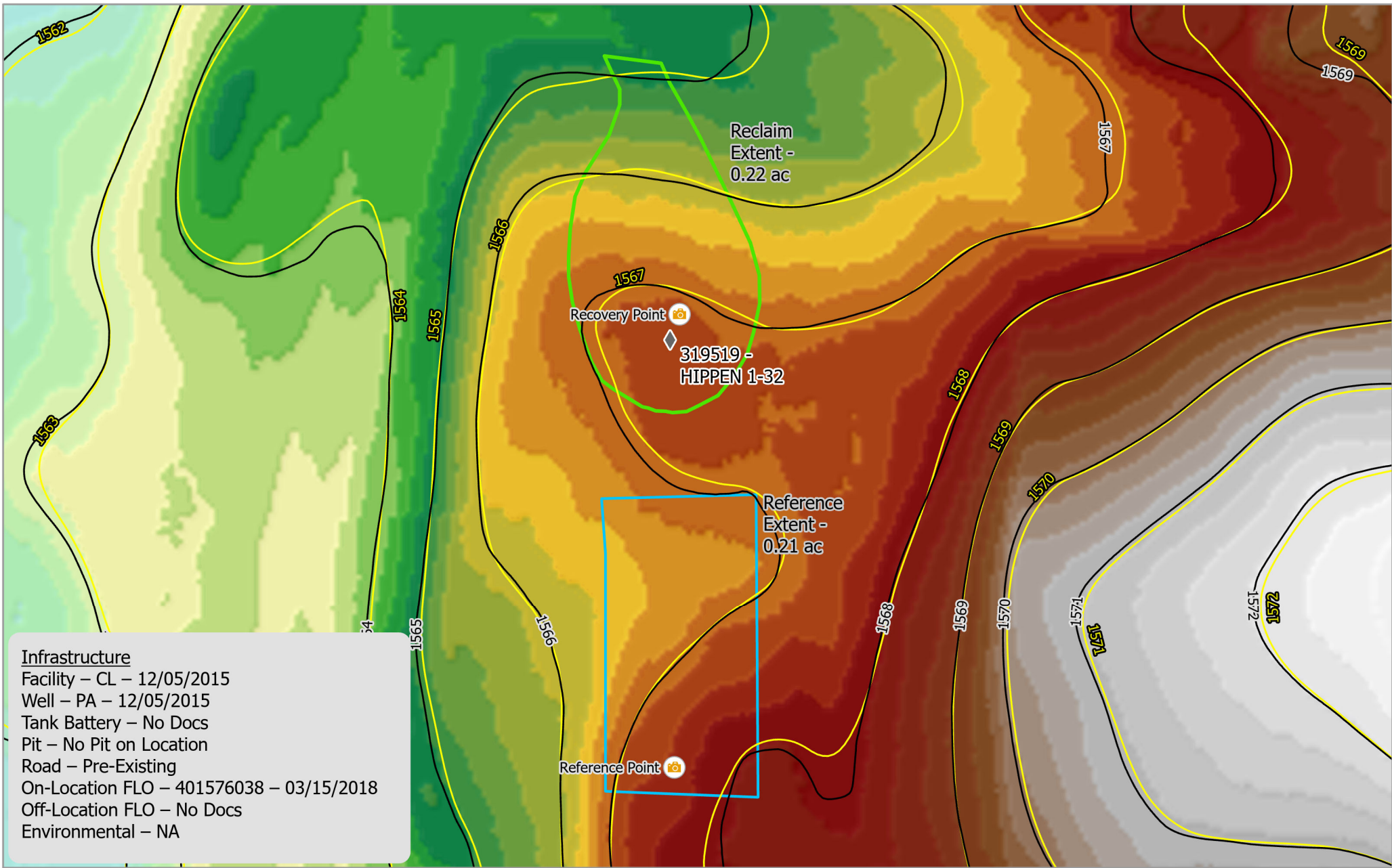
Total Disturbance:  
 1.02 Acres  
 Scale: 1:700

Pad Location:  
 40.012070  
 -105.033290



Service Credits -





**Infrastructure**

- Facility – CL – 12/05/2015
- Well – PA – 12/05/2015
- Tank Battery – No Docs
- Pit – No Pit on Location
- Road – Pre-Existing
- On-Location FLO – 401576038 – 03/15/2018
- Off-Location FLO – No Docs
- Environmental – NA

**CIV - 319519 - HIPPEN 1-32  
Map Extent - Elevation & Contours**

Imagery: DRCOG & USGS Elevation  
 Imagery Date: 2020 & 2014  
 Map Date: 26 Mar 2023  
 Datum: WGS 1984 UTM Zone 13N  
 POC: Soil Sage

|                             |           |
|-----------------------------|-----------|
| ◆ Wells                     | Elevation |
| 📷 Reference Recovery Points | Meters    |
| ~ 1 Meter Contours (2020)   | 1608      |
| ~ 1 Meter Contours (2014)   | 1543      |
| 🟩 Reclaim Extent            |           |
| 🟦 Reference Extent          |           |

0 20 40 Meters

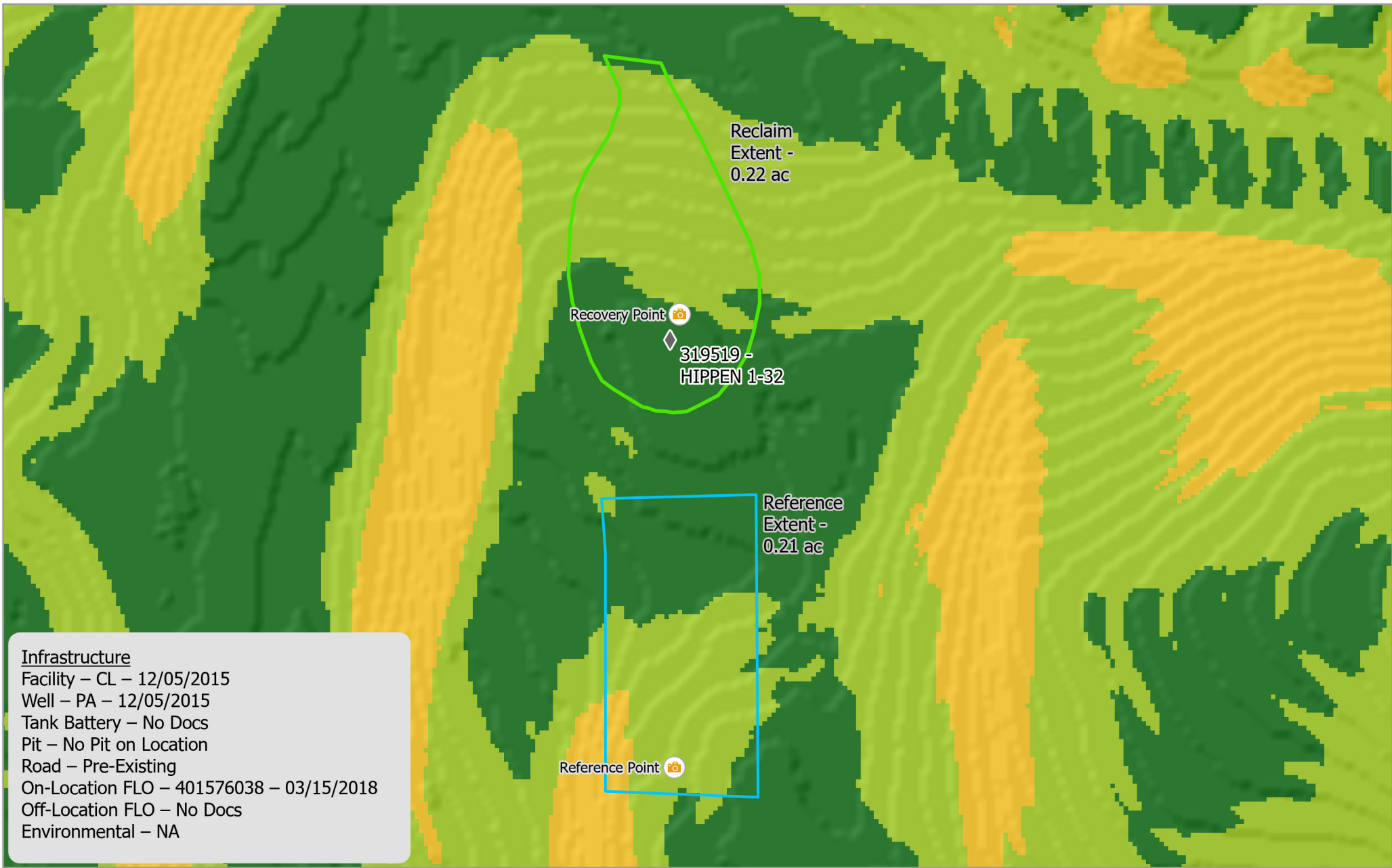
Total Disturbance: 1.02 Acres  
 Scale: 1:700

Pad Location:  
 40.012070  
 -105.033290

N



Service Credits -



**Infrastructure**  
 Facility – CL – 12/05/2015  
 Well – PA – 12/05/2015  
 Tank Battery – No Docs  
 Pit – No Pit on Location  
 Road – Pre-Existing  
 On-Location FLO – 401576038 – 03/15/2018  
 Off-Location FLO – No Docs  
 Environmental – NA

**CIV - 319519 - HIPPEN 1-32**  
**Map Extent - Slope**

Imagery: DRCOG Elevation  
 Imagery Date: 2020  
 Map Date: 26 Mar 2023  
 Datum: WGS 1984 UTM Zone 13N  
 POC: Soil Sage

|                             |           |
|-----------------------------|-----------|
| ◆ Wells                     | Slope     |
| 📷 Reference Recovery Points | Percent   |
| 🟩 Reclaim Extent            | 🟩 <5      |
| 🟦 Reference Extent          | 🟨 5 - 10  |
|                             | 🟨 10 - 30 |

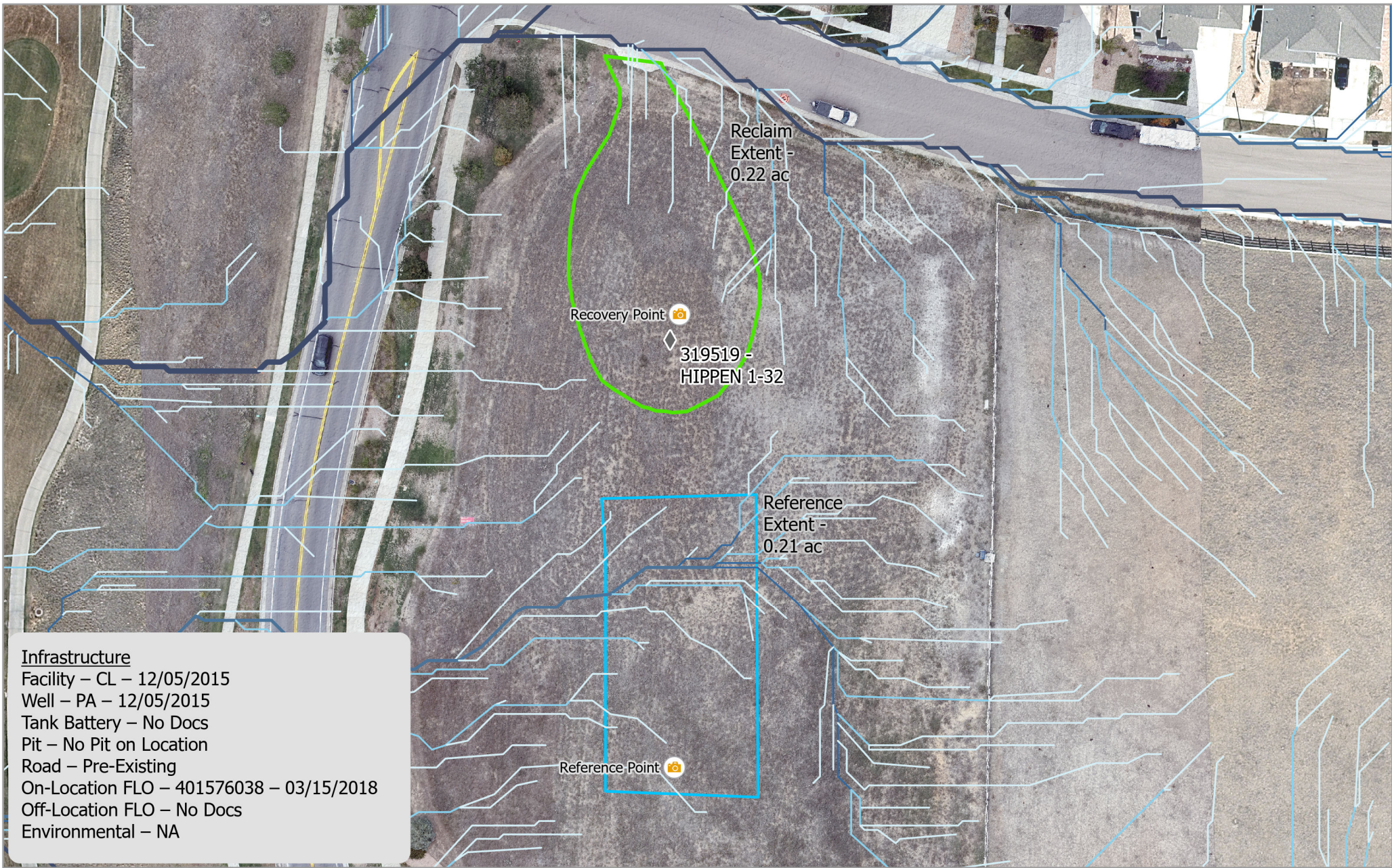
0                      20                      40 Meters

Total Disturbance: 1.02 Acres  
 Scale: 1:700

Pad Location:  
 40.012070  
 -105.033290

Service Credits -



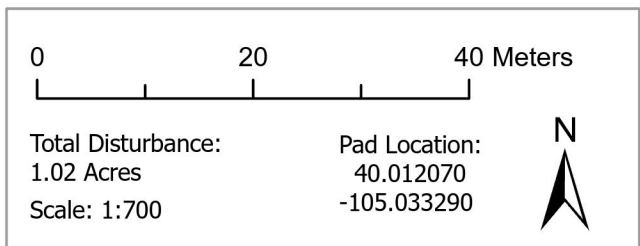
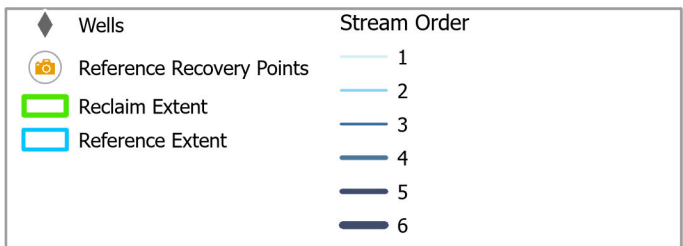


**Infrastructure**

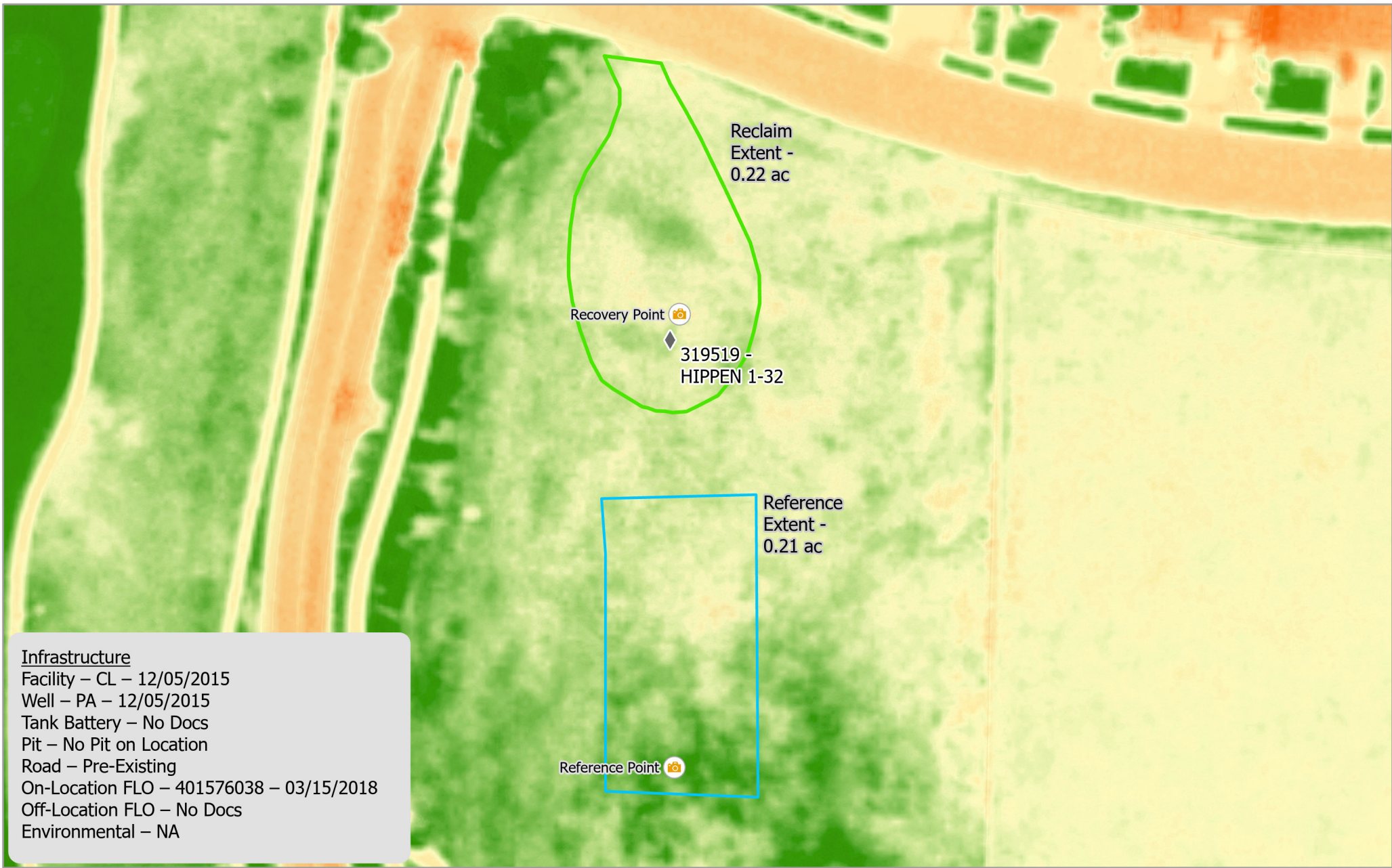
Facility – CL – 12/05/2015  
 Well – PA – 12/05/2015  
 Tank Battery – No Docs  
 Pit – No Pit on Location  
 Road – Pre-Existing  
 On-Location FLO – 401576038 – 03/15/2018  
 Off-Location FLO – No Docs  
 Environmental – NA

**CIV - 319519 - HIPPEN 1-32**  
**Map Extent - Hydrology**

Imagery: RS Orthomosaic & DSM  
 Imagery Date: 17 Sep 2022  
 Map Date: 26 Mar 2023  
 Datum: WGS 1984 UTM Zone 13N  
 POC: Soil Sage



Service Credits -



**Infrastructure**

Facility – CL – 12/05/2015  
 Well – PA – 12/05/2015  
 Tank Battery – No Docs  
 Pit – No Pit on Location  
 Road – Pre-Existing  
 On-Location FLO – 401576038 – 03/15/2018  
 Off-Location FLO – No Docs  
 Environmental – NA

**CIV - 319519 - HIPPEN 1-32**  
**Map Extent - NAIP NDVI Composite**

Imagery: USDA NAIP  
 Imagery Date: 2010 - 2020  
 Map Date: 26 Mar 2023  
 Datum: WGS 1984 UTM Zone 13N  
 POC: Soil Sage

- ◆ Wells
- 📷 Reference Recovery Points
- 🟩 Reclaim Extent
- 🟦 Reference Extent



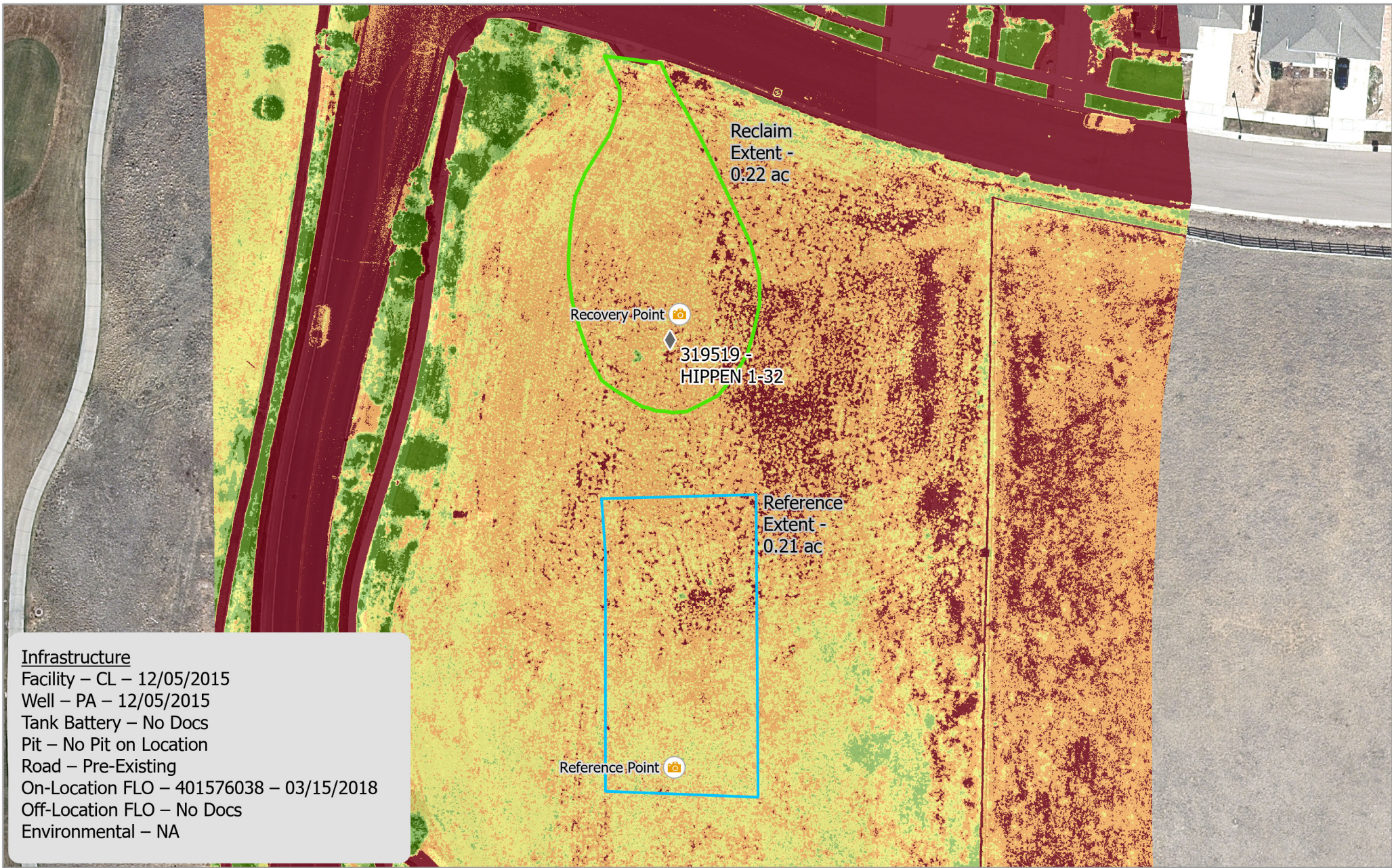
Total Disturbance:  
 1.02 Acres  
 Scale: 1:700

Pad Location:  
 40.012070  
 -105.033290



Service Credits - Esri, USDA Farm Service Agency





**Infrastructure**

Facility – CL – 12/05/2015  
 Well – PA – 12/05/2015  
 Tank Battery – No Docs  
 Pit – No Pit on Location  
 Road – Pre-Existing  
 On-Location FLO – 401576038 – 03/15/2018  
 Off-Location FLO – No Docs  
 Environmental – NA

**CIV - 319519 - HIPPEN 1-32**  
**Map Extent - NDVI**

Imagery: RS Multispectral  
 Imagery Date: 17 Sep 2022  
 Map Date: 26 Mar 2023  
 Datum: WGS 1984 UTM Zone 13N  
 POC: Soil Sage

|                             |           |
|-----------------------------|-----------|
| ◆ Wells                     | NDVI      |
| 📷 Reference Recovery Points | Classes   |
| 📏 Reference Extent          | 1-Veg     |
| 🟩 Reclaim Extent            | 2-Veg     |
|                             | 3-Non Veg |
|                             | 4-Non Veg |
|                             | 5-Non Veg |

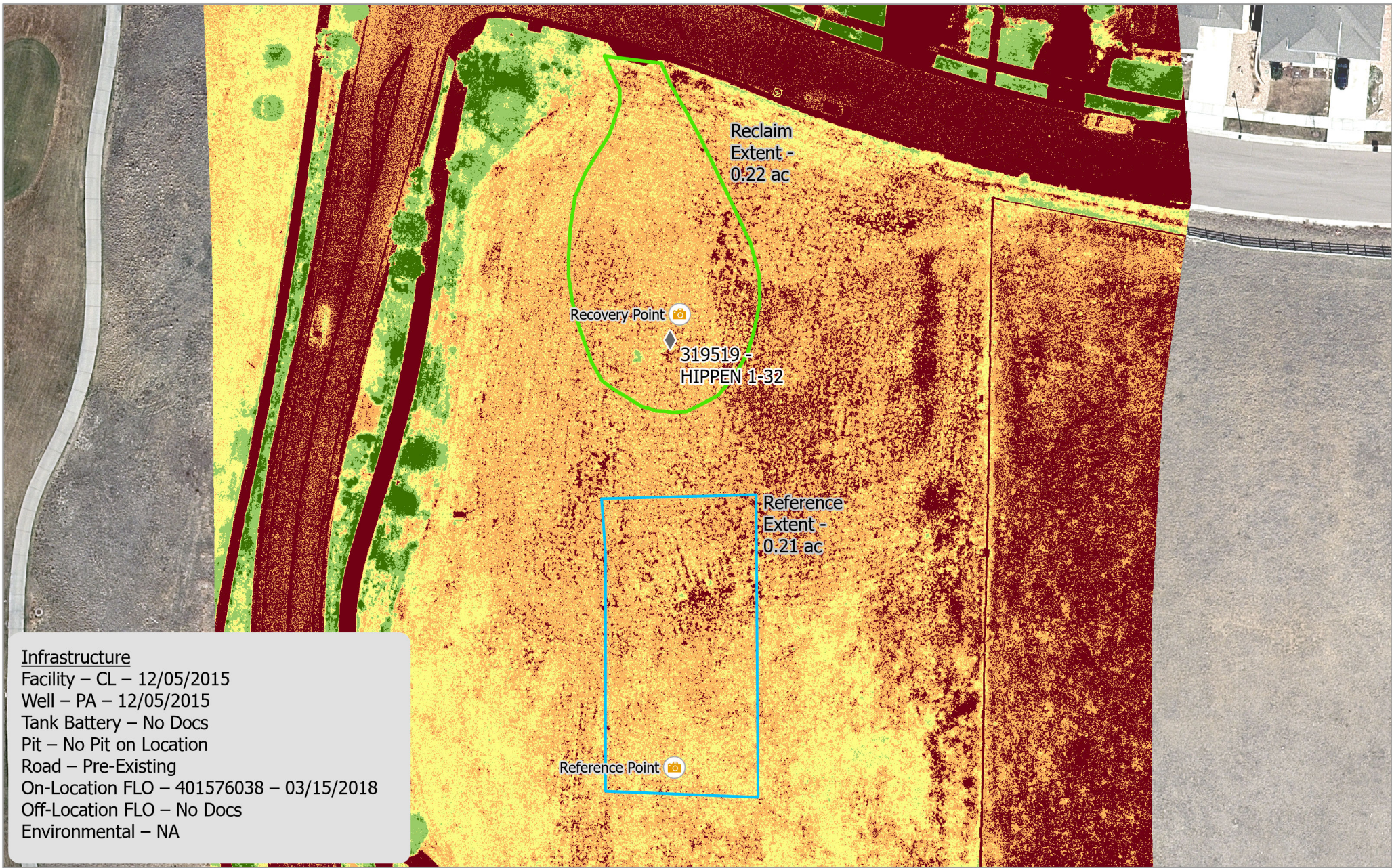
0 20 40 Meters

Total Disturbance: 1.02 Acres  
 Scale: 1:700

Pad Location: 40.012070  
 -105.033290



Service Credits -



**Infrastructure**

Facility – CL – 12/05/2015  
 Well – PA – 12/05/2015  
 Tank Battery – No Docs  
 Pit – No Pit on Location  
 Road – Pre-Existing  
 On-Location FLO – 401576038 – 03/15/2018  
 Off-Location FLO – No Docs  
 Environmental – NA

**CIV - 319519 - HIPPEN 1-32**  
**Map Extent - NDRE**

Imagery: RS Multispectral  
 Imagery Date: 17 Sep 2022  
 Map Date: 26 Mar 2023  
 Datum: WGS 1984 UTM Zone 13N  
 POC: Soil Sage

|                             |           |
|-----------------------------|-----------|
| ◆ Wells                     | NDRE      |
| 📷 Reference Recovery Points | Classes   |
| 🟩 Reclaim Extent            | 1-Veg     |
| 🟦 Reference Extent          | 2-Veg     |
|                             | 3-Non Veg |
|                             | 4-Non Veg |
|                             | 5-Non Veg |

0 20 40 Meters

Total Disturbance: 1.02 Acres  
 Scale: 1:700

Pad Location:  
 40.012070  
 -105.033290



Service Credits -