Shelduck South

Interim Reclamation Plan

In accordance with:

COGCC Rule 304.c.(16), requiring an Interim Reclamation Plan consistent with the requirements of COGCC Rule 1003.

Mallard Exploration

1400 16th Street, Suite 300

Denver, CO 80202

Contents

Appendices

Appendix A Stormwater Management Plan Maps:

- Initial Construction SWMP Overview Map
- Initial Construction SWMP Site Map
- Interim Reclamation Map
- Soils & Erosion Maps
- Pre-Disturbance Land Use Map
- Pre-Disturbance Vegetation Identification/Analysis and Photo Series

Appendix B Soils Reports

Appendix C Seed Mix & Methodology

1. Introduction

Mallard Exploration (Mallard) has prepared this document to satisfy the requirements of COGCC Rule 304.c.(16) to develop an interim reclamation plan, consistent with the requirements of COGCC Rule 1003, to accompany the Form 2A in order to demonstrate the Commission's Rules for the operation of the proposed oil and gas location in a manner that is protective of and minimizes adverse impacts to public health, safety, welfare, the environment, and wildlife resources.

2. Site Description

Mallard is proposing to construct the Shelduck South pad. The project consists of the development of infrastructure to support the drilling and production of eight oil and gas wells (with fee mineral ownership) from a new well pad located the NW ¼, SW ¼, Section 6, Township 7 North, Range 60 West, in Weld County, Colorado.

The total area of disturbance is planned to be 11.3 acres. Mallard plans to reclaim 3.8 acres after the location is producing, leaving 7.5 acres for the working pad and production pad surface. Construction of the location is anticipated to take approximately 20 working days. Initial drilling will include eight wells and is anticipated to take approximately 52 working days. Completions and flowback are anticipated to take another 56 and 30 days, respectively, and production operations will commence following flowback of each well.

A short access for the Shelduck South pad will be constructed leading south from Weld County Road 86 (CR #86), south to the planned pad disturbance.

In accordance with COGCC Rule 1003, interim reclamation at the Shelduck South pad will commence as soon as practicable and, at minimum, within six months following drilling and subsequent operations. Debris, waste material, and equipment associated with drilling, re-entry, and completion operations will be removed from the facility. All disturbed, non-working areas affected by drilling or subsequent operations, except those areas needed for production operations or for subsequent drilling operations to be commenced within 12 months, shall be reclaimed as nearly as practical to their original condition or their designated final land use. The disturbed areas will be seeded and mulched in the first favorable season following rig demobilization. Areas needed for production operations or for subsequent drilling operations to be commenced within twelve months will be stabilized and maintained to minimize dust and erosion to the extent possible.

3. Soils Description

To determine anticipated site characteristics for the project site, Geographic Information System (GIS) data from the Natural Resource Conservation Service (NRCS) along with aerial photography was overlain on the site proposed disturbance boundary to derive potential ecological site descriptions (ESDs) and NRCS soil map units. A desktop review of the proposed project area indicates the presence of one soils map units – 100% consisting of Olney fine sandy loam (0% to 6% slopes).

The Olney fine sandy loam (0% to 6% slopes) soils map unit shows an anticipated top soil depth of 0 to 6 inches. The depth to a restrictive feature is more than 80 inches. The drainage class is well drained, and the available water capacity is moderate (about 8.1 inches).

Slopes in the project area range from 0-6%. The risk of susceptibility to erosion/runoff is moderate based on K factor values; the overall erosion hazard is slight.

Soils and erosion maps and soils reports can be found in Appendix A and B, respectively.

4. Pre-Disturbance Vegetation:

The pre-disturbance land use at the subject location is non-agricultural grassland/rangeland.

The plant community includes predominantly switchgrass and deergrass, with smaller populations of black bindweed and yellow salsify. Much of the future project area consisted of dead and unidentifiable grasses, while vegetated areas showed a wide range of coverage and density.

Known noxious weed infestations – no plants from Colorado's A, B, or C lists were found onsite.

Vegetation Coverage (COGCC): ten semi-random quadrat (2.25 ft^2) samples were analyzed in the future project area in order to determine pre-disturbance vegetation coverage. COGCC coverage estimates include all plants, excluding noxious weeds. Pre-disturbance plant coverage ranged from 8% to 70%, averaging 26% over the ten semi-random samples. The pre-disturbance desirable coverage metric can be used to help determine COGCC interim reclamation completion and final reclamation in the future.

Vegetation Density (CDPHE): ten semi-random quadrats (2.25 ft^2) were analyzed in the future project area in order to determine pre-disturbance perennial vegetation density. The pre-disturbance density ranged from 1 to 30 perennial plants per quadrat, with an average of 13.7 perennial plants per quadrat. A standard error of the mean of 10% or less was not achieved, indicating relatively high variability and non-uniform coverage over the project area.

The vegetation density metric will be used to assess CDPHE final stabilization – the CDPHE requirement for final stabilization is that all areas of ground disturbing activities, where a uniform vegetative cover has been established, have an individual plant density of perennial species of at least 70 percent of pre-disturbance levels.

Pre-disturbance vegetation identification/analysis and photo series can be found in Appendix A.

5. Reference Area

The reference area chosen for the subject project is east and directly adjacent to the proposed location. The area directly east of the pad matches the subject location in terms soils map units (same single soils map units as on the proposed location – Olney fine sandy loam), and has a similar vegetation assessment (vegetation community, density, and coverage), with negligible differences.

6. Known Weed Infestations

No plants from Colorado's A, B, or C lists were found onsite.

7. Gathering Lines Reclamation

Flowlines or utility corridors within the interim reclamation areas on the interim reclamation map (Appendix A) will be reclaimed during the interim reclamation phase. All wells will be located on the same working surface as the tank battery so there will be no flowline corridors off location. On-pad reclamation for pipeline/utility corridors will likely include reapplying road base to armor these areas, and rebuilding perimeter BMPs (ditch/berm) after tie-in. Any midstream tie-in work will be unassociated to the subject project and off-pad permitting and reclamation will be managed by the 3rd party responsible for the construction.

8. Access Road Reclamation

The access road will remain for the long-term life of the oil and gas location. No portions of the access road will be reclaimed during interim reclamation.

9. Removal of Drilling, Re-entry, Completions Equipment, & Associated Debris and Waste Materials

Mallard will ensure the appropriate management, storage, transportation, and disposal requirements for non-E&P wastes are performed in accordance with State and Federal regulations. Non-E&P wastes anticipated to be generated onsite include used oil and TENORM scale and sludge. If used oil is being disposed of or exhibits hazardous characteristics, it will be managed as a hazardous waste. Used oil will be stored in a closed container, that is in good condition, and does not leak, or stored in a tank designated as a used oil container. Lids, funnels, and bungs will be kept closed when not adding used oil. Used oil containers will be stored inside containment pending disposal if disposal is not completed on the same day it is collected. TENORM scale and sludge will be kept in sealed DOT-rated containers. Containers will be closed when not adding waste. TENORM scale and sludge will be stored in containers in a secure area. TENORM pipe should be marked and kept in a separate area to prevent cross contamination and wrapped or stored in a closed container to prevent loose scale from contacting soil or contact with rain or snow. TENORM wastes will be disposed of at permitted disposal facilities that can accept wastes with low level radiation and possible hydrocarbon content.

Debris and other non-E&P wastes such as concrete, sack bentonite or other drilling mud additives, sand, plastic, pipe and cable will be removed as generated while cellars, rat holes, and other boreholes unnecessary for further lease operations will be backfilled.

10. Management of Waste Material

In compliance with Weld County Ordinance Sec. 21-5-450, COGCC Rules 905 and 1000 Series Reclamation Regulations, and the Drill Cuttings Management Policy (9/15/14), the following describes Mallard Exploration's (Mallard) general plan for handling and disposing of Exploration & Production (E&P) wastes.

Mallard does not anticipate conducting any on-site disposal or use land-application for waste management. All wastes generated on location will be disposed of at a permitted commercial waste facility. Each individual waste stream hauled off location will be accompanied with an approved waste

profile and manifest detailing waste characteristics and volume. The waste profiles are established using knowledge of process.

10.1. Waste Stream Volumes, Frequency, and Storage

The following table lists the anticipated waste streams generated on a per well basis. Volumes and frequencies are estimates based on Mallard's development of wells in the area.

Waste Stream	Est. Volume	Storage Method	Treatment Method	Disposal Frequency	Waste Disposal Location*	Duration of Waste Stream (days/well)	Phase
Surface Cuttings	150 tons/well	High Wall Containment		6 Loads/day	Commercial Solids Disposal - Pawnee	1	Drilling
Production Cuttings	700 tons/well	High Wall Containment		7 Loads/day	Commercial Solids Disposal - Pawnee	4	Drilling
Drilling Fluids	140 bbls/well	Storage Tanks		Recycled	N/A	4	Drilling
General Trash	40 yards/weekly	Roll Off Dumpster		1 dumpster / week	Commercial Landfill - Waste Management	92	Drilling & Completions
Drill Out Frac Sand	50 tons/well	High Wall Containment		1 Loads/day	Commercial Solids Disposal - Pawnee	2	Completions
Drill Out Water	1000 bbls/well	Closed Loop Frac Tanks	Biocide	3 Loads/day	Commercial Liquids Disposal - NGL C9	2	Completions
Flowback Water - 30 Days	1500 bbls/day	Sealed Tanks		Pipeline	Commercial Liquids Disposal - NGL C9	30	Completions
Flowback Sand - 30 Days	1 bbl/day	Sealed Frac Tank		Monthly	Commercial Solids Disposal - Pawnee	30	Completions
Produced Water - 6 Months	700 bbls/day	Sealed Tanks		Pipeline	Commercial Liquids Disposal - NGL C9	180	Production
Produced Water - Life of Well	50 bbls/day	Sealed Tanks		Pipeline	Commercial Liquids Disposal - NGL C9	Life of Well	Production
Tank Bottoms	5 bbls/month	Sump Tank		1 / month	Commercial Liquids Disposal - NGL C9	Life of Well	Production
Oily Soils	Varies	Trucked off-location	Characterized, removed, and disposed of		Commercial Solids Disposal - Pawnee	Life of Well	Production

10.2. Waste Disposal Locations

Mallard has active waste profiles with the following facilities:

<u>Commercial Solids Disposal</u>
Pawnee Waste, LLC
47368 County Road 118, Grover, CO 80729
(970) 889-0006

Commercial Liquids Disposal
NGL Energy Partners C9
57610 County Road 95, Grover, CO 80729
API #05-123-40194

Commercial Landfill
Waste Management North Weld Landfill
40000 Weld County Road 25, Ault CO 80610
970-686-2800

10.3. Waste Minimization, Reuse, and Recycling

Waste minimization efforts are pursued where economically feasible. Prevention of waste generation is the first step and is the best management practice is to avoid creating waste. The following waste prevention techniques shall be utilized whenever possible:

- Completely empty one container before opening another of the same product.
- Segregate waste and recyclables at the source.
- Require contractors to take unused products with them for use at the next applicable project.

Drilling fluids are anticipated to be re-mixed and re-used on location during drilling operations. Upon completion of drilling operations, the drilling fluid is returned to the provider for re-use on the next project.

At this time Mallard does not anticipate using recycled or reused water due to constraints in the scheduling and availability. If available, a small amount of recycled or reused water could be used during the drilling and completion phases. If opportunities for reuse and recycling of water become practicable, a reuse and recycling plan will be submitted as described in Rule 905.a.(3).

10.4. Best Management Practices

- Wastes stored onsite will be stored in compatible containers that are regularly inspected to ensure they are in good condition and free of excessive wear, structural issues or other defects that may impact effectiveness.
- All drill cuttings generated during drilling operations are transported offsite with proper manifesting for disposal at facilities properly permitted to receive E&P waste.
- Drilling fluids will be stored on site and recycled for use in future drilling operations.
- Advanced oil-based mud systems which target the reduction of aromatics will be utilized
- A temporary impermeable synthetic or geosynthetic liner with foam type berms will be utilized under the drilling rig, mud tanks, shakers, and drill cuttings bins. A liner will also be used under completions equipment.

- Produced water is disposed of at an offsite location via a permitted UIC well designed specifically for produced water disposal.
- Trash or other waste materials will not be buried or burned on location.
- All surface trash, debris, and material not intrinsic to the operation of the facility will be stored in a roll off dumpster and disposed of at a commercial solid waste facility.
- Trash receptacles (roll off dumpster) will be designed, maintained, and operated to exclude wildlife, and to protect public safety, the environment, and wildlife from exposure to overflowing, leak prone, or insecure trash receptacles.
- Unforeseen wastes not listed in the Waste Stream table will be stored and disposed of in accordance with all regulations applicable to the specific waste.

10.5. Haul Routes

Liquid and solid waste hauls will exit the location heading north and continue east onto Highway 14, turn north on Weld County Road 105, turn northwest onto Weld County Road 390, turn east on Weld County Road 112, and then north onto Weld County Road 95 to the NGL C9 commercial liquids disposal facility, or, proceeding past that facility and turning east on Weld County Road 118 and continuing to the Pawnee Waste commercial solids disposal facility.

10.6. Record Keeping and Documentation

Prior to transporting of the waste, Mallard will ensure that a waste profile is on file with the disposal company, or will, characterize the waste for profiling. When the waste is sent for disposal, the waste will be identified on the waste shipping manifest. Any associated sampling data and/or SDS information will be kept with the waste profile documentation.

- Records of waste characterization profiles with supporting documentation, disposal manifests, and transportation documents shall be maintained by Mallard. Records may be retained as a hard copy or as an electronic copy. Record will be maintained for no less than five years.

11. Identification of Interim Reclamation Areas no Longer in Use

Areas that are to be reclaimed during interim reclamation are shown in the interim reclamation construction layout drawing in Appendix A. Initial total construction disturbance is 11.3 acres. After interim reclamation is complete, the final interim pad disturbance area is 7.5 acres.

Areas that will not be reclaimed and that will remain as a permeant working surface are immediately around wellhead equipment, production tanks, separation equipment, air pollution control and treatment equipment, meter/monitoring stations, LACT units, and any other equipment needed to operate the Shelduck South production facility. All areas needed for ongoing operations will be armored and stabilized for the long-term life of the facility. The permeant working surface can be seen on the interim reclamation construction layout drawing in Appendix A.

12. Compaction Alleviation

Compacted soils and areas of the location impacted by construction that are to be reclaimed will be ripped to a minimum depth of 18 inches prior to topsoil replacement. Decompaction will be performed by a

ripper capable of fracturing the soil and ensuring soil layers are not mixed. Decompaction will occur when the soil moisture at the time of ripping is below 35% of field capacity.

13. Recontouring

Working in conjunction with the site-specific storm water plan, Mallard will complete interim reclamation by reestablishing all topography and contours on the reclaimed area to their pre-disturbance conditions after all soil horizons that were removed from the area are replaced to their original relative positions.

Mallard will document the existing topography, natural drainages, and contours at the site prior to disturbance, and will return the reclaimed areas to preexisting conditions during interim reclamation.

14. Re-establish & Stabilize Drainage Features

During active construction, best management Practices (BMPs) will be installed around the disturbance perimeter to prevent soil erosion, subsidence/slumping, and instability. Control measures and BMPs will be installed at the beginning of the construction phase and remain intact until interim reclamation phase in some cases. During active construction, the Shelduck South pad will implement a perimeter ditch/berm system with a sediment basin located in the downgradient corner to the northeast. To prevent onsite erosion, the working surface of the pad will be stabilized with road base and the top soil pile will be stabilized with surface roughening and/or tackifier or hydroseeding, as needed. During the interim reclamation phase, the working surface of the pad will maintain road base as armoring/stabilization throughout the life of the pad. The remaining top soil pile/berm will be seeded/mulched if it has not yet already been. The pulled-back, reclaimed area will be immediately stabilized with mulch until vegetation growth accounts for permanent stabilization (after decompaction, top soil application, recontouring, and seeding).

15. Re-establish Desired Self-Perpetuating Plant Community

Mallard will be using a Colorado Parks and Wildlife (CPW) – recommended pronghorn seed mix at the Shelduck South pad. Utilizing the Habitat Seeding Calculator, Mallard has designed an optimum seeding methodology during reclamation at the Shelduck South pad. The seed mix and application rates can be found in Appendix C.

16. Seedbed Preparation & Seeding

After decompaction, topsoil application, and recontouring, the top 3-4 inches of soil will be prepared for seed application using a disk and/or a mulcher as needed. Straw mulch will be applied and crimped to topsoil adding further stabilization and increasing moisture retention. Seedbed will be void of earthen clods and firm enough to keep seed from being applied to deeply. Soil samples can be collected and analyzed as needed to identify any amendments needed. Compost and fertilizer can be applied as needed.

Seed application will be performed using a drill seeder. Seeding will occur during interim reclamation – after compaction alleviation, topsoil application, recontouring, and seedbed preparation, and will be conducted during the first favorable window following pull-back/interim reclamation dirt work.

17. Fencing

Mallard will use CPW-recommended fence designs (three or four strand with the top strand height maximum of approximately 42-inches, and a lower smooth strand without barbs at a height of approximately 18-inches) when consistent with the surface owner's approval and any relevant local government requirements. The entire pad will be fenced initially during active construction. The fence will be pulled-in to surround only the reclamation area during interim reclamation activities.

18. Management of Invasive Plants

The location will be inspected for weed infested areas and prompt action consisting of spraying and/or mowing, where appropriate, will be taken to mitigate any identified infested areas. All noxious weeds identified will not be allowed to reach the flowering or seed dispersal stage. Vehicles will not be allowed to drive through, and machinery will not be parked, within weed infested areas. Routine inspections throughout the life of the pad will aid in identifying when weed mitigation is needed.

19. Proposed Interim Reclamation Drawing

The interim reclamation construction layout drawing is included in Appendix A.

20. Reclamation Monitoring, Inspection, Maintenance, & Reporting

20.1. Frequency

Active Construction Inspections: site inspections shall start within 7 calendar days of the commencement of construction activities at a new site. Inspections will then be conducted either, at least every 7 calendar days, or, at least every 14 calendar days and after precipitation and melting-events that cause surface erosion.

Non-Cropland Sites – Inactive/30-Day Inspections: at sites that are not located in cropland, once all ground disturbing activities have been completed and the location has been pulled-back and has been seeded/mulched (or is awaiting seeding/mulch), and all final stabilization measures have been implemented, the inspection frequency will be reduced to the 30-day/inactive frequency. Inspections will proceed until the site has met CDPHE final stabilization criteria, at which point it will move into the COGCC post-construction stormwater program.

Post-Construction Locations: when a location moves into the COGCC post-construction stormwater program, the location will be assessed against the COGCC Tier 1 criteria to determine COGCC Tier 1 exemption applicability. If the location is not Tier 1-exempted, risk-based criteria will be used to determine post-construction stormwater inspection frequencies (annual, bi-annual, quarterly), which will be conducted until final reclamation, or until conditions change to allow a transition to being Tier 1-exempted.

20.2. Inspection Scope

At a minimum, the following will be inspected for adequate protection of stormwater and compliance:

- Construction site perimeter

- All disturbed areas
- Designated haul routes
- Material and waste storage areas
- Discharge or potential discharge locations
- Vehicle access locations
- All BMPs

Inspection requirements:

- Visually verify whether all implemented control measures are in effective operational condition and are working as designed in their specifications to minimize pollutant discharges.
- Determine if there are new potential sources of pollutants.
- Assess the adequacy of control measures at the site to identify areas requiring new or modified control measures to minimize pollutant discharges.
- Identify all areas of non-compliance with the permit requirements and, if necessary, implement corrective action(s) in accordance with the general permit (Part I.B.1.c.).

At a minimum, the following information is recorded with each inspection:

- Inspection date
- Names and titles of personnel conducting the inspection
  - Inspector needs to be a Qualified Stormwater Manager (see Section 6.5)
- Weather
- Phase of construction
- Estimate acreage of disturbance
- Location(s) and identification of control measures requiring routine maintenance
- Location(s) and identification of discharges of sediment or other pollutants from the site
- Location(s) and identification of inadequate control measures
- Location(s) and identification of additional control measures needed that were not in place at the time of inspection
- Description of corrective action(s) for previous three items above, dates corrective action(s) were completed, including requisite changes to the SWMP, as necessary
- Description of minimum inspection frequency
- Deviations from inspection schedule
- After adequate corrective action(s) and maintenance have been taken, or where a report does not identify any incidents requiring corrective action or maintenance, the report shall contain the following statement, to be signed by the Qualified Stormwater Manager (QSM):

  I verify that, to the best of my knowledge and belief, all corrective action and maintenance items identified during the inspection are complete, and the site is currently in compliance with the permit.

20.3. Maintenance Procedures for BMPs

The operator is responsible for implementing control measures (inclusive of seeding/mulching and weed mitigation) and performing routine maintenance, as needed, to in ensure BMPs are in effective operating

condition. BMPs requiring maintenance are identified in inspection reports and are addressed in the field as soon as practicable.

21. Interim Reclamation Completion Notice

Interim reclamation of all disturbed areas no longer in use shall be considered complete when all ground surface disturbing activities at the site have been completed, and all disturbed areas have been either built on, compacted, covered, paved, or otherwise stabilized in such a way as to minimize erosion to the extent practicable, or a uniform vegetative cover has been established that reflects pre-disturbance or reference area forbs, shrubs, and grasses with total percent plant cover of at least eighty percent (80%) of pre-disturbance levels or reference areas, excluding noxious weeds.

Once interim reclamation is achieved, a vegetation coverage assessment is conducted to confirm and document successful reclamation. When a vegetation coverage assessment confirms that the requirements have been met, photos are collected to document interim reclamation completion. Four photos are taken from the pad reclamation during the growing season facing each cardinal direction, and one photo is taken to document the vegetation in an undisturbed/reference area adjacent to the pad. Each photograph is identified by date taken, well name or location number (for Weld County – location name), GPS coordinates, and direction of view. A COGCC Form 4 Sundry Notice is then submitted to document interim reclamation completion, accompanied by the requisite photos documenting the reclamation and vegetation analysis. The Form 4 submission will also outline a description of the reclamation procedures, associated mitigation measures, changes to final land use, and the total cover of live perennial vegetation to evaluate the success of interim reclamation.

Weld County Code Sec. 21-5-555 requires the operator to also notify Weld County via the 1041 WOGLA Sundry Form to document interim reclamation completion, with the same requirements and procedures as the COGCC.

22. Site-Specific Interim Reclamation BMPs

The following is a list of site-specific BMPs related to Mallard's interim reclamation approach at the Shelduck South location, for areas that will be reclaimed (the reclamation), and not used for continuing oil and gas operations (the working interim pad):

- Culvert – culverts are a means of subsurface storm water conveyance where surface transport is not feasible. Culverts will be used under the access road at the entrance to the pad to convey water through the perimeter ditch.
- Culvert protection - culvert protection may be required at the inlet (upstream side) of the culvert and/or the outlet (downstream side) of the culvert located at the entrance to the pad.
- Fencing – Mallard is using CPW-recommended fence designs (three or four strand with the top strand height maximum of approximately 42-inches, and a lower smooth strand without barbs at a height of approximately 18-inches) when consistent with the surface owner's approval and any relevant local government requirements. The entire pad will be fenced initially during active construction. The fence will be pulled-in to surround only the reclamation area during interim reclamation activities.

- Mulching – mulching will be used in conjunction with seeding on areas that will be reclaimed during interim reclamation. The entire pulled-back area surrounding the interim pad will be seeded and mulched during the interim reclamation phase of construction.
- Riprap – riprap will be used to establish a stabilized outlet on the sediment trap/basin located on the eastern edge of the pad.
- Sediment trap/basin – a sediment trap/basin will be implemented on the eastern edge of the pad disturbance to temporarily pond and capture eroded soil transported in storm water runoff and allow sediment to fall out of suspension prior to discharge.
- Seeding – seeding will be used in conjunction with mulching on areas that will be reclaimed during interim reclamation. The entire pulled-back area surrounding the interim pad will be seeded and mulched during the interim reclamation phase of construction. Mallard will be using a Colorado Parks and Wildlife (CPW) – recommended pronghorn seed mix at the Shelduck South pad. Utilizing the Habitat Seeding Calculator, Mallard has designed an optimum seeding methodology during reclamation at the Shelduck South pad. The seed mix and application rates can be found in Appendix C.
- Surface armor – surface armor will be applied as a stabilization measure to the working surface of the location throughout the life of the pad.
- Weed control – the location will be inspected for weed infested areas and prompt action consisting of spraying and/or mowing, where appropriate, will be taken to mitigate any identified infested areas. All noxious weeds identified will not be allowed to reach the flowering or seed dispersal stage. Vehicles will not be allowed to drive through, and machinery will not be parked, within weed infested areas. Routine inspections throughout the life of the pad will aid in identifying when weed mitigation is needed.

Appendix A

Stormwater Management Plan Maps:

- Initial Construction SWMP Overview Map
- Initial Construction SWMP Site Map
- Interim Reclamation Map
- Soils & Erosion Maps
- Pre-Disturbance Land Use Map
- Pre-Disturbance Vegetation Identification/Analysis and Photo Series

MALLARD EXPLORATION

Stormwater Management Plan Overview Map

Shelduck South

N W E S

0 1,100 2,200

Feet

Scale: 1:10,000

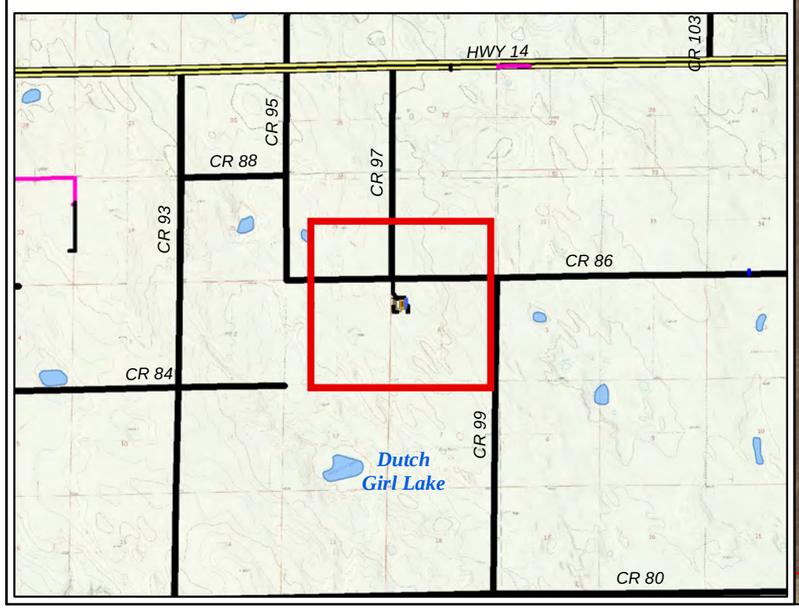
Prepared by:

Editor: nwilson

Date: 6/14/2021

File: Mallard_PreConstr_Overview_V1

- Construction Boundary
- Equipment
- Disturbance
- Pad Drilling (Road Base)
- Pad Drillling
- Sediment Trap
- Topsoil
- Trackpad
- Access Road
- County/Local Road
- Highway
- Waterbody
- Waterway



MALLARD EXPLORATION

Stormwater Management Construction Plan Site Map

Shelduck South

Prepared by:

N W E S

0 120 240

Feet

Editor: nwilson

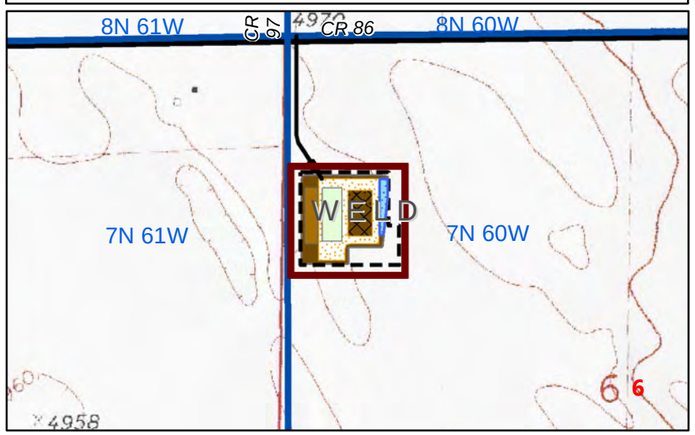
File: Mallard_Construction_V4

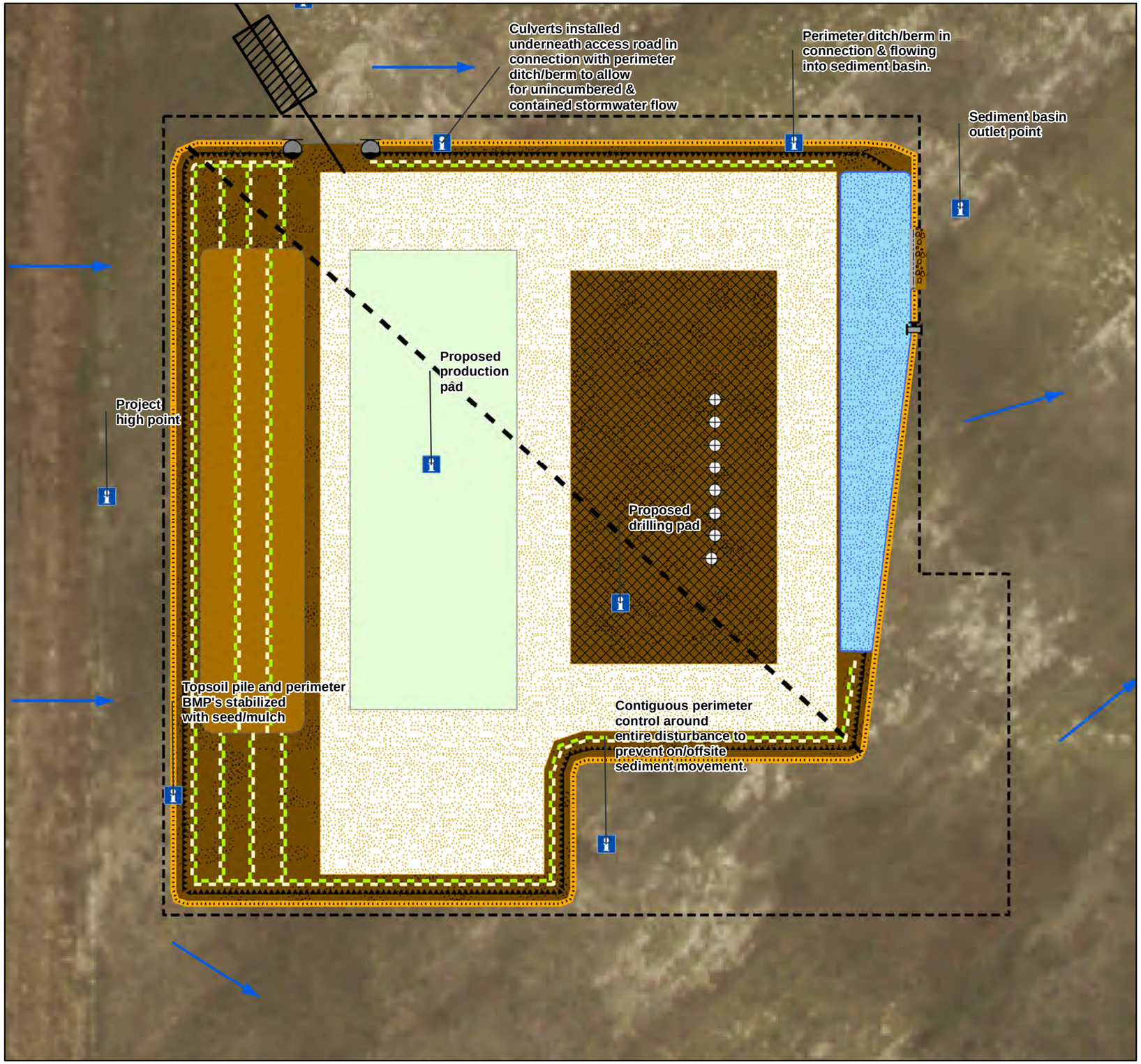
Scale:1:1,100

Date: 6/14/2021

- Wells
- Information
- Slope Drain
- Culvert w/Armor
- Erosion Control Blanket
- Surface Tack/Hydroseed
- Diversion Ditch
- Earthen Berm
- Riprap
- Cut/Fill
- Flow
- Construction Boundary
- Equipment
- Disturbance
- Pad Drilling (Road Base)
- Pad Drillling
- Sediment Trap
- Topsoil
- Trackpad
- Access Road

Note: Only disturbance boundary is to scale, all other diagram features are for representative purposes only.





MALLARD EXPLORATION

Stormwater Management Construction Plan Site Map

Shelduck South

Prepared by:

N W E S

0 180 360

Feet

Editor: nwilson

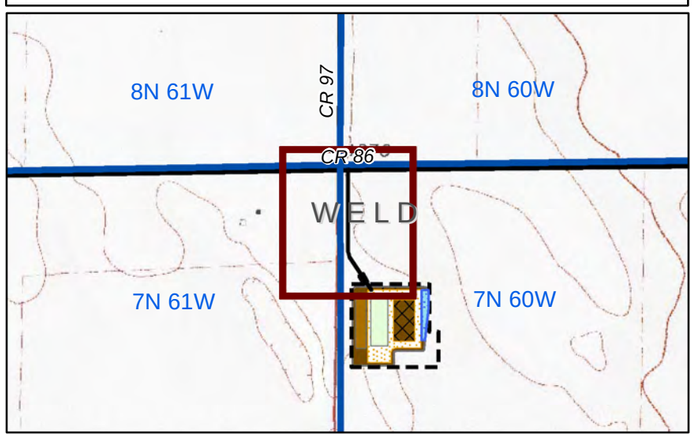
File: Mallard_Construction_V4

Scale:1:1,600

Date: 6/14/2021

- Wells
- Information
- Culvert w/Armor
- Erosion Control Blanket
- Surface Tack/Hydroseed
- Diversion Ditch
- Earthen Berm
- Riprap
- Cut/Fill
- Flow
- Construction Boundary
- Equipment
- Disturbance
- Pad Drilling (Road Base)
- Pad Drillling
- Sediment Trap
- Topsoil
- Trackpad
- Access Road
- Weld Local

Note: Only disturbance boundary is to scale, all other diagram features are for representative purposes only.



MALLARD EXPLORATION

Stormwater Management
Interim Reclamation Plan Site Map

Shelduck South

Prepared by:

N W E S

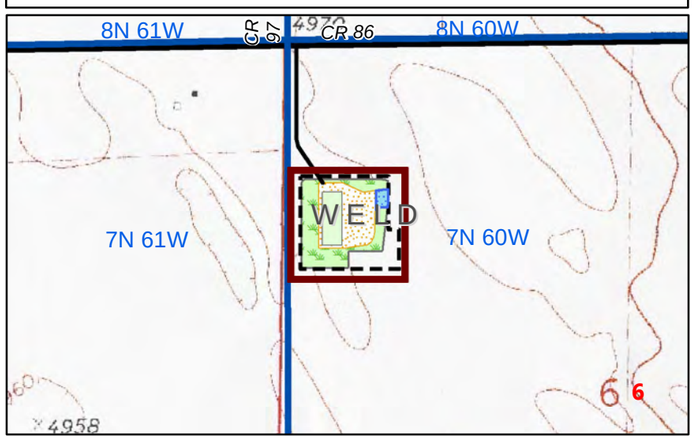
0 120 240
Feet

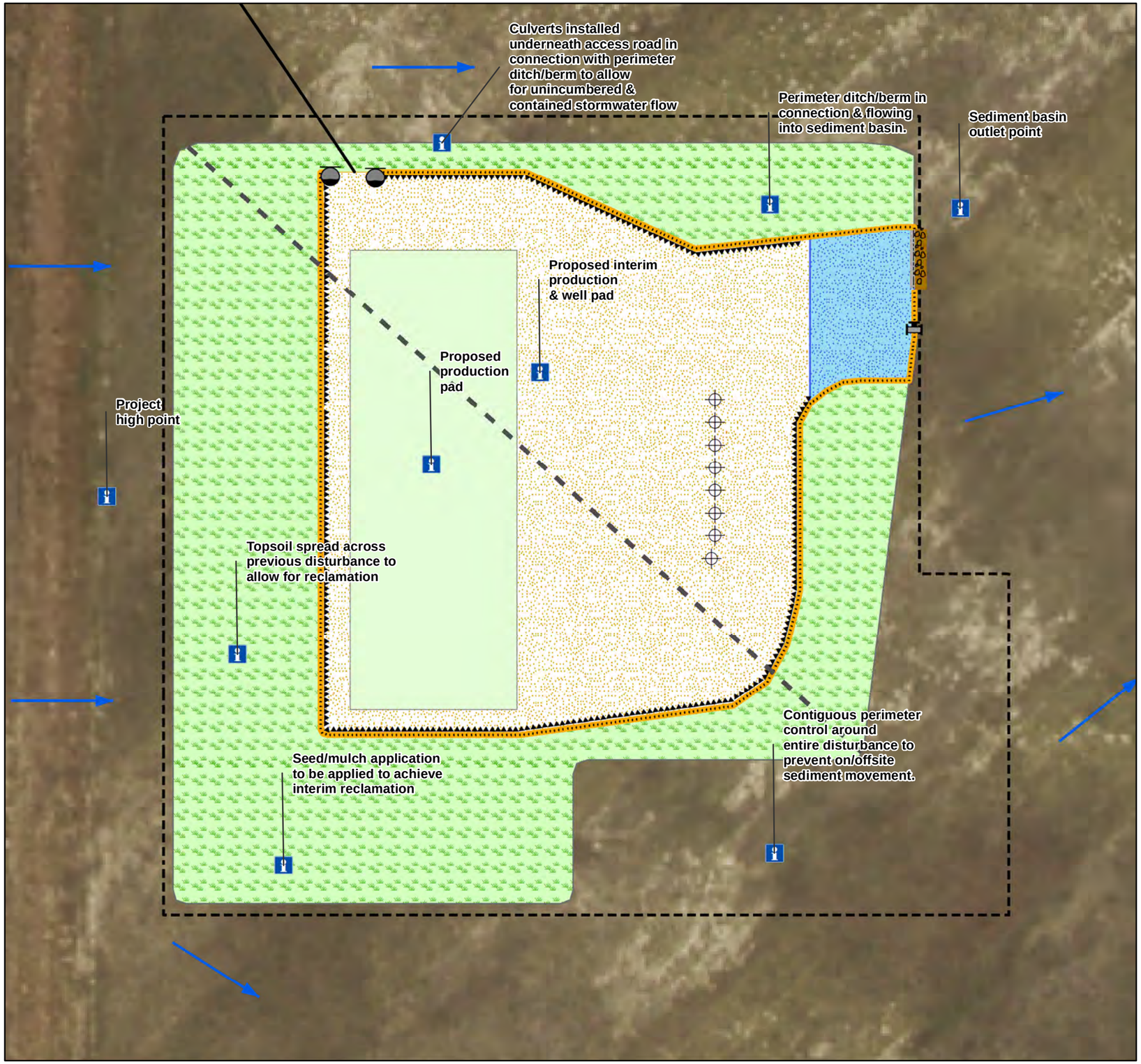
Editor: nwilson
File: Mallard_Construction_Interim_V1

Scale:1:1,100
Date: 6/14/2021

- Wells
- Information
- Slope Drain
- Culvert w/Armor
- Erosion Control Blanket
- Diversion Ditch
- Earthen Berm
- Riprap
- Cut/Fill
- Flow
- Construction Boundary
- Equipment
- Pad Interim (Road Base)
- Reclaimed
- Sediment Trap
- Access Road

Note: Only disturbance boundary is to scale, all other diagram features are for representative purposes only.





MALLARD EXPLORATION

Stormwater Management
Interim Reclamation Plan Site Map

Shelduck South

Prepared by:

N W E S

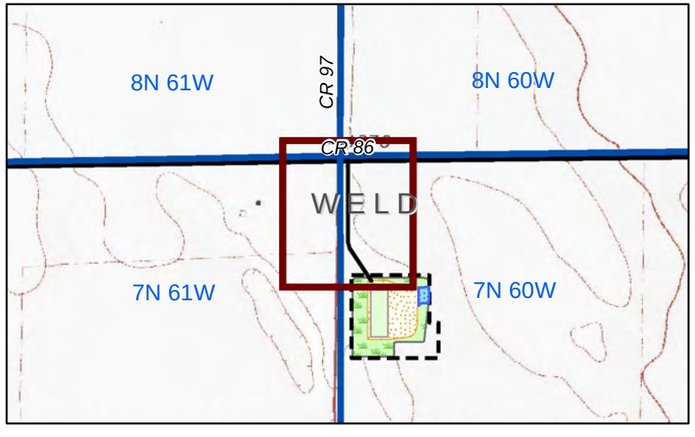
0 180 360
Feet

Editor: nwilson
File: Mallard_Construction_Interim_V1

Scale:1:1,600
Date: 6/14/2021

- Wells
- Information
- Culvert w/Armor
- Erosion Control Blanket
- Diversion Ditch
- Earthen Berm
- Riprap
- Cut/Fill
- Flow
- Construction Boundary
- Equipment
- Pad Interim (Road Base)
- Reclaimed
- Sediment Trap
- Access Road
- Weld Local

Note: Only disturbance boundary is to scale, all other diagram features are for representative purposes only.



MALLARD EXPLORATION

Stormwater Management Plan
Soils Map

Shelduck South

N W E S

Date: 6/7/2021

0 0.2 0.4

Miles

1:12,000

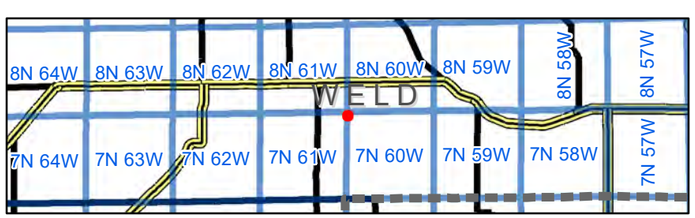
Prepared by:

Map Unit Name:

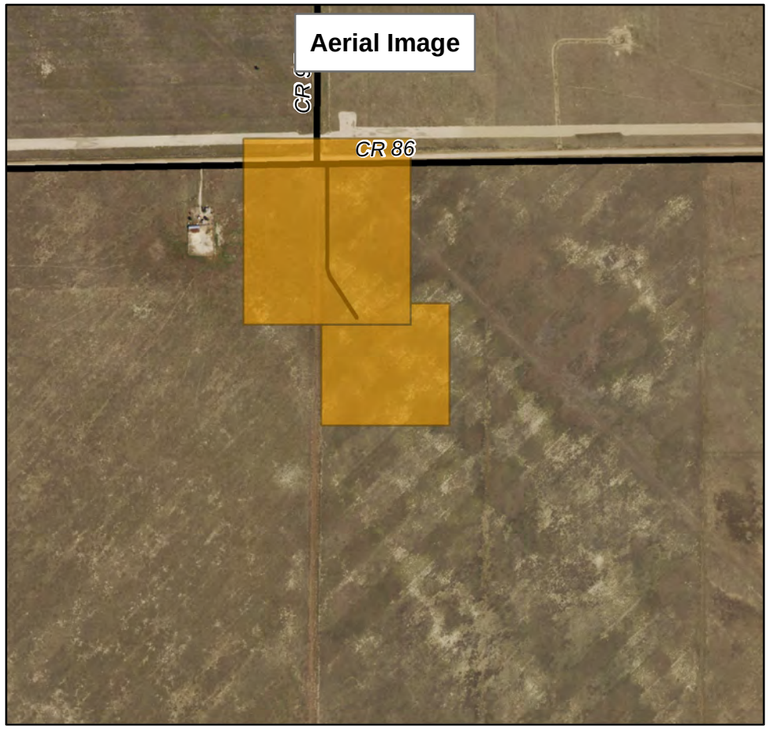
- ***AREA OF POTENTIAL IMPACT***
- Nunn loam, 0 to 6 percent slopes | 95133
- Olney fine sandy loam, 0 to 6 percent slopes | 95137
- Olney fine sandy loam, 6 to 9 percent slopes | 95138
- Vona sandy loam, 3 to 9 percent slopes | 95170

K Factor Value Groupings (Approximate):

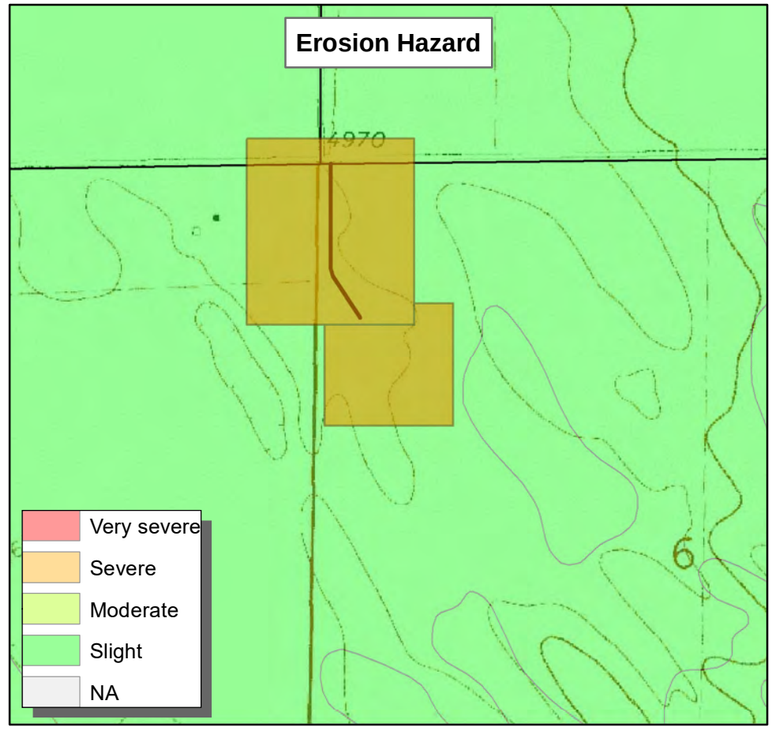
Low susceptibility to erosion/runoff: ≤ 0.2
Moderate susceptibility to erosion/runoff: > 0.2 - 0.4
High susceptibility to erosion/runoff: > 0.4

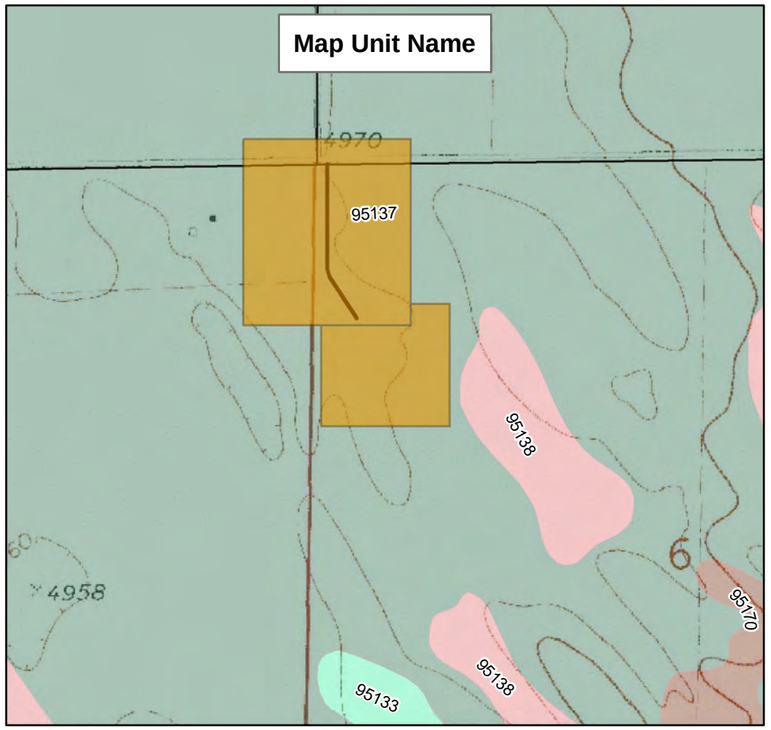


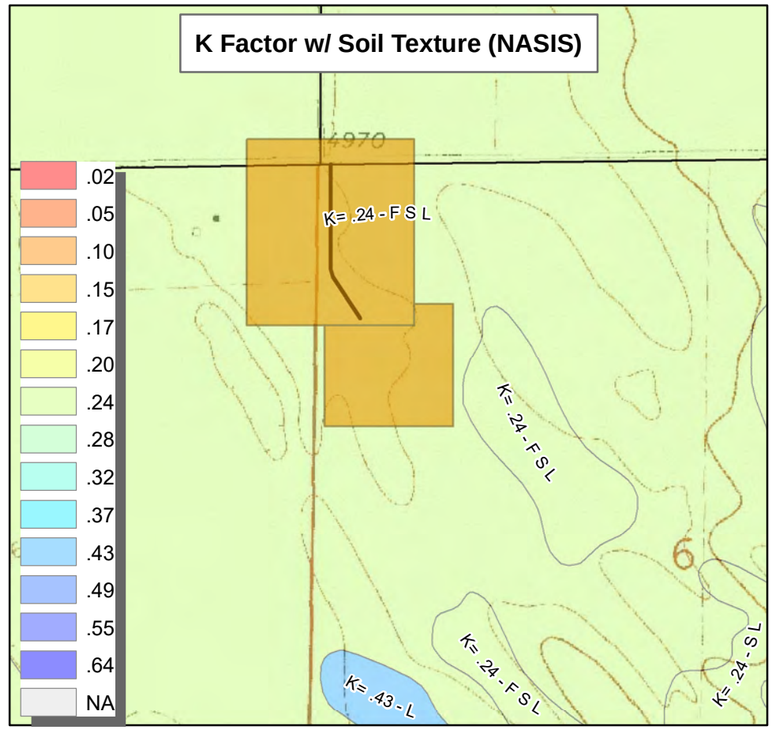
Document Name: Mallard_Soils_V2 User Name: nwilson



All data is from the NRCS soil surveys and is useful for overview purposes only. Onsite verifications are required to confirm accuracy when used for planning.







MALLARD EXPLORATION

Stormwater Management Plan Land Use Map

Shelduck South

N W E S

0 435 870

Feet

Scale: 1:3,890

Prepared by:

Editor: nwilson

Date: 6/14/2021

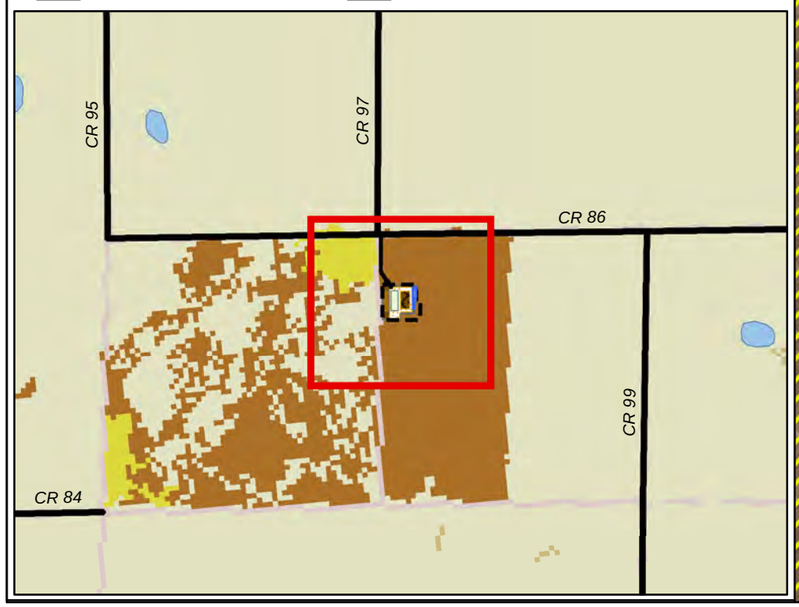
File: Mallard_Land_Use_V1

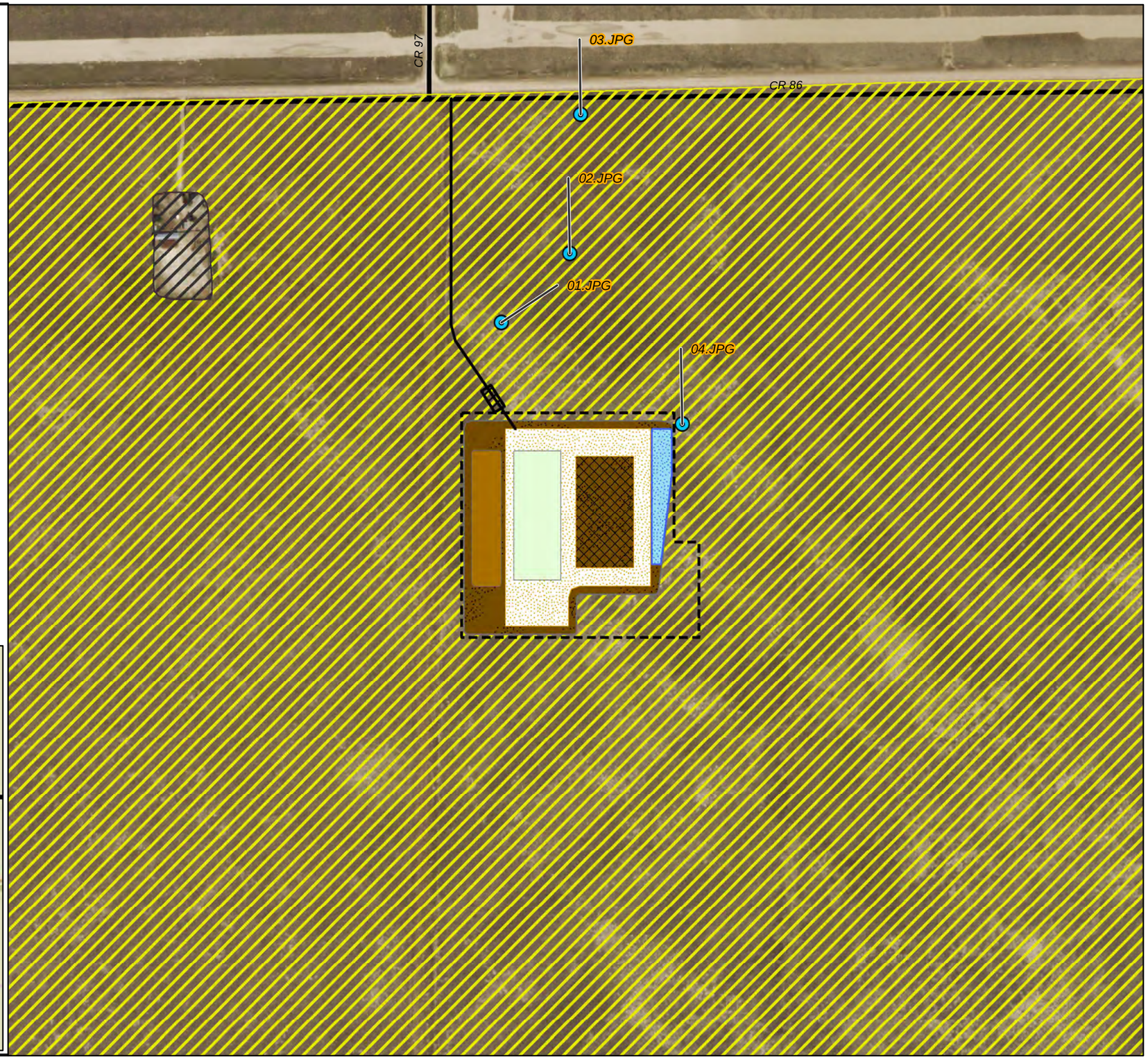
Main Map (H2E Gathered Data)

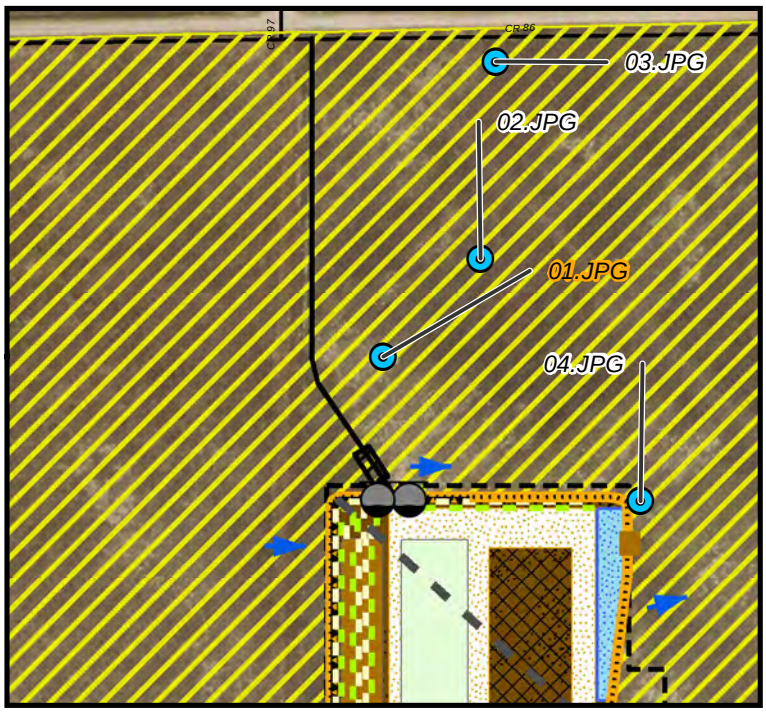
- Photo Point
- Disturbed Grassland
- Industrial
- Construction Boundary
- Equipment
- Disturbance
- Pad Drilling (Road Base)
- Pad Drillling
- Sediment Trap
- Topsoil
- Trackpad
- Access Road
- County/Local Road

Inset Map (National Land Cover Data)

- Barren Land
- Cultivated Crops
- Deciduous Forest
- Developed, High Intensity
- Developed, Low Intensity
- Developed, Medium Intensity
- Developed, Open Space
- Emergent Herbaceuous Wetlands
- Evergreen Forest
- Hay/Pasture
- Herbaceuous
- Mixed Forest
- Open Water
- Perennial Snow/Ice
- Shrub/Scrub
- Woody Wetlands







MALLARD EXPLORATION

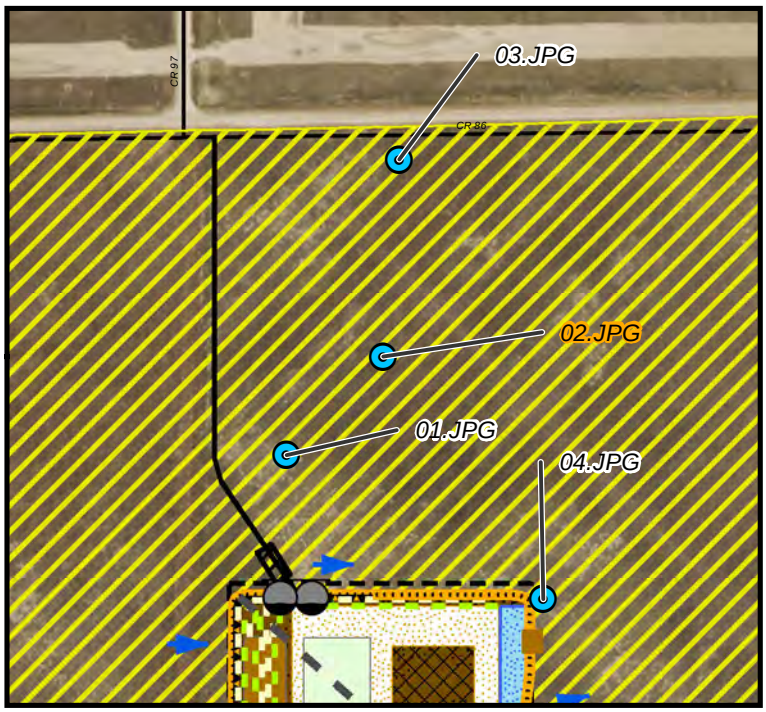
Stormwater Management Plan Map

01.JPG Shelduck South

D_WGS_1984: 40.6094 -104.144

- Photo Point
- Culvert w/Armor
- Cut/Fill
- Flow
- Surface Tack/Hydroseed
- Diversion Ditch
- Earthen Berm
- Riprap
- Access Road
- Construction Boundary
- Equipment
- Disturbance
- Pad Drilling (Road Base)
- Pad Drillling
- Sediment Trap
- Topsoil
- Trackpad
- Disturbed Grassland

Photo taken facing N towards CR #86, ~150' E of the proposed access road. Identifiable vegetation species found in the photo include deer grass and switchgrass.



MALLARD EXPLORATION

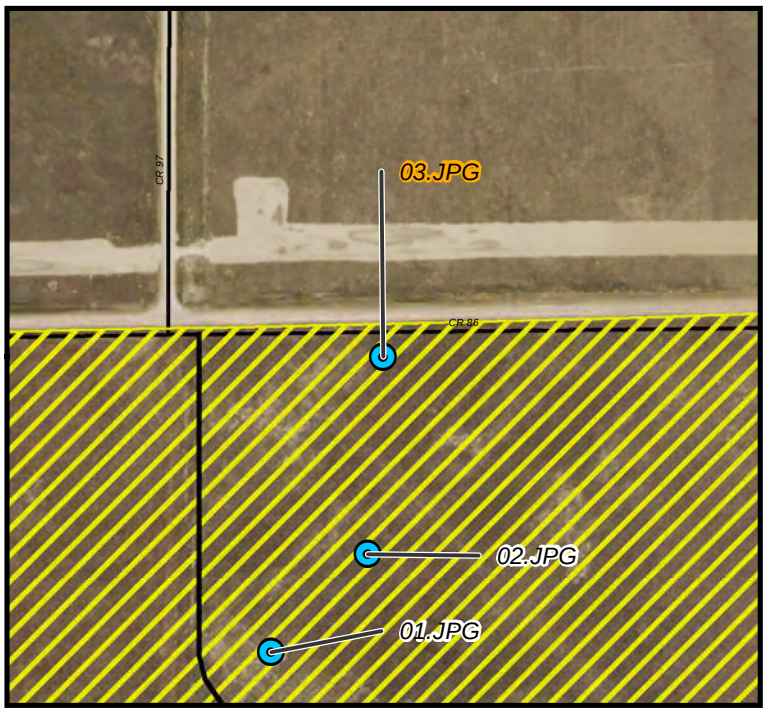
Stormwater Management Plan Map

02.JPG Shelduck South

D_WGS_1984: 40.60998 -104.1433

Photo Point	Earthen Berm	Pad Drilling (Road Base)
Culvert w/Armor	Riprap	Pad Drillling
Cut/Fill	Access Road	Sediment Trap
Flow	Construction Boundary	Topsoil
Surface Tack/Hydroseed	Equipment	Trackpad
Diversion Ditch	Disturbance	Disturbed Grassland

Photo taken facing E towards CR #99, N of the proposed facility. Identifiable vegetation species found in the photo include deer grass and switchgrass.



MALLARD EXPLORATION

Stormwater Management Plan Map

03.JPG Shelduck South

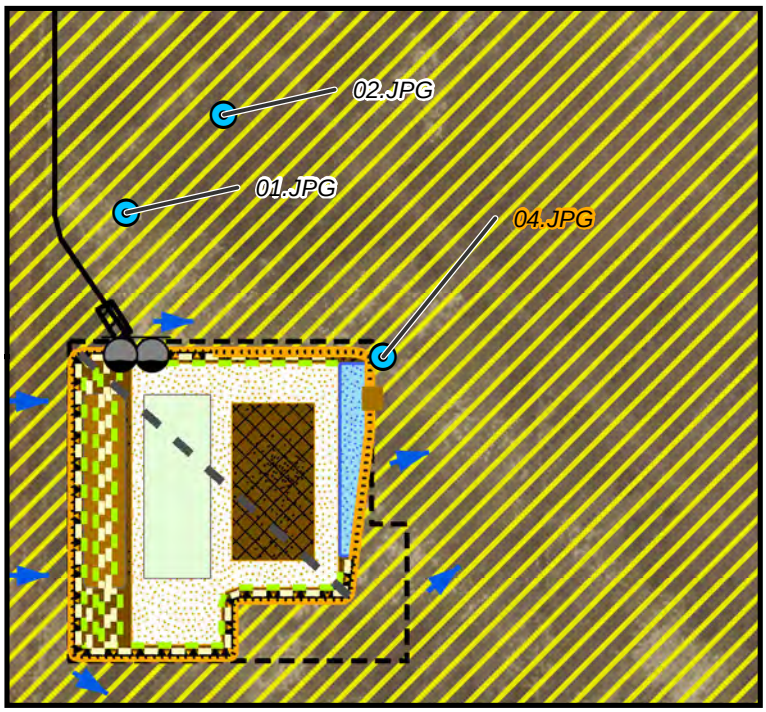
D_WGS_1984: 40.61116 -104.1431

Photo Point

Access Road

Disturbed Grassland

Photo taken facing S across the future disturbance area, ~50' S of CR #86. This photo provides an overview of the locations overall vegetational profile and land use. Identifiable vegetation species found in the photo include deer grass and switchgrass.



MALLARD EXPLORATION

Stormwater Management Plan Map

04.JPG Shelduck South

D_WGS_1984: 40.60852 -104.142

Photo Point	Earthen Berm	Pad Drilling (Road Base)
Culvert w/Armor	Riprap	Pad Drillling
Cut/Fill	Access Road	Sediment Trap
Flow	Construction Boundary	Topsoil
Surface Tack/Hydroseed	Equipment	Trackpad
Diversion Ditch	Disturbance	Disturbed Grassland

Photo taken facing W across the proposed facility towards the project's high point at the northeastern edge of the future sediment basin. The primary vegetation species found in the photo are switchgrass and deer grass.

Appendix B

Soils Reports

Weld County, Colorado, Northern Part

44—Olney fine sandy loam, 0 to 6 percent slopes

Map Unit Setting

National map unit symbol: 35zy
Elevation: 3,500 to 5,800 feet
Mean annual precipitation: 11 to 15 inches
Mean annual air temperature: 46 to 54 degrees F
Frost-free period: 125 to 175 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Olney and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Olney

Setting

Landform: Plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Calcareous loamy alluvium

Typical profile

H1 - 0 to 6 inches: fine sandy loam
H2 - 6 to 18 inches: sandy clay loam
H3 - 18 to 60 inches: sandy loam
H4 - 60 to 64 inches: sandy loam

Properties and qualities

Slope: 0 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4c
Hydrologic Soil Group: B
Ecological site: R067BY002CO - Loamy Plains

Hydric soil rating: No

Minor Components

Stoneham

Percent of map unit: 9 percent
Hydric soil rating: No

Ascalon

Percent of map unit: 6 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: Weld County, Colorado, Northern Part
Survey Area Data: Version 15, Jun 5, 2020

Appendix C

Seed Mix & Methodology

Appendix 1: CPW-NE Region Recommended Mitigation Seed Mix for Pronghorn

Instructions for the Habitat Seeding Calculator

Welcome to the Habitat Seeding Calculator. This tool allows for the design of specific rate, high diversity mixes for wildlife, pollinator and other conservation uses.
Begin designing your mix on the Pollinator Calculator tab. Enter your desired seeds/sqft at the top. Then choose your plant species in Column A. Enter your desired % of mix in Column F. Enter estimated price per PLS pound in Column I if you want a seedmix cost estimate calculated (not required for tool to function).
The Pollinator Calculator tab will automatically populate into the ECS-05 tab. Enter Landowner name, location and other information at the top of the ECS-05. **Please note that the ECS-05 by Seed Type (Bag) tab fills from Box G7/H7 on the ECS-05 tab, and thus must be entered correctly for that tab to function.**
Cultivars appropriate to eastern Colorado will automatically population on both the ECS-05 and ECS-05 by Seed Type (Bag) tabs.
On the ECS-05 tab, the plant list will automatically populate in the "Applied" section.
Once the Pollinator Calculator and ECS-05 tabs are filled out, the ECS-05 by Seed Type (Bag) tab will automatically populate all boxes. No additional entries are needed unless you want to edit comments in the "Requirements for Seed" section.
The ECS-05 is the official jobsheet and documentation for Colorado NRCS programs and technical assistance and must be in the project folders. The ECS-05 by Seed Type (Bag) tab can be given to landowners and seed dealers to clarify seedmix, bagging, and origin source requirements.

Pollinator Calculator

Desired Seeds/ft²	20

Species	Scientific Name	Bloom Time	Status (N/I)	Seed Rate	% Mix	Seeds/ft²	PLS/ AC	Cost/ PLS	Cost/ AC
Green needlegrass	Nassella viridula	0	N	4.81	5	1.00	0.24		0.00
Needleandthread	Hesperostipa comata	0	N	5.45	5	0.99	0.27		0.00
Sandberg bluegrass	Poa secunda	0	N	0.94	5	1.06	0.05		0.00
Indian ricegrass	Achnatherum hymenoides	0	N	6.22	5	1.00	0.31		0.00
Slim-leaf penstemon	Penstemon angustifolius	Early Mid	N	2.78	5	1.01	0.14		0.00
Alfalfa	Medicago sativa	Early Mid Late	I	3.96	5	1.01	0.20		0.00
Blanketflower	Gaillardia aristata	Mid Late	N	4.38	5	1.01	0.22		0.00
Dotted Gayfeather	Liatris punctata	Late	N	13.83	1	0.20	0.14		0.00
Blue flax	Linum perenne	Early Mid	I	2.95	5	1.02	0.15		0.00
Cicer milkvetch	Astragalus cicer	Early Mid Late	I	4.40	5	0.62	0.22		0.00
Tahoka Daisy	Machaeranthera Tanaceti	Early Mid Late	N	2.14	5	1.03	0.11		0.00
Pale evening primrose	Oenothera pallida	Early	N	1.34	5	1.04	0.07		0.00
Prairie Coneflower	Ratibida columnifera	Early Mid Late	N	0.97	5	1.03	0.05		0.00
Sainfoin	Onobrychis vicifolia	Early Mid Late	I	34.85	5	1.00	1.74		0.00
ocky Mountain Beepla	Cleome serrulata	Mid Late	N	13.61	5	1.00	0.68		0.00
Prickly poppy	Argemone polyanthemos	Early Mid Late	N	0.55	5	1.09	0.03		0.00
Purple prairie clover	Dalea purpurea purpurea	Mid Late	N	3.17	5	1.01	0.16		0.00
Rocky mtn. penstemon	Penstemon strictus	Early Mid	N	1.78	5	1.01	0.09		0.00
Small burnet	Sanguisorba minor	Early Mid	I	20.74	5	1.00	1.04		0.00
Scarlet globemallow	Sphaeralcea coccinea	Early Mid Late	N	1.74	5	1.03	0.09		0.00
Shrubs									
Winterfat	Krascheninnikovia lanata	Late	N	7.08	2	0.40	0.14		0.00
Fourwing Saltbush	Atriplex canescens	Late	N	19.80	2	0.40	0.40		0.00
Rubber rabbitbrush	Ericameria nauseosa	Late	N	2.18	2	0.37	0.04		0.00
Total					**102**	**20.33**	**6.58**		**0.00**

% Grass % Introduced

Notes:

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

Grass Seeding Planned and Applied Worksheet

Grass Seeding PART I - Planned

Cooperator	CPW recommended mitigation mix for pronghorn	Date	3/17/2021
Tract/Field No		Acres	1
Soil Survey Area		Map Unit (s)	
Contract No.		CIN	

Seeding dates	Nov 1 - May 1	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)	1/4" deep, 7-10" spacing		

	N	P_2O_5	K_2O
Planned fertilizer application (lb/ac)			

A Nutrient Management Plan is not required for the establishment of vegetative conservation practices.

Planned weed control activities	Description	Herbicide
	Date(s)	As needed prior to seeding

Attach WIN-PST Soil-Pesticide Interaction Risk Report for all chemical suppression activities

Planned residue cover or mulch	Type	Sorghum
	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					
Green needlegrass	N	*Nassella viridula*	Lodorm	5.0	0.24
Needleandthread	N	*Hesperostipa comata*		5.0	0.27
Sandberg bluegrass	N	*Poa secunda*		5.0	0.05
Indian ricegrass	N	*Achnatherum hymenoides*	Paloma	5.0	0.31
Slim-leaf penstemon	N	*Penstemon angustifolius*		5.0	0.14
Alfalfa	I	*Medicago sativa*	Ladak	5.0	0.20
Blanketflower	N	*Gaillardia aristata*		5.0	0.22
Dotted Gayfeather	N	*Liatris punctata*		1.0	0.14
Blue flax	I	*Linum perenne*	Appar	5.0	0.15
Cicer milkvetch	I	*Astragalus cicer*	Lutana, Monarch	5.0	0.22
Tahoka Daisy	N	*Machaeranthera Tanacetifolia*		5.0	0.11
Pale evening primrose	N	*Oenothera pallida*		5.0	0.07
Prairie Coneflower	N	*Ratibida columnifera*		5.0	0.05
Sainfoin	I	*Onobrychis vicifolia*	Shoshone	5.0	1.74
Rocky Mountain Beeplant	N	*Cleome serrulata*		5.0	0.68
Prickly poppy	N	*Argemone polyanthemos*		5.0	0.03
Purple prairie clover	N	*Dalea purpurea purpurea*	Kaneb	5.0	0.16
Rocky mtn. penstemon	N	*Penstemon strictus*	Bandera	5.0	0.09
Small burnet	I	*Sanguisorba minor*	Delar	5.0	1.04
Scarlet globemallow	N	*Sphaeralcea coccinea*		5.0	0.09
Shrubs					
Winterfat	N	*Krascheninnikovia lanata*		2.0	0.14
Fourwing Saltbush	N	*Atriplex canescens*		2.0	0.40
Rubber rabbitbrush	N	*Ericameria nauseosa*		2.0	0.04
				Total lbs PLS	6.58
				Seed Rate (lbs PLS/acre)	6.58

† 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 REQUIREMENTS

Seed **MUST** be sorted by size and type (e.g., large hard, small, fluffy). All seed must be USA or Canada origin, unless approved by NRCS before seed purchase.

Certified Planner _____ **Date**

Grass Seeding **PART II - Applied** (Seed tags must be attached)

Cooperator: /V recommended mitigation mix for prongh
Acres seeded:
Seedbed preparation:
Weed control:
Residue cover or mulch type:
Residue/mulch amount (lb/ac):

Seed rate:
Seeding date:
Suppression date(s):

Common name		Cultivar	Bulk pounds	% Germination	% Purity	% PLS	lb PLS
Grasses, forbs							
Green needlegrass	N					0.00	0.00
Needleandthread	N					0.00	0.00
Sandberg bluegrass	N					0.00	0.00
Indian ricegrass	N					0.00	0.00
Slim-leaf penstemon	N					0.00	0.00
Alfalfa	I					0.00	0.00
Blanketflower	N					0.00	0.00
Dotted Gayfeather	N					0.00	0.00
Blue flax	I					0.00	0.00
Cicer milkvetch	I					0.00	0.00
Tahoka Daisy	N					0.00	0.00
Pale evening primrose	N					0.00	0.00
Prairie Coneflower	N					0.00	0.00
Sainfoin	I					0.00	0.00
Rocky Mountain Beeplant	N					0.00	0.00
Prickly poppy	N					0.00	0.00
Purple prairie clover	N					0.00	0.00
Rocky mtn. penstemon						0.00	0.00
Small burnet						0.00	0.00
Rocky mtn. penstemon	N					0.00	0.00
Shrubs							
Winterfat	N					0.00	0.00
Fourwing Saltbush	N					0.00	0.00
Rubber rabbitbrush	N					0.00	0.00
						Total lbs PLS	0.00

Approved By

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

Seed Ordering and Mixing Sheet

Cooperator/Project Name: CPW recommended mitigation mix for pronghorn
Tract/Field No:
Date: 3/17/2021
Acres: 1

Requirements for Seed: All seed must be of USA or Canada origin. Seed must be mixed and bagged as shown below. Any substitutions for plant species or cultivars must be approved by NRCS. Bulk pounds for each species must be on the seed tag or provided on a separate sheet from the seed dealer.

Common Name	Genus, species	Cultivar	Pounds Pure Live Seed (PLS)
Fluffy Seeds (Bag 1):			
Blanketflower	Gaillardia aristata		0.22
Fourwing Saltbush	Atriplex canescens		0.40
Large Hard Seeds (Bag 2):			
Green needlegrass	Nassella viridula	Lodorm	0.24
Needleandthread	Hesperostipa comata		0.27
Indian ricegrass	Achnatherum hymenoides	Paloma	0.31
Slim-leaf penstemon	Penstemon angustifolius		0.14
Dotted Gayfeather	Liatris punctata		0.14
Tahoka Daisy	Machaeranthera Tanacetifolia		0.11
Sainfoin	Onobrychis vicifolia	Shoshone	1.74
Rocky Mountain Beeplant	Cleome serrulata		0.68
Small burnet	Sanguisorba minor	Delar	1.04
Winterfat	Krascheninnikovia lanata		0.14
Rubber rabbitbrush	Ericameria nauseosa		0.04
Small Hard Seeds (Bag 3):			
Sandberg bluegrass	Poa secunda		0.05
Alfalfa	Medicago sativa	Ladak	0.20
Blue flax	Linum perenne	Appar	0.15
Cicer milkvetch	Astragalus cicer	Lutana, Monarch	0.22
Pale evening primrose	Oenothera pallida		0.07
Prairie Coneflower	Ratibida columnifera		0.05
Prickly poppy	Argemone polyanthemos		0.03
Rocky mtn. penstemon	Penstemon strictus	Bandera	0.09
Scarlet globemallow	Sphaeralcea coccinea		0.09