

FINAL REPORT

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Bureau of Reclamation- Narrows Feasibility Study



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Table of Contents

| 1. | BACKGROUND | 1 |
|-----|--|--------|
| 2. | OBJECTIVES | 4 |
| 3. | TASK DISCUSSION | 4 |
| 3 | 3.1 Permitting | 5 6 |
| | 3.3.1 Soil Coring & Monitor Well Drilling | |
| | 3.3.2 Infiltration Testing | |
| | 3.3.3 Land Surveys | |
| 3 | 3.4 Framework for Water Agreements | 11 |
| 4. | PROJECT PLAN & CONCEPTUAL ENGINEERING DESIGNS | 12 |
| | 1.1 Existing Wetland Enhancements on the Akers & Kinnaman Tracts | |
| 5. | PROJECT DELIVERY | 22 |
| 6. | LITERATURE CITED | 24 |
| | st of Figures ure 1. Bureau of Reclamation - Narrows properties | 2 |
| _ | ure 1. Bureau of Reclamation - Narrows propertiesure 2. Golden Triangle area of the South Platte River Basin | |
| _ | ure 3. Project location map within the Central Flyway and in proximity to the Prairie Potholes | |
| | ure 4. Akers tract geotechnical investigation points | |
| | ure 5. Cook tract geotechnical investigation points | |
| _ | ure 6. Kinnaman tract geotechnicalure 7. Lantz tract geotechnical investigation points | |
| _ | ure 8. Monitoring well completion picture | |
| _ | ure 9. Akers tract conceptual engineering plan | |
| _ | ure 10. Kinnaman tract conceptual engineering plan | |
| _ | ure 11. Cook tract conceptual engineering planure 12. North Lantz tract conceptual engineering plan | |
| _ | ure 13. South Lantz tract conceptual engineering plan | |
| Lis | st of Tables | |
| Tak | ole 1. Installed monitoring wells | 10 |
| Tak | ole 2. Permeability classification based on measured infiltration | 10 |



1. BACKGROUND

In 1997, Ducks Unlimited, Inc. (DU) entered into a Memorandum of Understanding (MOU) with the United States Bureau of Reclamation (BOR) to research, develop, and construct wetland resources for waterfowl on Reclamation lands. Through the MOU, DU has been working with the BOR for several years to investigate the feasibility of developing conjunctive use wetlands and traditional shallow water wetland habitats on four properties, referred to as the BOR Narrows Tract. The four properties (Akers, Cook, Kinnaman, and Lantz), commonly referred to as the Narrows tracts, have a long and storied history in eastern Colorado. In 1947, Congress appropriated construction funds to build the Narrows Dam, which set in motion several decades of property acquisition, geologic investigation, and administrative review of the proposed site. The authorized project has yet to be built. On January 20th, 1983, the U.S. Fish and Wildlife Service issued a Biological Opinion stating that construction of the dam would cause significant impairment to the Platte River in Nebraska [Rogers, 2009]. This opinion has been cited as the sole reason for why BOR and State of Colorado delayed the construction of the dam. However, other factors may have confounded the decision and contributed to the tabling of the Narrows Dam Project. Regardless of the reasoning, the Narrows Dam Project has been officially tabled since the mid 1980's despite being a congressionally authorized project under Pick-Sloan Missouri Basin Program. Since the tabling of the Narrows Dam project BOR has continued to manage the four properties for agricultural production and public recreation, though these resources are currently underutilized.

The Narrow properties encompass 2,288 acres in western Morgan County, all within five miles of the South Platte River (Figure 1). The legal descriptions of each property are as follows:

Akers - Township 4N, Range 58W, and all or part of Sections 21 & 28

Cook - Township 5N, Range 60W, and all or part of Sections 28 & 33

Kinnaman - Township 4N, Range 60W, and all or part of Sections 18 & 19

Lantz - Township 4N, Range 59W, and all or part of Sections 24, 26, 27, & 35





Figure 1. Bureau of Reclamation - Narrows properties

The properties are located within one of the most significant waterfowl complexes in the State, known as the "Golden Triangle," which has been identified by both federal and state waterfowl managers as one of the most important wetland complexes in the Platte River watershed (Figure 2). The Golden Triangle nickname is a result of the abundant resources provided by three major surface water bodies (Riverside Reservoir, Jackson Reservoir, and Empire Reservoir) which provide large expanses of loafing habitat, and the surrounding agricultural practices that provide high energy food sources in the form of carbohydrates (e.g., corn and wheat). Lastly, the South Platte riverine corridor in the area feeds warm water sloughs and seasonal wetlands, which generate abundant protein and mineral food resources (e.g., seeds and arthropods) required by waterfowl.





Figure 2. Golden Triangle area of the South Platte River Basin

The Narrows Project location in the middle of the Central Flyway offers an important migratory bird stopover in Colorado. The landscape surrounding the project area serves as bridge between the Prairie Pothole Region of Canada and the wintering grounds for migratory birds in the Southern US, Mexico, and Central America (Figure 3). The Prairie Pothole Region is the core of what was once the largest expanse of grassland in the world. The potholes are rich in plant and aquatic life, and support globally important populations of breeding waterfowl. Over 70% of waterfowl observed along the South Platte during the winter months (October – February) originate from the Prairie Pothole Region.



Figure 3. Project location map within the Central Flyway and in proximity to the Prairie Potholes



2. OBJECTIVES

With Water Supply Reserve Funds and matching funds provided by DU, we completed a two-year feasibility study (Phase-I) on the four Narrows properties. The Cook and Lantz tracts were investigated for the potential groundwater recharge development and the Akers and Kinnaman tracts were investigated for existing shallow water wetland enhancements and additional habitat development. Specifically, the feasibility study was broken down into the following six tasks:

- **Task 1 Project administration:** Progress reporting and correspondence with CWCB, accounting, and management of subcontractors.
- **Task 2 Permitting:** Execution of a site-specific agreement with the BOR to develop the properties for program goals. Archaeological clearance was required to obtain the permit.
- **Task 3 Framework for long-term site management:** Engagement with CPW field staff to establish the framework for public lands management and operations.
- **Task 4 Geotechnical investigations:** Soil coring, monitor well drilling, infiltration testing, and cadastral surveys on all four properties. The data collected through the geotechnical investigations forms the basis of the engineering conceptual designs and overall project planning through Phases II and III.
- **Task 5 Framework for water agreements**: Presentation of the geotechnical data to water providers, local agricultural producers, and Colorado Parks and Wildlife (CPW) to develop the framework for water agreements that will be executed in Phase-II.
- **Task 6 Final report to CWCB:** Comprehensive report outlining the results of the feasibility study and the plan for project development.

3. TASK DISCUSSION

3.1 Permitting

The Special Use Permit from the BOR, which allowed DU access to all four properties to conduct the work outlined in the grant application was fully executed on 20 July 2016. The process included obtaining archeological clearance to conduct the geotechnical work and provides guidance for the areas that will be excluded from future project develop. To help expedite the archaeological clearance, DU



contracted a private consultant, which was above and beyond the scope of work, to avoid further delays in obtaining the permit due to personnel changeover at the BOR.

3.2 Long-Term Management

Long-term management of the properties will be accomplished via a multi-agency partnership. The two principle agencies who will take the lead are BOR and CPW. DU will facilitate the partnership.

The proposed activities are aligned with a primary goal identified in the CPW's Wetlands Program Strategic Plan:

Goal 1 - Improve the distribution and abundance of ducks, and opportunities for public waterfowl hunting. The plan and subsequent infrastructure improvements will maintain and increase the availability of quality migration habitat in a traditionally important migration corridor (subgoals 1a and 1c). CPW fully supports DU's plans to improve the number and diversity of public hunting opportunities in a region heavily used by most Colorado waterfowl hunters enhance and develop the Narrows properties for public hunting.

The BOR's Manual identifies the following management policy:

To the extent possible, Reclamation will manage recreation facilities and opportunities by entering into management agreements with qualified partners. Reclamation will itself manage recreation areas within the limitations provided by existing authorities if a partner cannot be secured. Every effort will be made to prevent developed recreation areas from being turned back to Reclamation once a partner has been secured.

Currently, all four properties are open to the public for recreation (primarily hunting) via unrestricted walk-in access only. The properties lack a structured framework for managing public access such as hunting and bird watching. Public use on the properties is currently managed passively. The properties also lack basic improvements (e.g., designated parking areas, signage, etc.) that could be used to improve public access and minimize potential conflicts with existing agricultural operations and lessees, as well as with adjoining private landowners that may result from increased public use. The Cook property, is the only one where signage exists and it is limited to a "No Pass Shooting" sign along the Jackson Reservoir inlet canal on the northern boundary. DU, as part of this feasibility study, held several meetings and site visits with CPW field staff, BOR, and adjoining private landowners to discuss the potential to develop a recreation framework for the properties. We discussed encompassing both



consumptive (i.e., hunting) and non-consumptive (i.e., birding, hiking, etc.) recreational uses. These discussions focused on balancing needs and opportunities and centered on providing a high-quality recreational experience, improving public access to the properties, and minimizing any potential issues resulting from proposed anticipated recreational activities by the public.

Conversations with CPW, BOR, adjacent private landowners have revealed that developing infrastructure for the public, such as parking lots, additional signage, as well as repairing or installing fencing ought to be a priority to improve long-term management of the properties. All parties agreed that investment in infrastructure was an essential component and would greatly help to minimize any potential issues resulting from increased visitation from the public. However, infrastructure was not the only component that may be needed to successfully manage the public. We also explored and discussed resources that are currently limited such as personnel and processes that must be navigated such as hunting regulations and procurement code of the Department of Natural Resources, and BOR internal procedures to implement different management scenarios.

All parties were supportive in developing a long-term management framework and recognize that implementation of various management alternatives are dependent on project delivery strategies. Meaning, some alternatives (e.g., parking lots) may not be implemented until specific properties are developed. DU will continue conversations with its partners through 2017 and will coordinate with partners to develop a formalized framework. We anticipate this objective to be achieved and gain considerable momentum as the project transitions to delivery.

3.3 Geotechnical Investigations

The project area is comprised of a terrace/floodplain landform developed by the downcutting of the South Plate River and its various tributary streams and has experienced considerable deposition of fine to medium grain eolian sands, which have become vegetated over time. The eolian material mantles the Pleistocene and recent alluvial deposits which are comprised of a heterogenous mixture of well sorted to poorly sorted sand, gravel, and clay lens channel deposits [Bjorkland and Brown, 1957; Warner *et al.*, 1986]. The unconfined alluvial aquifer is underlain by the Tertiary White River Group and the Upper Cretaceous Pierre Shale Formation [Lonsert, 2013]. The White River Group is comprised of the Brule and Chadron Formations and consists of poorly cemented beds of silt and clay which are relatively impermeable and form the base of the aquifer [Pocetta, 2005].



3.3.1 Soil Coring & Monitor Well Drilling

To understand site-specific geologic conditions, DU partnered with the Natural Resource Conservation Service (NRCS) to extract shallow soil cores and Drilling Engineers, Inc. to strategically bore monitor wells across the four properties at key areas of interest. The NRCS soil scientists from the Fort Morgan, CO field office extracted 52 soil cores (up to 12 feet deep) with truck mounted Giddings rigs across the four properties (Figures 4-7). The soil cores were brought to the surface and field analyzed to determine soil textures (percentages of sand, silt, and clay) throughout the profile, and the permeability characteristics of each soil group. The soil scientists provided an expert opinion on the ability of the soil profile to transport water vertically and the location of any horizontal confining layers that would inhibit further downward movement and influence the ability to recharge the alluvial aquifer or enhance shallow wetland habitat, depending on the location. The detailed soil logs and surface soil maps are presented in Appendix-B.

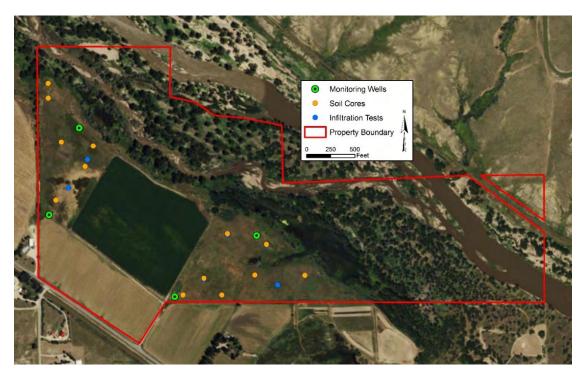


Figure 4. Akers tract geotechnical investigation points



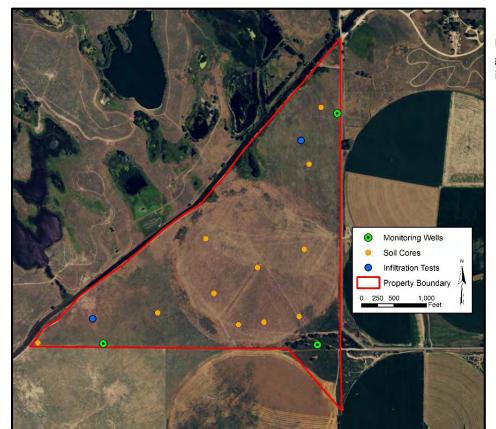


Figure 5. Cook tract geotechnical investigation points

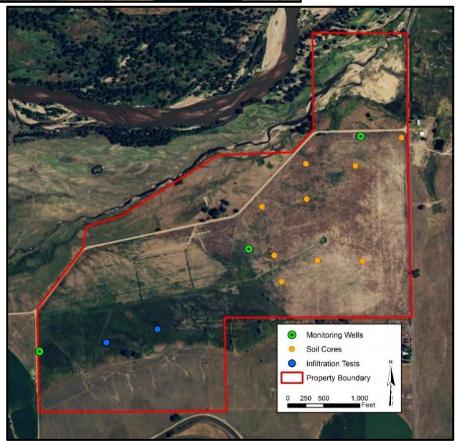


Figure 6. Kinnaman tract geotechnical investigation points



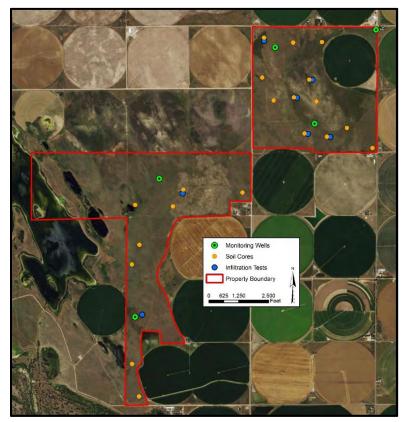


Figure 7. Lantz tract geotechnical investigation points

To assess the deeper alluvial sediments and determine the depth of the confining units and water table, DU contracted Drilling Engineers, Inc. to bore and install 15 monitoring wells across the four properties (Figures 4-7). A CME-75 drill rig was used, advancing 4.25-inch hollow stem augers to depths ranging from 20 to 120 feet. Soil samples were obtained every five feet with a standard spilt spoon an assessed for texture and moisture. The monitoring wells were constructed using two-inch diameter PVS factory slotted well screen, such that the screened interval bisected the water table at each location. Four-inch square by five-foot long locking well covers were installed and set in two-foot square concrete pads (figure x). Each well was developed using a surge block, bailer and submersible pump. The completion depths of each well and June 2017 water table elevations are presented in Table 1.



Table 1. Installed monitoring wells

| Well Name | Completion Depth (ft) | June 2017 Water Table Elevation (ft) | | | | |
|------------|--------------------------|---|--|--|--|--|
| Akers-1 | 29 | 2.02 | | | | |
| Akers-2 | 12 | 7.28 | | | | |
| Akers-3 | 15 | 2.82 | | | | |
| Akers-4 | 25 | 4.05 | | | | |
| Cook-1 | 42 | 16.10 | | | | |
| Cook-2 | 26 | 13.75 | | | | |
| Cook-3 | 22 | 13.65 | | | | |
| Kinnaman-1 | 20 | 5.30 | | | | |
| Kinnaman-2 | 30 | 6.48 | | | | |
| Kinnaman-3 | 30 | 9.37 | | | | |
| Lantz-1 | 100 | 49.31 | | | | |
| Lantz-2 | 120 | 63.45 | | | | |
| Lantz-3 | 112 | 45.65 | | | | |
| Lantz-4 | 98 | 13.00 | | | | |
| Lantz-5 | 35 | 10.41 | | | | |



Figure 8. Monitoring well completion picture

3.3.2 Infiltration Testing

Infiltration tests were conducted using an in-hole constant-head Permeameter on all four properties (Figures 4-7) to estimate field-saturated hydraulic conductivity, employing the Mariotte Principle. The method involves measuring the quasi steady-state rate of water recharge into unsaturated soil from a cylindrical well hole, in which constant depth (head) is maintained for 30-60 minutes. All holes were bored to a depth of eight-inches, using a 2.125-inch diameter soil auger. A constant pond depth of 2.75 inches was maintained for all tests.

Field saturated water flow parameters tend to be highly variable due to the spatial and temporal changes in pore characteristics due to changes in soil texture, structure, horizonation, and root growth [Reynolds *et al.*, 1986]. The parameters also exhibit a wide range of variability based on the antecedent water content of the soil, therefore we categorized each site based on the range of hydraulic conductivities measured at each location (Table 2).

Table 2. Permeability classification based on measured infiltration

| Permeability | Range of Infiltration Rates (ft/d) | | | | | |
|--------------|------------------------------------|--|--|--|--|--|
| Very High | >5 | | | | | |
| High | 2 - 5 | | | | | |
| Medium | 0.5 - 2 | | | | | |
| Low | 0.1-0.5 | | | | | |
| Very Low | <0.1 | | | | | |



3.3.3 Land Surveys

In addition to the soils investigations, DU also completed comprehensive cadastral surveys on each of the four properties to develop surface models depicting project site topography. The surveys captured the detailed topography of existing ditches, irrigation infrastructure, drains, roads, ditches, gates, locations of power poles, and fences. Maps illustrating two-foot contours of the site developed from the survey are found on figures 9-13.

3.4 Framework for Water Agreements

Because hydrology is the principal ecological driver of wetland habitat condition, recreational opportunity, and management cost, its supply and control is of utmost concern to effective project development and management on the properties. Through this study, DU investigated the potential for improving hydrological control on the existing Akers and Kinnaman tract wetlands such that inundations during the spring and fall migrations would not interfere with existing agricultural operations on the sites. On a broad scale, small infrastructure improvements are needed to manage seasonal availability of water supplies in order to sustain larger, more diverse populations of waterfowl, shorebirds, and waterbirds as well as improve waterfowl hunting opportunity and quality on the properties. At this time, we do not expect to have complex water agreements on the Akers and Kinnaman tracts.

The Cook and Lantz tracts have very little to no existing wetlands, respectively, but both properties are comprised of thick sand layers and deep water tables, conducive to alluvial groundwater recharge. To explore the potential for developing recharge ponds under existing adjudicated water rights, DU engaged with CPW and several private entities to discuss their current and future augmentation needs and to present our long-range vision for the properties. The basic purpose of the meetings was to lay out the results of the geotechnical investigations, propose infrastructure improvements, and discuss conveyance routes that will allow water managers options to optimize their augmentation plans, while benefitting targeted populations of waterfowl as well as other species of wildlife. All parties recognize the value in developing additional augmentation in this reach of the South Platte River alluvium, and although an augmentation project of this size is a complex undertaking in Colorado, we believe it is achievable with a collection of partners that all receive benefit. DU will continue augmentation agreement discussions with the partners throughout the remainder of 2017.



4. PROJECT PLAN & CONCEPTUAL ENGINEERING DESIGNS

4.1 Existing Wetland Enhancements on the Akers & Kinnaman Tracts

The development goals of our work on the Akers and Kinnaman tracts are to increase the quality, availability, and persistence of waterfowl foraging habitats on the existing wetlands, while preserving the irrigated row crop and haying agricultural operations. Through a series of conservation actions deemed necessary to reach the habitat and recreational opportunity goals there are four, interrelated objectives that when completed themselves, will assure attainment of our goals. Those objectives are:

- 1. Hydrologic control of the wetlands in the complex;
- 2. Appropriate plant community composition and structure;
- 3. Expansion of the area and diversity of wetland types in the complexes; and,
- 4. Development of a public access parking area and a recreational use management plan.

To achieve these four goals, the focus of the feasibility study on Akers and Kinnaman centered on gaining a better understanding of the land surface elevations, soil composition, hydrology, and existing plant communities.

Akers tract description

The Akers tract consists of 46 acres of irrigated cropland (alfalfa and corn production), 10 acres of emergent wetlands, 40 acres of uplands, and 248 acres of river channel/riparian habitat (all approximate). The hydrology of the wetlands and wet meadows is driven by ditch seep out of the Fort Morgan Canal and irrigation return flows, and is heavily influenced by the relatively shallow depth of the alluvial confining unit (11-12 feet near the river). The water table is at or near the surface during the irrigation season, which has resulted in monotypic stands of tall emergent vegetation in the shallow water wetlands. The stability of water regimes has, through ecological succession, established these stands of emergent vegetation, including cattail and reed canary grass.

Kinnaman tract description

Similar to the Akers tract, Kinnaman is a mixed-use landscape with 168 acres of agricultural fields (corn and hay production), 56 acres of emergent wetlands, 44 acres of uplands, and 27 acres of river channel/riparian habitat (all approximate). The primary emergent wetland complex (54 acres) located in the southwest corner of the property, where the hydrology is driven primarily by ditch seep from the Bijou canal. The water table is at or near the surface while the canal is running, which has resulted in monotypic stands of tall emergent vegetation in the shallow water wetlands. The stability of water



regimes has, through ecological succession, established these stands of emergent vegetation, including cattail and reed canary grass.

Engineering Solutions

Present wetland conditions on both properties call for two strategies to achieve high-quality foraging habitats for waterfowl and other wildlife. First, project development must address the preponderance of monotypic stands of tall emergent vegetation in the shallow water wetland on the properties. The stability of water regimes has, through ecological succession, established these stands of emergent vegetation, including cattail and reed canary grass. DU has utilized several techniques in the past to diminish monotypic stands of tall emergent vegetation, including cattail. These techniques either kill the plant directly (through fire or herbicide application) or work to exhaust the plant's resources such that it cannot continue to dominate the system and is out-competed by other, preferred plant communities. In Colorado, where chemical treatment and fire are often not acceptable treatments, managers are left with two modes of cattail treatment: First, they may attempt to dry out the colonized wetland basin such that more mundane disturbance treatments – like grazing, mowing or disking – can be accomplished. Following these disturbances with water level management can promote the growth of preferred forage plants while obstructing further colonization by the cattail; Or, second, managers can attempt to drown cattail by flooding over stands and interrupting the supply of oxygen to the cattail rhizome.

The principal strategy to achieve this end is the installation of water control infrastructure such that independent water delivery and drawdowns can be more easily accomplished. Drawn down to encourage the growth of preferred plant species or to perform management and maintenance activities is essential for maintaining high-quality foraging habitats for waterfowl and other wildlife. Overall, moist soil management of the emergent wetlands will result in lower total consumptive use of groundwater as the hydrology will be drawn down during the summer months to allow for better vegetation management. The areas that DU will seek to enhance through engineering solutions in Phase-II of this project are depicted in Figures 9 and 10.

The maps in Appendix-A present the soil descriptions for the project site and the soil logs provide detailed soil descriptions and qualities for each sampling location. The monitoring well borehole logs are available in Appendix-B.



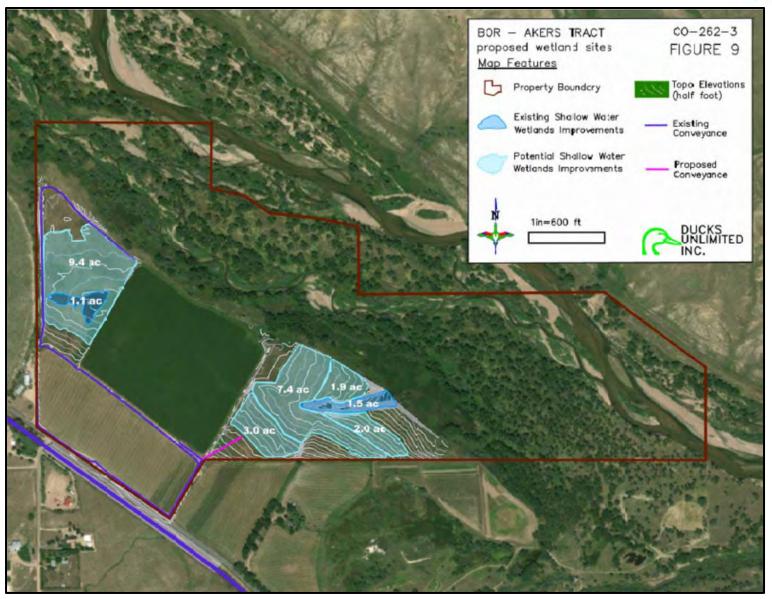


Figure 9. Akers tract conceptual engineering plan



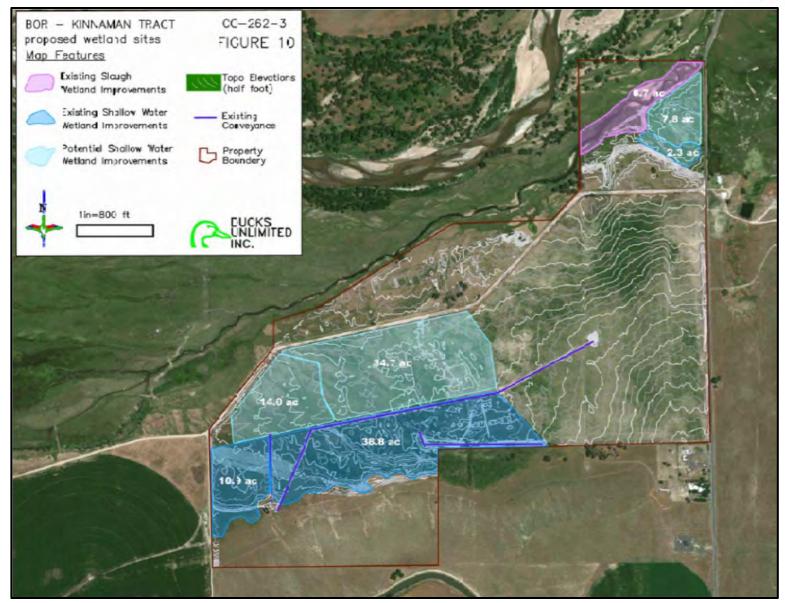


Figure 10. Kinnaman tract conceptual engineering plan



4.2 Recharge Development on The Cook & Lantz Tracts

The development goal on the Cook and Lantz tracts is to increase the availability and persistence of multi-purpose waterfowl foraging habitats through the construction of recharge wetlands. Recharge wetlands are a unique water resource management tool that allow for the addition of shallow water impoundments to the landscape, for use by migratory birds and for the benefit of junior water rights (primarily agriculture) that rely on alluvial groundwater. DU has been following two principal recharge wetland development strategies for over 30 years in the South Platte River alluvium: First, through cadastral surveying, we identify natural depression in the landscape and potential routes for water conveyance to the wetlands, either through ditches or the installation of underground pipelines; and, Second, we partner with water providers and independent agricultural producers to retime their augmentation water. Projects are designed such that the series of impoundments can be operated independently or in concert, as water is available. At the start of the irrigation season, the ponds are dried out to encourage the growth of preferred plant species and to perform management and maintenance activities.

Cook tract description

The Cook tract is a mixed-use property consisting of 110 acres of irrigated cropland (corn production), 110 acres of uplands, and 5 acres of wet meadow and emergent wetland along the Jackson Reservoir inlet canal (all approximate). The monitor well drill cuttings and split spoon soil samples revealed a continuous sand layer ranging from 22 to 42 feet thick and a depth to water ranging between 13 and 18 feet from the land surface. The medium grain sand layer and unsaturated layer great than ten feet thick both indicate good potential to develop groundwater recharge impoundments.

Lantz tract description

The Lantz tract is the largest of the four properties, totaling over 1,400 acres. The landscape is comprised of rolling eolian sand hills, with 90 acres of the northeastern corner under center pivot (corn production). In addition to the 19 soils sampling locations and 7 infiltration tests, DU drilled and completed five monitoring wells on the two parcels (Figure 7) - three on North Lantz (northeastern full Section) and two on South Lantz (t-shaped parcel that intersects Bijou Reservoir).

Very little geotechnical data was available for the site before the investigations so the results were particularly informative on both parcels. The upper Lantz parcel is comprised of think, continuous sand layers (100-120 feet thick), overlaying the shale confining unit. The soil sampling and drill logs indicate



that, generally, the site is comprised of well-drained soils, with limited water holding capacities that will allow for a high rate of groundwater transmission. Depth to water in the wells ranged from 49 to 63 feet (from the land surface), indicating excellent subsurface conditions for recharge development. The rolling topography of natural depressions make for natural groundwater recharge ponds that would require minimal earthwork to bring on-line. Through constant-head Permeameter tests, we assessed the ability of the natural depressions to allow surface water infiltration. The tests revealed infiltration rates in excess of 5 feet/day (very high permeability) at all locations, furthering confirming the excellent recharge development potential of the site.

The South Lantz parcel exhibited more spatial variability than the upper parcel with regard to soil textures, depth to water, and infiltration rates. Soil sampling and monitor well drilling on the upper half of the parcel indicated that groundwater seep from Bijou Reservoir is headed in a northeastern direction, extending through the property. The seep direction is further confirmed by the presence of surface water in two locations below the dam, visible from aerial imagery. The heterogeneous composition of the soil samples revealed that infiltrated water will move at a lower velocity than the North Lantz parcel due the presence of clay lenses interspersed with the sandy loam and clay loam soil textures. These findings do not rule out the potential to develop recharge ponds but expectations on performance will not be as ideal as the upper parcel. Soil sampling and monitor well drilling on the southern half of the lower Lantz parcel, indicated a thicker sand layer with less heterogeneity. The monitor well on the lower half was drilled to a depth of 120 feet before hitting shale and the water table was located at 13 feet below the land surface.

The maps in Appendix-A present the soil descriptions for the project site and the soil logs provide detailed soil descriptions and qualities for each sampling location. The monitoring well borehole logs are available in Appendix-B.

Engineering Development

Developing recharge on the Cook and Lantz tracts is a straightforward approach of utilizing the natural depressions on the landscape and supplementing with minimal earthwork where necessary, to form wetlands ranging from 1-inch to 6 feet in depth. The potential water conveyance routes and recharge wetland locations are presented in Figures 11-13. The preliminary conceptual designs call for a flow-through system, where water is delivered to the furthest upgradient pond and allowed to gravity flow



through the series of ponds. Typical DU engineering designs incorporate in-line water control structures with 4-6 inch stop logs on each pond to allow for a range of water levels to be managed.





Figure 11. Cook tract conceptual engineering plan



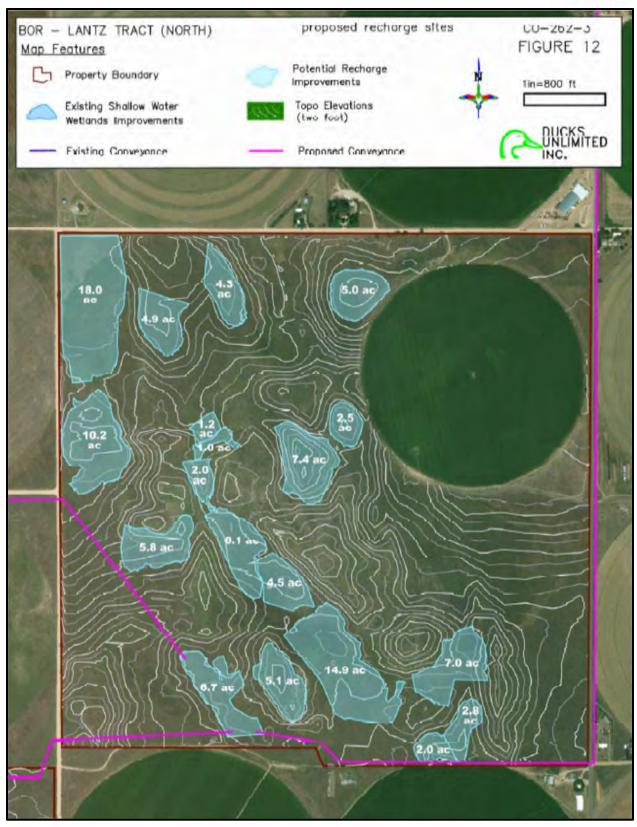


Figure 12. North Lantz tract conceptual engineering plan





Figure 13. South Lantz tract conceptual engineering plan



5. PROJECT DELIVERY

Due to the various complexities of this project and the large scale of the landscape, we anticipate that delivery will be accomplished through multiple phases. With the completion of this feasibility study, DU will immediately transition into developing the delivery strategies. We anticipate that delivery will likely follow two different paths: 1. The existing wetland enhancements on the Akers and Kinnaman tracts are likely to proceed ahead of the Cook and Lantz recharge developments, as wetland enhancements are shovel ready, and; 2. Recharge development of the Lantz and Cook tracts will follow a long-term delivery strategy as the partnerships and agreements become further solidified. Strategies for accomplishing successful delivery of all four properties were identified above, under the task discussion in Section-3, and remain a work in progress. Moving forward, DU will be transitioning into the following next steps:

Project Components and Cost Estimates

This report provides conceptual engineering plan figures of what is potentially feasible to deliver on each property. Some factors may constrain actual delivery (i.e., construction). For example, some locations of the wetlands may not be acceptable (i.e., too close to existing infrastructure) or volume of ponds may exceed availability of water for augmentation. DU will continue to be engaged with the partners and coordinate additional meetings to determine which components on each property are most appealing and viable. Once we have an agreed to final plan for each property, DU will develop cost estimates and final design plans for delivery.

Permitting

The principal permit required is authorization to fill wetlands and waters of the United States under provisions of the Section 404 of the Clean Water Act. These permits are released by the United States Army Corps of Engineers. Acting under the assumption that Narrows wetlands are jurisdictional waters of the United States, a permit to fill those portions of the wetlands within the bounds of the embankments must be secured prior to any earth-moving activities in those water features. Our history with similar types of restoration projects indicates that these activities will be permitted under a General Nationwide Permit No, 27, *Aquatic Habitat Restoration, Establishment, and Enhancement Activities*. These permits are often issued between one week and three months after notification. If the USACE maintains that the work must be permitted under an Individual Permit, then we can expect the permitting process to take a much longer time — beyond 12 months.



Funding

Moving into Phase-II of the project, DU will continue to work with our public and private partners to raise the funds necessary to develop the properties in incremental stages. Through this feasibility study funded by the CWCB, several private landowners and agencies in Colorado have expressed tremendous support for the project concept and are eager to keep the momentum moving forward. Accordingly, public fundraising efforts will be initiated after various delivery components are agreed to by the partners and DU is able to develop cost estimates based on a final design for each property.



6. LITERATURE CITED

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APPENDIX A

Natural Resource Conservation Service Soil Coring Results

Test Hole Locations Akers Tract - Narrows Project - Ducks Unlimited Morgan County, Colorado





Ducks Unlimited - Narrows Project - Akers Tract Soils Log Report

| | NRCS Soil | | | | | | |
|------|-------------------|----------------|--|--------|--------|--------|---|
| Hole | Classification | Depth (inches) | Soil Texture | % Clay | % Sand | % Silt | Notes |
| | HtA - Heldt clay | • | • | • | • | | This test hole was dug using the Giddings hydraulic probe |
| 1 | loam, 0-1% slopes | 0-6 | clay loam | 32 | 35 | 33 | from 0 to 108 inches. The material best suited for the pond |
| | | 6-26 | clay loam | 34 | 40 | 26 | liner would be from 0 to 26 inches. The present water table |
| | | 26-37 | sandy loam | 12 | 70 | 18 | is at 74 inches; however, there were visible redoximorphic |
| | | 37-61 | very fine sandy loam | 16 | 60 | 24 | features (oxidized iron masses or reduced iron masses) |
| | | 61-74 | loam | 22 | 50 | 28 | observed within 37 inches of the soil surface and extending |
| | | 74-108 | gravelly coarse sand | 1 | 95 | 4 | to 74 inches. It is unknown when the water table last |
| | | | | | | | reached these depths. |
| | | | | | | | |
| | HtA - Heldt clay | | | | | | This test hole was dug using the Giddings hydraulic probe |
| 2 | loam, 0-1% slopes | 0-6 | clay | 40 | 25 | 35 | from 0 to 63 inches. The material best suited for the pond |
| | | 6-21 | silty clay | 45 | 10 | 45 | liner would be from 0 to 21 inches. The material from 21 to |
| | | 21-35 | loam | 22 | 45 | 33 | 50 inches could be used, but at a much lesser effectiveness |
| | | 35-50 | loam | 22 | 45 | 33 | than the material above. The present water table is at 50 |
| | | 50-63+ | coarse sand | 1 | 95 | 4 | inches; however, there were visible redoximorphic features |
| | | | | | | | (oxidized iron masses or reduced iron masses) observed |
| | | | | | | | within 21 inches of the soil surface and extending to 50 |
| | | | | | | | inches. It is unknown when the water table last reached |
| | | | | | | | these depths. |
| | HtA - Heldt clay | | | | | | This test hole was dug using the Giddings hydraulic probe |
| 3 | loam, 0-1% slopes | 0-9 | clay | 40 | 25 | 35 | from 0 to 80 inches. The material best suited for the pond |
| | , | 9-32 | silty clay | 45 | 10 | 45 | liner would be from 0 to 40 inches. The present water table |
| | | 32-40 | silty clay | 47 | 5 | 48 | is at 41 inches; however, there were visible redoximorphic |
| | | 40-72 | sandy loam | 16 | 65 | 19 | features (oxidized iron masses or reduced iron masses) |
| | | | • | | | | observed within 32 inches of the soil surface and extending |
| | | 72-80+ | coarse sand & gravels | 1 | 95 | 4 | to 72 inches. It is unknown when the water table last |
| | | | , and the second | | | | reached these depths. |
| | | | | | | | |
| | HtA - Heldt clay | | | | | | This test hole was dug using the Giddings hydraulic probe |
| 4 | loam, 0-1% slopes | 0-13 | clay loam | 36 | 25 | 39 | from 0 to 60 inches. The material best suited for the pond |
| | | 13-32 | silty clay | 45 | 10 | 45 | liner would be from 0 to 53 inches. The present water table |
| | | 32-53 | silty clay | 48 | 5 | 47 | is at 53 inches; however, there were visible redoximorphic |

Ducks Unlimited - Narrows Project - Akers Tract Soils Log Report

| | NRCS Soil | | | | | | |
|------|---------------------|----------------|-------------------------|--------|----------|--------|--|
| Hole | Classification | Depth (inches) | Soil Texture | % Clay | % Sand | % Silt | Notes |
| | | 53-60+ | gravelly coarse sand | 1 | 95 | 4 | features iron manganese concentrations) observed within 52 inches of the soil surface. It is unknown when the water table last reached these depths. |
| | Hs - Heldt clay, | | | | | | This test hole was dug using the Giddings hydraulic probe |
| 5 | saline | 0-17 | sandy clay loam | 33 | 55 | 12 | from 0 to 120 inches. The material best suited for the pond |
| | | 17-41 | silty clay | 45 | 5 | 50 | liner would be from 0 to 72 inches. The present water table |
| | | 41-72 | silty clay | 45 | 5 | 50 | is at 72 inches; however, there were visible redoximorphic |
| | | | - , , | | | | features (oxidized iron masses or reduced iron masses) |
| | | | loamy very fine sand to | | | | observed within 54 inches of the soil surface and extending |
| | | 72-120+ | gravelly coarse sand | 4 to 1 | 90 to 95 | 6 to 4 | to 120+ inches. It is unknown when the water table last |
| | | | • | | | | reached these depths. |
| | | | | | | | · |
| | VrB - Vona sandy | | | | | | This test hole was dug using the Giddings hydraulic probe |
| | loam, terrace, 1-3% | | | | | | from 0 to 72 inches. The material best suited for the pond |
| 6 | slopes | 0-6 | clay | 42 | 20 | 38 | liner would be from 0 to 54 inches. The present water table |
| | ' | 6-16 | silty clay | 45 | 10 | 45 | is at 54 inches; however, there were visible redoximorphic |
| | | 16-25 | silty clay | 47 | 5 | 48 | features (oxidized iron masses or reduced iron masses) |
| | | 25-54 | silty clay | 47 | 5 | 48 | observed within 25 inches of the soil surface and extending |
| | | 54-72 | loamy very fine sand | 4 | 90 | 6 | to 72 inches. It is unknown when the water table last |
| | | 72+ | gravelly coarse sand | 1 | 95 | 4 | reached these depths. |
| | Ca - Cascajo soils | | | | | | This test hole was dug using the Giddings hydraulic probe |
| 7 | and gravelly land | 0-12 | clay loam | 30 | 40 | 30 | from 0 to 99 inches. The material best suited for the pond |
| | | 12-22 | clay loam | 30 | 40 | 30 | liner would be from 0 to 41 inches. The present water table |
| | | 22-41 | silty clay | 45 | 10 | 45 | is at 94 inches; however, there were visible redoximorphic |
| | | 41-60 | loamy fine sand | 4 | 90 | 6 | features (oxidized iron masses or reduced iron masses) |
| | | 60-99 | gravelly coarse sand | 1 | 95 | 4 | observed within 41 inches of the soil surface and extending |
| | | | | | | | to 99 inches. It is unknown when the water table last reached these depths. |
| | VrB - Vona sandy | | | | | | This test hole was dug using the Giddings hydraulic probe |
| | loam, terrace, 1-3% | | | | | | from 0 to 72 inches. The material best suited for the pond |
| 8 | slopes | 0-4 | silty clay loam | 34 | 18 | 48 | liner would be from 0 to 32 inches. The present water table |

Ducks Unlimited - Narrows Project - Akers Tract Soils Log Report

| | NRCS Soil | | | | | | |
|------|----------------------|----------------|----------------------|--------|--------|--------|---|
| Hole | Classification | Depth (inches) | Soil Texture | % Clay | % Sand | % Silt | Notes |
| | 4-11 silty clay loam | | silty clay loam | 34 | 15 | 51 | is at 43 inches; however, there were visible redoximorphic |
| | | 11-32 | silty clay | 42 | 10 | 48 | features (oxidized iron masses or reduced iron masses) |
| | | 32-46 | loamy fine sand | 4 | 90 | 6 | observed within 30 inches of the soil surface and extending |
| | | 46-72+ | gravelly coarse sand | 1 | 95 | 4 | to 51 inches. It is unknown when the water table last |
| | | | | | | | reached these depths. |
| | VrB - Vona sandy | | | | | | This test hole was dug using the Giddings hydraulic probe |
| | loam, terrace, 1-3% | | | | | | from 0 to 122 inches. The material best suited for the pond |
| 9 | slopes | 0-8 | silty clay loam | 30 | 18 | 52 | liner would be from 0 to 18 inches. The present water table |
| | • | 8-18 | silty clay loam | 32 | 16 | 52 | is at 93 inches; however, there were visible redoximorphic |
| | | 18-36 | loamy very fine sand | 5 | 90 | 5 | features (oxidized iron masses or reduced iron masses) |
| | | 36-72 | loamy very fine sand | 3 | 92 | 5 | observed within 18 inches of the soil surface and extending |
| | | 72-80 | silty clay | 45 | 5 | 50 | to 117 inches. It is unknown when the water table last |
| | | 80-97 | loamy very fine sand | 2 | 95 | 3 | reached these depths. |
| | | 97-107 | loamy very fine sand | 2 | 95 | 3 | · |
| | | 107-122+ | gravelly coarse sand | 1 | 98 | 1 | |
| | Ca - Cascajo soils | | | | | | This test hole was dug using the Giddings hydraulic probe |
| 10 | and gravelly land | 0-6 | loam | 16 | 45 | 39 | from 0 to 120 inches. The material in this area is not very |
| | | 6-14 | loam | 23 | 40 | 37 | well suited for pond liner material. The present water table is |
| | | 14-34 | very fine sandy loam | 16 | 60 | 24 | at 114 inches; however, there were visible redoximorphic |
| | | 34-66 | loamy very fine sand | 4 | 90 | 6 | features (oxidized iron masses or reduced iron masses) |
| | | 66-74 | silty clay loam | 38 | 5 | 57 | observed within 24 inches of the soil surface and extending |
| | | 74-100 | very fine sandy loam | 8 | 65 | 27 | to 120+ inches. It is unknown when the water table last |
| | | 100-120 | loamy fine sand | 4 | 90 | 6 | reached these depths. |
| | | 120+ | gravelly coarse sand | 1 | 98 | 1 | • |

Cook Tract



Ducks Unlimited - Narrows Project - Cook Tract

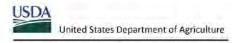
Soils Log Report

| | | Depth | | | | | Permeability | | |
|------|--|----------|-----------------|--------|--------|--------|--------------|---|--|
| Hole | NRCS Soil Classification | (inches) | Soil Texture | % Clay | % Sand | % Silt | (in./hr.) | Notes | |
| 33 | Ve - Valentine-Dwyer | 0-16 | sandy loam | 6 | 65 | 29 | 2.0-6.0 | This test hole was dug using the Giddings hydraulic probe from 0 to | |
| | sands, terrace | 16-29 | sandy loam | 6 | 65 | 29 | 2.0-6.0 | 111 inches. No water table encountered to 111 inches. Permeability | |
| | | 29-51 | fine sandy loam | 6 | 70 | 24 | 2.0-6.0 | is going to be as fast as the slowest layer/horizon; for this test hole that horizon would be from 51 to 69 inches. | |
| | | 51-69 | sandy clay loam | 20 | 68 | 12 | 0.6-2.0 | that horizon would be from 51 to 69 inches. | |
| | | 69-111 | loamy fine sand | 3 | 80 | 17 | 6.0-20.0 | | |
| 34 | VnB - Vona loamy sand, terrace, 1-3% slopes | 0-19 | loamy fine sand | 4 | 80 | 16 | 6.0-20.0 | This test hole was dug using the Giddings hydraulic probe from 0- 130 inches.Permeability is going to be as fast as the slowest | |
| | , | 19-44 | loamy fine sand | 3 | 83 | 14 | 6.0-20.0 | layer/horizon; for this test hole that horizon would be from 44 to 58 | |
| | | 44-58 | clay loam | 38 | 35 | 27 | .42-1.41 | inches. Water table encountered at 110 inches | |
| | | 58-110 | loamy fine sand | 3 | 85 | 12 | 6.0-20.0 | | |
| | | 110-130 | loamy sand | 3 | 85 | 12 | 6.0-20.0 | | |
| | VcD - Valent sand, 3- 9% slopes | | | | | | | This test hole was dug using the Giddings hydraulic probe from 0 to 110 inches. There is no water table within 110 inches. Permeability is | |
| 35 | • | 0-110 | loamy sand | 3 | 85 | 12 | 6.0-20.0 | going to be as fast as the slowest layer/horizon; this test hole is | |
| - 00 | VcD - Valent sand, 3- | 0 110 | loanly band | Ŭ | - 00 | | 0.0 = 0.0 | This test hole was dug using the Giddings hydraulic probe from 0 to | |
| 36 | 9% slopes | 0-53 | loamy fine sand | 2 | 85 | 13 | 6.0-20.0 | 104 inches. Permeability is going to be as fast as the slowest | |
| | | | | | | | | horizon; this test hole is uniform loamy fine sand to 104 inches. | |
| | | 53-104 | loamy fine sand | 4 | 82 | 14 | 6.0-20.0 | | |
| 37 | VcD - Valent sand, 3- | 0-75 | loamy fine sand | 3 | 82 | 15 | 6.0-20.0 | This test hole was dug using the Giddings hydraulic probe from 0 to 140 inches. Water table encountered at 128 inches. Permeability i uniform to 140 inches. | |
| | 9% slopes | 75-96 | loamy fine sand | 3 | 82 | 15 | 6.0-20.0 | | |
| | | 96-126 | loamy fine sand | 3 | 82 | 15 | 6.0-20.0 | | |
| | | 126-140 | very gravelly | 3 | 85 | 12 | 6.0-20.0 | | |
| | | | loamy sand | | | | | | |
| 38 | Ve - Valentine-Dwyer | 0-35 | loamy fine sand | 2 | 85 | 13 | 6.0-20.0 | This test hole was dug using the Giddings hydraulic probe from 0 t | |
| | sands, terrace | 35-60 | sandy loam | 12 | 75 | 13 | 2.0-6.0 | 102 inches. Permeability is going to be as fast as the slowest | |
| | | 60-79 | loamy sand | 6 | 80 | 14 | 6.0-20.0 | horizon, for this test hole that depth will be 79-86 inches. No water table encountered to 102 inches. | |
| | | 79-86 | loam | 24 | 50 | 26 | 0.6-2.0 | table chodinated to 102 mones. | |
| | | 86-102 | vgr coarse sand | 1 | 95 | 4 | >20.0 | | |
| | VcD - Valent sand, 3- | | | | | | | This test hole was dug using the Giddings hydraulic probe from 0 to | |
| 39 | 9% slopes | 0-38 | loamy fine sand | 3 | 85 | 12 | 6.0-20.0 | 107 inches. Permeability is going to be as fast as the slowest horizon, for this test hole that depth will be 38-45 inches. No water | |
| | | 38-45 | sandy loam | 5 | 78 | 17 | 2.0-6.0 | table encountered to 107 inches. | |
| | | 45-99 | loamy sand | 3 | 82 | 15 | 6.0-20.0 | | |
| | | | gravelly coarse | | | | | | |
| | \/aD \/ala=+ | 99-107 | sand | 1 | 95 | 4 | >20.0 | This test halo was due vains the Oilding to budge discuss his | |
| 40 | VcD - Valent sand, 3- 9% slopes | 0-85 | loamy fine sand | 6 | 80 | 14 | 6.0-20.0 | This test hole was dug using the Giddings hydraulic probe from 0 to 113 inches. Permeability is going to be as fast as the slowest horizon, for this test hole that depth will be 85-107 inches. No water | |
| | | 85-107 | sandy clay loam | 26 | 62 | 12 | 0.6-2.0 | table encountered to 113 inches. | |
| | | 30 101 | gravelly loamy | | 02 | | | - Control of the money. | |

Ducks Unlimited - Narrows Project - Cook Tract

Soils Log Report

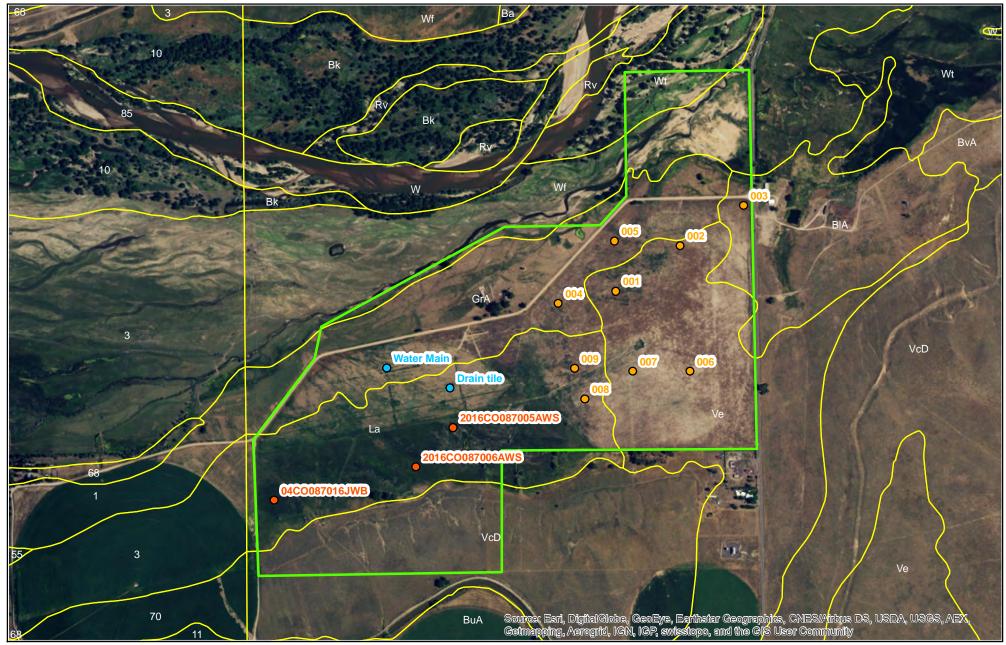
| | | 67-94 | silty clay loam | 38 | 5 | 57 | 0.06-0.20 | This test hole was dug using the Giddings hydraulic probe from 0 to |
|----|-----------------------|---------|--|----|----|----|-----------|---|
| | | 94-101 | loamy fine sand | 3 | 85 | 12 | 6.0-20.0 | 101 inches. Permeability is going to be as fast as the slowest horizon, for this test hole that depth will be 67-94 inches. No water table encountered to 113 inches. |
| | | 101+ | unknown material, very dense, sands and gravel | | | | | table chocalitered to 116 mones. |
| 42 | OnA - Olney loamy | 0-78 | loamy sand | 4 | 82 | 14 | 6.0-20.0 | This test hole was dug using the Giddings hydraulic probe from 0 to |
| | sand, terrace, 0-1% | 78-86 | sandy clay loam | 32 | 65 | 3 | 0.6-2.0 | 121 inches. Permeability is going to be as fast as the slowest |
| | slopes | 86-99 | loamy sand | 3 | 85 | 12 | 6.0-20.0 | horizon, for this test hole that depth will be 78-86 inches. Water table encountered at 103 inches. |
| | | 99-111 | fine sandy loam | 8 | 75 | 17 | 2.0-6.0 | abbe sheed he fee an order. |
| | | 111-121 | gravelly loamy coarse sand | 3 | 83 | 14 | 6.0-20.0 | |
| 43 | VcD - Valent sand, 3- | 0-35 | loamy fine sand | 4 | 82 | 14 | 6.0-20.0 | This test hole was dug using the Giddings hydraulic probe from 0 to |
| | 9% slopes | 35-57 | sandy clay loam | 25 | 60 | 15 | 0.6-2.0 | 106 inches. Permeability is going to be as fast as the slowest |
| | | 57-99 | loamy fine sand | 3 | 82 | 15 | 6.0-20.0 | horizon, for this test hole that depth will be 35-57 inches. No water |
| | | | | | | | | table encountered to 106 inches. |
| | | 99-106 | loamy sand | 3 | 85 | 12 | 6.0-20.0 | |



Soil Map Kinnaman Tract - Narrows Project - Ducks Unlimited Morgan County, Colorado



Natural Resources Conservation Service



Created 10/20/2016 by Andy Steinert Soil Survey of Morgan County, Colorado Soil Survey Version 16 - 9/22/2015 USDA-NRCS NAIP 2013-2015

La - Las loam, saline Soil Notes

Soil Survey of Morgan County, CO

Kinnaman Tract - Soil Core Locations

O Kinnaman Tract - Water Main & Drain Tile Locations

Ducks Unlimited - Narrows Project - Kinnaman Tract Soils Log Report

| | NRCS Soil | Depth | | | | | Permeability | |
|------|-------------------|----------|-------------------------|----------|----------|--------|---------------|---|
| Hole | Classification | (inches) | Soil Texture | % Clay | % Sand | % Silt | (in./hr.) | Notes |
| 1 | Ve - Valentine- | 0-8 | sandy clay loam | 30 | 55 | 15 | 0.2 - 0.6 | This test hole was dug using the Giddings hydraulic |
| | Dwyer sands, | 8-16 | clay | 42 | 25 | 33 | 0.06 - 0.20 | probe from 0 to 106 inches. Water table encountered |
| | terrace | 16-25 | clay loam | 36 | 38 | 26 | 0.06 - 0.20 | at 96 inches. Permeability is going to be as fast as the |
| | | 25-33 | loam | 27 | 45 | 28 | 0.6 - 2.0 | slowest layer/horizon; for this test hole that horizon would be from 8 to 16 inches. |
| | | 25-55 | gravelly sandy clay | 21 | 40 | 20 | 0.0 2.0 | would be from 6 to 10 inches. |
| | | 33-41 | loam | 21 | 68 | 11 | 0.6 - 2.0 | |
| | | 41-106 | gravelly coarse sand | 1 | 95 | 4 | >20.0 | |
| 2 | Ve - Valentine- | 0-24 | sandy clay loam | 25 | 58 | 17 | 0.6 - 2.0 | There is a perched water table from 35 to 41 inches. |
| | Dwyer sands, | 24-35 | fine sandy loam | 6 | 72 | 22 | 2.0 - 6.0 | Redoximorphic features are present from 35 to 41 |
| | terrace | 35-41 | silt loam | 14 | 19 | 67 | 2.0 - 6.0 | inches. Permeability is going to be as fast as the |
| | | 41-53 | silty clay | 65 | 5 | 30 | 0.0014 - 0.06 | slowest layer/horizon; for this test hole that horizon |
| | | 53-118 | gravelly coarse sand | 2 | 95 | 3 | >20.0 | would be from 41 to 53 inches. Water table |
| 3 | BIA - Bijou loamy | 0-17 | loamy sand | 5 | 83 | 12 | 6.0 - 20.0 | This test hole was dug using the Giddings hydraulic |
| | sand, 0-1% | 4-00 | gravelly sandy clay | | | | | probe from 0 to 118 inches. There is no water table |
| | slopes | 17-33 | loam | 32 | 58 | 10 | 0.2 - 0.6 | within 118 inches. Permeability is going to be as fast |
| | | 33-118 | gravelly coarse sand | 1 | 93 | 6 | >20.0 | as the slowest layer/horizon; for this test hole that |
| 4 | GrA - Gilcrest | 0-9 | clay | 48 | 25 | 27 | 0.06 - 0.20 | horizon would be from 17 to 33 inches. This test hole was dug using the Giddings hydraulic |
| 7 | sandy loam, 0-1 | 9-14 | loam | 22 | 45 | 33 | 0.6 - 2.0 | probe from 0 to 96 inches. Water table is at 90 inches. |
| | % slopes | 0 14 | loam | | 40 | 00 | 0.0 2.0 | Permeability is going to be as fast as the slowest |
| | 70 0.0p00 | 14-28 | very fine sandy loam | 5 | 60 | 35 | 2.0 - 6.0 | horizon; for this test hole that horizon would be from 0 |
| | | 28-96 | gravelly coarse sand | 1 | 95 | 4 | >20.0 | to 9 inches. |
| 5 | GrA - Gilcrest | 0-13 | olov | 45 | 38 | 17 | 0.06 - 0.2 | This toot halo was due using the Ciddings hydraulia |
| 5 | sandy loam, 0- | 13-18 | clay sandy clay loam | 45 32 | 36 62 | 6 | 0.06 - 0.2 | This test hole was dug using the Giddings hydraulic probe from 0 to 110 inches. Water table encountered |
| | 1% slopes | 18-110 | gravelly coarse sand | 1 | 92 | 7 | >20.0 | within 78 inches. Permeability is going to be as fast as |
| | 1 /0 310pes | 10-110 | gravery coarse sand | ' | 32 | , | >20.0 | the slowest horizon; for this test hole that horizon |
| | | | | | | | | would be from 0 to 13 inches. |
| | | | | | | | | |
| 6 | Ve - Valentine- | 0-8 | sandy loam | 12 | 65 | 23 | 2.0 - 6.0 | This test hole was dug using the Giddings hydraulic |
| | Dwyer sands, | 8-12 | sandy loam | 12 | 65 | 23 | 2.0 - 6.0 | probe from 0 to 125 inches. There is no water table |
| | terrace | 12-24 | sandy clay loam | 28 | 55 | 17 | 0.2 - 0.6 | within 125 inches. Redoximorphic features are present |
| | | 24-33 | loamy sand | 4 | 80 | 16 | 6.0 - 20.0 | from 58 to 125 inches. Permeability is going to be as |
| | | 33-58 | sand | 2 | 90 | 8 | >20.0 | fast as the slowest horizon; for this test hole that |

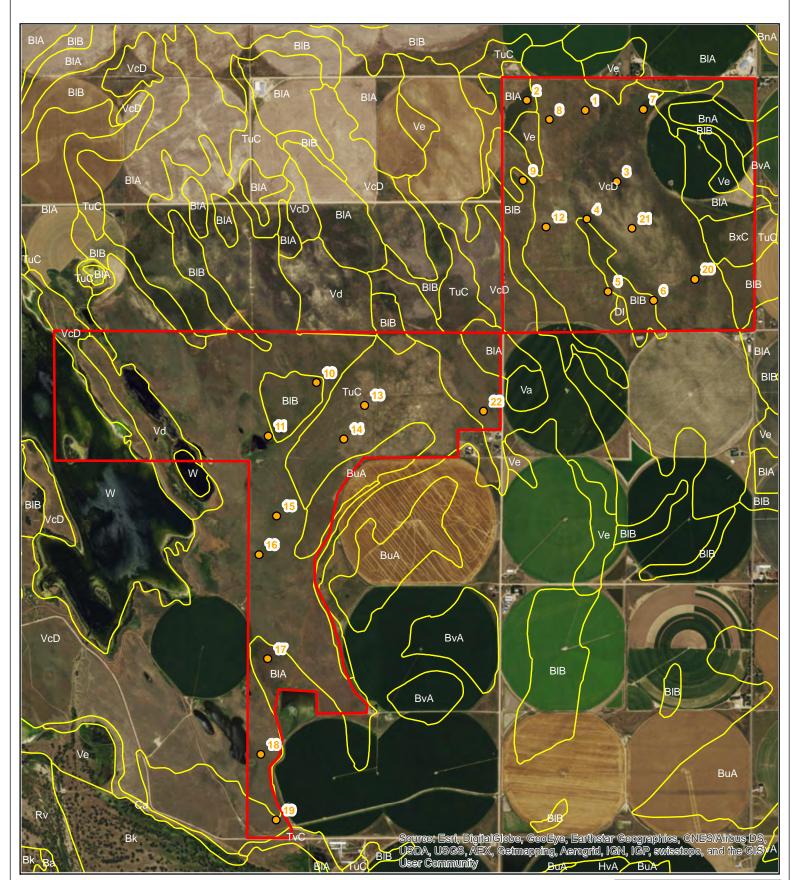
| | NRCS Soil | Depth | | | | | Permeability | |
|--------|-----------------|----------|----------------------|--------|--------|--------|--------------|--|
| Hole | Classification | (inches) | Soil Texture | % Clay | % Sand | % Silt | (in./hr.) | Notes |
| | | 58-77 | sandy clay | 36 | 50 | 14 | 0.06 - 0.2 | horizon would be from 85 to 125 inches. |
| | | 77-85 | sandy loam | 8 | 75 | 17 | 2.0 - 6.0 | |
| | | 85-104 | silty clay | 45 | 14 | 41 | 0.06 - 0.2 | |
| | | 104-125 | silty clay | 45 | 14 | 41 | 0.06 - 0.2 | |
| 7 | Valentine-Dwyer | 0-5 | sandy loam | 8 | 75 | 17 | 2.0 - 6.0 | This test hole was dug using the Giddings hydraulic |
| | sands, terrace | 5-12 | sandy loam | 12 | 75 | 13 | 2.0 - 6.0 | probe from 0 to 108 inches. A water table is present |
| | | 12-21 | sandy loam | 8 | 75 | 17 | 2.0 - 6.0 | within 104 inches. Redoximorphic features are present |
| | | 21-44 | sand | 3 | 90 | 7 | >20.0 | from 83 to 108 inches. Permeability is going to be as |
| | | 44-73 | silty clay | 45 | 5 | 50 | 0.06 - 0.2 | fast as the slowest layer/horizon; for this test hole that |
| | | 73-83 | sandy clay | 37 | 50 | 13 | 0.06 - 0.2 | horizon would be from 44 to 83 inches. |
| | | 83-92 | sandy clay loam | 24 | 60 | 16 | 0.6 - 2.0 | |
| | | 92-108 | gravelly coarse sand | 1 | 95 | 4 | >20.0 | |
| 8 | La - Las Ioam, | 0-5 | sandy loam | 14 | 75 | 11 | 2.0 - 6.0 | This test hole was dug using the Giddings hydraulic |
| | saline | 5-12 | sandy loam | 18 | 70 | 12 | 2.0 - 6.0 | probe from 0 to 96 inches. A water table is present |
| | | 12-24 | fine sandy loam | 12 | 75 | 13 | 2.0 - 6.0 | within 72 inches. Permeability is going to be as fast as |
| | | 24-34 | fine sandy loam | 12 | 75 | 13 | 2.0 - 6.0 | the slowest layer/horizon; for this test hole that horizon |
| | | 34-42 | silty clay loam | 30 | 15 | 55 | 0.2 - 0.6 | would be from 34 to 42 inches. |
| | | 42-53 | loamy fine sand | 4 | 85 | 11 | 6.0 - 20.0 | |
| | | 43-96 | gravelly coarse sand | 1 | 95 | 4 | >20.0 | |
| 9 | La - Las Ioam, | 0-6 | loam | 22 | 45 | 33 | 0.6 - 2.0 | This test hole was dug using the Giddings hydraulic |
| | saline | 6-12 | loam | 25 | 45 | 30 | 0.6 - 2.0 | probe from 0 to 95 inches. A water table is present |
| | | 12-23 | clay loam | 30 | 25 | 45 | 0.2 - 0.6 | within 66 inches. Redoximorphic features are present |
| | | 23-33 | clay loam | 34 | 25 | 41 | 0.2 - 0.6 | from 45 to 95 inches. Permeability is going to be as |
| | | 33-45 | very fine sandy loam | 12 | 65 | 23 | 0.6 - 2.0 | fast as the slowest layer/horizon; for this test hole that |
| | | 45-71 | coarse sand | 1 | 95 | 4 | >20.0 | horizon would be from 12 to 33 inches. |
| | | 71-95 | gravelly coarse sand | 1 | 95 | 4 | >20.0 | |
| 2016 | La - Las Ioam, | 0-4 | silty clay loam | 32 | 10 | 58 | 0.2 - 0.6 | This test hole was dug using the Giddings hydraulic |
| CO | saline | 4-15 | silty clay | 45 | 13 | 42 | 0.06 - 0.2 | probe from 0 to 80 inches. A water table is present |
| 087005 | | | • | | | | | within 21 inches. Redoximorphic features are present |
| AWS | | | | | | | | from 4 to 80 inches. Permeability is going to be as fast |
| | | | | | | | | as the slowest layer/horizon; for this test hole that |
| | | | | | | | | horizon would be from 4 to 15 inches. |
| | | 15-80 | gravelly coarse sand | 1 | 95 | 4 | >20.0 | |

| Hole | NRCS Soil Classification | Depth (inches) | Soil Texture | % Clay | % Sand | % Silt | Permeability (in./hr.) | Notes |
|-----------------------------|-----------------------------|--|---|---------------------------|----------------------|----------------|---|---|
| 2016 CO 087006 AWS | La - Las Ioam, saline | 0-3 3-10 10-27 | loam loam loam very gravelly coarse | 18 23 23 | 35 45 45 45 | 47 32 32 | 2.0 - 6.0 0.6 - 2.0 0.6 - 2.0 | This test hole was dug using the Giddings hydraulic probe from 0 to 120 inches. A water table is present within 41 inches. Redoximorphic features are present from 10 to 27 inches. Permeability is going to be as fast as the slowest layer/horizon; for this test hole that horizon would be from 3 to 27 inches. |
| 04 CO 087016 JWB | La - Las Ioam, saline | 27-120 0-1 1-11 11-18 18-36 36-46 45-59+ | loam sandy clay loam sandy clay loam very fine sandy loam gravelly sand very gravelly coarse sand | 18 22 27 14 2 | 95 | 4 | >20.0 2.0 - 6.0 0.6 - 2.0 0.6 - 2.0 2.0 - 6.0 >20.0 >20.0 | This test hole was dug using the Giddings hydraulic probe from 0 to 59 inches. A water table is present within 46 inches. Redoximorphic features are present from 6 to 46 inches. Permeability is going to be as fast as the slowest layer/horizon; for this test hole that horizon would be from 1 to 18 inches. |



Soil Map Lantz Tract - Narrows Project - Ducks Unlimited Morgan County, Colorado







| | NRCS Soil | Depth | | | | | Permeability | |
|------|-------------------|----------|-------------------|--------|--------|--------|--------------|---|
| Hole | Description | (inches) | Soil Texture | % Clay | % Sand | % Silt | (in./hr.) | Notes |
| 1 | VcD - Valent | 0-16 | fine sandy loam | 5 | 72 | 23 | 2.0 - 6.0 | This test hole was dug using the Giddings hydraulic probe from |
| | sand, 3-9% | 16-37 | sandy loam | 16 | 65 | 19 | 2.0 - 6.0 | 0 to 90 inches. There is no water table within 90 inches. |
| | slopes | 37-42 | sandy clay | 38 | 48 | 14 | 0.06 - 0.20 | Permeability is going to be as fast as the slowest layer/horizon; |
| | | 42-72 | loamy sand | 3 | 85 | 12 | 6.0 - 20.0 | for this test hole that horizon would be from 37 to 42 inches. |
| | | 72-90 | fine sandy loam | 6 | 74 | 20 | 2.0 - 6.0 | |
| 2 | BIA - Bijou loamy | 0-6 | sandy loam | 14 | 62 | 24 | 2.0 - 6.0 | This test hole was dug using the Giddings hydraulic probe from |
| | sand, 0-1% | 6-22 | Sandy clay loam | 24 | 58 | 18 | 0.6 - 2.0 | 0 to 65 inches. There is a perched water table from 30 to 65 |
| | slopes | 22-30 | clay | 45 | 44 | 11 | 0.06 - 0.20 | inches. Redoximorphic features are present from 30 to 65 inches. Permeability is going to be as fast as the slowest |
| | | 30-65 | loamy coarse sand | 3 | 85 | 12 | 6.0 - 20.0 | layer/horizon; for this test hole that horizon would be from 22 to |
| | | 65+ | shale | | | | 0.0 - 0.06 | 30 inches. |
| 3 | VcD - Valent | 0-7 | sandy loam | 8 | 65 | 27 | 2.0 - 6.0 | This test hole was dug using the Giddings hydraulic probe from |
| | sand, 3-9% | 7-12 | sandy loam | 8 | 65 | 27 | 2.0 - 6.0 | 0 to 119 inches. There is no water table within 119 inches. |
| | slopes | 12-17 | loamy sand | 5 | 80 | 15 | 6.0 - 20.0 | Permeability is going to be as fast as the slowest layer/horizon; |
| | | 17-32 | sandy clay loam | 32 | 48 | 20 | 0.2 - 0.6 | for this test hole that horizon would be from 17 to 56 inches. |
| | | 32-56 | sandy clay loam | 30 | 45 | 25 | 0.2 - 0.6 | |
| | | 56-72 | loamy sand | 5 | 85 | 10 | 6.0 - 20.0 | |
| | | 72-94 | loamy sand | 2 | 85 | 13 | 6.0 - 20.0 | |
| | | 94-119 | loamy coarse sand | 4 | 80 | 16 | 6.0 - 20.0 | |
| 4 | BIB - Bijou loamy | 0-4 | sandy loam | 8 | 65 | 27 | 2.0 - 6.0 | This test hole was dug using the Giddings hydraulic probe from |
| | sand, 1-3% | 4-12 | sandy loam | 12 | 60 | 28 | 2.0 - 6.0 | 0 to 122 inches. There is no water table within 122 inches. |
| | slopes | 12-26 | sandy loam | 8 | 70 | 22 | 2.0 - 6.0 | Permeability is going to be as fast as the slowest horizon; for |
| | | 26-45 | loamy sand | 6 | 80 | 14 | 6.0 - 20.0 | this test hole that horizon would be from 59 to 65 inches. |
| | | 45-59 | sandy loam | 8 | 70 | 22 | 2.0 - 6.0 | |
| | | 59-65 | sandy clay loam | 23 | 60 | 17 | 0.6 - 2.0 | |
| | | 65-78 | sandy loam | 10 | 70 | 20 | 2.0 - 6.0 | |
| | | 78-92 | loamy coarse sand | 4 | 85 | 11 | 6.0 - 20.0 | |
| | | 92-107 | fine sandy loam | 8 | 75 | 17 | 2.0 - 6.0 | |
| | | 107-122 | loamy sand | 3 | 85 | 12 | 6.0 - 20.0 | |
| 5 | BIB - Bijou loamy | 0-6 | sandy loam | 10 | 65 | 25 | 2.0 - 6.0 | This test hole was dug using the Giddings hydraulic probe from |
| | sand, 1-3% | 6-13 | sandy loam | 12 | 60 | 28 | 2.0 - 6.0 | 0 to 126 inches. There is no water table within 126 inches. |
| | slopes | 13-25 | sandy loam | 8 | 70 | 22 | 2.0 - 6.0 | Permeability is going to be as fast as the slowest horizon; for |
| | | 25-66 | loamy sand | 10 | 65 | 25 | 6.0 - 20.0 | this test hole that horizon would be from 101 to 126 inches. |
| | | 66-101 | sandy loam | 10 | 75 | 15 | 2.0 - 6.0 | |
| I | | 101-126 | sandy clay loam | 2 | 95 | 3 | 0.6 - 2.0 | |

| | NRCS Soil | Depth | | | | | Permeability | |
|------|----------------------------|-----------------|-------------------|--------|--------|--------|--------------|---|
| Hole | Description | (inches) | Soil Texture | % Clay | % Sand | % Silt | (in./hr.) | Notes |
| 6 | BIB - Bijou loamy | 0-5 | sandy loam | 8 | 75 | 17 | 2.0 - 6.0 | This test hole was dug using the Giddings hydraulic probe from |
| | sand, 1-3% | 5-12 | sandy loam | 8 | 75 | 17 | 2.0 - 6.0 | 0 to 125 inches. There is no water table within 125 inches. |
| | slopes | 12-23 | loamy sand | 4 | 80 | 16 | 6.0 - 20.0 | Permeability is going to be as fast as the slowest horizon; for |
| | | 23-40 | clay loam | 30 | 30 | 40 | 0.2 - 0.6 | this test hole that horizon would be from 23 to 40 inches. |
| | | 40-55 | fine sandy loam | 18 | 55 | 27 | 2.0 - 6.0 | |
| | | 55-76 | sandy loam | 12 | 70 | 18 | 2.0 - 6.0 | |
| | | 76-125 | loamy coarse sand | 4 | 90 | 6 | 6.0 - 20.0 | |
| 7 | VcD - Valent | 0-14 | sandy clay loam | 23 | 55 | 22 | 0.6 - 2.0 | This test hole was dug using the Giddings hydraulic probe from |
| | sand, 3-9% | 14-20 | fine sandy loam | 8 | 72 | 20 | 2.0 - 6.0 | 0 to 108 inches. Permeability is going to be as fast as the |
| | slopes | 20-57 | sandy clay loam | 32 | 54 | 14 | 0.6 - 2.0 | slowest layer/horizon; for this test hole that horizon would be |
| | | 57-81 | loamy fine sand | 4 | 85 | 11 | 6.0 - 20.0 | from 81 to 90 inches. |
| | | 81-90 | clay | 45 | 33 | 22 | 0.06 - 0.20 | |
| | | 90-108 | loamy fine sand | 3 | 85 | 12 | 6.0 - 20.0 | |
| 8 | VcD - Valent | 0-21 | loamy fine sand | 5 | 80 | 15 | 6.0 - 20.0 | This test hole was dug using the Giddings hydraulic probe from |
| | sand, 3-9% | 21-42 | sandy loam | 7 | 70 | 23 | 2.0 - 6.0 | 0 to 98 inches. Permeability is going to be as fast as the |
| | slopes | | loamy sand and | | | | | slowest layer/horizon; for this test hole that horizon would be |
| | | 42-98 | coarse sand | 2 | 88 | 10 | 6.0 - >20.0 | from 21 to 42 inches. |
| 9 | BIB - Bijou loamy | 0-11 | loamy sand | 3 | 85 | 12 | 6.0 - 20.0 | This test hole was dug using the Giddings hydraulic probe from |
| | sand, 0-1% | 11-25 | sandy clay loam | 24 | 65 | 11 | 0.6 - 2.0 | 0 to 98 inches. Permeability is going to be as fast as the |
| | slopes | 25-62 | loamy fine sand | 4 | 84 | 12 | 6.0 - 20.0 | slowest layer/horizon; for this test hole that horizon would be |
| | | 62-92 | silt loam | 24 | 25 | 51 | 0.6 - 2.0 | from 11 to 25 inches. |
| | | 92-98 | fine sand | 1 | 95 | 4 | >20 | |
| 10 | BIB - Bijou loamy | 0-9 | sandy loam | 6 | 75 | 19 | 2.0 - 6.0 | This test hole was dug using the Giddings hydraulic probe from |
| | sand, 0-1% | 9-39 | loamy fine sand | 3 | 83 | 14 | 6.0 - 20.0 | 0 to 87 inches. There is a water table at 74 inches. |
| | slopes | 39-74 | clay | 43 | 30 | 27 | 0.06 - 0.20 | Permeability is going to be as fast as the slowest layer/horizon; |
| | | 74-87 | coarse sand | 1 | 95 | 4 | >20 | for this test hole that horizon would be from 39 to 74 inches. |
| 11 | VcD - Valent sand, 3-9% | 0-37 | loamy sand | 3 | 85 | 12 | 6.0 - 20.0 | This test hole was dug using the Giddings hydraulic probe from 0 to 63 inches. There is a perched water table at 41 to 63 |
| | slopes | 37-51 | sandy clay loam | 32 | 55 | 13 | 0.6 - 2.0 | inches. Redoximorphic features are present from 25 to 63 |
| | зюроз | 51-63 | loamy sand | 3 | 85 | 12 | 6.0 - 20.0 | inches. Permeability is going to be as fast as the slowest |
| | | - | , | | | | | layer/horizon; for this test hole that horizon would be from 63+ |
| | | 63+ | silty clay | 65 | 5 | 30 | < 0.06 | inches. |
| 12 | VcD - Valent | 0-4 | sand | 1 | 95 | 4 | > 20.0 | This test hole was dug using the Giddings hydraulic probe from |
| 12 | sand, 3-9% | 4-9 | loamy sand | 4 | 90 | 6 | 6.0 - 20.0 | 0 to 121 inches. There is no water table within 121 inches. |
| | _1 | - -3 | idaniy danu | 4 | 90 | U | 0.0 - 20.0 | Description to action to be an fact on the classical business for |

| | NRCS Soil | Depth | | | | | Permeability | |
|------|-------------------|----------|-------------------|--------|--------|--------|--------------|---|
| Hole | Description | (inches) | Soil Texture | % Clay | % Sand | % Silt | (in./hr.) | Notes |
| | siopes | 9-19 | sandy loam | 10 | 75 | 15 | 2.0 - 6.0 | Permeability is going to be as fast as the slowest norizon; for |
| 1 | | 19-46 | sandy loam | 16 | 70 | 14 | 2.0 - 6.0 | this test hole that horizon would be from 63 to 70 inches. |
| | | 46-63 | loamy sand | 6 | 90 | 4 | 6.0 - 20.0 | |
| | | 63-70 | clay loam | 32 | 33 | 35 | 0.2 - 0.6 | |
| | | 70-121 | loamy coarse sand | 3 | 90 | 7 | 6.0 - 20.0 | |
| 13 | Truckton loamy | 0-33 | sandy loam | 14 | 72 | 14 | 2.0 - 6.0 | This test hole was dug using the Giddings hydraulic probe from |
| | sandy, 3-5% | 33-66 | clay | 40 | 35 | 25 | 0.06 - 0.20 | 0 to 81 inches. Permeability is going to be as fast as the |
| | slopes | | , | | | | | slowest layer/horizon; for this test hole that horizon would be |
| 1 | | 66-81 | loamy coarse sand | 3 | 85 | 12 | 6.0 - 20.0 | from 33 to 66 inches. |
| 14 | TuC - Truckton | 0-60 | loamy sand | 5 | 80 | 15 | 6.0 - 20.0 | This test hole was dug using the Giddings hydraulic probe from |
| | loamy sandy, 3- | 60-85 | clay loam | 38 | 25 | 37 | 0.06 - 0.20 | 0 to 98 inches. Permeability is going to be as fast as the |
| | 5% slopes | | | _ | | | | slowest layer/horizon; for this test hole that horizon would be |
| | | 85-98 | coarse sand | 2 | 90 | 8 | >20 | from 60 to 85 inches. |
| 15 | VcD - Valent | 0-49 | loamy fine sand | 3 | 80 | 17 | 6.0 - 20.0 | This test hole was dug using the Giddings hydraulic probe from |
| | sand, 3-9% | 49-60 | sandy clay loam | 24 | 52 | 24 | 0.6 - 2.0 | 0 to 95 inches. Permeability is going to be as fast as the |
| | slopes | 60-87 | sandy loam | 14 | 68 | 18 | 2.0 - 6.0 | slowest layer/horizon; for this test hole that horizon would be |
| | | 87-95 | sandy clay loam | 33 | 52 | 15 | 0.6 - 2.0 | from 49 to 60 inches and 87 to 95 inches. |
| 16 | VcD - Valent | 0-7 | sandy loam | 10 | 70 | 20 | 2.0 - 6.0 | This test hole was dug using the Giddings hydraulic probe from |
| | sand, 3-9% | 7-15 | sandy loam | 10 | 70 | 20 | 2.0 - 6.0 | 0 to 121 inches. There is no water table within 121 inches. |
| | slopes | 15-34 | clay loam | 32 | 33 | 35 | 0.2 - 0.6 | Permeability is going to be as fast as the slowest horizon; for |
| | | 34-57 | sandy loam | 10 | 75 | 15 | 2.0 - 6.0 | this test hole that horizon would be from 15 to 34 inches. |
| | | 57-121 | loamy coarse sand | 6 | 84 | 10 | 6.0 - 20.0 | |
| 17 | BIA - Bijou loamy | 0-5 | loamy sand | 6 | 80 | 14 | 6.0 - 20.0 | This test hole was dug using the Giddings hydraulic probe from |
| | sand, 0-1% | 5-11 | sandy loam | 8 | 75 | 17 | 2.0 - 6.0 | 0 to 124 inches. There is no water table within 124 inches. |
| | slopes | 11-29 | sandy clay loam | 22 | 65 | 13 | 0.6 - 2.0 | Permeability is going to be as fast as the slowest horizon; for |
| | | 29-50 | sandy clay loam | 32 | 48 | 20 | 0.2 - 0.6 | this test hole that horizon would be from 11 to 50 inches. |
| | | 50-64 | sand | 2 | 95 | 3 | > 20.0 | |
| | | 64-104 | coarse sand | 2 | 95 | 3 | > 20.0 | |
| | | 104-124 | coarse sandy loam | 18 | 65 | 17 | 2.0 - 6.0 | |
| 18 | VcD - Valent | 0-11 | loamy sand | 3 | 87 | 10 | 6.0 - 20.0 | This test hole was dug using the Giddings hydraulic probe from |
| 10 | sand, 3-9% | 11-18 | loamy sand | 3 | 87 | 10 | 6.0 - 20.0 | 0 to 123 inches. There is no water table within 123 inches. |
| 1 | slopes | 18-29 | loamy sand | 5 | 85 | 10 | 6.0 - 20.0 | Permeability is going to be as fast as the slowest horizon; for |
| _ | - | | • | | | | 6.0 - 20.0 | this test hole that horizon would be from 79 to 103 inches. |
| 1 | | 29-51 | loamy fine sand | 3 | 87 | 10 | 6.0 - 20.0 | the test hele that helizen wedie be from 70 to 100 mones. |

| | NRCS Soil | Depth | | | | | Permeability | |
|------|-------------------|----------|-------------------|--------|--------|--------|--------------|---|
| Hole | Description | (inches) | Soil Texture | % Clay | % Sand | % Silt | (in./hr.) | Notes |
| | | 79-103 | sandy loam | 8 | 80 | 12 | 2.0 - 6.0 | |
| | | 103-123 | loamy sand | 3 | 87 | 10 | 6.0 - 20.0 | |
| 19 | BIA - Bijou loamy | 0-5 | sandy loam | 10 | 65 | 25 | 2.0 - 6.0 | This test hole was dug using the Giddings hydraulic probe from |
| | sand, 0-1% | 5-25 | loamy sand | 5 | 85 | 10 | 6.0 - 20.0 | 0 to 122 inches. There is no water table within 122 inches. |
| | slopes | 25-37 | loamy sand | 3 | 85 | 12 | 6.0 - 20.0 | Permeability is going to be as fast as the slowest horizon; for |
| | | 37-42 | loamy sand | 7 | 80 | 13 | 6.0 - 20.0 | this test hole that horizon would be from 42 to 71 inches. |
| | | 42-71 | sandy clay loam | 22 | 65 | 13 | 0.6 - 2.0 | |
| | | 71-92 | coarse sandy loam | 18 | 70 | 12 | 2.0 - 6.0 | |
| | | 92-111 | loamy coarse sand | 3 | 85 | 12 | 6.0 - 20.0 | |
| | | 111-122 | coarse sand | 1 | 95 | 4 | > 20.0 | |
| 20 | VcD - Valent | 0-8 | loamy sand | 4 | 85 | 11 | 6.0 - 20.0 | This test hole was dug using the Giddings hydraulic probe from |
| | sand, 3-9% | 8-17 | loamy sand | 4 | 85 | 11 | 6.0 - 20.0 | 0 to 114 inches. There is no water table within 114 inches. |
| | slopes | 17-33 | clay loam | 30 | 35 | 35 | 0.2 - 0.6 | Permeability is going to be as fast as the slowest horizon; for |
| | | 33-63 | sandy loam | 8 | 75 | 17 | 2.0 - 6.0 | this test hole that horizon would be from 17 to 33 inches. |
| | | 63-114 | loamy sand | 5 | 90 | 5 | 6.0 - 20.0 | |
| 21 | | 0-6 | loamy sand | 3 | 95 | 2 | 6.0 - 20.0 | This test hole was dug using the Giddings hydraulic probe from |
| | | 6-14 | loamy sand | 3 | 95 | 2 | 6.0 - 20.0 | 0 to 114 inches. There is no water table within 114 inches. |
| | VcD - Valent | 14-29 | sand | 2 | 96 | 2 | > 20.0 | Permeability is going to be as fast as the slowest horizon; for |
| | sand, 3-9% | 29-99 | sand | 2 | 96 | 2 | > 20.0 | this test hole that horizon would be from 0 to 14 inches. |
| | slopes | 99-114 | sand | 1 | 97 | 2 | > 20.0 | |
| 22 | VcD - Valent | 0-87 | loamy sand | 4 | 83 | 13 | 6.0 - 20.0 | This test hole was dug using the Giddings hydraulic probe from |
| | sand, 3-9% | 0 01 | loanly dana | | 00 | 10 | 0.06 - 0.20 | 0 to 98 inches. There is no water table within 98 inches. |
| | slopes | | | | | | 0.00 0.20 | Permeability is going to be as fast as the slowest horizon; for |
| | | 87-98 | clay loam | 38 | 42 | 20 | | this test hole that horizon would be from 87 to 98 inches. |



APPENDIX B

Monitoring Well Construction Reports

| Form No. GWS-31 02/2017 | 1313 | Sherman St., R | orado, Office Room 821, De | | Fo | or Office Use | Only | | |
|-------------------------------|---|---------------------|-------------------------------|-------------------|--|--------------------------|-------------------|---------------------|--|
| 1. Well Perm | it Number: Kinn | | | t Number: 00 | The second secon | - | | | |
| 2. Owner's W | 'ell Designation: | larine, | ,,,,,,,,, | t Humber, oo | 75837 A | - | | | |
| | er Name: United Sta | ates Bureau of I | Reclamation | | | - | | | |
| | ion Street Address | | rectarración. | | | - | | | |
| | | | one 12 🔳 Z | one 13 Eastir | ng: 572238 Northing: | 1116-1014 | | | |
| 6. Legal Well | Location:1 | /4,1/4, | Sec., | Twp. | N or S , Range | F | or W | P.M. | |
| County: _ Subdivision: _ | | | | | , Lot, Block | , Fil | ling (Unit) | | |
| 7. Ground Sui | rface Elevation:_ | 4433 fee | et Date Cor | mpleted: _ 4 | 6/6/17 Drilling Meth | nod: Hollow S | tem Auger | | |
| Completed | Aquifer Name : | South Platte All | luvium | Total Depth: | 20 feet Den | oth Complete | d. 20 | feet | |
| 9. Advance No | otification: Was N | otification Req | uired Prior to | Construction | n? Yes No, Date N | otification Giv | /en: | _ ,,,,,, | |
| 10. Aquifer T | ype: Type I | (One Confining | Layer) | Type I | (Multiple Confining Layers) | Laramie | | | |
| (Check or | | (Not overlain b | y Type III) | | (Overlain by Type III) | | (alluvial/coll | uvial) | |
| 11. Geologic | Log: | | | | 12. Hole Diameter (in.) | | m (ft) | To (ft) | |
| Depth | Туре | Grain Size | Color | Water Loc. | | | 0 | ZO | |
| 0-5' | gilty loam | 0.1 | gray | | 4.25 ID | - | 0 | 20 | |
| 5-10' | Silty sand | 0,2 | 1 | 51 | | | 0 | 20 | |
| 10-15' | silly gravel | <0.01,0.4 | | | 13. Plain Casing | | | | |
| 15-20' | silty gravel | 60.01,0.4 | 1 | | | Wall Size (in) Sch 40 | From (ft) | To (ft) | |
| | | | | | | JC11 40 | 3 | 5 | |
| | | | | | | | | | |
| | | | | | | | | | |
| | 1 | | | | Perforated Casing Screen | een Slot Size (| (in): 0.01 | | |
| | | | | | | Wall Size (in) | | To (ft) | |
| | 1 | | | | 2.25 PVC | Sch 40 | 5 | 20 | |
| | | | | | | | 2 | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | 14. Filter Pack: | 15. Pack | er Placemer | nt: | |
| | | | 4 | | Material washed silica sa | | No. of the second | | |
| 11 11 11 | 1 | | | | Size 10/20 | | | | |
| | | le | | | Interval 3 - Zo | Depth | | | |
| | | | | | 16. Grouting Record | 1 = Figure | | | |
| | | | | | Material Amount | Density | Interval | Method | |
| Remarks: | _/ | 100 | | | | | | | |
| 1 1 | 3 steel e | asing stic | ik up, | | | | | | |
| benton | lite seal, | concrete | pad | | | | | | |
| 17. Disinfecti | ion: Type | | | | Amt. Used | | | | |
| | Estimate Data: | | Check b | ox if Test Dat | ta is submitted on Form Nur | mber GWS-39, | Well Yield T | est Report | |
| | Estimate Method: | - | 101 | | | | | | |
| Static Leve | | | | Estimated Y | /ield (gpm) | | | | |
| Date/Time | measured:6 | 19/17 | | Estimate Le | ength (hrs) | | | | |
| Remarks: | | | | | | | | | |
| 19. I have read t | the statements made h | herein and know th | he contents the | ereof, and they | are true to my knowledge. This n Rules, 2 CCR 402 2. The filing | document is sig | ned (or name e | entered if | |
| statements is a vi | iolation of section 37 or er considers the entry | 91 108(1)(e), C.R.: | S., and is punis | shable by fines u | up to \$1,000 and/or revocation of | of the contractin | nat contains id | lise ling online | |
| Company Name | e: | | Email: | | Phone w/area | code | License Nur | har | |
| Ducks Unlimite | | | kwarner@du | icks.org | | 97-7279 | License Nui | mber: | |
| | s: 1825 Sharp Point | Drive Fort Col | And a second second second | | 1 1 1 | | | | |
| | name if filing online | | | ne and Title | and Title | | | | |
| 1.111 | — Thing only | -, | | | | | | | |
| 19ller | | | Kevin Wa | irrier, PE | | | 07/14/2017 | | |

| Form No. GWS-31 02/2017 | 1313 | WELL CONSTRI State of Col 3 Sherman St., F ww.water.state | lorado, Office Room 821, Dei | of the State enver, CO 8020 | Engineer 03 303.866.3 | 581 us | | For | r Office Use | Only |
|-------------------------------|--|--|---------------------------------|--------------------------------|--------------------------|-----------------|-----------|--------------|------------------------------|------------|
| 1. Well Permi | | naman - 2 | | Number: 00 | | | - | | | |
| | /ell Designation: | naman - | - Modelpe | Number: 00. | 2002/12 | | | | | |
| | er Name: United Sta | ates Bureau of | Reclamation | | | | | | | |
| | tion Street Address | | ncctaniación. | | | | | | | |
| | | | one 12 7 | one 13 Eastir | 10: 57712 | 2-Northing: | 446 | 1449 | | |
| 6. Legal Well | PS Well Location (r Location:1 | /4,1/4 | Sec., | Twp. | Norsi | Range | 770 | T E O | r W | P.M. |
| County: _ | | | | | | | | | | , |
| 7. Ground Sur | rface Elevation: | 4427 fe | et Date Cor | moleted: 6 | 10/17 | Deilling Ma | .Lade | Hallow Ct | ing (Unit) | |
| 8. Completed | Aquifer Name : | South Platte Al | luvium . | Total Depth: | 17/17 | | | | | F. 122 |
| | otification: Was N | | | Construction | 2 T Vos T | TAIG Date | Sptn Co | ompleted | d: | _ feet |
| 10. Aquifer Ty | vpe: Type I | (One Confining | Laver) | Trype L | Multiple Conf | fining Laver | Notific | li aramio | en: | |
| (Check on | | (Not overlain b | ny Type III) | Type II | Multiple com | Tune III) | | | -Fox Hills (alluvial/coll | |
| 11. Geologic | Log: | (Hot Oronaus 2 | y type iii, | Пі урс п | 12. Hole Di | | | | n (ft) | |
| Depth | Туре | Grain Size | Color | Water Loc. | | 25 OD | .) | | | To (ft) |
| 0-5' | Coarse sand | 0-2 | +an | Water Loc. | _ | 25 ID | - | | | 30 |
| 5-10' | coarse sand | 0.2 | 1 | 6' | 7 | 25 10 | - | | 0 | 30 |
| 10-15' | | 0.1 | 1 | 6 | 13. Plain Ca | esing | | | | |
| 15-20' | 5illy sand | 40.1 | gray | | OD (in) | | Wall | Size (in) | From (ft) | To (ft) |
| 20-25' | silly sand | < 0.1 | 1 | | 2.25 | PVC | | th 40 | Prom (It) | 5 |
| 25-30' | silly sand | <0./ | | | 97.5 | 1.00 | | 11 40 | 0 | 3 |
| | - | | - | | - | | | | | |
| | | | | | | | _ | | | |
| | | | | | Perforate | ed Casing S | croon S | Lat Size (| in): <u>0.01</u> | |
| - | | | | | OD (in) | Kind | | Size (in) | | To (ft) |
| | | | | | 2.25 | PVC | | h 40 | 5 From (IL) | 30 |
| | | | | | | 114 | 30. | 140 | | 30 |
| | | | | | - | | | | | |
| | | | | | - | | | | | |
| | | | | | 14. Filter Pa | ack: | | 15 Pack | er Placemen | · · |
| | | | | | Material wa | | | Type | el riacemen | it. |
| | | | | | Size | 10/20 | - | Турс | | ic. |
| | | | | | Interval 3 | | | Depth | | |
| | | | | | 16. Grouting | | | рерит | | |
| | | | | | Material | Amount | De | ensity | Interval | Method |
| Remarks: | 1'9" steel | casing. | stick of | > | | | | | | |
| Den ton | The seal, | concret | e paa | | | | | | | |
| Distillectiv | I Estimate Data: | | | | Amt. Used | | - | | | |
| | Estimate Data: | | спеск в | ox if Test Data | a is submitted | d on Form N | umber | GWS-39, | Well Yield T | est Report |
| | | 0 | | Te | | | | | | |
| Static Leve | | | _ | | ield (gpm) | | | | | |
| | measured:6 | 19/17 | | Estimate Ler | ngth (hrs) | | | | | |
| Remarks: | | | | | | | | | | |
| 19. I have read t | the statements made h | nerein and know t | he contents the | reof, and they a | are true to my k | mowledge. The | nis docu | ment is sign | ned (or name e | entered if |
| filing online) and | certified in accordance | ce with Rule 17.4 | of the Water We | ell Construction | Rules, 2 CCR 4 | 02 2. The filir | ng of a c | document th | hat contains fa | lse |
| the State Engines | riolation of section 37 section 3 | 91 108(1)(e), C.K.: | S., and is punish | nable by fines u | p to \$1,000 and | or revocation | n of the | contracting | g license. If fil | ing online |
| | | | | to be computat | | | | | | |
| Company Name | | | Email: | -112 | | Phone w/ar | | | License Nur | mber: |
| Ducks Unlimite | 7.1.0 | | kwarner@dud | | | (970) | 297-72 | 279 | 4779 | 14 |
| | s: 1825 Sharp Point | | llins, CO 8052 | .5 | | | | | | |
| sign (or enter r | name if filing online | e) | Print Nam | ne and Title | | | | | Date: | |
| hollon | | | Kevin Wa | rner, PE | | | | 07/14/2017 | | |
| 1 100 | | | | | | | | | | |

| Form No. GWS-31 02/2017 | 1313 | WELL CONSTRUCTION AND YIELD ESTIMATE REPORT State of Colorado, Office of the State Engineer 1313 Sherman St., Room 821, Denver, CO 80203 303.866.3581 www.water.state.co.us and dwrpermitsonline@state.co.us | | | | | | | | | | |
|--|---|---|------------------|------------------|-----------------------|---------------|------------------|------------|-----------------|------------|--|--|
| 1. Well Permi | t Number: Kinn | man - 3 | Receipt | Number: 00 | 56857 | | - | | | | | |
| 2. Owner's We | ell Designation: | | жестре | riamber: 00 | 30037 C | | | | | | | |
| | r Name: United Sta | ates Bureau of | Reclamation | | | | | | | | | |
| | on Street Address | | rectarration | | C771-7 | | | | | | | |
| | S Well Location (r | | one 12 7 | one 13 Factir | 573603 | Morthing | 11461 | 920 | | | | |
| 6. Legal Well I | Location:1 | /4 1/4 | Sec Sec | Two | Nor C | M Northing. | 7-161 | 757 | M C | 5.0 | | |
| | | | , 500., | _ TWP | | , Range | | _IE or | w, | P.M. | | |
| Subdivision: _ | | | | | , Lot | -, Block - | | -, Filir | ng (Unit) | | | |
| 7. Ground Sur | face Elevation: 4 | 1426 fe | et Date Cor | mpleted: _ 6 | 15/17 | Drilling Me | thod: Ho | low Ste | em Auger | | | |
| 8. Completed | Aquifer Name : | South Platte Al | luvium | Total Depth: | 30 fe | eet D | epth Com | pleted: | 30 | feet | | |
| 9. Advance No | otification: Was N | otification Req | uired Prior to | Construction | ? Yes | No, Date | Notificati | on Give | en: | | | |
| 10. Aquifer Ty | /pe: Type I | (One Confining | Layer) | Type I | Multiple Conf | ining Laver | s) \square La | ramie-F | ox Hills | | | |
| (Check one | e) Type II | (Not overlain b | y Type III) | Type II | (Overlain by 1 | Type III) | | | lluvial/coll | (lvial) | | |
| 11. Geologic I | Log: | | | | 12. Hole Di | | | From | | To (ft) | | |
| Depth | Type | Grain Size | Color | Water Loc. | | 5 OD | ., | | 10.15 | 30 | | |
| 0-2' | Sundy loam | 0.01 | tan | mater Loc. | | 25 ID | | | | | | |
| Z-5' | Fine soul | 0.02 | 1 | | 4.4 | עו ני | - | 0 | , | 30 | | |
| | med sand | 0.1 | | 9' | 13. Plain Ca | sing | | | | | | |
| | med sand | 0.1 | | / | OD (in) | | Wall Cine | (3:-1 | C (6) | To (ft) | | |
| | coase sand | 0.2 | 1 | | 2.25 | Kind PVC | Wall Size | | From (ft) | | | |
| 20-25' | med. sand | 0.1 | | | 2.23 | FYC | 3CH 4 |) | 0 | 5 | | |
| 25-30' | med. sand | 0.1 | 1 | | 10- | | | | | | | |
| 23 50 | raca. sana | 0.7 | - | - | | | | | | | | |
| | | | | | - | | | | | | | |
| | - | | | | Perforate | | | | n):0.01_ | | | |
| | | | | | OD (in) | Kind | | | From (ft) | To (ft) | | |
| | | | | | 2.25 | PVC | Sch 40 |) | 5 | 30 | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | 14. Filter Pa | | | . Packe | r Placemen | it: | | |
| | | | | | Material wa | shed silica | sand Ty | pe | | | | |
| | | | | | Size | 10/20 | | | | | | |
| | | | | | Interval | 3-30 | De | pth | | | | |
| | | | | | 16. Grouting | Record | | | | _ | | |
| | | | | | Material | Amount | Densi | ty | Interval | Method | | |
| Remarks: | | | | | | | | 7. | | | | |
| | 3' 1" sh | cel casing | Stick | UP | | | | | | | | |
| bentonik | e scal, co | nerete | pad | , | | | | | | | | |
| 17. Disinfection | on: Type | | | | Amt. Used | | | | | | | |
| 18. Well Yield | Estimate Data: | | Check b | ox if Test Dat | a is submitted | on Form N | lumber GV | /S-39. \ | Well Yield To | est Report | | |
| Well Yield E | Estimate Method: | | | | 7 2 1 2 1 2 1 7 1 7 1 | | | 21233 | 11218 7 | out nopole | | |
| Static Level | 1: 9 | 37 | | Estimated Y | ield (gpm) | | | | | | | |
| Date/Time | measured: (| 19/17 | | | ngth (hrs) | | | | | | | |
| Remarks: | measured. | 1111 | | Estimate Le | ingeri (ilis) | | | | | | | |
| AND DESCRIPTION OF THE PERSON NAMED IN | ha statements J- 1 | araia and I | ha santant at | | | | | | | | | |
| filing online) and o | he statements made h certified in accordance | erein and know t | of the Water W | ereof, and they | are true to my k | nowledge. T | his documer | t is sign | ed (or name e | ntered if | | |
| statements is a vic | olation of section 37 | 91 108(1)(e), C.R. | S., and is punis | hable by fines u | n to \$1 000 and | or revocation | ng of a docu | ment th | at contains fa | lse | | |
| the State Engineer | r considers the entry | of the licensed co | intractor's name | e to be complia | nce with Rule 17 | .4. | ir or the con | tracting | ticense. If fit | ing online | | |
| | | | | - Frank | | | 50 F W. W. W. W. | | | | | |
| Company Name Ducks Unlimite | | | Email: | elie era | F | Phone w/ar | | | License Nur | | | |
| | | | kwarner@du | | | (970) | 297-7279 | Pa | 4779 | 7 | | |
| | : 1825 Sharp Point | | | | | | | | | | | |
| oign (or enter n | ame if filing online | e) | Print Nam | ne and Title | | | | -1 | Date: | | | |
| telle | | | Kevin Wa | rner, PE | | | | 07/14/2017 | | | | |
| 1/ | | | | | | | | 07/14/2017 | | | | |

| Form No. GWS-31 02/2017 | 1313 | | orado, Office Room 821, Der | of the State nver, CO 8020 | Engineer 03 303.866.3581 | Fo | or Office Use (| Only | |
|--|-----------------------------|---|------------------------------------|-----------------------------------|---|--|--------------------------------|------------|--|
| _ 27/27/1 | | | | | | | | | |
| | it Number: Coo | K-1 | Receipt | Number: 005 | 56857 D | | | | |
| | ell Designation: | | | | | | | | |
| | er Name: United Sta | | Reclamation | | | | | | |
| | ion Street Address | | | | THE WAR ALL | | | | |
| 5. As Built GP | S Well Location (re | equired): 🔲 Zo | one 12 🖸 Zo | one 13 Eastin | g: 576176,Northing: | 446781 | 09 | | |
| 6. Legal Well | Location:1 | /4,1/4, | Sec., | Twp. | N or S , Range | Ec | or W , | P.M. | |
| County: _ Subdivision: _ | | | | | , Lot, Block | Fil | ling (Unit) | | |
| 7 Cround Cur | of a Flauntian 1 | 1443 6 | . 54.6- | / | | , 11.11 | ing (onic) | | |
| 7. Ground Sui | race Elevation. | 1116 | et Date Con | iipieted: 6 | Jeiji + Drilling Met | nod: Hollow 3 | tem Auger | | |
| | Aquifer Name : | | | Total Depth: | | pth Completed | d: <u>4Z</u> | _ feet | |
| 9. Advance N | otification: was N | otification Requ | uired Prior to | | ? Yes No, Date N | | | | |
| 10. Aquifer T | | (One Confining | | | Multiple Confining Layers) | | | | |
| (Check or | | (Not overlain b | y Type III) | ☐Type II | (Overlain by Type III) | | (alluvial/coll | | |
| 11. Geologic | | | | | 12. Hole Diameter (in.) |) From | m (ft) | To (ft) | |
| Depth | Туре | Grain Size | Color | Water Loc. | 8.25 OD | | 0 | 42 | |
| 0-10' | fine sand | 0.01 | fan | | 4.25 ID | 7 7 | 0 | 42 | |
| 10-40' | silly med . sand | 0.2 | tan | 16' | | | | | |
| 40-42 | Shale | _ | black | | 13. Plain Casing | | | | |
| | | | | | OD (in) Kind 2.25 PVC | Wall Size (in) Sch 40 | From (ft) | To (ft) | |
| | | | | | 2.25 | JUI TO | | 2 | |
| | | | | | | | | | |
| | | | | | Perforated Casing Sc OD (in) Kind 2.25 PVC | reen Slot Size (Wall Size (in) Sch 40 | (in): <u>0.01</u> From (ft) | To (ft) | |
| | | | | | 14. Filter Pack: Material washed silica s Size 10/20 Interval 3-72 16. Grouting Record | The second second | ker Placemer | nt: | |
| Pomarks: 2 | Jell aleal o | | | | Material Amount | Density | Interval | Method | |
| bendanis. | 3'5"- steel conte seal, con | evete pad | ٥٢ | | 3 | | | | |
| | | | | | | | | | |
| 17. Disinfecti | | | Tet salet | | Amt. Used | | | | |
| AND A DESCRIPTION OF THE PROPERTY OF THE PROPE | d Estimate Data: | | Пспеск р | ox if Test Dat | a is submitted on Form Nu | umber GWS-39 | , Well Yield I | est Report | |
| | Estimate Method:, | | | 1 | | | | | |
| Static Leve | | 15 1 5 | | | rield (gpm) | | | | |
| Date/Time | e measured:6 | 130/17 | | Estimate Le | ngth (hrs) | | | | |
| Remarks: | | | | - | | | | | |
| filing online) and statements is a v | d certified in accordance | ce with Rule 17.4 91 108(1)(e), C.R. | of the Water W S., and is punis | ell Construction hable by fines u | are true to my knowledge. Th n Rules, 2 CCR 402 2. The filin up to \$1,000 and/or revocation nce with Rule 17.4. | ng of a document | that contains fa | alse | |
| Company Nam | | | Email: | 2. 3. | Phone w/are | | License Nu | | |
| Ducks Unlimit | 0-1-6 | | kwarner@du | 7.7.7.4.4 | (970) | 297-7279 | 477 | 94 | |
| Mailing Addres | ss: 1825 Sharp Point | Drive, Fort Col | llins, CO 8052 | 25 | | | | | |
| Sign (or enter | name if filing onlin | e) | Print Nam | ne and Title | | | Date: | | |
| Kellle | | | Kevin Wa | arner, PE | | | 07/14/2017 | | |

| Form No. GWS-31 02/2017 | 1313 | WELL CONSTRI State of Col Sherman St., F www.water.state | | For | Office Use | Only | | | |
|---|--|---|-------------------------------------|--------------------------------------|----------------------------------|------------------|--------------------------|-----------------|------------|
| 1. Well Permi | it Number: Co | 0K - 2 | Receipt | Number: 00 | 56857 E | | - | | |
| | ell Designation: | | Мостро | mamber 00. | 30037E | | - | | |
| 3. Well Owne | er Name: United Sta | tes Bureau of | Reclamation | | | | | | |
| 4. Well Locat | ion Street Address | : | | | | | THE | | |
| 5. As Built GP | S Well Location (re | equired): 🔲 Z | one 12 🖸 Zo | one 13 Eastin | g: 577275 | Northing: | 446 8889. | 1 | |
| 6. Legal Well | Location: 1 | 4,1/4 | , Sec., | _ Twp | Nors | , Range | E o | rw 🔲, | P.M. |
| | | | | | | | , Fili | | |
| 7. Ground Sui | rface Elevation: | 1443 fe | et Date Cor | mpleted: 6 | 121117 | Drilling Met | hod: Hollow St | em Auger | |
| Completed | Aquifer Name : 5 | outh Platte Al | luvium | Total Depth: | 26 fe | et Dei | oth Completed | : 26 | feet |
| 9. Advance N | otification: Was No | otification Req | uired Prior to | Construction | ? Yes | No, Date N | lotification Give | en: | |
| 10. Aquifer T | ype: Type I (| One Confining | Layer) | Type I (| Multiple Confi | ining Layers) | Laramie- | | |
| (Check or | | (Not overlain b | y Type III) | ☐Type II | (Overlain by T | ype III) | ■Type III (| alluvial/coll | uvial) |
| 11. Geologic | Log: | | | | 12. Hole Dia | ameter (in.) | | n (ft) | To (ft) |
| Depth | Туре | Grain Size | Color | Water Loc. | 8.2 | 5 OD | | 0 | 26 |
| 0-10' | silly fine sand | 0.01 | tan | | 4.2 | 25 ID | | 5 | 26 |
| 10-25 | silly med sand | 0.2 | ton | | 1 10 10 10 10 | | | | |
| 26 | shale | - | black | | 13. Plain Ca | sing | | | |
| | | | | | OD (in) 2.25 | Kind PVC | Wall Size (in) Sch 40 | From (ft) | To (ft) |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | d Casing Scr | een Slot Size (i | | T- /64) |
| | | | | | OD (in) | Kind PVC | Wall Size (in) | From (ft) | To (ft) |
| | | | | | 2.25 | PVC | Sch 40 | 5 | 26 |
| | | | | | | | | | |
| | | | | | 14. Filter Pa | ick: | 15. Pack | er Placemer | nt: |
| | | | | | Material wa | | and Type | | |
| | 1 | | | | Size | 10/20 | | | |
| | 7 | | | | Interval | 3-26 | Depth | | |
| | | | | | 16. Grouting Material | | Density | Interval | Method |
| | 10" - skel | | | | | | | | |
| bentonit | Le seal, con | ecrete pac | (| | | | | | |
| 17. Disinfecti | ion: Type | | | | Amt. Used | | | | |
| 18. Well Yield | Estimate Data: | | Check b | ox if Test Dat | | | ımber GWS-39, | Well Yield T | est Report |
| Well Yield | Estimate Method: | | | | | | | | est neport |
| Static Leve | el: 13.75 | | | Estimated Y | ield (gpm) | | | | |
| | measured: 6/ | 21117 | | | ngth (hrs) | | | | |
| Remarks: | 777 | | | Lottinate Le | | | | | |
| | the statements made h | perein and know t | he contents the | proof and thou | are true to my k | novelodas Thi | e document is six | | |
| filing online) and statements is a v | certified in accordance riolation of section 37 ser considers the entry | e with Rule 17.4 91 108(1)(e), C.R. | of the Water W .S., and is punis | ell Construction hable by fines u | Rules, 2 CCR 40 p to \$1,000 and | 02 2. The filing | g of a document the | hat contains fa | lse |
| Company Name | | | Email: | 7.7 | F | Phone w/are | | License Nur | |
| Ducks Unlimite | | | kwarner@du | | | (970) | 297-7279 | 477 | 94 |
| | s: 1825 Sharp Point | | llins, CO 8052 | 25 | | | | | |
| Sign (or enter | name if filing online | 2) | Print Nam | ne and Title | | | | Date: | |
| Kallh | / | | Kevin Wa | arner, PE | | 07/14/2017 | | | |

| Form No. GWS-31 02/2017 | 1313 : | Sherman St., R | orado, Office oom 821, Den | | For | Office Use (| Only | |
|--|---------------------|----------------------------------|-------------------------------|------------------|--|-------------------------------------|--------------|------------|
| 1. Well Permi | t Number: Coc | k-3 | Receipt | Number: 005 | 6857 F | | | |
| | ell Designation: | | | | 00377 | | | |
| | r Name: United Stat | es Bureau of F | Reclamation | | | | | |
| | on Street Address: | | 39 2441111111111111 | | | | | |
| 5. As Built GP: | S Well Location (re | equired): | one 12 🔳 Zo | ne 13 Easting | g: 577182, Northing: | 4467803 | M | |
| 6. Legal Well | Location:1/ | 4,1/4, | Sec., | _Twp | N or S , Range | E or | w 🔲, _ | P.M. |
| County: _ Subdivision: _ | | | | | , Lot, Block | , Filin | ng (Unit) | |
| 7. Ground Sur | face Elevation: 4 | 422 fee | et Date Com | pleted: 6/ | 21/17 Drilling Meth | od: Hollow Ste | m Auger | |
| 8. Completed | Aquifer Name : S | outh Platte All | uvium 7 | otal Depth: | 22 feet Dept | th Completed: | 22 | feet |
| 9. Advance No | otification: Was No | tification Requ | uired Prior to | Construction | ? Yes No, Date No | tification Give | n: | |
| 10. Aquifer Ty (Check on | | One Confining (Not overlain b | | | Multiple Confining Layers) Overlain by Type III) | Laramie-F Type III (a | | uvial) |
| 11. Geologic | Log: | | | | 12. Hole Diameter (in.) | From | (ft) | To (ft) |
| Depth | Туре | Grain Size | Color | Water Loc. | 8.25 OD | 0 | | 22 |
| 0-10' | fine sand | 0.01 | tan | | 4.25 ID | |) | 22 |
| 10-22 | 3. 1 y med. sand | 0.2 | tan | 梅13 | | | | |
| 22' | Shale | | black | | 13. Plain Casing | | | To (ft) |
| | | | | | OD (in) Kind V 2.25 PVC | Vall Size (in) Sch 40 | From (ft) | To (ft) |
| | | | | | - | | | |
| | | | | | Doufswated Casing 6 | | | |
| _ | | | | | Perforated Casing Scree | een Slot Size (ii Vall Size (in) | | To (ft) |
| | | | | | OD (in) Kind V 2.25 PVC | Sch 40 | From (ft) | 22 |
| | 7 | | | | 2.23 | 3011 40 | 2 | 22 |
| | | | | | | | | |
| | | | | | 14. Filter Pack: | | er Placemei | nt: |
| | | | | | Material washed silica sa | nd Type | | |
| | | | | | Size 10/20 | 1 0 00 | | |
| 1 | | | | | Interval 3-22 | Depth | | |
| | | | | | 16. Grouting Record Material Amount | Density | Interval | Method |
| Remarks: 2 | 19"-steel c | asing stick | k up | | - | | | |
| bentonit | e seal, cou | icrete pa | d | | | | | |
| 17. Disinfect | | | | | Amt. Used | | 1 4 7 4 1 | |
| | d Estimate Data: | | ☐Check b | ox if Test Dat | a is submitted on Form Nu | mber GWS-39, | Well Yield 7 | est Report |
| | Estimate Method: | | | _ | | | | |
| | el: 13.65 | | | | ield (gpm) | | | |
| Date/Time | e measured:6/ | 21/17 | | Estimate Le | ngth (hrs) | | | |
| Remarks: | | | | | | | | |
| the state of the s | | | | | are true to my knowledge. This n Rules, 2 CCR 402 2. The filing | | | |
| statements is a v | | 91 108(1)(e), C.R | .S., and is punis | hable by fines u | up to \$1,000 and/or revocation | | | |
| Company Nam | 101 | 4 -14 - 11 - 14 - 1 | Email: | | Phone w/area | a code. | License Nu | mber. |
| Ducks Unlimited, Inc. kwarner@ducks.c | | | | icks.org | | 297-7279 | | 94 |
| Mailing Address: 1825 Sharp Point Drive, Fort Collins, CO 8052 | | | | | 1.797 | | 1/// | 1 |
| Sign (or enter name if filing online) Print Name and | | | | | | | Date: | |
| 1/ | | | | arner, PE | | | | |
| Helle | | | I THE THE | minery to be | | 07/14/2017 | | |

| Form No. GWS-31 02/2017 | 1313 | WELL CONSTR State of Col Sherman St., F ww.water.state | | For Office Use Only | | | | | | |
|--|---------------------------|---|---------------------|---------------------|-------------------|-----------------|---------------------|-------------|--|-------------|
| 1. Well Permi | it Number: Lant | | | | | | | | | |
| 2. Owner's W | ell Designation: | - | песегре | Number: 00 | 15685/ 54 | | | | | |
| 3. Well Owne | r Name: United Sta | ites Bureau of | Reclamation | | | | - | | | |
| 4. Well Locati | ion Street Address | : | Nectaniación | | | | | | | |
| And the second s | S Well Location (re | | Zone 12 To | ne 13 Eastir | ng 591479 | - Northing | 446 | 2109 | 4 | |
| 6. Legal Well | Location: 1/ | /4,1/4 | . Sec., | Twp. | Nors | Range | 1.0 | F O | r W 🗔 | P.M. |
| County: | | | , | | | | | | , , | PW. |
| Subdivision: _ | | | | | Lot | Block _ | | Fili | ng (Unit) | |
| 7. Ground Sur | rface Elevation: 4 | 1399 fe | et Date Con | nleted: (| 112/17 | Drilling Me | thad: H | follow St | om Auger | |
| 8. Completed | Aquifer Name : S | South Platte Al | luvium T | otal Depth: | 100' | | | | : /00' | feet |
| | otification: Was No | | | Construction | n? T Yes T | TNo Date | Notifica | tion Give | . /00 | leet |
| 10. Aquifer Ty | ype: Type I (| (One Confining | Layer) | Птуре І | (Multiple Con | fining Lavers | 1 1 | | Fox Hills | |
| (Check on | | (Not overlain b | | | (Overlain by | | | | alluvial/collu | (leiva |
| 11. Geologic | | , Vi | 7 - 71 | — • 71 · • • | | iameter (in. |) | | n (ft) | To (ft) |
| Depth | Туре | Grain Size | Color | Water Loc. | | 25 OD | , | | 0 | |
| 0-5' | sandy loam | <0.01 | drk brwn | 0.8420 | _ | .25 ID | | | 0 | 100 |
| 5-20' | fine sand | 0.01 | tan | | - | ZJ ID | | | 5 | 100 |
| 20-98 | medium sand | 0.1 | tan | 50' | 13. Plain Ca | asing | | | | |
| 98-100 | shale | | black | | OD (in) | Kind | Wall Si | ze (in) | From (ft) | To (ft) |
| | | | | | 2.25 | | | | D | 35 |
| | | | | | | | Sch | | | |
| | | | | | | | | | | |
| = | | | 10 10 10 | | | | | | | |
| | | | | | Perforate | ed Casing Sc | reen Slo | ot Size (i | (n): 0.01 | |
| | | | | | OD (in) | Kind | Wall Si | 76 (in) | From (ft) | To (ft) |
| | | | | | 2.25 | PVC | Sch | | 35 | 4.00 |
| | | | | | - | | 501. | 10 | 30 | 100 |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | 14. Filter Pa | ack: | 1 | 5. Packe | er Placemen | ıt. |
| | | | | | | ashed silica s | | Туре | 21 1 Mac | |
| | 1 | | | | Size | 10/20 | | 1,700 | | |
| | | | | | Interval | 30-100 | i Ir | Depth | | |
| | | | | | 16. Groutin | | 1 | усрен. | | |
| | 1 | | | | Material | Amount | Den | nsity | Interval | Method |
| Remarks: 3 | 1" - Steel cas | sina stick | up | | | 100000 | 7.7 | 13.29 | ilitari i un | metriod |
| | | | | | | | | | | |
| | seal, con | crete pa | ٨ | | 1 | | | | | |
| 17. Disinfection | | | | | Amt. Used | d | | | | |
| | Estimate Data: | | Check bo | x if Test Dat | ta is submitte | | umber C | GWS-39, | Well Yield Te | est Report |
| Well Yield | Estimate Method: | | | A Train | W. W. W. | | | 23.0 | 11.77 | ose maps. |
| Static Leve | el: 49.31 | | | Estimated Y | /ield (gpm) | | | | | |
| Date/Time | measured: 6/ | 20/17 | | | ength (hrs) | | | | | |
| Remarks: | | | | | 115411 (1.1.5) | | | | | |
| | the statements made h | perein and know t | the contents ther | and thou | ara trua to mu l | leanile des Th | Act of a second | * A 145 GG. | ************************************** | |
| filing online) and | certified in accordance | e with Rule 17.4 | of the Water We | Il Construction | are true to my r | knowledge. IF | ils docum | ent is sign | led (or name el | ntered if |
| statements is a vi | iolation of section 37 9 | 91 108(1)(e), C.R. | .S., and is punisha | able by fines u | up to \$1,000 and | d/or revocation | of the c | ontracting | license. If file | ing online |
| he State Enginee | er considers the entry of | of the licensed co | ontractor's name | to be complia | nce with Rule 1 | 7.4. | | 0.12.22 | , treeriser | ilig Ontine |
| Company Name | 3: | | Email: | | | Phone w/are | an codo: | | It teamed Num | E.S. |
| Ducks Unlimite | | | kwarner@ducl | ks org | | | ea code: 297-727 | | License Nun | |
| | s: 1825 Sharp Point | Drivo Fort Co | | | | (,,,, | Z71-121 | 7 | 477 | 77 |
| | name if filing online | | | | | | | | T | |
| VIII | lattie it titting offune | 9 | Print Name | | | | | | Date: | |
| Millo | | Kevin War | Kevin Warner, PE | | | | | 07/14/2017 | | |

| Form No. GWS-31 | | WELL CONSTRUCTION AND YIELD ESTIMATE REPORT State of Colorado, Office of the State Engineer 1313 Sherman St., Room 821, Denver, CO 80203 303.866.3581 | | | | | | | For Office Use Only | | |
|--------------------|---------------------------|---|--------------------------------|-------------------|----------------------|--------------|--------------------------|-------------------|---------------------|--|--|
| 02/2017 | | Sherman St., R www.water.state. | | | | | | | | | |
| | it Number: Lan | | | | | | | | | | |
| | /ell Designation: | 72 - 2 | кесеірі | t Number: 005 | 56857 H | | | | | | |
| | er Name: United Sta | tos Rureau of I | Paclamation | | | | - | | | | |
| | tion Street Address | | Rectamation | | | | | | | | |
| | PS Well Location (re | | one 12 7 | one 13 Fastin | a. capt 96 | Northing: | 446091 | 2 | | | |
| 6. Legal Well | Location:1 | /4. 1/4. | Sec. | Twn | Nor S | 7 Range | 7760 // | or W | P.M. | | |
| | | | | | , Lot, | | | | 1 .m. | | |
| 7. Ground Sur | rface Elevation: | | | | | | | | | | |
| | Aquifer Name : S | | | | | t De | pth Complete | | feet | | |
| 9. Advance No | lotification: Was No | otification Reg | uired Prior to | Construction | 2 T Yes TNo | Date N | Intification Gi | u. // | _ leet | | |
| 10. Aquifer T | vne: Trype I | One Confining | Laver) | | Multiple Confini | | | | | | |
| (Check or | | (Not overlain b | | | (Overlain by Typ | | _ | (alluvial/coll | endal) | | |
| 11. Geologic | | (Not oreitain 2 | у турс ті, | урс п | 12. Hole Dian | | | m (ft) | | | |
| Depth | Type | Grain Size | Color | Water Loc. | | | | om (1t) | To (ft) | | |
| 0-5' | fine sand | 0.01 | tan | Water Loc. | | | | | 120 | | |
| 5-110' | medium sand | 0.1 | tan | 63' | 4.25 | ID | | 0 | 110 | | |
| 3-110 | MEATON SANG | 011 | 494 | 03 | 13. Plain Casir | | - | | _ | | |
| | | | | - | | - | Wall Ciza (in) | From (6t) | To (ft) | | |
| | - | | | | OD (in) 2.25 | Kind PVC | Wall Size (in) Sch 40 | | | | |
| | | | | - | | FVC | 3011 40 | 0 | 10 | | |
| | | - | | | - | | | | | | |
| | | | | | - | | | | | | |
| | | | | 1 | Parforated | Cooling C | | 44 44 | | | |
| | | | | | Perforated | | reen Slot Size | | To (ft) | | |
| | | | | | OD (in) | | Wall Size (in) | | To (ft) | | |
| | | | | | 2.25 | PVC | Sch 40 | 10 | 110 | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | V 1 = 2 | 14. Filter Pack | | JULY PERMIT | ker Placemer | nt: | | |
| | | | | | Material wash | | and Type | | | | |
| | . 1 | | | | Size | 10/20 | | | | | |
| | | | | | | 5-110 | Depth | | V | | |
| / = _ = 4 | | | | 10-1 | 16. Grouting R | Record | | | | | |
| | | 1 | | 1 | Material / | Amount | Density | Interval | Method | | |
| Remarks: | 3' steel sti | ckup | | | | | < | | | | |
| | | | 1- 2-1 | 1 | | | | | | | |
| | ntonite sea | 1, concre | te pad | | | | | | | | |
| 17. Disinfecti | | | | | Amt. Used | | | | | | |
| | d Estimate Data: | | Check b | ox if Test Dat | a is submitted o | on Form Nu | ımber GWS-39 | , Well Yield T | est Report | | |
| | Estimate Method: | - | | | | | | 174-1-1 | 225 | | |
| Static Leve | | | | Estimated Y | ield (gpm) | | | | | | |
| Date/Time | e measured: 6/1 | 9/17 | | Estimate Lei | ngth (hrs) | | | | | | |
| Remarks: | | | | | | | | | | | |
| | the statements made h | nerein and know t | he contents the | ereof, and they | are true to my kno | wledge. Th | is document is si | igned (or name (| ontered if | | |
| filing online) and | d certified in accordance | ce with Rule 17.4 | of the Water W | Vell Construction | Rules, 2 CCR 402 | 2. The filin | g of a document | that contains fa | alse | | |
| statements is a v | violation of section 37 9 | 91 108(1)(e), C.R.: | .S., and is punis | shable by fines u | ip to \$1,000 and/or | r revocation | of the contracti | ng license. If fi | iling online | | |
| the State Engine | er considers the entry | of the licensed co | ontractor's nam | e to be complia | nce with Rule 17.4 | 1. | | | | | |
| Company Name | ie: | | Email: | | Ph | one w/are | a code. | License Nu | mhor: | | |
| Ducks Unlimit | | | kwarner@du | ucks.org | | | 297-7279 | | 794 | | |
| | ss: 1825 Sharp Point | Drive Fort Co | IN THE RESERVE OF THE PARTY OF | - | | (*, | 227 727 | 17 | 7/7 | | |
| | name if filing online | | | ne and Title | | | | In-te- | | | |
| VIII | Harne II Titting Official | 2) | | | | | | Date: | | | |
| 10/1/1 | | Kevin Wa | arner, PE | | | 07/14/2017 | | | | | |

| Form No. GWS-31 02/2017 | 1313 ww | For | For Office Use Only | | | | | | | |
|--|--|--|---------------------------------------|--------------------------------------|--|---|----------------|-----------------|-------------|--|
| 1. Well Perm | nit Number: Lant | | | Number: 00! | ne@state.co.us | | | | | |
| | Vell Designation: | 4-3 | кесегрс | Number: 00: | 5685/1 | | | | | |
| | er Name: United Sta | stor Rureau of | Paclamation | | | | | | | |
| | tion Street Address | | Rectamation | | | | | | | |
| | THE RESERVE THE PROPERTY OF THE PARTY OF THE | | Zeno 12 - 7e | - 12 Fastin | C4-100 1 | | 11100 | | | |
| 6 Legal Well | PS Well Location (rel Location:1/ | 74 1/A | one IZ F Zor | ne 13 Eastin | 1g: 390172m | Northing: 47 | 6/885 | M | 2.11 | |
| | | | | | , Lot, | | | | P.M. | |
| 7. Ground Su | rface Elevation: 4 | 4401 fee | et Date Com | npleted: 6 | /13/17 Dr | illing Method | : Hollow St | tem Auger | | |
| | d Aquifer Name : S | | | otal Depth: | | Depth | Completed | : 112 | feet | |
| 9. Advance N | Notification: Was No | otification Req | uired Prior to | Construction | n? Yes No | , Date Notif | ication Giv | en: | | |
| 10. Aquifer T | Type: Type I (| (One Confining | Layer) | Type I (| (Multiple Confini | ng Layers) [| Laramie- | | | |
| (Check or | | (Not overlain b | by Type III) | | (Overlain by Typ | | | (alluvial/col | luvial) | |
| 11. Geologic | | | | | 12. Hole Diam | | Fron | | To (ft) | |
| Depth | Туре | Grain Size | Color | Water Loc. | | | 1 377 | 0 | 112 | |
| 0-5' | sandy loam | <0.01 | drk bran | 71.00 | 4.25 | | - | 0 | 112 | |
| 5-112 | medium sand | | tan | 45 | | 10 | - | - | 116 | |
| 112 | Shale | - | black | 10 | 13. Plain Casin | ng | _ | | | |
| 1 | | | - Inon | | OD (in) | | l Size (in) | From (ft) | To (ft) | |
| | | | | - | 2.25 | Letter 1 | Sch 40 | | | |
| | + | | | | 2.20 | FYC . |)CII 40 | 0 | 12 | |
| | | - | | - | | | | | | |
| | | | | | | | | | | |
| | + | | | | | | | | | |
| | - | | | | Perforated 0 | Casing Screen | Slot Size (| in):0.01 | | |
| | | | | | OD (in) | Kind Wall | l Size (in) | From (ft) | | |
| | | | | 1 | 2.25 | PVC S | ich 40 | 12 | 112 | |
| | | | | | | | | | -67 | |
| | | | | | | | | | | |
| | | | | | 2 | | | | | |
| | | 1 | | | 14. Filter Pack | | 15. Pack | er Placeme | nt: | |
| | | | 1 | | Material washe | ed silica sand | Type | | 1350 | |
| | | | | | Size | 10/20 | 13.0 | | • | |
| | | 0 = 1 | | | | 7-112 | Depth | | | |
| | | () | | | 16. Grouting Re | | Depa. | | H-1 | |
| | | | | - | | | Doneity | Intonual | Hathod | |
| Remarks: 2 | 1111 040-10 | etik | 4 .0 | | - Material . | Amount , | Density | Interval | Method | |
| د الما | 3'1"- Steel co | asing sin | and and | | | | | | | |
| benion | THE SEAT | CONCICT | - paris | | 12=== | | | | | |
| 17. Disinfecti | | | | | Amt. Used | | | | | |
| | d Estimate Data: | | Check bo | x if Test Dat | ta is submitted or | n Form Numbe | er GWS-39, | Well Yield | Test Report | |
| | Estimate Method: | | | | | | | | 4.00 | |
| Static Leve | el: 45.65 | 7 | | Estimated Y | 'ield (gpm) | | | | | |
| Date/Time | e measured: 6/19 | | | | ngth (hrs) | | | | | |
| Remarks: | Charita ham = 14 | | | CROWN MALLEY | | | | | | |
| THE RESERVE THE PARTY OF THE PA | the statements made h | porein and know t | the contents ther | roof and thou | ara trua to mu know | Index This do | - to also | | | |
| filing online) and statements is a v | d certified in accordance violation of section 37 9 | ce with Rule 17.4 (91 108(1)(e), C.R.: | of the Water We .S., and is punish | ell Construction hable by fines u | n Rules, 2 CCR 402 2 up to \$1,000 and/or | The filing of a revocation of the | a document the | hat contains fa | alse | |
| the State Enginee | er considers the entry of | of the licensed co | intractor's name | to be complian | nce with Rule 17.4. | M. P. S. B. Steine Steiner Vo. | 13.73. | 5 (100) | Milis 4.1 | |
| Company Name | | | Email: | 13.12 | Phone w/area code: License Numbe | | | ımber: | | |
| Ducks Unlimite | 2 7 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | | kwarner@duc | 1000 | | (970) 297- | 7279 | 1477 | 794 | |
| | ss: 1825 Sharp Point | | llins, CO 80525 | 5 | | | | | | |
| Sign (or enter | name if filing online | e) | Print Name | e and Title | | | | Date: | | |
| Kettla | | | Kevin War | Kevin Warner, PE | | | | 07/14/2017 | | |

For Office Use Only WELL CONSTRUCTION AND YIELD ESTIMATE REPORT Form No. State of Colorado, Office of the State Engineer **GWS-31** 1313 Sherman St., Room 821, Denver, CO 80203 303.866,3581 02/2017 www.water.state.co.us and dwrpermitsonline@state.co.us 1. Well Permit Number: Lantz - 4 Receipt Number: 0056857 3 2. Owner's Well Designation: 3. Well Owner Name: United States Bureau of Reclamation 4. Well Location Street Address: 5. As Built GPS Well Location (required): Zone 12 Zone 13 Easting: 588405 Northing: 4458450 n
6. Legal Well Location: 1/4, 1/4, Sec., Twp. Nor S , Range E or W , County: Subdivision: 7. Ground Surface Elevation: 4450 feet Date Completed: 6/22/17 Drilling Method: Hollow Stem Auger 8. Completed Aquifer Name: South Platte Alluvium 98 feet Total Depth: Depth Completed: 9. Advance Notification: Was Notification Required Prior to Construction? Yes No. Date Notification Given: 10. Aquifer Type: Type I (One Confining Layer) Type I (Multiple Confining Layers) Laramie-Fox Hills (Check one) ☐ Type II (Not overlain by Type III) Type II (Overlain by Type III) ■ Type III (alluvial/colluvial) 11. Geologic Log: 12. Hole Diameter (in.) From (ft) To (ft) Depth Type Grain Size Color Water Loc. 8.25 OD 43 0 0-10' silly fine sand 20.01 drk brun 4.25 ID 43 10-98' silly sound 20.00 13' dek bown 98' shale black 13. Plain Casing OD (in) Kind Wall Size (in) From (ft) To (ft) PVC 2.25 Sch 40 Perforated Casing Screen Slot Size (in): 0.01 To (ft) OD (in) Kind Wall Size (in) From (ft) PVC 2.25 Sch 40 5 43 14. Filter Pack: 15. Packer Placement: Material washed silica sand Type 10/20 Size 3-43 Interval Depth 16. Grouting Record Material Amount Density Interval Method Remarks: 3' steel casing strekup. Hole collapsed to 43' and was bentonite seal, concrete pad aset accordingly 17. Disinfection: Type Amt. Used Check box if Test Data is submitted on Form Number GWS-39, Well Yield Test Report 18. Well Yield Estimate Data: Well Yield Estimate Method: Static Level: ______/3 Estimated Yield (gpm) Date/Time measured: 6/22/17 Estimate Length (hrs) Remarks: 19. I have read the statements made herein and know the contents thereof, and they are true to my knowledge. This document is signed (or name entered if filing online) and certified in accordance with Rule 17.4 of the Water Well Construction Rules, 2 CCR 402 2. The filing of a document that contains false statements is a violation of section 37 91 108(1)(e), C.R.S., and is punishable by fines up to \$1,000 and/or revocation of the contracting license. If filing online the State Engineer considers the entry of the licensed contractor's name to be compliance with Rule 17.4. Company Name: Email: Phone w/area code: License Number: Ducks Unlimited, Inc. kwarner@ducks.org (970) 297-7279 47794 Mailing Address: 1825 Sharp Point Drive, Fort Collins, CO 80525 Sign (or enter name if filing online) Print Name and Title Date: Kevin Warner, PE 07/14/2017

| Form No. GWS-31 02/2017 | 1313 | WELL CONSTR State of Co Sherman St., I www.water.state | Fo | r Office Use | Only | | | | |
|---|--|---|--|--------------------------------------|-------------------------------|------------------------------|--|--------------------------------|------------|
| 1. Well Perm | it Number: Lav | _ | | | | | | | |
| | ell Designation: | | пессірі | Number: 00 | 30037 N | | _ | | |
| | er Name: United Sta | ites Bureau of | Reclamation | | | | _ | | |
| | ion Street Address | | rectarration | | | | | | |
| 5. As Built G | S Well Location (re | equired): | Zone 12 - Zo | one 13 Eastin | ng: 5887/3 | - Northing | 44602 | 12 | |
| 6. Legal Well | Location: 1 | /4, 1/4 | , Sec., | Twp. | Nors | Range | TEC | or W | P.M. |
| | | | | | | | , Fil | | 1 .m. |
| 7. Ground Su | rface Elevation: | | | | | | | | |
| 8. Completed | Aquifer Name : | South Platte Al | | Total Depth: | | | epth Completed | | fort. |
| | otification: Was No | | | Construction | 2 D Voc F | TNo Date | Notification Civ | 1; | _ feet |
| 10. Aquifer T | vpe: Type I | One Confining | Laver) | Type L | Multiple Co | nfining Layers | s) Laramie | | |
| (Check or | | (Not overlain I | | | | | | | |
| 11. Geologic | | (Hot orentall) | by Type III) | уре п | | Diameter (in | | (alluvial/coll m (ft) | |
| Depth | Type | Grain Size | Color | Water Loc. | - | .25 OD | .) | | To (ft) |
| 0-5' | fine sand | 0.01 | tan | Trucci Loc. | | 1.25 ID | | 0 | |
| 5-7' | silty sand | 60.01 | 1 | | - | | | 0 | 35 |
| 7-10' | medium sand | 0.2 | | 10' | 13. Plain C | asing | | | |
| 10-15 | motion sand | 0.2 | | 10 | OD (in) | V | Wall Size (in) | From (ft) | To (ft) |
| 15-20 | medium sand | 0.2 | 1 | | 2.25 | PVC | Sch 40 | 0 | 5 |
| 20-25 | silty sand | 60.01 | gray | | | | | | |
| 25-30 | silty sand | € 0.01 | | | - | | | | |
| 30-35 | silty sand | 40.01 | 1 | | | | | | |
| | , | | | | Perforat OD (in) 2.25 | ted Casing Se Kind PVC | creen Slot Size (Wall Size (in) Sch 40 | (in): <u>0.01</u> From (ft) | To (ft) |
| | | | | | | vashed silica | The second secon | er Placemer | nt: |
| | | | - | | Size | 3-35 | - | | |
| | | | | | Interval 16. Groutin | | Depth | | |
| | | | | | Material | | Donaitu | Interviel | 11-11-23 |
| Remarks: | 313"- skel lite seal, | concrete | pad | | | Amount | Density | Interval | Method |
| 17. Disinfect | ion: Type | | | | Amt. Use | ed | | | |
| 18. Well Yield | Estimate Data: | | Check b | ox if Test Dat | | | lumber GWS-39, | Well Yield T | est Report |
| Well Yield | Estimate Method: | | _ | | 3 13.2 2 2 11.11 | | | well ricia i | est Report |
| Static Leve | el: 10.4 | / 1 | | Estimated Y | ield (gpm) | | | | |
| | e measured: | | | | ngth (hrs) _ | | | | |
| Remarks: | | | | | | | | | |
| 19. I have read filing online) and tatements is a v | the statements made h I certified in accordance riolation of section 37 Ser considers the entry of | e with Rule 17.4 91 108(1)(e), C.R. | of the Water W .S., and is punis | ell Construction hable by fines u | Rules, 2 CCR up to \$1,000 an | 402 2. The fili | ng of a document t | hat contains fa | lse |
| Company Nam | | | Email: | | | | es codo: | Licens - M | nha: |
| Ducks Unlimit | | | kwarner@du | icks.org | | Phone w/ar | ea code: 297-7279 | License Number: 47794 | |
| | s: 1825 Sharp Point | Drive Fort Co | A CONTRACTOR OF THE PARTY OF TH | | | (370) | 211-1217 | 177 | 17 |
| | name if filing online | | | ne and Title | | | | Date | |
| 1/11 | If Truing Oriellie | | arner, PE | | | Date: | | | |

| Form No. GWS-31 02/2017 | 1313 ww | Fo | For Office Use Only | | | | | | |
|-------------------------------|--|---------------------|---------------------|------------------|------------------|-------------------|--------------------|--------------------|-------------|
| 1. Well Perm | it Number: Aker | | | | | | | | |
| 2. Owner's W | ell Designation: | 3 - 1 | Receipt | Number: 00 | 3685/L | | | | |
| | er Name: United Sta | ates Bureau of | Poclamation | | | | | | |
| | ion Street Address | | Rectamation | | | | | | |
| | PS Well Location (r | | Zone 12 70 | no 13 Faction | m. 544691 | Northings | 441.04.00 | | |
| 6. Legal Well | Location: 1 | /4. 1/4 | Sec. | Twn | S. SITO II | M Northing. | 7160787 | M | D.U |
| | | | , see., | _ (WP | | , Range | | or w, | P.M. |
| Subdivision: | | | | | , Lot | Block | Fi | ling (Unit) | |
| 7. Ground Su | rface Elevation: | | | | | | | | |
| 8. Completed | Aquifer Name : | South Platte Al | | | 29 | | oth Complete | | feet |
| 9. Advance N | otification: Was N | otification Rec | uired Prior to | Construction | ? TYes T | TNo. Date N | lotification Giv | ven: | _ 1000 |
| 10. Aquifer T | ype: Type I | (One Confining | Layer) | Type I (| Multiple Con | fining Layers) | Laramie | | |
| (Check or | | (Not overlain I | | | (Overlain by | | | (alluvial/coll | uvial) |
| 11. Geologic | | | 7 71 | | | iameter (in.) | Fro | m (ft) | To (ft) |
| Depth | Туре | Grain Size | Color | Water Loc. | | 25 OD | 1,10 | 0 | 29 |
| 0-5' | 5:14 loam | 40.01 | dark brown | 2' | - | .25 ID | | 0 | 29 |
| 5-10' | silly loam | <0.01 | 1 | | - | .23 10 | _ | 0 | -1 |
| 10-15' | silly sand | 60.01 | 1 | | 13. Plain Ca | asing | _ | | |
| 15-20' | med. sand | 0.01 | light brown | | OD (in) | | Wall Size (in) | From (ft) | To (ft) |
| 20-25' | coase sand | 0.1 | 1 | | 2.25 | PVC | Sch 40 | 0 | 4 |
| 25-29' | coarse sand | 0.1 | 1 | | | | | | |
| 29' | Shale | _ | black | | | | | | |
| | 1 1 1 1 1 1 1 1 1 1 1 1 1 | | | | | | | | |
| | | | | | Perforate | ed Casing Scr | een Slot Size | (in): 0.01 | |
| | | | | | OD (in) | Kind | Wall Size (in) | From (ft) | To (ft) |
| | | | | | 2.25 | PVC | Sch 40 | 4 | 29 |
| | | 14 | | | | | | | |
| | | | | | | | | | |
| | | | h | | 0 ==== | | | | |
| | Y | | | | 14. Filter P | ack: | 15. Pack | ker Placemer | nt: |
| | | | | | Material w | ashed silica sa | and Type | | |
| | | | | | Size | 10/20 | | | |
| | | | | | Interval | 3-29 | Depth | | |
| | | | | | 16. Groutin | ng Record | | | |
| | | | 4 | | Material | Amount | Density | Interval | Method |
| Remarks: 3 | 's" steel ca | sing stick | ٥٥ | | 0 | | | | |
| bentoni | te scal, ce | sucrete f | ad | | | | | | |
| | | 1 | | | | | | | |
| 17. Disinfect | | | | Walter | Amt. Use | | | | |
| | Estimate Data: | | Check bo | ox if Test Dat | a is submitte | ed on Form Nu | mber GWS-39 | , Well Yield T | est Report |
| | Estimate Method: | | | le or or or or | | _ | | | |
| | el: 2.02 | | | | ield (gpm) _ | | | | |
| | e measured:6/ | 20/2017 | | Estimate Le | ngth (hrs) _ | | | | |
| Remarks: | | | | | | | | | |
| 19. I have read | the statements made h | herein and know t | the contents ther | eof, and they | are true to my | knowledge. Thi | s document is sig | gned (or name e | entered if |
| filing online) and | d certified in accordance | ce with Rule 17.4 | of the Water We | ell Construction | Rules, 2 CCR 4 | 402 2. The filing | g of a document | that contains fa | lse |
| the State Engine | violation of section 37 or er considers the entry | of the licensed of | .S., and is punish | to be complian | p to \$1,000 and | d/or revocation | of the contraction | ng license. If fil | ling online |
| | | or the theelised et | | to be compila | | | | | |
| Company Nam | | | Email: | | | Phone w/are | | License Nur | mber: |
| Ducks Unlimit | | | kwarner@duc | | | (970) | 297-7279 | 477 | 74 |
| | ss: 1825 Sharp Point | | | | | | | | |
| oign (or enter | name if filing online | e) | The second second | e and Title | | | | Date: | |
| 18ttla | | Kevin War | rner, PE | | 07/14/2017 | | | | |

For Office Use Only WELL CONSTRUCTION AND YIELD ESTIMATE REPORT Form No. State of Colorado, Office of the State Engineer **GWS-31** 1313 Sherman St., Room 821, Denver, CO 80203 303.866.3581 02/2017 www.water.state.co.us and dwrpermitsonline@state.co.us 1. Well Permit Number: Akers - 2 Receipt Number: 0056857 M 2. Owner's Well Designation: 3. Well Owner Name: United States Bureau of Reclamation 4. Well Location Street Address: 5. As Built GPS Well Location (required): Zone 12 Tone 13 Easting: 594786 Northing: 4460764 n 6. Legal Well Location: _____ 1/4, _____ 1/4, Sec., ____ Twp. ___ N or S ___, Range ____ E or W __, ___ P.M. County: Subdivision: _ 7. Ground Surface Elevation: 4325 feet Date Completed: 6/7/17 Drilling Method: Hollow Stem Auger 8. Completed Aquifer Name: South Platte Alluvium Total Depth: 12 feet Depth Completed: 12 feet 9. Advance Notification: Was Notification Required Prior to Construction? Yes No, Date Notification Given: 10. Aquifer Type: Type I (One Confining Layer) Type I (Multiple Confining Layers) Laramie-Fox Hills (Check one) ☐ Type II (Not overlain by Type III) Type II (Overlain by Type III) ■ Type III (alluvial/colluvial) 11. Geologic Log: 12. Hole Diameter (in.) From (ft) To (ft) Depth Grain Size Color Water Loc. Type 8.25 OD 0 12 0-5 sandy loam 20.1 gray 4.25 ID 17 5-10' medium sand 0.1 Tan 10-12 Shale 13. Plain Casing Black To (ft) OD (in) Kind Wall Size (in) From (ft) PVC 2.25 Sch 40 0 3 Perforated Casing Screen Slot Size (in): __0.01 To (ft) OD (in) Kind Wall Size (in) From (ft) PVC 2.25 Sch 40 12 14. Filter Pack: 15. Packer Placement: Material washed silica sand Type Size 10/20 Interval 3-12 Depth 16. Grouting Record Material Amount Density Interval Method Remarks: 2 7" Steel casing stick up Bentonite seal, concrete pad 17. Disinfection: Type Amt. Used 18. Well Yield Estimate Data: Check box if Test Data is submitted on Form Number GWS-39, Well Yield Test Report Well Yield Estimate Method: Static Level: 7.28 Estimated Yield (gpm) Date/Time measured: 6/19/17 Estimate Length (hrs) ___ Remarks: 19. I have read the statements made herein and know the contents thereof, and they are true to my knowledge. This document is signed (or name entered if filing online) and certified in accordance with Rule 17.4 of the Water Well Construction Rules, 2 CCR 402 2. The filing of a document that contains false statements is a violation of section 37 91 108(1)(e), C.R.S., and is punishable by fines up to \$1,000 and/or revocation of the contracting license. If filing online the State Engineer considers the entry of the licensed contractor's name to be compliance with Rule 17.4. Company Name: Email: Phone w/area code: License Number: Ducks Unlimited, Inc. kwarner@ducks.org (970) 297-7279 47794 Mailing Address: 1825 Sharp Point Drive, Fort Collins, CO 80525 Sign (or enter name if filing online) Print Name and Title Date: Kevin Warner, PE 07/14/2017

| Form No. GWS-31 02/2017 | WELL CONSTRUCTION AND YIELD ESTIMATE REPORT State of Colorado, Office of the State Engineer 1313 Sherman St., Room 821, Denver, CO 80203 303.866.3581 www.water.state.co.us and dwrpermitsonline@state.co.us | | | | | | | Office Use (| Only |
|---------------------------------------|--|-------------------|---|------------------|------------------|------------------|--------------------------|------------------|------------|
| 1. Well Perm | it Number: Aker | 5-3 | Receipt | Number: 00 | 56857 N | | | | |
| | ell Designation: | | | | 3003777 | | | | |
| | r Name: United Sta | tes Bureau of | Reclamation | | | | | | |
| | ion Street Address | | nectamation | | | | | | |
| | S Well Location (r | | one 12 7 | ne 13 Factin | a. Caczus | 2 Morthing: | HUGAHA | 4 | |
| | Location:1 | | | | | | | | P.M. |
| County: _Subdivision: _ | | | | | | | , Fili | | P.M. |
| | | | | | | | | | |
| | rface Elevation: | | | | | | | | |
| | Aquifer Name : | | | | f | | pth Completed | | feet |
| | otification: Was N | | | | | | | | |
| 10. Aquifer T | | (One Confining | | | | |) Laramie- | | |
| (Check or | | (Not overlain b | by Type III) | Туре II | | | | alluvial/coll | |
| 11. Geologic | | | | - | | iameter (in. | | n (ft) | To (ft) |
| Depth | Туре | Grain Size | Color | Water Loc. | _ | 25 OD | | 2 | 15 |
| 0-2' | Silly Loam | 40.01 | gray | | 4. | 25 ID | | | 13 |
| 2-5' | clay | 40.01 | | 3' | | | | | |
| 5-10 | silly sand | 0.01 | | | 13. Plain Ca | asing | | | |
| 10-12 | silly sand | 0.01 | 1 | | OD (in) | Kind | Wall Size (in) | From (ft) | To (ft) |
| 12-13 | Shale | 1 (-1 | Black | | 2.25 | PVC | Sch 40 | 0 | .3 |
| | | | | | | | | | |
| | | | | | Doufount | ad Casina a | | | |
| | | | | - | | | reen Slot Size (| | To (ft) |
| | | | | | OD (in) 2.25 | Kind PVC | Wall Size (in) Sch 40 | | |
| | | | | | 2,25 | FVC | 3011 40 | 3 | 13 |
| | | | | | - | | | | |
| | | | | | 14. Filter P | | | er Placemer | nt: |
| | | | | | | ashed silica s | and Type | | |
| | | | | | Size | 10/20 | | | |
| | | | | | Interval | 2-15 | Depth | | |
| | | | | | 16. Groutin | g Record | | | |
| Remarks: | | 121. 0 | | | Material | Amount | Density | Interval | Method |
| Ben le | I steel casin onite scal, | concrete | pad | | | | | | |
| | | 7 7 7 7 7 7 7 7 | • | | | | | | |
| 17. Disinfect | | | | | Amt. Use | | | | |
| | Estimate Data: | | Check b | ox if Test Da | ta is submitte | d on Form N | umber GWS-39, | Well Yield T | est Report |
| | Estimate Method: | | | T | | | | | |
| | el: 2.82 | | | Estimated \ | rield (gpm) _ | | | | |
| Date/Time | e measured:6/ | 19/17 | | Estimate Le | ength (hrs) _ | | | | |
| Remarks: | | | | | | | | | |
| filing online) and | the statements made d certified in accordan violation of section 37 | ce with Rule 17.4 | of the Water W | ell Construction | n Rules, 2 CCR 4 | 402 2. The filir | ng of a document t | that contains fa | lse |
| | er considers the entry | | | | | | | | - |
| Company Nam | e: | | Email: | | | Phone w/ar | ea code: | License Nu | mber: |
| Ducks Unlimit | | | kwarner@du | icks.org | | | 297-7279 | 477 | 94 |
| | ss: 1825 Sharp Point | Drive Fort Co | | | | 17.5.7 | | 111 | // |
| | | | | ne and Title | | | | Data | |
| Sign (or enter name if filing online) | | | 100000000000000000000000000000000000000 | arner, PE | | | Date: 07/14/2017 | | |

| Form No. GWS-31 02/2017 | 1313 | WELL CONSTR State of Co 3 Sherman St., I ww.water.state | Fo | For Office Use Only | | | | | |
|--|-------------------------|--|--------------------|---------------------|---|----------------------|-------------------|--------------------------|-------------|
| 1. Well Permi | it Number: Ake | -11 | | | | | | | |
| | ell Designation: | 15 | | t Number: 00 | 30037.0 | | | | |
| | er Name: United Sta | ates Bureau of | Reclamation | | | | | | |
| | ion Street Address | | | | | | | | |
| 5. As Built GP | S Well Location (r | required): | Zone 12 🔳 Z | one 13 Eastir | ng: 595089, | Northing: | 4460230 | D m | |
| | Location:1 | | | | | | | | P.M. |
| County: _ Subdivision: _ | | | | | , Lot | , Block — | , Fi | iling (Unit) _ | |
| | rface Elevation: | | | | | | | | |
| | Aquifer Name : | | | | 25 fee | | pth Complete | | _ feet |
| 10. Aquifer T | otification: Was N | (One Confining | | | n? Yes N (Multiple Confir | | | | |
| (Check on | | | | | (Overlain by Ty | - | | | 1:t=1\ |
| 11. Geologic | | (NOT OVERTAIL) | by Type III) | Птуре п | 12. Hole Dia | | | (alluvial/col om (ft) | |
| Depth | Type | Grain Size | Color | Water Loc. | | imeter (in.) 5 OD | t con | om (ft) | To (ft) |
| 0-5' | silty loam | 40.01 | 9 1919 | Water Loc. | | 5 ID | | | |
| 5-10' | med . sand | 0,1 | ten | 1 | 7.4. | טוט | - | 0 | 25 |
| 10-151 | med sand | 01/ | 7749 | | 13. Plain Cas | ing | | | |
| 15-20' | med. sand | 0./ | | | OD (in) | Kind | Wall Size (in) | From (ft) | To (ft) |
| 20-25' | med. sand | 0./ | 1 | | 2.25 | PVC | Sch 40 | 0 | 5 |
| | | - 1 | | | | | | | |
| | | | | | | | | | |
| | | | | | . 14.2 | | | | |
| | | | | | Perforated | Casing Sc | reen Slot Size | (in): 0.01 | |
| | | | | | OD (in) | Kind | Wall Size (in) | | |
| | | | | | 2.25 | PVC | Sch 40 | 5 | 25 |
| | 10 | | | | | | | | |
| | | | | | | | | | |
| | | | | | 1.3 | | 105 221 | | |
| | | | | - | 14. Filter Pag | | | ker Placeme | nt: |
| | | | | | Material was | | sand Type | _ | - |
| | | | | | Size _ | 10/20 | . Double | | |
| | 1 | | - | - | Interval _ | 3-25 | Depth | _ | |
| | | | | | 16. Grouting | | Density | Intomial | Machael |
| Pemarks: / | 2 1 1/4 40 | | 1 1 | - | Material | Amount | Density | Interval | Method |
| Kemarks. 75 | Bentonite se | Al , conce | rete pad | | | | | | |
| 3'4"5 | kelcasing sh | ick up | | | - | | | | |
| 17. Disinfect | | - | | | Amt. Used | | | | |
| | d Estimate Data: | | Check ! | hox if Test Da | ata is submitted | on Form N | umber GWS-39 | Well Yield | Test Report |
| | Estimate Method: | | | 707 11 | 10 000000000000000000000000000000000000 | 0111 01 | ulliber G | , nen nen | rest neport |
| Static Leve | | | | Estimated ' | Yield (gpm) | | | | |
| the state of the s | e measured: 6/1 | | | | ength (hrs) | | | | |
| Remarks: | : Ilicasurea + / | 71. | | LJUITACE L | eligen (iii s) | | | | |
| | the statements made | herein and know | the contents th | pereof and they | rare true to my kr | nowledge Ti | his document is s | igned (or name | ontored if |
| | d certified in accordan | | | | | | | | |
| statements is a v | violation of section 37 | 7 91 108(1)(e), C.F | R.S., and is punis | ishable by fines | up to \$1,000 and/ | or revocation | | | |
| the State Engine | eer considers the entry | of the licensed of | contractor's nam | ne to be complia | ance with Rule 17 | .4. | | | |
| Company Nam | ne: | | Email: | 1 | P | Phone w/are | ea code: | License No | umber: |
| Ducks Unlimit | | | kwarner@di | ucks.org | (970) 297-7279 47794 | | | 794 | |
| Mailing Addres | ss: 1825 Sharp Poin | nt Drive, Fort C | ollins, CO 805 | 525 | | | | | |
| | name if filing onlin | | | me and Title | | | | Date: | |
| K111 | The same state of | | | /arner, PE | | | | | |
| Jua | M | 1,50 | | | 07/14/2017 | | | | |