AREA "1"
RESIDENTIAL SUBDIVISION
5 LOTS – 5.50 AC

AREA "3"
RESIDENTIAL/SOLAR ENERGY SYSTEMS
10 LOTS – 9.46 AC

AREA "4"
RESIDENTIAL SUBDIVISION
3 LOTS
1.12 AC

AREA "5"
WORKING FARM
EAST/SOLAR
ENERGY SYSTEMS
73.89 AC

AREA "6" NORTH
WORKING FARM – WEST/SOLAR ENERGY SYSTEMS
54.70 AC

AREA "6" SOUTH
WORKING FARM – WEST/SOLAR
ENERGY SYSTEMS
142.21 AC

AREA "7" NORTH
COMMERCIAL/
INDUSTRIAL PARK
5.45 AC

AREA "7" SOUTH
COMMERCIAL/INDUSTRIAL PARK
5.86 AC

AREA "8" NORTH
OUTDOOR ADVENTURE
PARKS 6.14 AC

AREA "8" SOUTH
OUTDOOR ADVENTURE PARKS
49.89 ACRES

AREA "2"
RESIDENTIAL SUBDIVISION
42.14 AC

PRIVATE OPEN SPACE "A"
1.41 AC

PRIVATE OPEN SPACE "B"
281.19 AC

COLORADO RIVER

100-YR. FLOODPLAIN

RIVERBEND WELL HOUSE/CHLORINATION

PROPOSED LOVA TRAIL (FINAL LOCATION TO BE DETERMINED)

WELLS

EXISTING LIVESTOCK BARN (UNDER CONSTRUCTION)

PASTURE-RAISED BEEF

IRRIGATION STATION (UNDER CONSTRUCTION)

NUTRIENT RANCH ROAD (EXISTING)

EXISTING LIVESTOCK POND #1

RIVERBEND WATER TOWER

MATCHLINE (SEE BELOW)

WASTEWATER PLANT

RIVERBEND FILING 5

EX. SUBDIVISION

RE-2 PARCEL NOT IN PUD

AREA 1 ROAD

AREA 3 ROAD

ENERGY BUILDING

SOLAR ENERGY FIELD

NUTRIENT FARM ROAD

GREENHOUSE

RESTAURANT

SOLAR SPA HOT TUBS

CONSERVATORY

FARM PROCESSING

LANDSCAPE BUFFER

ENERGY ROAD

U-PICK ORCHARD

DUCK PONDS

ORCHARD

BERRY ORCHARD

FARM ROAD (PUBLIC ACCESS EASEMENT)

FARMHOUSE ROAD

COOLING/STORMWATER DETENTION POND

PARKING

U-PICK PUMPKIN

PUMPKIN PATCH

ADVENTURE FARM

PTES

CORN MAZE

NURSERY

NURSERY FARM ROAD

CUCURBITS

PROPOSED LOVA TRAIL (FINAL LOCATION TO BE DETERMINED)

FARM

KIDS ADVENTURE FARM

PETTING BARN

FARM ROAD

VEGETABLES

VULCAN DITCH

POTABLE WATER TREATMENT HOUSE

DIRT BIKE PARK

EX. HOUSE

(NOT IN PUD)

HOUSE

BOAT LAUNCH

RV LAUNCH

DOG PARK

PARKING

WATER PARK

BEACH

WATER PARK ROAD

RIVERFRONT ROAD

CAMPGROUND ROAD

RV SITES

RV ROAD

CAMPSITES

CAMPGROUND CABINS

TENT SITES

RETREAT ROAD

RETREAT CABINS

MUSIC ROAD

STAGE

PERFORMING ARTS

MUSIC VENUE

STORAGE SHED

ZORBING SLEDDING

ADVENTURE PARK ROAD

SKATE PARK

PARKING

ULTRALIGHT AIRCRAFT PAD

ONEWHEEL PARK

"ATV" PARK

DEFROAD ADVENTURE PARK

HELI STOP

BALLOON

ULTRALIGHT ROAD

IRRIGATION POND 1 AC

IRRIGATION POND 1 AC

IRRIGATION POND 1 AC

IRRIGATION POND 1 AC

MATCHLINE (SEE BELOW)

PRIVATE OPEN SPACE "A"

PRIVATE OPEN SPACE "B"

MATCHLINE (SEE ABOVE)

NOTES:

1. REFER TO PUD PLAN MAP FOR LEGAL DESCRIPTION AND SURVEY INFORMATION.

Graphic Scale
0 150 300 600
In Feet: 1" = 300'

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Nutrient Farm

Garfield County, Colorado

#	Revision	Date	By:
	Project Milestone: Preliminary Not For Construction		

Job No.	2018-271.002
Drawn by:	FJB
Date:	1.17.23
QC: DMK	PE: DMK
File:	RivRch-OverallSite

Title: Overall Site Plan

Dwg No. 1

Of : 1

Nutrient Farm

Impact Analysis Report

Nutrient Farm PUD
Garfield County, Colorado

December 14, 2020

Prepared for:

Nutrient Holdings, LLC
520 River View Drive, #506
New Castle, CO 81647

Prepared by:

SGM
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1. Executive Summary

The Nutrient Farm Planned Unit Development (PUD; the "Proponent") is proposed for the undeveloped parcels currently located in the Coal Ridge and Riverbend PUDs (the "Property"), located on the south side of the Colorado River between New Castle and Glenwood Springs (**Figures 1** and **2**), immediately adjacent to the existing Riverbend community. This report has been prepared in accordance with the requirements of the Garfield County (GarCo) Land Use and Development Code (LUDC), including Section (§) 4-203G Impact Analysis, §7-202 Wildlife Habitat Areas, and §7-203 Protection of Water Bodies.

The property consists of five parcels containing approximately 1,136 acres, located on a flat benched area that lies between the Colorado River and backs up to Coal Ridge and the Grand Hogback. (Assessor Records Parcel ID numbers are: 212335300081, 218306100057, 212334400007, 212334400005, and 218305300086; **Figure 3**). Per our surveyor's research, these parcels are combined and re-organized in the property's formal legal description in the title work and deeds.)

All five parcels will vacate the existing PUD zoning and be rezoned to Nutrient Farm PUD. The Property is currently dominated by grazed pastures historically irrigated by the Vulcan Ditch, with undeveloped steep slopes to the south. The Vulcan Ditch is currently being converted from an open ditch to a piped ditch and is anticipated to provide irrigation and other waters to the Nutrient Farm PUD area later in 2020.

Nutrient Farm would be an approximately 1,136-acre, agriculturally oriented mixed-use PUD that revolves around the use and enjoyment of a working farm with multi-use education, entertainment and recreational facilities (Nutrient Farm PUD Guide 2020). The PUD would include a working farm, a mix of residential homes, a commercial/industrial area, outdoor adventure parks with outdoor entertainment/music venue, a campground, lodge, motorized and non-motorized trails, and a retreat/spa facility.

In summary, the PUD would include 18 new single-family residences with allowances for accessory dwelling units, occupying approximately 56 acres (or 5 percent) of the PUD area. One additional single family/ranch home already exists on the property. Approximately 24 percent of the PUD area would support agricultural operations. Approximately 1 percent of the PUD would support a commercial industrial area, which would be used for support agricultural operations, commercial uses, and industrial uses. Approximately 16 percent of the PUD area would support outdoor adventure parks, which would contain motorized and non-motorized tracks, an outdoor entertainment and music area, a campground, a lodge and a spa/retreat facility.

The purpose of this report is to document conditions as they exist on the parcels at this time, to discuss the potential impacts of the development being contemplated for the Property based on existing conditions and provide measures to ensure that any potential impacts will be mitigated.

1.1. Summary of Findings

- The density, scope and scale of the residential development areas, along with the proposed agricultural operations, would be similar to existing uses of the surrounding area.
- The outdoor music venues, recreational facilities including motorized (OHV) track, trail and outdoor adventure parks would introduce much different land uses and human activity patterns to the area, including increased fugitive lighting and sound from both the music venues and the motorized tracks. These impacts would be significantly different than current land use patterns in the area, but measures have been proposed in the PUD to help mitigate any potential impacts.
    - Nutrient Farm is planning on conducting additional sound modelling and planning to reduce sound levels at both the music venue and OHV track to bring these activities into compliance with consistent with CRS 25-12-103 standards. Nutrient Farm PUD has already indicated that

preventative sound barriers, insertion loss and sound mitigation strategies are being developed to reduce sound levels.

- The agricultural, recreational and commercial use areas would introduce new local employment opportunities to the area.
- Traffic would likely increase on County and Town roads, and increased use of existing area trails (including the proposed LoVa Trail). There would also likely be increased visitors and use of businesses in New Castle from increased local population at Nutrient Farm.
- Environmental Impacts
    - Some portions of the PUD are located on alluvial fans; at this time these areas are stable and development on these alluvial fans does not pose a significant risk as long as dense vegetation continues to stabilize slopes.
    - Soils on the Property do not pose significant challenges or risks from development.
    - The Property does not support extensive wetlands, aside from a very narrow riparian fringe along the Colorado River; much of the Colorado River fringe does not support any wetlands, due to the seasonal scouring from high flows. A proposed boat ramp would have localized direct and indirect impacts to the riparian corridor and any associated wetlands. Additional indirect impacts to wildlife habitats around the boat ramp would also occur.
    - Bald eagles may occasionally roost along the Colorado River in proximity to the Property; however, there are no active bald eagle nests within 0.5 miles of proposed development areas.
    - The majority of the Property is dominated by grazed and dryland pastures, which provide minimal wildlife habitat values. Proposed residential, agricultural, and commercial development would be concentrated in these level pasture areas with low-quality habitat, but recreational facilities and trails would be mostly placed in native shrubland habitat types at the toe of the Grand Hogback.
    - Wildlife
        - The Property supports elk and mule deer Severe Winter Range habitats; some of the proposed development would directly and/or indirectly impact native habitat types and winter ranges.
        - Development within the pastures would reduce availability of springtime grazing areas for elk and mule deer, but these areas are also previously disturbed; aside from some springtime elk and mule deer grazing, pastures have very low wildlife habitat values.
        - Increase human activities, especially fugitive noise from outdoor music venues and motorized tracks will have notable indirect impacts on surrounding habitat values outside the PUD area.
        - Black bear-human conflict will likely be an issue, due to the increased density of food availability in proximity to large tracts of relatively intact bear habitat. Development should incorporate design criteria to minimize black bear-human conflicts.
        - Nutrient Farm met with Colorado Parks Wildlife (CPW) and is in the process of developing a Wildlife Mitigation Plan to avoid, minimize, and mitigate impacts to wildlife and habitats.
    - Noxious weeds will be an issue with development if not addressed; there are well established infestations of weeds in the dryland pastures, along roads, and along the Vulcan Ditch. A

Weed Management Plan per section 4-203.E.18.c. has been prepared for the Property and will be implemented with the review/approval of the PUD.

2. Description of the PUD

The Proponent is proposing to develop the existing pastures and associated ranch infrastructure, and the shrubby hillsides at the toe of the Grand Hogback into a diverse, multi-use area with an agricultural focus and ancillary residential and recreational amenities (**Figure 2**). Agricultural, residential and mining uses are currently allowed under the existing Riverbend and Coal Ridge PUDs. Thus, the proposed uses are generally consistent with, and less intense than, the current land uses allowed under those PUDs, with the exception of the proposed recreational facilities that would be a new use. Ancillary agricultural uses include agricultural processing facilities, and agri-tourism features such as farm stands, a farm-to-table restaurant and cabin rentals and campgrounds are also proposed. Outdoor adventure-type parks and a music performance venue are also being proposed. In general, facilities are expected to operate year-round, except for the campgrounds and outdoor venues, which would operate only in the summer season (roughly May 1 – Nov 1). However, the campground cabins will remain available for rent year-round.

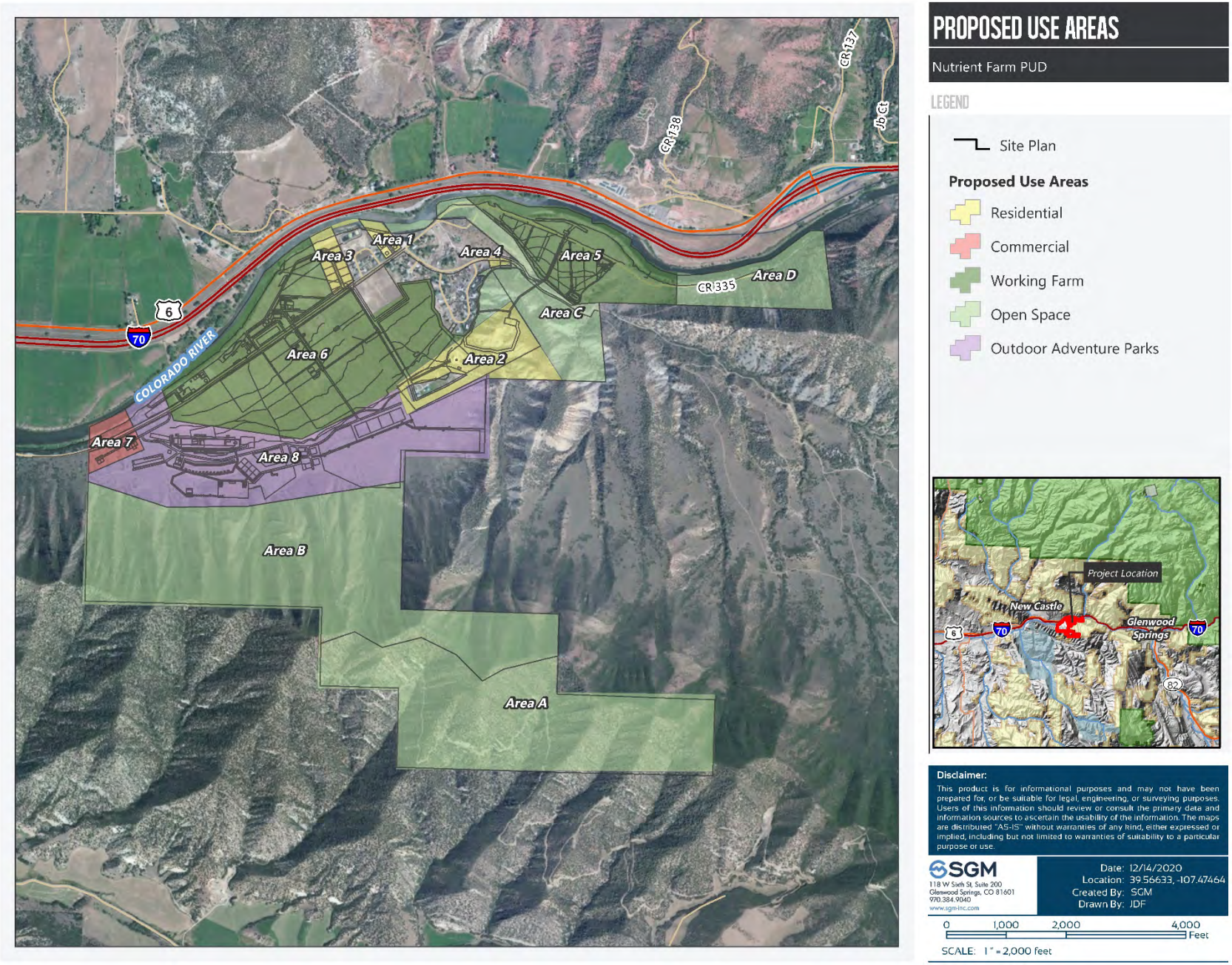
Please see the PUD Guide for additional details on the development proposal.

Table 1 – Proposed Development Summary

Development Areas and Open Space Tracts			
Area	**Name**	**Major Land Uses**	**Size / Percentage**
1	Residential Subdivision	Agricultural and Animal Related Uses Residential Uses: 5 Dwelling Units, Single-Unit + ADUs	5.50 Acres +/- 0.5% +/-
2	Residential Subdivision	Agricultural and Animal Related Uses Residential Uses: 1 Dwelling Unit, Single-Unit + ADU	42.14 Acres +/- 3.7%
3	Residential Subdivision	Agricultural and Animal Related Uses Residential Uses: 10 Dwelling Units, Single-Unit + ADUs	9.46 Acres +/- 0.8% +/-
4	Residential Subdivision	Agricultural and Animal Related Uses Residential Uses: 2 Dwelling Units, Single-Unit + ADUs	1.12 Acres +/- 0.1% +/-
5	Working Farm – East	Agricultural and Animal Related Uses Commercial Uses Residential Uses: 1 Dwelling Unit, Single-Unit + ADU and Dwelling Units, Bunkhouse	73.99 Acres +/- 6.5% +/-
6 North	Working Farm - West	Agricultural and Animal Related Uses Commercial Uses Residential Uses: Dwelling Units, Bunkhouse	54.70 Acres +/- 4.8% +/-
6 South	Working Farm - West	Agricultural and Animal Related Uses Commercial Uses Residential Uses: Dwelling Units, Bunkhouse	142.21 Acres +/- 12.5% +/-
7 North	Commercial/Industrial Park	Agricultural and Animal Related Uses Commercial Uses Industrial Uses Residential Uses: Dwelling Units, On-	5.45 Acres +/- 0.5% +/-

		Site Employee Housing	
7 South	Commercial/Industrial Park	Agricultural and Animal Related Uses Commercial Uses Industrial Uses Residential Uses: Dwelling Units, On-Site Employee Housing	6.86 Acres +/- 0.6% +/-
8 North	Outdoor Adventure Parks/Campground	Agricultural and Animal Related Uses Commercial Uses Industrial Uses Public/Institutional Uses Visitor Accommodations Residential Uses: Dwelling Units, On-Site Employee Housing	6.14 Acres +/- 0.5% +/-
8 South	Outdoor Adventure Parks/Campground	Agricultural and Animal Related Uses Commercial Uses Industrial Uses Public/Institutional Uses Visitor Accommodations Residential Uses: Dwelling Units, On-Site Employee Housing	168.25 Acres +/- 14.8% +/-
Area	**Major Land Uses**		**Size / Percentage**
A	Private Open Space		214.63 Acres +/- 18.9% +/-
B	Private Open Space		281.19 Acres +/- 24.8% +/-
C	Private Open Space		65.40 Acres +/- 5.8% +/-
D	Private Open Space		47.54 Acres +/- 4.2% +/-
County Road 335 ROW	Right- of Way		11.42 Acres +/- 1.0% +/-

Figure 1 – Proposed Use Areas



2.1. Project Setting

The Project is located entirely on the south bank of the Colorado River, abutting a near-continuous 2.75-mile section of the river front. The Property generally encompasses the irrigated terrace surface above and outside the river's channel and riparian corridor, as well as a portion of the steep slopes to the south. There is currently one homesite (a farm house) on the parcels, as well as attendant farming/ranching infrastructure, including the Vulcan Ditch (that being converted from open ditch to closed pipe at this time), lateral ditches, fences, sheds, etc. The development is anticipated to be concentrated on the irrigated pasture areas, due to considerations of constructability and access. The steeper slopes on the southern side of the Property are derived from Mancos shales, and are not as conducive to development.

The portions of the Property that are proposed for development are historical ranchlands typical of grazed or dryland pasture settings in the surrounding vicinity. The pastures are elevated above the water table of the Colorado River, and are dominated by upland pasture grasses and adventitious ruderal species supported by seasonal precipitation. Habitat diversity and value is minimal due to the low-quality vegetation and the dominance of non-native cultivars and weedy species. Several swales carry ephemeral runoff from the steep southern slopes to the Colorado River, but do not contain any riparian features or indications of more-than-ephemeral flow. Riverine wetland conditions occur in small and discontinuous patches along the banks of the Colorado River (see **Section 3.2** and **3.3**).

2.2. Traffic

SGM prepared a **Level III Traffic Impact Study** for the Nutrient Farm PUD, and this report utilizes that information and incorporates that report by reference (SGM 2020a). County Road 335 (CR-335; Colorado River Road) is the main access road to the PUD and to the existing Riverbend community (which collectively includes Riverbend Subdivision, Riverbend Ranchettes, and Cedar Ridge Subdivisions). In the vicinity of the project area, this east-west roadway consists of a two-lane cross section. The posted speed limit is 35 mph.

According to the SGM traffic study, CR 335 carries commuter traffic from subdivisions and residential development between New Castle and from the Riverbend subdivisions adjacent to the project area (and associated construction and service traffic to those residential areas). As there are no public roads beyond the Riverbend subdivisions, there is no pass-through traffic. Much of the existing traffic is generated during the morning and evening rush hours, coinciding with daily commuter traffic between bedroom communities in the Riverbend area, and work destinations in the Glenwood Springs and Aspen areas. This results in daily traffic volumes of approximately 470 vehicles per day (VPD) through the Nutrient Farm project area, peaking in the morning and evening commute times. As detailed in the SGM traffic report, these peak traffic periods are relatively short-lived, and during much of the day and especially at night, traffic patterns would be relatively low. At full build out and peak use, traffic generated from the Nutrient Farms project would likely generate 1,730 additional VPD, raising the level of vehicle use along CR 335 to 2,200 VPD.

The study concludes that the development can be implemented, and the roadway system will continue to operate at an acceptable Level of Service with the addition of a stop sign at southbound Bruce Road for normal conditions and with the use of traffic control supervision during music festival events.

2.3. Description of Existing Adjacent Development

As previously mentioned, the Nutrient Farm PUD area is immediately adjacent to significant existing development. More than 60 single-family homes are currently occupied on Riverbend Drive and Glen Eagle Circle and are accessed by CR-335 from Interstate 70 (I-70) at the New Castle exit. Impacts typical of residential development (such as dogs, exterior lights, & light vehicle traffic) are present. Garfield County traffic data indicated approximately 800 VPD on CR 335 in 2014 while April 2019 counts showed a reduction to 535 VPD. Traffic counts performed by SGM in January 2020 indicated 470 VPD. Refer to the SGM Traffic Impact Study (SGM 2020a) for detailed information and see additional discussion below.

I-70 between New Castle and Glenwood is located immediately across the Colorado River from the Property. Recent data indicate that traffic on I-70 is approximately 25,000 VPD, including approximately 10% truck traffic. (CDOT 2019). The noise and visual impact associated with this level of traffic is readily evident from the Property, with only minor screening vegetation is present on either side of the Colorado River to mitigate these traffic conditions.

The Union Pacific railroad is also immediately across the Colorado River from the Property, adjacent and north of I-70. The railroad contributes additional visual and audible impacts to the area, primarily through freight train use, but the impact types are similar to those associated with I-70. Approximately 10-15 train trips utilize the tracks on a daily basis, which includes the less frequent Amtrak commuter trains.

In summary, existing housing developments and associated anthropogenic disturbance have a significant presence in the middle of the PUD area. These existing impacts include traffic, lighting, noise, human activities and visual modifications typical of residential subdivisions. To the south and east of the PUD, steeper slopes with shrubby vegetation communities are dominant.

Figure 2 – Aerial Photo of Existing Conditions – PUD Area

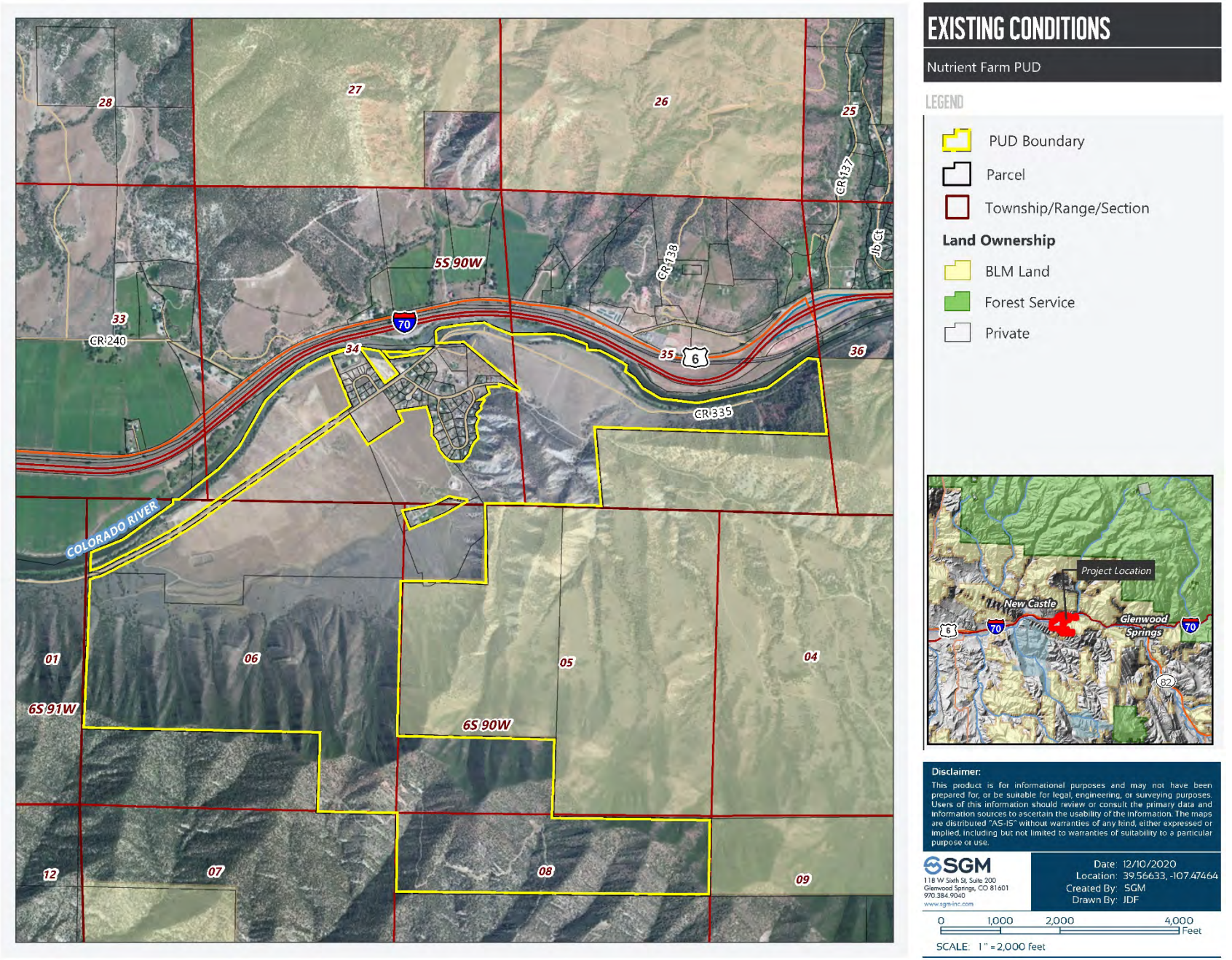


Figure 3 – Aerial Photo of Existing Conditions – West

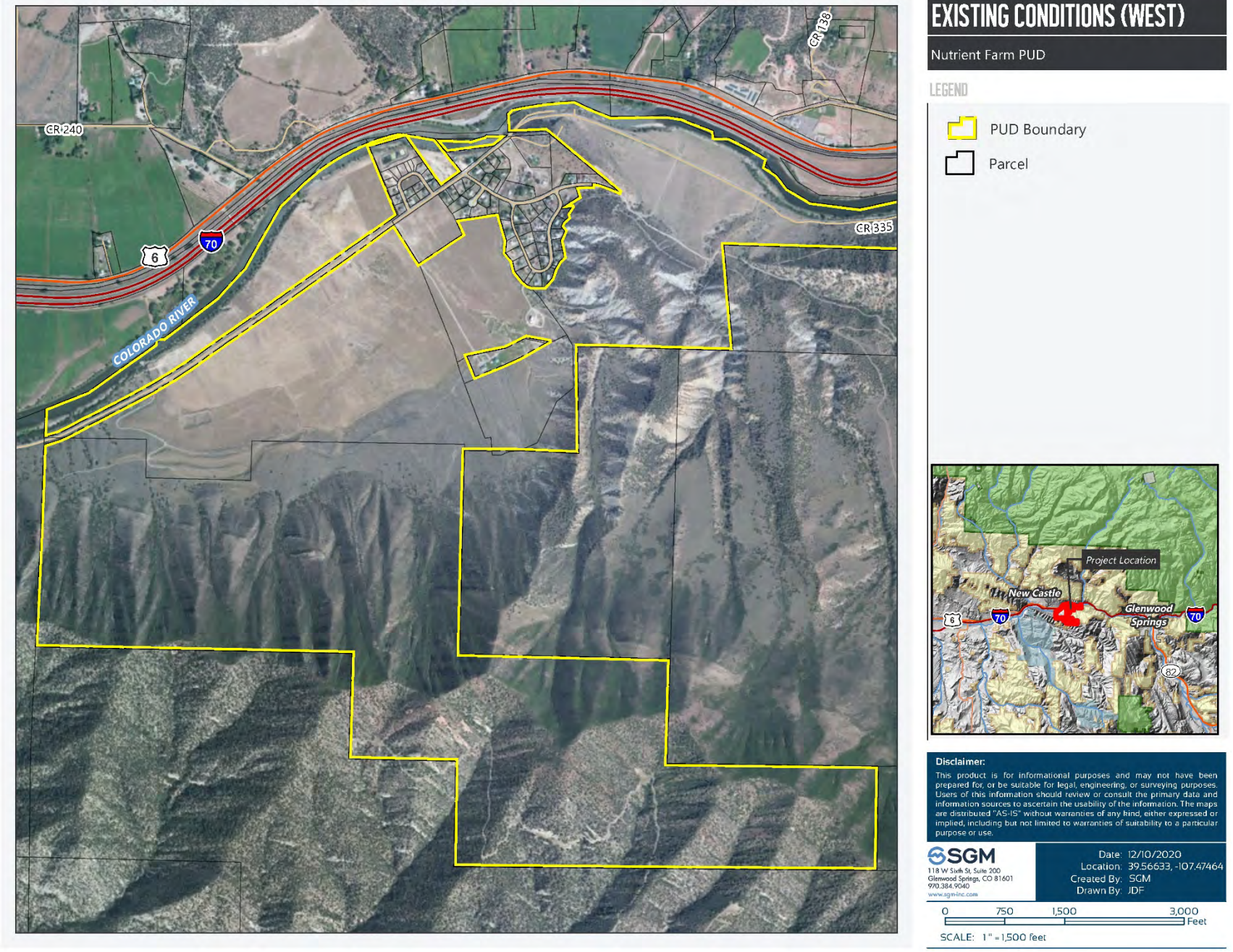
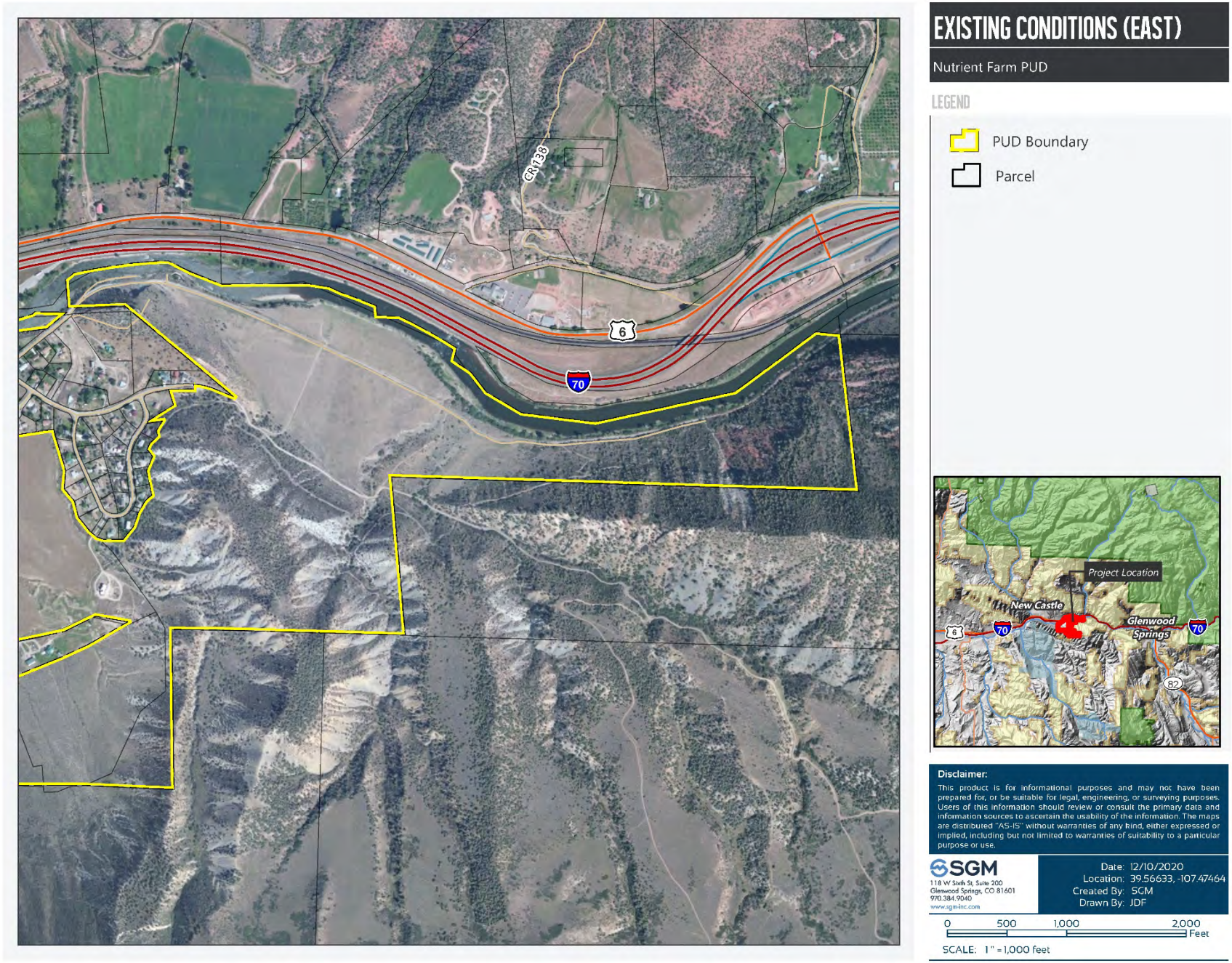


Figure 4 – Aerial Photo of Existing Conditions – East



3. Site Features within Proposed PUD Area

SGM has completed site visits on several occasions, including June, July, and September of 2018, and in April of 2020. Existing vegetation conditions as they existed on the Property at the time of those inspections are described below. This section primarily focuses on the existing vegetation, hydrology, soils and land uses in the portions of the PUD that are planned for development.

3.1. Parent Geology and Soils

The proposed development area is located within the Storm King Mountain quadrangle and is covered in its entirety by the "Geologic Map of the Storm King Mountain Quadrangle, Garfield County, Colorado" (Bryan et al. 2002). Several geologic units and features are within the proposed development area including, but not limited to, quaternary deposits and bed rock units consisting of: Mancos Shale members (Cretaceous), Dakota Sandstone (Lower Cretaceous), Morrison Formation (Upper Jurassic), Entrada Sandstone (Middle Jurassic), the Chinle Formation (Upper Triassic), the State Bridge Formation (Lower Triassic), and the Maroon Formation members (Lower Permian to Middle Pennsylvanian). Several geologic hazards and geotechnical concerns are also present in the area, such as: landslide and debris flow deposits, alluvial fan deposits consisting of potentially hydro-collapsible soils and shrinking/swelling soils derived from the Mancos Shale Members. Geotechnical hazards are further discussed in detail and analyzed by RJ Engineering & Consulting, Inc. (Please see the attached Soils and Geohazards Evaluation, Riverbend PUD in Garfield County, Colorado for details).

The majority of the site is in the geologic quaternary unit **Qfy**. It is described as consisting of younger fan alluvium and debris-flow deposits (Holocene and latest Pleistocene) consisting of poorly to very poorly sorted cobble and pebble gravel with a silty sand matrix. Clasts south of the Colorado River are angular to subangular sandstone, subrounded basalt, and angular to subangular shale and siltstone (Bryant et al. 2002). This unit is potentially susceptible to collapsible soils, though proper building standards and drainage engineering should avoid structure settling issues (RJ Engineering & Consulting, Inc. 2020). The site also has quaternary deposits of colluvium undivided (**Qc**), older debris-flow deposits (**Qdo**), and landslide deposits (**Qls**). Proper engineering design and protocols should be used on and around units Qdo and Qls to avoid potential structure issues/damage and land instability.

Bedrock units (listed above) in the site are generally dipping to the south-south west, at 45 to 50 degrees. The Mancos Shale members can have high concentrations of bentonite, which can pose shrinking-swelling soil issues.

According to the Garfield County Soil Hazard Profile Map, the subject parcel is not within any Moderate or Major Soil Hazard Areas. There is a nearby area mapped as a Major Soil Hazard Area, which is discussed in further detail in below. (Source Map: Soil Hazard Profile, Study Areas 1, 2, & 3, Garfield County, Colorado; 2-6-02).

3.1.1. Soils

The soils on this site consist of various types of clay material. Conditions that were recorded in the geotechnical report indicated that the first 20 to 30 feet consisted of a low plasticity clay. The Natural Resources Conservation Service (NRCS) Soils Map shows the area soil types. The following soil units are within the proposed PUD include:

10 – Begay sandy loam, 1 to 6 percent slopes: These soil units are deep, well drained, moderately sloping, hilly, to steep soils found on valley sides and alluvial fans with elevations ranging from 5,000 to 6,500 feet. These soils formed from alluvium derived from sandstone and shale. This soil is well drained and can be classified as prime farmland if irrigated.

11 – Begay sandy loam, 6 to 12 percent slopes: These soil units are deep, well drained, moderately sloping found on valley sides and alluvial fans with elevations ranging from 5,000 to 6,500 feet. These soils formed from alluvium derived from sandstone and shale. These soils are not hydric and are not classified as prime farmland.

14 – Chilton channery loam, 6 to 12 percent slopes: These soil units are deep, well drained, moderately sloping found on valley sides and alluvial fans with elevations ranging from 5,000 to 6,500 feet. These soils formed from alluvium derived from sandstone and shale. These soils are not hydric and are not classified as prime.

29 – Heldt clay loam, 3 to 6 percent slopes: These soil units are deep, well drained, moderately sloping found on valley sides and alluvial fans with elevations ranging from 5,000 to 6,000 feet. These soils formed from fine-textured alluvium derived from sandstone and shale. These soils are not hydric and are classified as Farmland of statewide importance.

30 – Heldt clay loam, 6 to 12 percent slopes: These soil units are deep, well drained, moderately sloping found on valley sides and alluvial fans with elevations ranging from 5,000 to 6,000 feet. These soils formed from fine-textured alluvium derived from sandstone and shale. These soils are not hydric and are classified as Farmland of statewide importance.

47 – Nihill channery loam, 6 to 25 percent slopes: These soil units are deep, well drained, moderately sloping, hilly, to steep soils found on valley sides and alluvial fans with elevations ranging from 5,000 to 6,500 feet. These soils formed from alluvium derived from sandstone and shale. This soil is well drained, non-hydric, and not prime farmland.

51 – Olney loam, 6 to 12 percent slopes: These soil units are deep, well drained, moderately sloping found on valley sides and alluvial fans with elevations ranging from 5,000 to 6,500 feet. These soils formed from fine-textured alluvium derived from sandstone and shale. These soils are not hydric and are classified as Farmland of statewide importance.

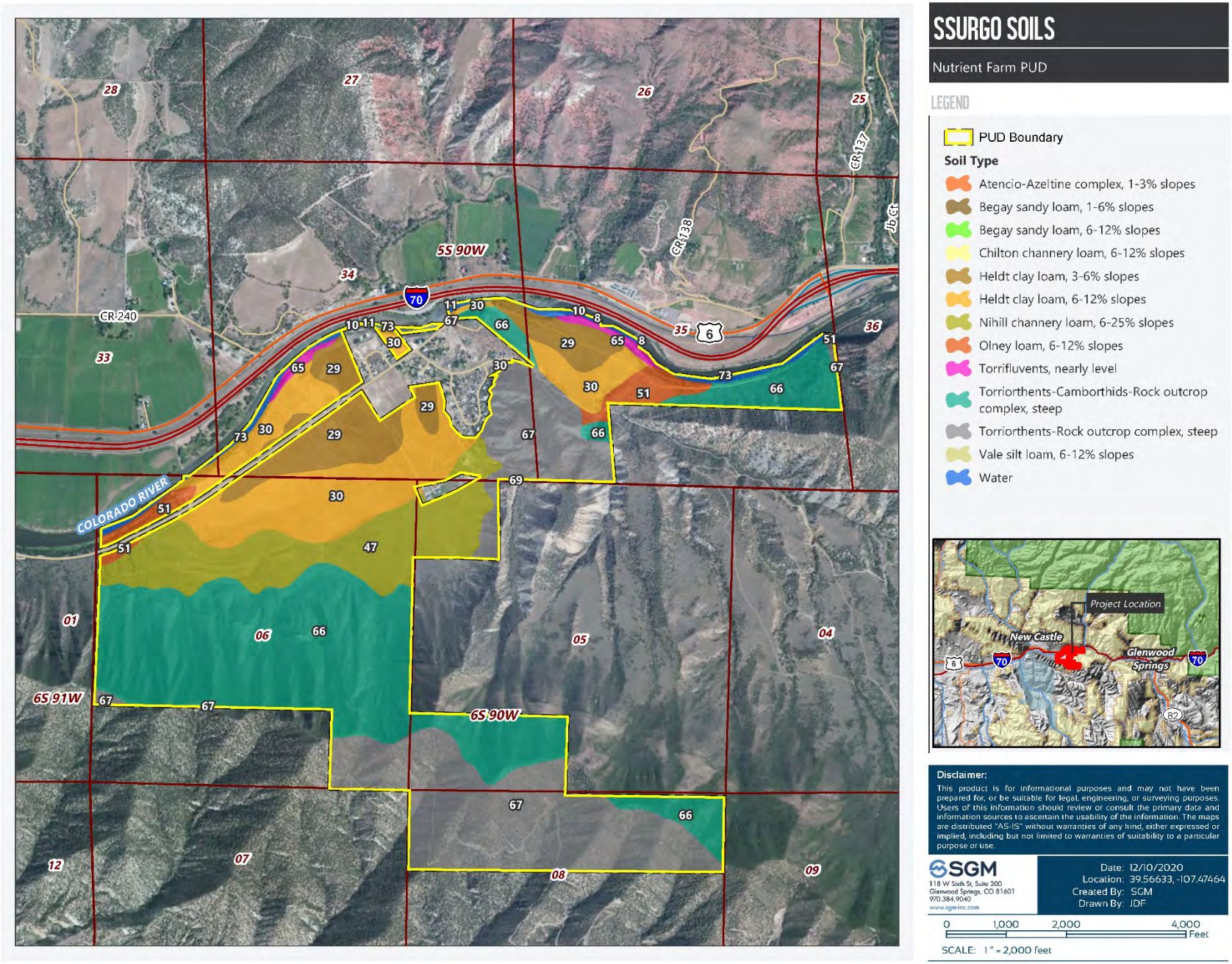
65 – Torrifluents nearly level: These soil units are found in flat areas, primarily around rivers and floodplains around 5,000 to 7,000 feet. These are well-drained, and the water table can be reached within 12 to 36 inches. These soils occasionally flood. These soils are not classified as prime farmland.

66 – Torriorthents-Camborthids-Rock outcrop complex, steep: These soil units are shallow, well drained, and found on steep mountainsides around 5,000 to 8,500 feet. These soils formed as stony, basaltic alluvium derived from sandstone and shale. These soils are not hydric and are not classified as prime farmland.

67 – Torriorthents-Rock outcrop complex, steep: These soil units are shallow, well drained, and found on steep mountainsides around 5,800 to 8,500 feet. These soils formed as stony, basaltic alluvium derived from sandstone and shale. These soils are not hydric and are not classified as prime farmland.

69 – Vale silt loam, 6 to 12 percent slopes: These soil units are deep, well drained, and found on alluvial fans, benches, and mesas at 5,000 to 7,200 feet. The parent material of these soils consists of calcareous eolian deposits. These are not hydric soils and they are classified as Farmland of statewide importance.

Figure 5 – Soil Types



3.2. Vegetation

The Property generally has four separate vegetation communities (and four corresponding habitat types. The majority of the Property, including the area proposed for development, is dominated by grazed pasture areas with gently sloping topography, located on alluvial/colluvial material which has been further leveled by tilling. The steep slopes above the pastures are dominated by sparse pinyon-juniper woodlands and mixed mountain shrublands with minimal understory vegetation, derived from Mancos shale; in the transitional areas between the mixed mountain shrublands and pastures there are remnant stands of sagebrush shrublands. The portion of the Property immediately adjacent to the Colorado River supports sparse and discontinuous wetland/riparian vegetation on the banks of the river. No wetlands extend beyond the immediate boundaries of the river's channel, and in many areas, there are no wetlands, due to seasonal high flow scouring. Each of the vegetation types is described below in more detail.

Pastures. The pasture portions of the Property are dominated by agricultural cultivars including smooth brome (*Bromus inermis*), orchardgrass (*Dactylis glomerata*), western wheatgrass (*Pascopyrum smithii*), as well as some native fescues (*Festuca* spp.) and rabbitbrush (*Ericameria nauseosa*). The noxious weed cheatgrass (*Anisantha tectorum*) is common, and weedy adventitious species such as tumble mustard (*Sisymbrium* spp.) are also prevalent. In the spring, the introduced purple mustard (*Chorispora tenella*) and storkbill filaree (*Erodium cicutarium*) are also common. The site was grazed at the time of investigation, and additional pasture grasses are likely present and identifiable earlier in the grazing season. The condition of the pastures is typical of grazed or dryland pasture sites, with low levels of ground coverage and minimal diversity.

Typical conditions in the pasture areas.

Typical conditions in ungrazed terrace areas, seen in center midground from the upgradient slope.

Historically (pre-settlement) this site would have supported a more diverse assemblage of native forbs, with a significant shrub component (likely sagebrush [*Artemisia tridentata*] and rabbitbrush) and isolated stands of conifers, oakbrush (*Quercus gambelii*) or cottonwoods depending on groundwater availability.

Some areas of the flat terrace on the Property are not grazed or irrigated and support a sparse coverage of sagebrush that is likely representative of original conditions.

Mixed Mountain Shrublands. The steep slopes on the south side of the Property are composed of Mancos shale which has been uplifted and deformed by the Grand Hogback monocline, which passes through the Property. Mancos shale typically supports limited plant diversity and lower density of vegetation, due to challenging growing conditions associated with the formation's high salt content, poor water infiltration, and high erodibility. In lower elevations, Mancos shale can support a salt-desert scrub community with a high percentage of endemic plant species. However, at the elevations found on this Property, and in the general area surrounding the Project, Mancos shale soils types support sparse pinyon-juniper woodland (*Pinus edulis*

– *Sabina osteosperma*) with mixed shrub component of Gambel oak (*Quercus gambelii*), mountain mahogany (*Cercocarpus montanus* and *C. ledifolius*) and Utah serviceberry (*Amelanchier utahensis*). The shrub component is dense in some areas on north-facing slopes with high moisture availability, and sparse or absent on south-facing slopes. The steepest south-facing slopes of Mancos shale are nearly bare of vegetation.

Riparian/Wetlands. Within the channel of the Colorado River, isolated and discontinuous patches of riparian a vegetation occur on point bars and sheltered eddy banks. Vegetation is predominantly Chinese elm (*Ulmus parvifolia*), an invasive exotic tree species. Other notable species include narrowleaf cottonwood (*Populus angustifolia*), serviceberry, and dogwood (*Cornus stolonifera*). The banks are generally composed of large-diameter cobble material, which is well-drained and due to scouring, extensive wetlands do not occur. However, in protected eddy zones enough silt has collected to support small stands of coyote willow (*Salix exigua*) which suggest the presence of wetland conditions in these limited eddy zones. There are also small occurrences of the noxious weed species Russian olive (*Elaeaganus angustifolia*) and tamarisk (*Tamarix chinensis*). The riparian habitat is in poor condition, with minimal continuous canopy coverage over the river and a high percentage of exotics, likely due to historic grazing pressure.

No wetlands extend beyond the immediate vicinity of the river. A wetland delineation in accordance with the procedures established for wetland delineation by the U.S. Army Corps of Engineers (USACE 1987, 2010) has not been completed at this time, but upland conditions clearly prevail on the majority of the property (see **Photolog, Appendix B**).

Typical mixed mountain shrublandsconditions on the Mancos slopes. Note sparse
shrub coverage on the south-facing slope (center middle view), with greater abundance on the north-facing slopes (left middle view).

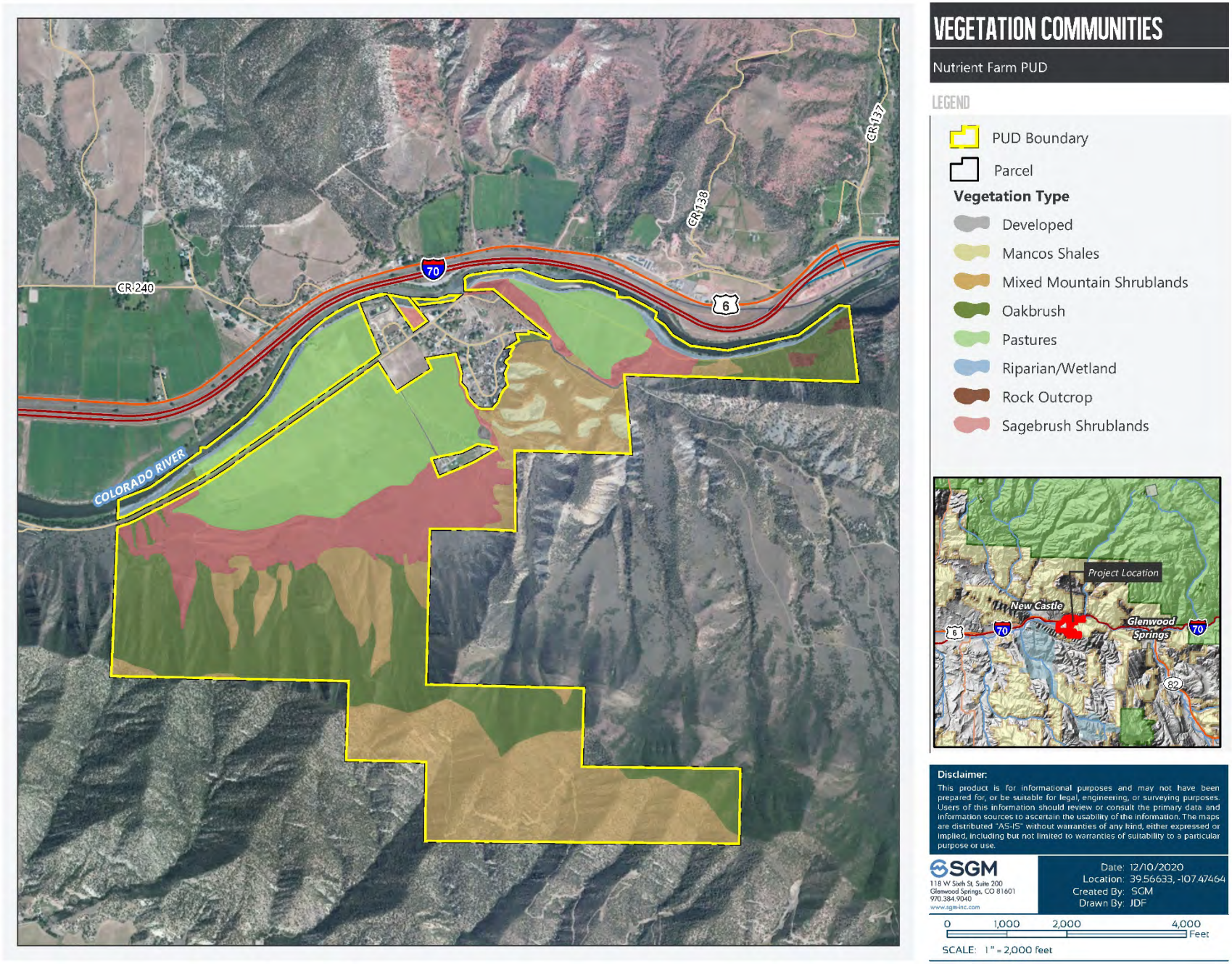
Willows dominate in small backwater reaches, adjacent to grazed pasture (right foreground).

Isolated elm and Russian olive with minor willow Component.

Sagebrush Shrublands. Around the edges of the previously cleared and tilled pastures there are small remnant stands of sagebrush (*Artemisia tridentata* ssp. *bonvillensis*) shrublands. Along washes and in more well drained soils, great basin sagebrush (*A. t.* ssp. *tridentata*) can also be found. Understory vegetation is often compromised by cheatgrass, but desirable grasses and forbs include smooth brome, western wheatgrass, Indian ricegrass (*Acnatherum hymenoides*), and needle-and-thread grass (*Hesperostipa comata*).

Typical conditions in remnant sagebrush shrublands.

Figure 6 – Vegetation Types



3.3. Hydrology

The only significant surface water on the property aside from the Colorado River is the Vulcan Ditch, which traverses the southern slopes of the Property. The Vulcan Ditch has been and will be the primary water supply source for the ranch. It previously carried, and will carry in the future, in excess of 8 cubic feet per second (cfs) on a seasonal basis, of which the Property owns approximately 90% of the potential flows. The ditch originally supplied water to the Vulcan coal mine, and more recently to pasture areas on the parcels, where flood irrigation was used to support pasture grass production. The ditch has older sections where it has already been piped and flumed across steep drainages, and some sections are lined (with plastic sheeting and bentonite clays). The ditch is currently dominated by invasive weedy species typical of disturbed soils, with significant occurrences of Russian knapweed (*Acroptilon repens*) in some locations. As part of the PUD improvements, the entire ditch would be piped and used, likely starting in the summer of 2020.

Typical ditch conditions dominated by weeds and excavated in an upland setting on Mancos shale slope

Unnamed intermittent drainage near terminus with Colorado River. Note lack of consistent flow indicators.

Two minor drainages occur on the southern slopes of the Property and drain north to the Colorado River. Both drainages are unnamed washes that are mapped as intermittent on USGS maps and by the U.S. Fish and Wildlife Service (USFWS 1983). The catchment areas for the drainages are approximately 2.5 square miles or less. Examination of the features suggests that surface water is likely present only ephemerally. The channel morphology is poorly developed, upland vegetation dominates the channels, and there is minimal vegetation to suggest shallow subsurface flow (i.e., there are no cottonwoods or other deep-rooted phreatophytes). Based on observed conditions, these drainages likely flow only briefly during the snow melt season of low-elevation snowpack in early spring, and then ephemerally in response to precipitation. There are no notable wetland or riparian characteristics of these drainages, including vegetation, soils, ecosystem function, or species habitats. There are no gauges or other methods available to estimate the timing or volume of flows associated with these features.

As discussed, the Property encompasses the south bank of the Colorado River. However, interactions with, and impacts to, the hydrology of the river are minimal due to the lack of tributary waters that traverse the Property and flow into the river. Sediment, nutrient, and material inputs to the river are limited to overland sheet flow and rare ephemeral storm events. However, the sediment input to the river from these sources is likely elevated from historical levels, due to grazing pressure and the dried-up pasture conditions that has reduced vegetation coverage and has left the soils on the Property susceptible to erosion.

The existing residential developments adjacent to the Property, located on Riverbend Drive and Glen Eagle Court, produces stormwater and wastewater in volumes typical of such development. It is assumed that all

stormwater and wastewater derived from these residential developments are collected and treated (in the case of wastewater), and then discharged to the Colorado River within the bounds of those properties.

3.4. Floodplain

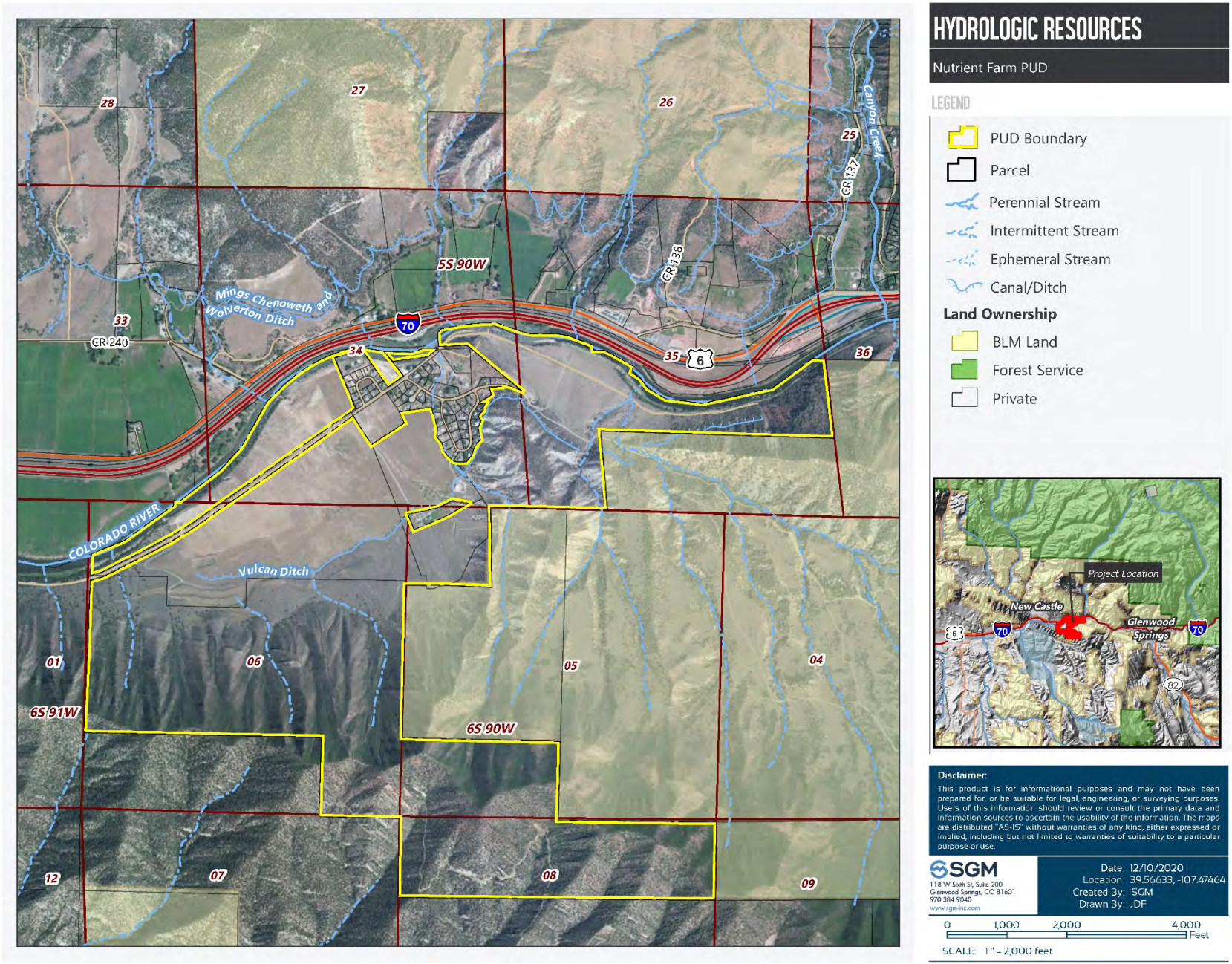
The site is adjacent to the Colorado River and is mapped in Garfield County's "Floodplain Overlay District". However, FEMA has not mapped the floodplain in this area. The area was previously surveyed and studied on several occasions by FEMA and the CWCB but the studies were not officially adopted for this reach of the Colorado River adjacent to Nutrient Farm. The effective FEMA panel is 0802051020B dated 12/15/1977 (not printed). All areas are assigned Zone D areas of possible flooding.

An approximate Floodplain Zone A was created and published for public review and comment in the Garfield County Preliminary study circa 2011. The Preliminary Flood Insurance Study and accompanying maps and GIS digital data were made available on the County website and was widely used as the "best available" information.

SGM obtained updated 2015 DFIRM metadata published by FEMA on 7/31/2015 and used these GIS layers as the best available information for Nutrient Farm. This reach of the river remains as an approximate Zone A floodplain without water surface elevations. SGM understands that FEMA is very near publishing a new detailed floodplain study for this reach. That study will use a reduced 100-yr flowrate and is expected to result in 100-yr water surface elevations that are lower than shown in previous studies.

Based on our review of the proposed Nutrient Farm PUD improvements with respect to all flood study information referenced above, the development will comply with all applicable FEMA, National Flood Insurance Program (NFIP), CWCB and Garfield County floodplain regulations. Specifically, any future improvements will comply with the applicable Floodplain Overlay Regulation of sections 3-102 and 3-301 and the Floodplain Specific Site Plan requirements of 4-203.O.1. of the LUDC. In addition, any future improvements near the Colorado River will abide by section 7-203 Protection of Waterbodies of the LUDC. This includes the required setbacks for structures and activities near a waterbody and compliance with all applicable State and Federal regulations and permitting requirements including, but not limited to, section 404 of the Federal Clean Water Act administered by the Corps. Possible improvements that could occur below the future 100-year flood elevation, consist of pump intakes, boat ramps, Colorado River access trails and possibly other improvements meant to enhance the experience of the Colorado River user. All of these can be constructed without adversely impacting the River and floodplain.

Figure 7 – Hydrologic Resources



4. Impact Analysis

4.1. Adjacent Land Use

The adjacent uses within a 1,500-foot radius of the site consist of agricultural hay fields, CDOT/UPRR Right-of-Way, residential development, vacant zoned commercial land, undeveloped private land and public lands managed by the Bureau of Land Management – Colorado River Valley Field Office (CRVFO). This PUD proposes a development with mixed uses which includes agricultural, residential, recreational and commercial uses. The proposed PUD is compatible with surrounding land uses and impacts to adjacent land uses would be mitigated through appropriate planning and design. The following adjacent land uses are as follows:

West Side: The current land use is primarily irrigated agricultural hay fields and undeveloped mixed mountain shrublands. It is currently zoned as rural.

South Side: The adjacent south and west parcels are currently undeveloped mixed mountain shrublands and zoned as PUD. The adjacent south and eastern parcels are public lands.

East Side: The eastern side of the proposed project area are currently public land (southeast) and rural zones near the Colorado River and Interstate 70.

North Side: The northern boundary of the Property includes the Colorado River and Interstate 70, but beyond that is a mixture of different residential and commercial uses. The residential and commercial uses north of Interstate 70 will not be affected by the proposed PUD.

The Official Zoning District Map of Garfield County recognizes the existing PUDs and designates the zoning for the Property as such. According to the Garfield County 2030 Comprehensive Plan, the future land use designated for this area is Residential Medium High (RMH). This land use designation would allow for small farms, estates, and clustered residential subdivisions. This land use designation is compatible with PUDs and Rural zoning. The western portion of the proposed development falls within the New Castle Urban Growth Boundary. Garfield County encourages development within urban growth areas.

4.2. Soil Impacts

The site is dominated by soils that have few construction constraints. However, soils derived from Mancos shales are susceptible to shrink/swell issues due to high concentrations of bentonite clay. The soils at the site were tested by RJ Engineering & Consulting as part of a geotechnical investigation. Laboratory results indicated the soil exhibited low swelling to low collapse potential, with an estimated differential and total movement of 0 to 2 inches. RJ Engineering & Consulting recommend deep foundations (drilled piers or micropiles) for structures sensitive to movement and concluded that shallow foundations are adequate for non-sensitive structures. Proper drainage should be engineered for structures and features to reduce water infiltration. The soil on site is adequate to use for fill material provided it is moisture conditions to within 2% of optimum moisture content and compacted to 95 percent of maximum standard Proctor dry density (ASTM 698).

Up to 307.96 acres of soil may be impacted by project activities, total soil impacts by soil type and development type are summarized in **Table 2**. Topsoil removed for development purposed will be stockpiled and re-applied where necessary. Topsoil will not be used for fill material.

Table 2 – Impacts by Soil Type

Soil Disturbance							
Soil Type Name	**Map Unit Symbol**	**Agricultural**	**Building**	**Recreation**	**Transportation**	**Water**	**Total Area (acres)**
Heldt clay loam, 3 to 6% slopes	29	55.33	8.37	0.50	9.59	0.85	**74.64**
Heldt clay loam, 6 to 12% slopes	30	91.29	11.94	7.46	11.92	0.59	**123.20**
Nihill channery loam 6 to 25% slopes	47	15.61	7.35	53.09	9.13	4.26	**89.44**
Olney loam, 6 to 12% slopes	51	2.82	2.33	-	0.47	-	**5.62**
Torrifluvents, nearly level	65	-	-	-	0.13	-	**0.13**
Torriorthents-Camborthids-Rock outcrop complex, steep	66	0.99	5.83	1.75	0.32	-	**8.89**
Torriorthents-Rock outcrop complex, steep	67	-	1.31	2.23	0.95	1.55	**6.04**
Total Project Components Disturbance		**166.04**	**37.13**	**65.03**	**32.51**	**7.25**	**307.96**

4.3. Groundwater and Aquifer Recharge Areas

The portion of the Property planned for development and farming is underlain by the Colorado River alluvial aquifer, connected to and recharged by Colorado River surface water. SGM reviewed well completion and pump installation reports for information about subsurface geology and groundwater levels utilizing data from two of the Riverbend Wells, Nos. 3 and 4 (Permit Nos. 018146-F and 018147-F, respectively). The Riverbend Wells supply water to the existing Riverbend housing developments and are located within 200 feet of the Colorado River on the eastern portion of the Farm property (Area 5 – Working Farm East). Based on the well completion reports, the entire drilled depth of the wells is boulders and gravels, alluvial type deposits which allow relatively easy transmission of groundwater.

Water was found at 22 feet below ground surface for Riverbend Well No. 4, and 5 feet below ground surface for Riverbend Well No. 3, indicating that the elevation of the water table in this alluvial aquifer is similar to the elevation of surface water in the Colorado River at 5,590 - 5,600 feet. Further to the south on the property, the ground surface slopes gradually upward for about 200 feet until it transitions to the steep hill slopes of the Grand Hogback. So, while wells located close to the River have a shallow depth to groundwater, potential sites for septic system leach fields could be located further to the south with a greater depth to groundwater.

Surface water return flows from water use on the Property will flow downhill and into the Colorado River. Surface water returns are expected from flow-through water from ponds and from irrigation runoff. Historical irrigation on the Property has been flood irrigation, which is relatively inefficient and has significant surface returns. While initial irrigation on the Farm will likely be largely flood irrigation, the Farm anticipates converting to more efficient irrigation practices (such as sprinklers and drip irrigation), which would have minimal surface runoff, thereby reducing transport of sediment and nutrients from fields to the River. Groundwater return flows from irrigation are anticipated to return to Colorado River quickly, due to the alluvial boulder and gravel composition of the aquifer and the proximity of fields to the Colorado River.

The land under Area 5 – Working Farm East slopes gradually toward the Colorado River and portions of this area planned as hay fields are located within the flood plain. The other areas that border the Colorado River (Areas 1, 6, and 7) are at least thirty feet above the river due to the steep banks on the western part of the Property. Structures and residential development on the Property will be sited above the regulatory 100-yr flood plain.

4.4. Environmental Impacts

4.4.1. Vegetation

The majority of the proposed Development (69 percent) would occur within pastures; 68 percent, which are previously disturbed lands, and which provide minimal environmental services or habitat value. Most of the development within the pastures would also be from agricultural activities, either in the form of orchards, fields, or other similar land uses. New impacts to native habitats and vegetation communities would primarily occur (32.1 percent) within the Sagebrush Shrubland habitat type, primarily through the conversion to recreational activity areas, roads/transportation, and buildings.

Development within native vegetation types is not extensive, and most of the development, as mentioned, occurs in previously disturbed areas. There is a high potential for the spread of noxious weeds from disturbed areas into undisturbed vegetation types, and aggressive noxious weed management will need to be followed as specified in the Weed Management Plan to keep undisturbed native habitat types from becoming infested by adventitious weed species.

Table 3 – Impacts to Vegetation Types

Vegetation Disturbance							
Vegetation Community Type	**Agricultural**	**Building**	**Recreation**	**Roads/ Trails**	**Water**	**Total Acres**	**Percent**
Mancos Shales (mostly unvegetated)	-	0.22	-	0.01	0.45	**0.68**	**0.02**
Mixed Mountain Shrubland	-	0.75	2.69	0.46	1.46	**5.36**	**1.8**
Oakbrush	2.19	2.72	0.39	0.22	-	**5.52**	**1.82**
Pastures	155.23	17.89	10.38	20.29	1.32	**205.11**	**67.6**
Riparian/Wetlands	-	0.35	-	0.03	-	**0.38**	**0.01**
Sagebrush Shrublands	7.51	15.09	51.27	8.53	4.01	**86.41**	**28.5**
Total Project Components Disturbance	**164.93**	**37.02**	**64.73**	**29.54**	**7.24**	**303.46**	**-**

4.4.2. Federally Listed Species

Information on species status, distribution, and ecology was derived from U.S. Fish and Wildlife Service (USFWS) recovery plans, Colorado Natural Heritage Program maps and reports, Colorado Parks and Wildlife (CPW) habitat mapping, geographic information system (GIS) databases, various scientific studies and reports, and field reviews. The wildlife species assessments have been mapped and described following all applicable practices of the CPW.

Listed or candidate wildlife species considered and evaluated for this assessment include those identified by the USFWS as potentially occurring in the development areas of the proposed PUD ("Project Area.") While all listed species were initially considered, species where there would be *No effect* from the project were

eliminated from further consideration. The decision to eliminate a species from consideration was based on known range distributions and/or complete habitat incompatibility (**Table 4**).

Table 4 - Federally-Listed Species Initially Considered

Species[1]	Occurrence	Habitat Association	Potential Habitat in Project Area?	Potential Impact/Issue?
MAMMALS				
Canada lynx (FT, ST) *Lynx canadensis*	High mountain areas with large expanses of conifer forests in Colorado	Spruce/fir and lodgepole pine forests, sometimes aspen, shrublands	No	No
BIRDS				
Mexican spotted-owl (FT, ST) *Strix occidentalis lucida*	Southwest Colorado, and along Wet Mountains, Rampart Range	Deep shaded canyons with closed canopy conifers and cliffs	No	No
Yellow-billed cuckoo (FT) *Coccyzus americanus*	North Fork of Gunnison, Colorado, Dolores, Yampa and Rio Grande rivers	Large cottonwood stands along larger rivers	No	No
FISHES				
Bonytail chub (FE, SE) ***Gila elegans***	**No known populations remain in Colorado**	**Large, swift-flowing waters of the Colorado River system**	**No**	**Yes**
Colorado pikeminnow (FE, ST) ***Ptychocheilus lucius***	**Colorado, Dolores, Green, Gunnison, San Juan, White and Yampa**	**Large, swift-flowing rivers that are seasonally turbid with warm backwaters**	**No**	**Yes**
Colorado River cutthroat trout (SGCN) *Oncorhynchus clarkii pleuriticus*	Widespread localized reaches	Headwater streams and lakes	No	No
Humpback chub (FE, ST) ***Gila cypha***	**Green, Yampa and Colorado Rivers**	**Pools and eddies in areas of fast-flowing, deep, turbid water, often associated with cliffs and boulders**	**No**	**Yes**
Razorback sucker (FE, SE) ***Xyrauchen texanus***	**Lower Yampa and lower Colorado Rivers**	**Deep, clear to turbid waters of large rivers and reservoirs, with silt, mud, or gravel substrate. Quiet, soft-bottom river backwaters**	**No**	**Yes**
PLANTS				
Ute Ladies'-tresses (FT) ***Spiranthese diluvialis***	**Northwest Colorado, the Roaring Fork Valley, and the northern Front Range**	**Moist meadows, seasonal river terraces, and irrigation channels below 7000 feet in elevation**	**Yes**	**No**

Source: CPW 2015
FE = Federally Endangered; FT = Federally Threatened; SE = State Endangered; ST = State Threatened; SGCN = Species of Greatest Conservation Need

The species in bold text in the table are federally listed and are identified by USFWS as potentially occurring within the Project's immediate vicinity. The Property does not support suitable habitat and is not within the range of any other listed species.

4.4.2.1. Colorado River Fish

Status: FWS Endangered

Four species of fish endemic to the Colorado River system (Colorado pikeminnow [*Ptychocheilus lucius*], razorback sucker [*Xyrauchen texanus*], bonytail [*G. elegans*], and humpback chub [*Gila cypha*]) are listed as endangered with critical habitats designated in the Colorado River. The Colorado River adjacent to the

property is approximately 20 miles upstream from occupied habitats and the nearest designated critical habitats are in the Rifle, CO vicinity.

The Colorado pikeminnow was included on the 1967 list of native fish and wildlife threatened with extinction under the Endangered Species Preservation Act of 1966 and included in Appendix D, the "United States List of Endangered Native Fish and Wildlife" prior to enactment of the ESA of 1973. The USFWS (1994) designated critical habitat in the Colorado River and its 100-year floodplain from approximately the Town of Rifle in Garfield County downstream through Utah, to Lake Powell in Utah.

The razorback sucker was listed as endangered by the USFWS in 1991 because of limited numbers found throughout the Colorado River Basin and minimal evidence of natural recruitment (USFWS 1991). Within the Upper Colorado River Basin, naturally reproducing populations are only found in the middle Green River in Utah and in an off-channel pond in the Colorado River near Grand Junction (USFWS 2002b). Most razorback suckers in the Colorado River have occurred in the Grand Valley near Grand Junction, although the number of fish captured in Grand Valley has declined dramatically since 1974 (Osmundson and Kaeding 1991). The USFWS (1994) designated the same critical habitat for razorback suckers in the Colorado River Basin as for Colorado pikeminnows.

The bonytail is an exceedingly rare minnow originally native to the Colorado River system of the western United States and northern Mexico (USFWS 2002c). The bonytail was listed as endangered by the USFWS in 1980 because it had been nearly extirpated from its historical range (USFWS 1980). The USFWS designated critical habitat for the bonytail in river channels and flooded, ponded, or inundated riverine habitats that would be suitable for adults and young (USFWS 1994). Critical habitat for bonytail chub occurs in the Colorado River on the Colorado-Utah border, in westernmost Mesa County, Colorado, and eastern Grand County, Utah.

The humpback chub was listed as endangered in 1973. The distribution of humpback chub in 1990 included the Colorado River mainstem reaches in the vicinity of Westwater Canyon, Utah and Black Rocks, Colorado (USFWS 1990a). Humpback chubs occasionally are collected outside of documented population centers and the lower Gunnison River (Valdez et al. 2011). The USFWS designated critical habitat for the humpback chub in river channels and flooded, ponded, or inundated riverine habitats that would be suitable for adults and young (USFWS 1994). Critical habitat for humpback chubs occurs in the Colorado River on the Colorado-Utah border, in westernmost Mesa County, Colorado, and eastern Grand County, Utah.

Impact Analysis. No habitat exists within or adjacent to the Property for the Colorado pikeminnow, razorback sucker, bonytail or humpback chub; the Colorado River in this reach is generally too cold, clear, and fast-moving to support these species. Therefore, no direct impacts would result from this project.

It is assumed that any project development would utilize the existing water rights associated with existing wells, the Colorado River, and the Vulcan Ditch, and that no additional depletions of surface water would occur on a permanent basis. Potential construction water needs would be associated with dust suppression, compaction, and other construction needs; these waters would presumably come from existing Colorado River water rights or from the Vulcan Ditch diversion, and no additional temporary depletions are anticipated. The 1999 Programmatic BO (USFWS 1999) concludes that implementation of the specified elements of the Recovery Action Plan, along with existing and a specified amount of new depletions, are not likely to jeopardize the continued existence of the endangered fish or adversely modify their critical habitat in the Colorado River sub-basin within Colorado.

Currently, the site is likely contributing sediment to the Colorado River via overland sheet flow at rates slightly elevated over historic conditions, due to the denuded vegetation that expose the naturally erosive soils. The current proposal to resume intensive agriculture on the site would likely increase vegetation cover, given the current grazed and dry conditions. Increased vegetation and greater management oversight would reduce the presumed levels of sediment input to the Colorado River from agricultural areas.

When considering the conceptual plans for multi-use development on the site, it is assumed that any stormwater generated from development would be collected and treated appropriately, and that any hazardous materials would be stored in appropriate containment per Garfield County building code and Colorado Department of Health and Environment (CDPHE) construction stormwater permit standards. With adherence to stormwater permit stipulations, additional sediment reaching the Colorado River should not occur; however, it is not uncommon for larger developments, even with a Stormwater Management Plan in place, to have unintentional unauthorized releases of sediment. It is therefore likely that the Nutrient Farm PUD could also potentially see temporary releases of stormwater sediments. These minor releases would have no meaningful impacts to downstream fisheries and listed species, given the diluting abilities of the Colorado River, and as listed fish species are not negatively impacted by minor increases in sedimentation; listed fish species are actually extremely accustomed to heavy silt loads in their habitats.

Given the constraints within which construction and operation must take place, development is not expected to increase the risk or release of any potential contaminated materials on the site and is not anticipated to increase the likelihood of future contamination of downstream waters.

Development of the Project would have no direct effect on the Colorado Pikeminnow, razorback sucker, humpback chub and bonytail chub. Construction and post development site runoff would be managed through formalized stormwater drainage plans using best management practices. Nevertheless, it is still likely that some increased sediment delivery would occur during and after construction; these increases are not anticipated to have impacts to downriver listed fish species. Other minor discharges of contaminants reaching the Colorado River are not anticipated to result in negative impacts to potentially occupied habitats on the Colorado River, which is over 40 river miles downstream of the project area. Minor water depletions such as those proposed with development were anticipated under the 1999 Programmatic BO (USFWS 1999, USFWS 2000b), and guidance has been issued for the authorization and handling of water depletions. Additional water depletions beyond current authorizations associated with the property and Vulcan Ditch would need to be mitigated through initiation of a Recovery Agreement with the USFWS.

4.4.2.2. Ute Ladies-tresses Orchid

This species (*Spiranthes diluvialis*) is a perennial, terrestrial orchid approximately 8 to 20 inches tall. Ute Ladies'-tresses blooms from late July through August; the flowers are white to ivory in color. Habitat for this orchid occurs along riparian edges, gravel bars, old oxbows, high flow channels, and moist to wet meadows along perennial streams. It typically occurs in stable wetland and seepy areas associated with stable features within historical floodplains of major rivers. It also is found in wetland and seepy areas near freshwater lakes or springs, and soils range from alluvial sands and gravels to coarse silts and clays (USFWS 2018).

This species was discovered in the Roaring Fork valley along irrigation ditches, canals, and ponds near Carbondale in 2009 (Wheeler and Petterson 2009) and was subsequently added to County lists in the area by USFWS. This species has not been observed much further downstream along the Roaring Fork than Cattle Creek confluence and has not been observed on the Colorado River mainstem. Although the Property is outside the area of known occupancy for the orchid, suitable habitat does occur along the banks of the Colorado River. No surveys for this species have occurred at this time.

Impact Analysis. The proposed boat ramp and river access points would occur through potential orchid habitat. Orchids have not been identified as occurring along the Colorado River, initial surveys occurred in August 2020, and no orchids were observed. As construction of the boat ramp and any other developed facilities that impact wetlands or waters of the U.S. would require a USACE permit, Nutrient Farm PUD would be required to conduct additional surveys for Ute ladies' tresses orchids for permit compliance. If orchids are detected in these development areas, or in areas which may see potential indirect impacts (e.g., from human trampling, etc.), then Nutrient Farm PUD would need to coordinate with the U.S. Fish and Wildlife Service to protect occupied and other potentially suitable orchid habitats. As Ute ladies' tresses orchids have

not been identified along the Colorado River, it is assumed that it is unlikely that these orchids would occur within the PUD area. Surveys would nevertheless be required as part of the USACE section 404 permitting process.

Outside of the boat ramp or other improved trails along the Colorado River, the development of the Property would have no potential direct impacts on the orchid, however, indirect impacts from increased human activities, increased potential sedimentation issues, and other indirect impacts could affect potential habitats and any unidentified orchids along the banks of the Colorado River.

In summary, the property contains limited potential habitat for the species (immediately adjacent to the Colorado River) and is outside the area where the species is known to occur. Prior to any development along the banks of the Colorado River, surveys for the species would need to occur per USACE and USFWS requirement, and if the orchid is identified, Nutrient Farm PUD would likely need to modify their plans or develop a mitigation plan through the USFWS processes. Because of the permitting process with the USACE and USFWS, it is unlikely that impacts to orchids would occur (if they occur at all on the property). Aside from direct impacts from a boat ramp or other developed features (such as a trail), the anticipated indirect impacts of the development could result in an insignificant and temporary degradation of potential habitat for the orchid in the vicinity of the Project primarily from stormwater runoff, but these risks would be minimized by CDPHE-mandated stormwater controls.

4.4.3. State-Listed Species

Colorado Parks and Wildlife's (CPW's) list of Threatened and Endangered species and Species of Greatest Conservation Need (SGCN; Tier 1 species only) was reviewed to determine if any species had potential habitat in or adjacent to the Project Area. While all listed species were initially considered, an elimination of unlikely species from further consideration is provided in **Appendix C**. These decisions are based on known range distributions being either outside of the Project Area or complete habitat incompatibility. The Colorado River endangered fish species have already been addressed under section **5.1 Federally Listed Species** and are not further considered in this section.

4.4.3.1. Bald Eagle

Bald eagles (*Haliaeetus leucocephalus*) are federally protected by the Bald and Golden Eagle Protection Act of 1940. They are also protected under the Migratory Bird Treaty Act of 1918. In addition, CPW tracks bald eagle populations, nesting sites, roosting habitat, and foraging areas and has developed protective stipulations for the species, with specific recommendations for nests, winter night roosts, and hunting perches (CPW 2008).

As currently mapped, the Project is located within bald eagle winter and summer range habitat that extend along the length of the Colorado River. The Property is also upstream from a known bald eagle nest site, which was confirmed to be active as of March 29, 2020. The Property is outside the protective 0.5-mile buffer established for the active nest (**Figure 4**). The mapped eagle range encompasses only the Colorado River and the immediately surrounding banks and does not extend into the portions of the Property that are removed from the river.

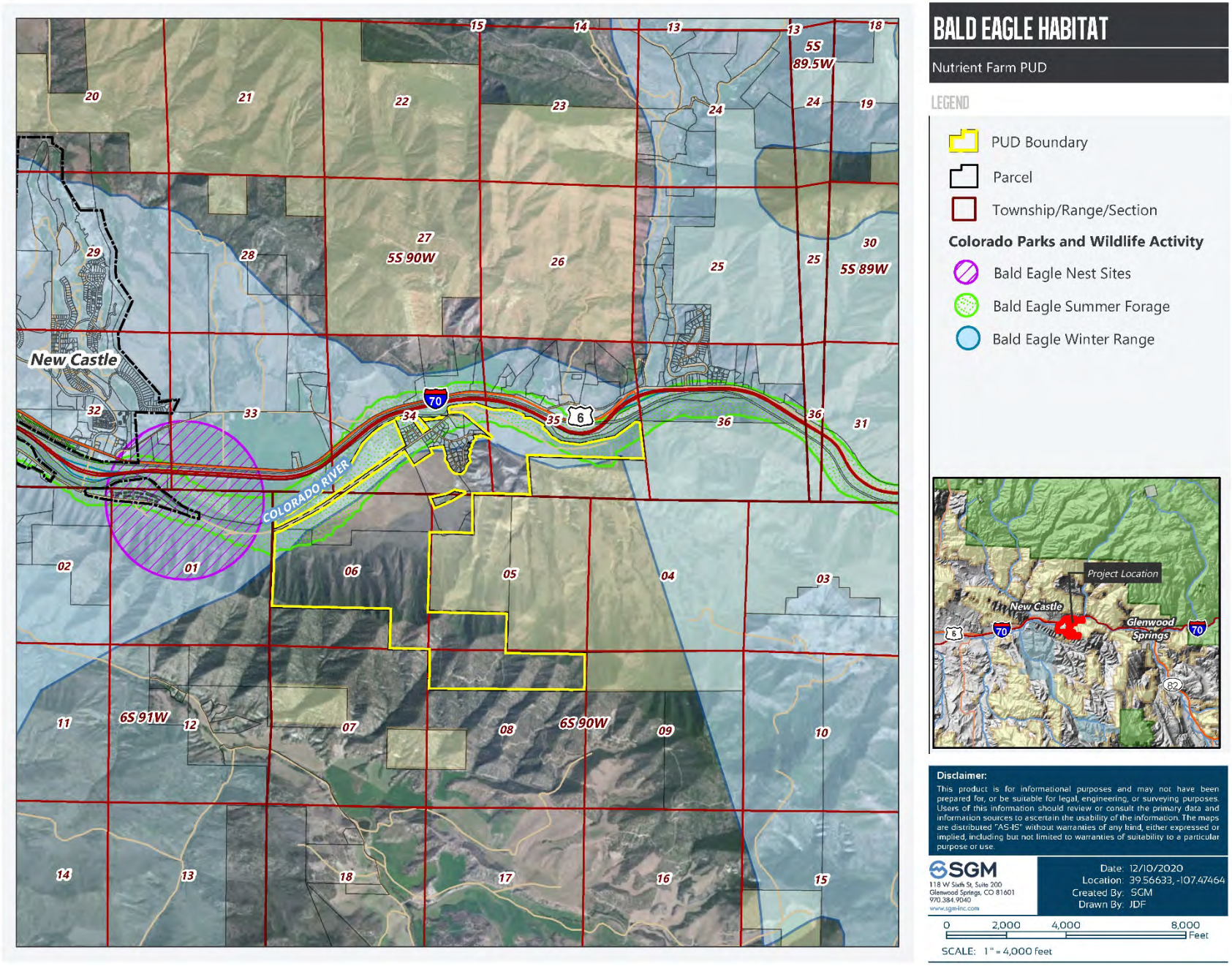
No nests are currently located within or adjacent to the PUD area. There is minimal habitat of the type preferred by nesting eagles (large deciduous tree adjacent to flowing water) on the Property, but a handful of large ponderosa pines (*Pinus ponderosa*) do provide attractive perching sites, primarily upstream and at the easternmost end of the project area. Some opportunistic perching likely occurs on larger trees adjacent to the river, but there are very few suitable perching or nest trees along this stretch of the Colorado River. One larger ponderosa pine in particular upstream of the project area could provide some wintertime roosting opportunities, but in the spring and summer months this tree is occupied by a great blue heron (*Ardea*

heodias) heronry, which would preclude bald eagles using the ponderosa pine for perching during the heron nesting and chick rearing season (see section **4.4.4.5 Great Blue Heron** below). It is also likely that eagles could be attracted to the foraging habitat along the river, since the winter-seasonal ice coverage is limited, and the river contains an abundance of the large prey preferred by eagles. Bald eagles (as well as golden eagles) are also known to prey on heron chicks, so some opportunistic predation of the heronry may also occur.

CPW recommends limited human encroachment within 0.5 miles of occupied eagle nests during the nesting season. At this time there are no nests within 0.5 miles of the property, and there is a limited likelihood of any new nests being constructed due to a lack of suitable nesting trees. Diurnal hunting perches of the type that could be utilized on the Property should also be protected from direct encroachment but are less sensitive than nesting sites.

At this time, development along the river is limited to a boat ramp and some riverside trails. No significant impacts to eagles are anticipated given there are no suitable perching sites or nesting trees along the river in proximity to the PUD area. If eagles are observed perching on the Property in the future, the preferred perching sites should be considered for preservation. In general, the few large trees adjacent to the river should not be removed, to retain perching/foraging value for eagles. The boat ramp and any riverside trails would likely reduce bald eagle foraging habitats when humans are using these amenities, but these indirect impacts are not considered significant, given a lack of perches near the river.

Figure 8 - Bald Eagle Habitats



4.4.3.2. River Otter

The Colorado River in the vicinity of the Property is mapped as habitat for the river otter (*Lontra canadensis*) by CPW. Northern river otter inhabits riparian habitats that occur from low elevation deserts to high valleys of Colorado. Otters require permanent water of relatively high quality with an abundance of fish and/or crustaceans (crayfish; *Cambarus* sp.). Otters are usually found in streams with higher volumes (minimum of 10 cfs). During the winter months, otters also need streams with relatively high amounts of open, ice-free water, deep pools, and good access to the shoreline. The river otter once occurred in most of the major river drainages in Colorado and was extirpated. Starting in 1976, Colorado started reintroduction efforts in several drainages, with an initial goal of establishing two populations. In 1998 a more intensive reintroduction program was started by CPW. Historically and currently in Colorado, otters are most commonly found in larger rivers at low or moderate elevations. Otters are also known to have colonized larger ponds, reservoirs, lakes and flooded gravel pits.

Fish are the primary food source for otters, particularly slow-swimming fish species. In streams where they are abundant, crayfish can make up a significant portion of otter's diet. Most research indicates that abundant prey is needed to support otter use of an area (Mack 1985, Malville 1990, Melquist et al. 1981).

Because of the river otter's aquatic life, many aspects of the species' behavior and ecology are not well understood. They are active year-round, and do not hibernate. Otters in mid-elevation areas such as the Colorado River in the Project vicinity are mostly diurnal in winter and more nocturnal in summer, with the least activity in late summer and early fall. River otters are social, forming family groups led by the adult female, who may exhibit territorial behavior. Yearling otters, unrelated juveniles, and occasional adult otters may join with family groups.

River otters use both terrestrial resting sites and dens when not actively moving. Beaver bank dens are particularly favored sites. Adult otters apparently have few natural predators, although individuals have been killed by bobcats, dogs, coyotes, and foxes (Fitzgerald et al. 1994). Most mortality is thought to occur from trapping and road kills. Habitat destruction and water pollution have an impact as well.

The section of the Colorado River adjacent to the PUD area remains at least partially ice-free during the winter months, and because of this, river otter activity in this area could occur year-round. In addition, CPW fish stocking and fishery data suggests that ample prey is likely available. Therefore, otter use of this stretch of the Colorado River is likely to only be constrained by den site availability and human disturbance. Beavers and potential den sites do not occur in significant density on this stretch of the Colorado River, and hazards from dogs and road traffic are significant, which likely reduces the potential for otters to occur in this area on a regular basis. River otters are not known to occur in the river immediately adjacent to the Property, but certainly could utilize the habitat on a seasonal basis.

Impacts Analysis. While the property encompasses nearly 2.75 miles of the south bank of river, the development is mostly set back from the river, and most of the proposed development and agricultural use would not be expected to directly affect any individual otters that could occur in the vicinity. The adventure farm, picnic area, restaurant and other development features are approximately 80-100 feet from the edge of the river (to stay outside of the floodway), and at this distance most river otter activities would not be impacted. The boat ramp and proposed riverside trail would have minor direct impacts to habitats (given a lack of structural diversity in the banks) but would introduce areas of focused human activity at the river's edge. Development on the property is assumed to use constructed stormwater management basins under final development plans and would not impact water quality values necessary for river otters or their habitat.

Increases in human activity (and assumedly pet dogs) would occur, and human activities along the banks of the river would likely reduce habitat effectiveness for river otter, and while otters may still occur in the river, they would not likely linger for long periods or establish up dens along the riverbanks near the boat ramp or

even near riverside trails. Foraging activity may still occur, but again if there are more continuous human activities along the banks, then otters would likely cease foraging activities and move to stretches of the river with less human activity.

The cumulative impacts of the proposal LoVa Trail in this area would additionally increase human activities near the river, and could further reduce habitat effectiveness along the river, especially during the spring, summer and fall months when the trail would be most active.

4.4.4. Other Wildlife Considerations

4.4.4.1. Traffic and Big Game Species

Traffic in Colorado is often the leading indirect impact to wildlife habitat and wildlife mortality. Highways and busier roads are often located in areas of flat benches adjacent to river systems, which bisect upland habitats from riparian habitats. As riparian habitats often attract upland wildlife species, and in some cases congregate wildlife for significant periods of time, increased traffic levels on roadways can often form effective barriers to wildlife movement and can then fragment habitats by dissuading wildlife from crossing roadways. For some species, the draw of traditional habitats or water can override the fear of traffic, and wildlife will often attempt to cross busy roadways, incurring mortality and thus negative impacts to population levels. Further, for species such as deer and elk, vehicle strikes can often cause significant financial impacts to commuters, through increased insurance rates, direct costs of repairing or "totaling" of vehicles, to costs of hospitalization, injury, and even death to drivers and passengers in vehicles. There are no big game migration corridors within the PUD area.

Research on traffic impacts to habitat connectivity and wildlife use patterns indicate that traffic levels of 4,000 to 5,000 VPD begin to create significant deterrents to wildlife crossings (Ruediger et al. 2000, Alexander et al. 2005, Gagnon et. al. 2007). Some of the other actions wildlife take when having to cross a road with 4,000-5,000 VPD includes animals avoiding highways altogether (not even trying to cross), failed attempts (animal tries to cross, but turns around due to traffic), injury in crossing (from vehicles strikes), or death. As mentioned, existing traffic levels on CR 335 is not likely a barrier to wildlife crossing the road.

Impact Analysis. According to the SGM traffic study, CR-335 carries commuter traffic from residential subdivisions between New Castle and the Riverbend, Riverbend Ranchettes and Cedar Ridge subdivisions adjacent to the Project Area (and associated construction and service traffic to those residential areas). As there is no public access or roads beyond these subdivisions, there is no pass-through traffic. Much of the existing traffic is generated during the morning and evening rush hours, coinciding with daily commuter traffic between the Riverbend area, and work destinations in the Glenwood Springs and Aspen areas. This results in daily traffic volumes of approximately 470 VPD through the Nutrient Farm PUD, peaking in the morning and evening commute times. As detailed in the SGM traffic report, these peak traffic periods are relatively short-lived, and during much of the day and especially at night, traffic patterns would be relatively low.

At full build out, traffic generated from the Nutrient Farm project would likely generate 1,730 additional VPD, raising the level of vehicle use along CR-335 to 2,200 VPD. This amount is still well below traffic levels at which more noted avoidance of wildlife crossing attempts begin to occur. Further, given the 35 mph road speeds, traffic levels are also mitigated by the slower road speeds.

These volumes would not likely produce temporary barriers to wildlife movement across CR-335 but may produce conditions mildly hazardous for wildlife crossing. However, as detailed in the SGM traffic report, these peak traffic periods are relatively short-lived, and during much of the day and especially at night, and wildlife would easily be able to cross CR-335.

4.4.4.2. Black Bear

Black bear (*Ursus americanus*) has become a significant wildlife management issue in the State of Colorado. Bears are commonly supplementing their diets by raiding garbage cans, breaking into homes, and becoming a hazard and a nuisance. Habitat on the Property itself is dominated by grazed and dry-land pasture meadows which do not currently provide foraging opportunities for bears. The north-facing slopes south of the pastures do include a mixed mountain shrub component, which provides good foraging value for bears. The Riverbend community likely sees relatively common bear activity, given the proximity to shrubby habitats.

Conditions on the north bank of the Colorado River and I-70 are more attractive to bears currently, given the density of human occupancy and the presence of agricultural activity including orchards along Canyon Creek. These areas are more attractive to bears because of human-provided food sources, especially trash or orchard fruit. This is reflected in CPW's mapping of Black Bear Human Conflict Areas in the greater area (**Figure 5**), but these Human Conflict Areas do not extend onto the Nutrient Farm PUD.

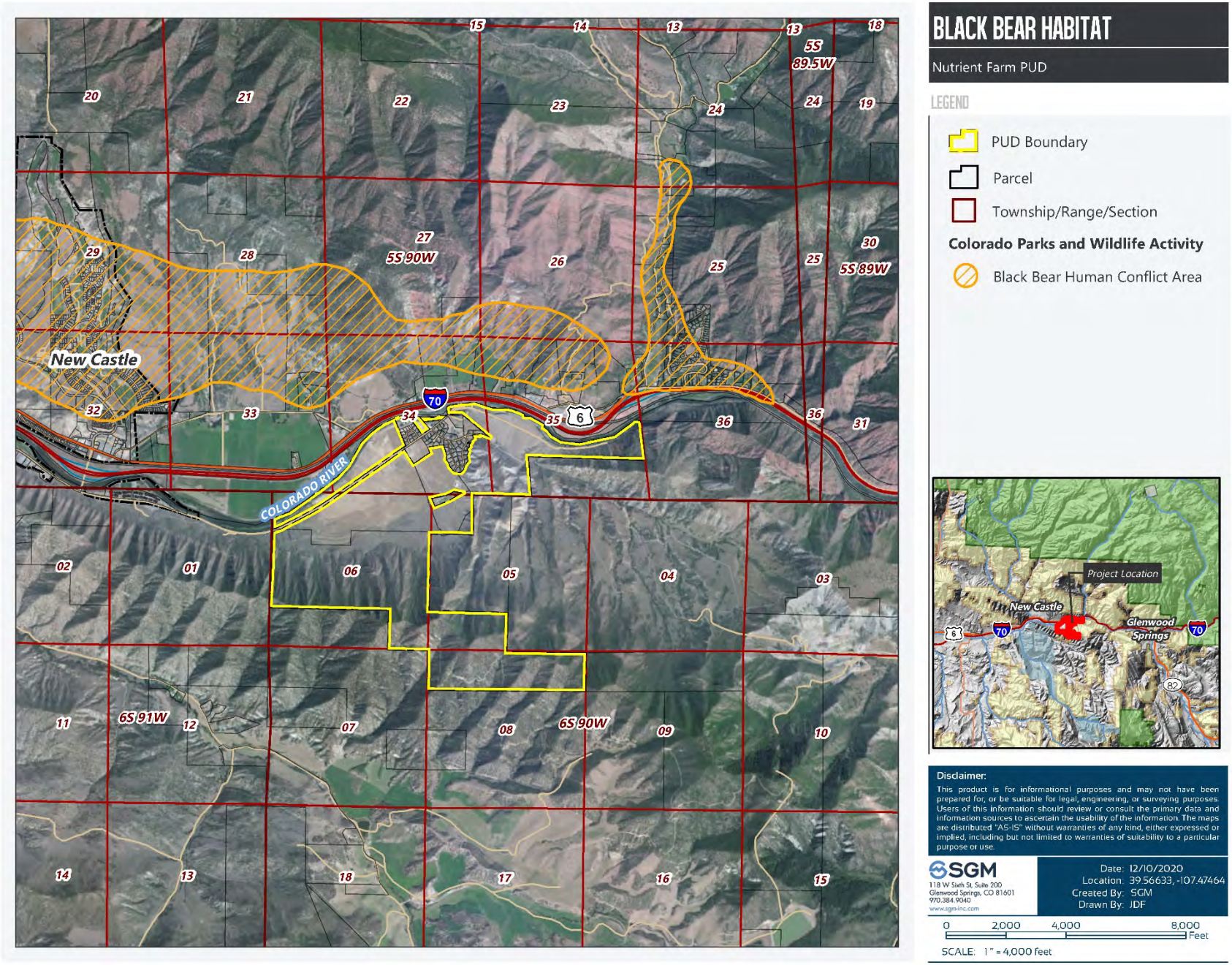
However, the proposed development would create similar conditions within the Property, since orchards are a component of the plan, and the residential and agri-tourism areas would generate significant food waste that would also be an attractant.

Impact Analysis. This development would have minor to insignificant impacts on bear populations or bear habitat availability, but black bears will take advantage of the PUD to supplement their diets. Because of the extensive orchards planned, it should be expected that the level of conflict with black bears could dramatically increase, and the Property should be treated as a Black Bear Human Conflict Area when considering the development proposal. Residents should use bear-proof trash containers, should not feed pets outside or leave pet food outside, and should be cautioned against planting significant amounts of fruit-bearing trees near their homes. The orchards will be a strong attractant for bears, and preventative game damage fencing will help preclude most bear issues in the orchards. But regardless, it is highly likely that bears will be an issue for Nutrient Farm residents, campers and visitors, and strict adherence to rules such as keeping trash and food secure, and keeping fences maintained around orchards, will be needed to keep bears from becoming an even greater issue.

The following measures will be implemented to reduce potential bear problems:

1) There should be no dumps that have edible materials associated with construction and post-construction activities.
2) Residential garbage should be placed in bear-proof dumpsters, individual bearproof trash containers, or kept in trash cans inside closed buildings.
3) Pets should not be fed outside.
4) Bird feeders and hummingbird feeders should be brought in during the evenings and removed altogether during the fall months (September through late November).
5) Nut, fruit, or berry-producing trees or shrubs should not be used in landscaping in order to minimize an attractant for bears around homes and developed areas; orchards should be within fenced areas.
6) Individual home compost piles should be discouraged or prohibited; a community-wide site can be developed if it has adequate fencing and lighting to keep bears out, and protect people from bear interactions, especially at night.

Figure 9 - Black Bear Habitats



4.4.4.3. Elk

In the southern Rocky Mountains, as elsewhere in North America, elk are often associated with edge (ecotone) habitats where forested and meadow/shrubland systems are intermingled. During much of the year, elk are typically found near edges where forests grow adjacent to parks, meadows, or alpine tundra (Skovlin 1982, Fitzgerald et al. 1994). During the summer months, elk may spend significant amounts of time feeding in open alpine environments above tree line. Use of alpine habitats is thought to be associated with the cooler temperatures, persistent snowbanks, and breezy conditions that keep bothersome flying insects to a minimum (Adams 1982, Lyon and Ward 1982). Similarly, during the winter elk may congregate in low elevation sagebrush expanses, pinyon and juniper woodlands, irrigated meadows, and other open habitats that are significant distances from forested cover (Lyon and Ward 1982). On winter ranges, elk form mixed herds of bulls, cows, and calves (Fitzgerald et al. 1994), but in the more developed areas in Colorado, bulls may avoid traditional winter ranges that are near high-use roads, homes, and other human developments (B. Andree, CPW pers. comm. 2006, Dodd et al. 2007).

Generally, elk feed at twilight and at night, but they readily forage and disperse through the daylight hours. Most elk mortality is due to predation on calves, hunting, and winter starvation. Localized mortality from vehicle strikes may also produce noticeable impacts on herds where traffic exceeds 1,000 VPD and where traffic travels at high speeds (Gagnon et al. 2007).

Elk are generalist feeders, but usually prefer to graze on grasses, grass-like plants, and forbs during the non-winter months (Nelson and Leege 1982, Fitzgerald et al. 1984). The specific diet for elk in a particular locality is largely determined by the season and palatability of available forage plants (Nelson and Leege 1982). In Colorado, elk show a clear preference for grasses and grass-like plants (Hoover and Wills 1984). Browse species can also vary by site and palatability of available plants. Shrubs, deciduous trees, and sometimes conifers compose much of the winter diet when snow depth limits access to grasses, sedges, and forbs (Nelson and Leege 1982).

On Colorado winter ranges, oakbrush, aspen (*Populus tremuloides*), serviceberry (*Amelanchier* spp.), sagebrush, and snowberry (*Symphorocarpos* spp.) are the major browse species used by elk (Hoover and Wills 1984). Locally heavy feeding on aspen bark during the winter and spring can be very significant and can leave long-lasting impacts on aspen stands.

Issues of Concern. CPW staff have indicated that most herds near mountain communities have decreased in size from 50 to 60 percent since their peak population sizes in the mid- to late-1990s. While direct habitat loss has slowed from the 2000s, there has been a widespread increase in outdoor uses around mountain communities, primarily through increased trail construction, and now almost year-round recreation (C. Wescoatt and B. Andree, CPW District Wildlife Managers, as cited in Vail Daily, 6/16/2018; J. Mao, CPW Terrestrial Biologist, pers. comm. 10/10/2018). There is no single definitive activity or habitat impact that can be strongly linked to elk population declines, but the current hypothesis is that the long-term reduction in winter ranges and increased year-round human pressure (primarily through recreation) in habitats are having cumulative impacts at a level where elk's ability to produce a viable numbers of calves is unable to replace yearly mortality (J. Mao pers. comm. 10/10/2018).

CPW has mapped the north-facing slopes and portions of the pastures as Severe Winter Range (**Figure 6**). At this time, elk use of these pastures is limited to the winter and more so in the early spring months; this use is very sporadic but can be notable. It is not uncommon to see a herd of 50+ elk in these meadows, but they generally only linger a day or two, and then they may not be back for weeks or even until the next winter/spring. It is unlikely that elk would utilize the pastures or steep north facing slope habitats heavily or regularly, since snow accumulation on the steeper north-facing slopes restricts movement and access to forage. Such site-

specific factors cannot be reflected in state-wide mapping, which is why much of the area within PUD is mapped as Severe Winter Range.

As snow accumulates during the early winter, migrating elk may traverse the Property area as animals move towards the smaller ridges with south-facing slopes located south of the Property in the Alkali Creek drainage and in the "Vulcan" basin (southeast of the project area). The existing Riverbend housing developments also likely limits the amount of winter residency on and in proximity to the Property. Elk wintertime use of the Property is likely to be limited in extent and duration, but as mentioned, heavy intermittent use may occur, especially in the spring as grasses begin to green up in the pastures.

The presence of intervening barriers between the Property and other winter ranges north of I-70 (including the Interstate and associated big-game fencing to reduce vehicle mortality, frontage roads, railroad, residences, and the Colorado River) make it unlikely that large numbers of elk will migrate from winter ranges north of the Colorado River onto the Property. Elk may move north across the property to procure water at the Colorado River.

Impact Analysis. Development of the property would not impact elk summer range habitats; during the summer elk utilize much higher elevations. The development of the Property would not impact any Production (calving) areas.

Development of the Property would occur in areas mapped as Severe Winter Range Habitats by CPW; however, there is little available wintertime forage in the pastures (there are no shrubs available for browsing, aside from a few poor-value rabbitbrush), and short-statured grasses are unavailable or limited in the winter due to snow cover. There is also no effective refugia cover in the pastures, aside from elk being able to place themselves at distance to roads and homes. Thus, wintertime use of the pastures and habitats near the homesites is very limited, and the pastures likely do not support enough elk use to qualify the habitats as "Severe Winter Range."

However, development in native shrubland habitats along the southern sides of the PUD, and towards the eastern end of the PUD would occur in, and adjacent to, suitable elk winter range habitats supporting good forage. And while large numbers of elk do not likely linger in these habitats, there would nevertheless still be some direct impact and loss of winter range habitats from development. It is unknown exactly how many elk utilize these winter ranges, given the intense but very sporadic nature of their use patterns in the area, but conservatively we must assume the sporadic but intense use is still an important component of overall winter range compositions, as mapped by CPW.

A potential larger concern is that elk infrequently migrate through the area later in the spring and are known to loaf in the pastures when new grasses are emerging. Elk coming off winter ranges are often malnourished and have caloric deficiencies, and the new springtime grass growth can be very important for elk. Proposed development of the Property would likely halt most springtime elk use of the pastures and would further reduce remaining habitat value or movement corridor values given the extensive fencing needed to protect orchards, the proposed OHV area, trails, facilities, and music venue location placed in the hills south of the pastures. However, as the most important elk use occurs in the late winter/early spring months, the music venue and OHV track would not likely be open for the season at that time. So elk may still be able to use habitats very near these areas, as long as human activity levels are low, pet dogs are not allowed to run free, and winter range timing stipulations are used to minimize disturbance to elk.

While the presence of the existing housing developments has already decreased habitat effectiveness, the new activities in native shrubland habitats at the southern and eastern ends of the PUD area will further reduce available habitat and increase indirect impacts to big game using these areas. Elk wintering activities in shrubby habitats in the hilly areas around the PUD would likely see reductions in use with development, even if the music venue and OHV area is not being used, given overall increased human activities in the general PUD area. Controlling of pet dogs and minimization of human activities in surrounding native habitat types during the fall, winter and spring seasons will help reduce the indirect impacts to elk wintering around the PUD.

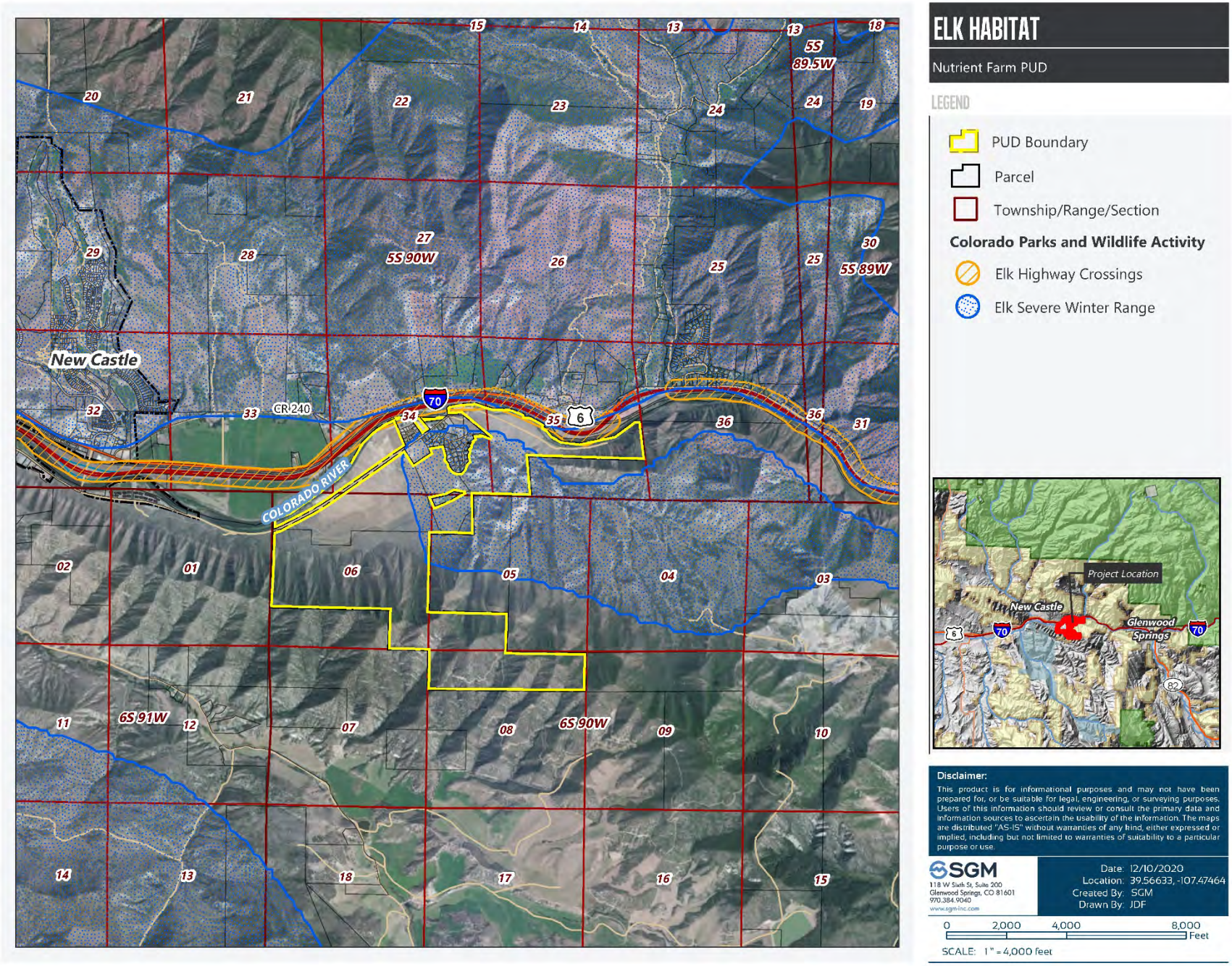
While it is unlikely that development of this Property would result in any noticeable or significantly detrimental impacts to elk at the herd level, the development would cumulatively reduce springtime foraging areas, which is a very important habitat component given the poor condition most elk are in at the end of the winter season, and would cumulatively reduce available elk winter range habitats.

Mitigation Planning. In response to these concerns, Nutrient Farms has met with CPW District Wildlife Manager (Travis Bybee) to discuss the potential impacts of the project and develop mitigation measures to reduce impacts. Through these discussions, Nutrient Farms will work with CPW to develop the following items as part of a Wildlife Mitigation Plan.

- Winter timing and activity stipulations to avoid and minimize disturbance to elk
- Use of laydown fencing in some areas to allow for habitat connectivity and allow for wintertime elk access to pastures
- Leaving taller stubble heights in pastures for more elk grazing opportunities,
- Development of wintertime water sources for elk
- Assistance with habitat improvement and water resource development on neighboring BLM lands.

Through the development of the mitigation plan, impacts to elk would be minimized and mostly mitigated. The project would therefore not result in significant, long-term detrimental impacts resulting in reductions in herd size or significant impacts to habitat.

Figure 10 - Elk Habitats



4.4.4.4. Mule Deer

Mule deer occur throughout Colorado and are relatively common in the west. Mule deer occupy all ecosystems in Colorado from grasslands to alpine tundra, but they reach their greatest densities in shrublands on rough, broken terrain, which provides abundant browse and cover. Their wide distribution and general adaptability make for broad diets. However, deer are considered to be browsers (primarily eating shrubs and twigs), as opposed to grazers (which eat mostly grasses). In Colorado the winter diets of mule deer consist of browse from a variety of trees, shrubs (74%) and grasses and forbs (26%), depending on local browse availability. In the spring and summer, browse contributes around 50% of the diet, and forbs and grasses make up the remainder (Fitzgerald et al. 1994).

Mule deer are mostly nocturnal and crepuscular in the warmer summer months and become more diurnal during winter. Activity depends on local conditions including temperature, season, weather, and forage. Over much of Colorado the species is migratory, summering at higher elevations and moving downslope to winter ranges. In some areas of Colorado migrations may be over 55 miles, but in most areas, migrations are closer to about 5 miles. The routes followed are often habitual, and deer show a certain amount of fidelity to these routes. Snow depths of 8 to 16 inches appear to trigger fall movements, and depths over 3 feet prevent use of an area (Loveless 1967). In some areas of northwestern Colorado mule deer begin migrations before snow accumulation (Garrott et al. 1987, as cited in Fitzgerald et al. 1994). These authors suggest that better-quality forage on winter range at that time of year triggers the movements. Throughout the winter mule deer will move about winter ranges, depending on snowfall and snow-melting events, but prefer to linger on more south-facing slopes where snow depth is shallowest.

Spring and summer ranges are most typically mosaics of meadows, aspen woodlands, alpine tundra and Krummholz, or montane forest edges. Montane forests and pinyon-juniper woodlands with good shrubby understories are often favored winter ranges. Because of the mule deer's seasonal migratory movements, estimation of home ranges is somewhat difficult; however, deer appear to be seasonally sedentary, staying within areas of 100 to 2,200 acres. In areas where the animals do not migrate significant distances, annual home ranges are 1,700 acres to 5,400 acres (Mackie et al. 1982). Migrating individuals show strong winter and summer range site fidelity.

Mortality in mule deer varies with age class and region. In Colorado, annual fawn mortality can vary as much as from 27% to 67% (Anderson and Bowden 1977). Fawn mortality is due to predation and starvation. Larger fawns are more likely to survive, and smaller fawns are more likely to starve. However, predators will take any size of fawn. Winter mortality of fawns may approach 75% annually. Mortality of adult deer is mostly from hunting and starvation (Carpenter 1976). Predators include coyotes, bobcats, golden eagles, mountain lions, black bears, and domestic dogs. Locally, coyote and mountain lion predation on fawns can account for significant mortality within populations. Fawns comprise about half of the yearly mortality; while mature females and bucks comprise the remaining 15% and 35%, of the annual mortality, respectively.

Similar to elk, impacts to mule deer from human activities, recreational activities, trails and dogs have been well studied and documented in the scientific literature.

Issues of Concern. Historically, mule deer would have utilized a wide swath of habitat throughout the Colorado River valley bottoms, but development and conversion of rangelands to pastures has constrained most movement to areas with less disturbance, where natural topography, native shrublands and an absence of development creates preferable conditions. The presence of existing residential developments adjacent to the project have compounded a situation where mule deer movement and migration in the immediate vicinity has been impacted.

Mule deer use of the Property occurs year-round. Similar to elk, the presence of other development adjacent to the Property likely have reduced habitat effectiveness across portions of the Property, and mule deer use likely avoids areas with high levels of human activity.

CPW has mapped the entire PUD Boundary as Winter Range and has mapped PUD Development Area as Severe Winter Range. However, mule deer are subject to much the same snow depth limitations as elk: snow accumulations deeper than a foot can preclude significant utilization. Winter habitat utilization would be concentrated on steeper slopes that support good shrub cover; however, south-facing slopes retain significantly less snowpack due to greater wind scour and greater solar exposure and are preferred habitat for mule deer in the winter. The availability of south-facing slopes are limited on the Property; therefore, although the Project Area is within Winter Range and Severe Winter Range, the true habitat effectiveness and browse availability is limited to areas with good shrub cover, on steeper south-facing slopes (**Figure 7**).

Similar to elk, mule deer use of pastures in the springtime when grasses first emerge is likely quite significant and can be a very important habitat component for deer coming off wintertime caloric deficits.

Impact Analysis. Development of the Property would impact areas of mapped mule deer Winter Range and Severe Winter Range. While north-facing slopes are mapped as winter range, once winter snows accumulate mule deer would likely move to more suitable winter ranges on more south facing slopes, such as to the east in the Vulcan basin.

Development of native shrubland habitats at the southern end of the parcel would nevertheless reduce important early- and late-season winter range habitats, even if most recreational activities have ceased for the winter. While it is unknown how many mule deer utilize winter range habitats in the PUD area, any losses of winter range habitat can be concerning, and would have cumulatively negative impacts on mule deer winter range.

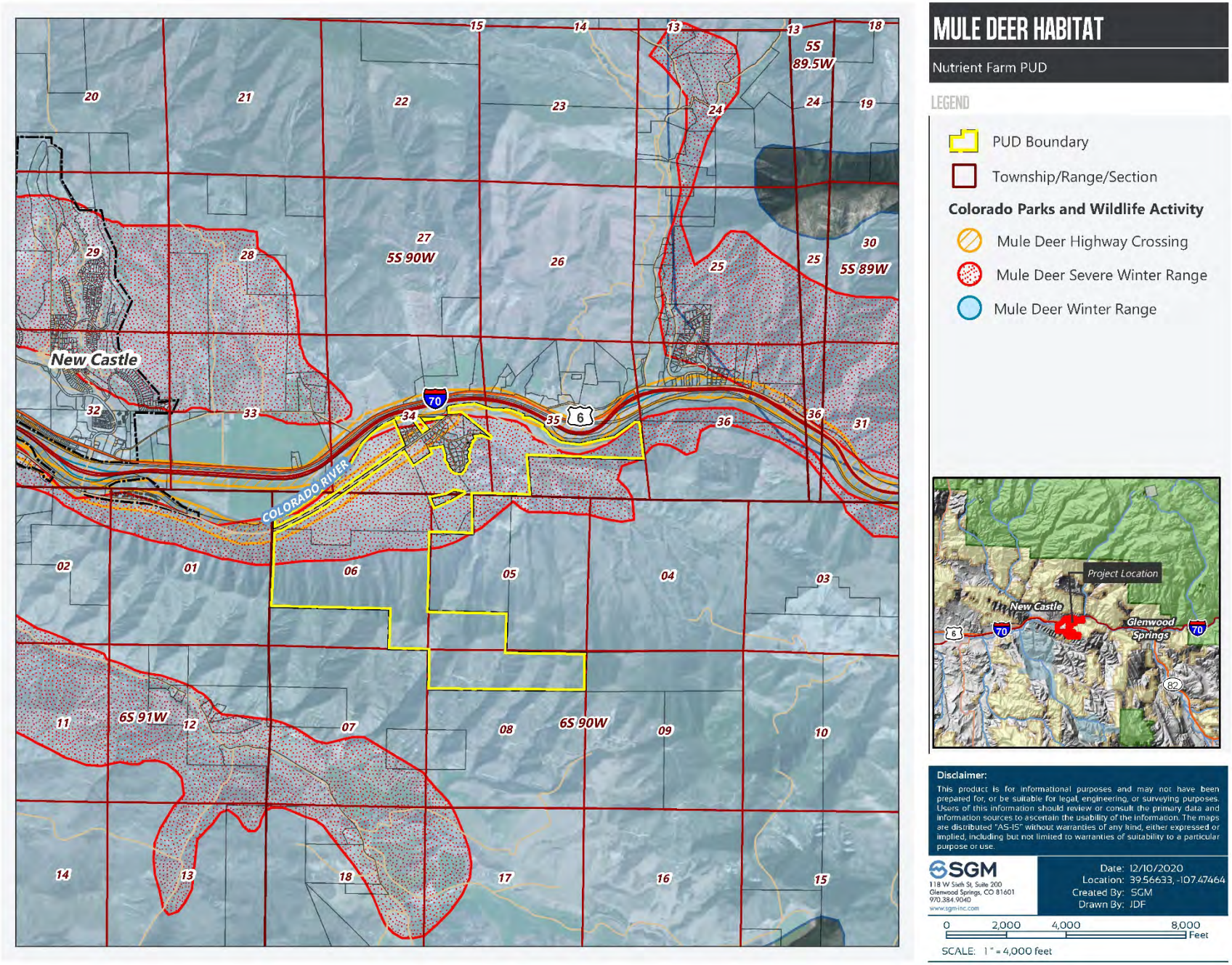
Summertime use of shrubby habitats near developments, the OHV track and music venue area by mule deer would see marked reductions in use given higher levels of human activity, the presence of motorized and non-motorized recreational uses, and increased sound levels. Fugitive noise and light from these developments and venues would further reduce habitat effectiveness in surrounding native habitat types. The extensive fencing on the Property will also reduce habitat connectivity across the Property, but this is not likely a significant impact given a lack of suitable summertime habitats across the pastures. Cumulatively, when assessing all the various components of motorized and non-motorized venues, outdoor music venues, fenced orchards and homesites, mule deer use across the PUD area would be mostly precluded aside from some incidental use, and continued use on steeper, shrubby hillsides further away from centers of human activity. While there would be significant decreases in mule deer activity in the PUD, this project would not be expected to result in meaningful impacts to mule deer herds in the greater area but decreases in mule deer activity in and around the PUD area would be noticeable.

Mitigation Planning. In response to these concerns, Nutrient Farms has met with CPW District Wildlife Manager (Travis Bybee) to discuss the potential impacts of the project and develop mitigation measures to reduce impacts. Through these discussions, Nutrient Farms will work with CPW to develop the following items as part of a Wildlife Mitigation Plan.

- Winter timing and activity stipulations to avoid and minimize disturbance to mule deer
- Use of laydown fencing in some areas to allow for habitat connectivity and allow for wintertime mule deer access to pastures
- Leaving taller stubble heights in pastures for more grazing opportunities,
- Development of wintertime water sources for mule deer
- Assistance with habitat improvement and water resource development on neighboring BLM lands.

Through the development of the mitigation plan, impacts to mule deer would be minimized and mostly mitigated. The project would therefore not result in significant, long-term detrimental impacts resulting in reductions in herd size or significant impacts to habitat.

Figure 11 - Mule Deer Habitat



4.4.4.5. Great Blue Heron

Great blue herons breed across the entire North American continent. They are the largest heron species in North America and are common and widespread. They are highly adaptable to different habitats and environments. Great blue heron populations are generally stable or increasing throughout most of their range and are ranked globally secure, but uncommon in Colorado (G5/S3, NatureServe 2020). The World Conservation Union (IUCN) red list category for the great blue heron is "Least Concern", and the Audubon Watchlist Status is "Green" (Audubon Society 2007). As with all migratory birds, the great blue heron is protected under the Migratory Bird Treaty Act of 1918 (as amended).

Great blue herons generally nest in colonial "heronries". Habitat characteristics of heronries vary considerably depending on locations within North America. Likewise, the level of human activity around established heronries also vary widely; however, high levels of human activity have been associated with heronry abandonment (Bjorkland 1975, Wershkul et al. 1976). The level of response from a disturbance is influenced by a variety of factors, including breeding stage and distance (Vos et al. 1985).

Human disturbance can be a major factor influencing nesting and foraging activities of great blue heron. Some herons do become habituated to human activities (Grubb 1979, Kelsall & Simpson 1980, Butler 1991, and Vennesland 2000). Human recreational activities can cause herons to temporarily abandon their breeding attempts, allow predation of eggs and young (Moul 1990), or permanently abandon a colony (Markham & Brechtel 1979). Most heronries are located in areas away from human activity or have significant vegetative screening from human activities (Watts & Bradshaw 1994, Gibbs & Kinkel 1997, J. Lowsky pers. comm. 2008).

Klein (1993), and Lowsky (2007 & pers. comm. 2008) reported that great blue herons in Colorado and in Pitkin County had highly variable responses to humans in vehicles and afoot. However, in most situations, herons responded stronger to humans on foot than on bicycles or in vehicles. This is a common theme with many wildlife species, including elk. Rodgers and Smith (1995) reported that great blue herons flushed at a mean distance of 32.0 $\pm$ 12.3m in response to persons approaching on foot. Skagen et al. (2001) found a reduction in the number of great blue heron nests when they were exposed to humans on foot. Vos et al. (1985) studied a heronry in Larimer County, Colorado, and found that heron's response to human activity changed as the breeding season progressed through the year. Herons were most responsive to human intrusions early in the breeding season (March), flushing from the nest at the slightest disturbance and not returning until the cause was no longer present. During egg laying and incubation (mid-April), herons were less willing to abandon nests and returned more readily. This "nest site fidelity" is a common theme among many bird species-whereby as the breeding season progresses, adult birds are less likely to stay away from eggs or nestlings as the season progresses, and is thought to be a function of "resource investment" into their young (Thompson 2007).

Vennesland (2000) experimentally showed that herons do habituate to non-threatening presence of people near colonies. His results showed that colonies in rural areas that seldom experienced human activities left nests more readily than colonies in urban areas. His study concluded that heron breeding productivity was significantly diminished with higher levels of pedestrian activities within 250m of colonies due to decreased nest protection from adults and increased secondary predation from bald eagles. But he also concluded that "…total human activity (including pedestrians, cars, planes and land clearing equipment) had no relationship to heron breeding".

Personal observation of the colony at Cattle Creek on the Roaring Fork River during June and July of 2007 showed humans (landing rafts from float trips down the Roaring Fork River) at the base of the ponderosa pine trees containing nests (see photo), with no flushing of herons (distances of less than 10m).

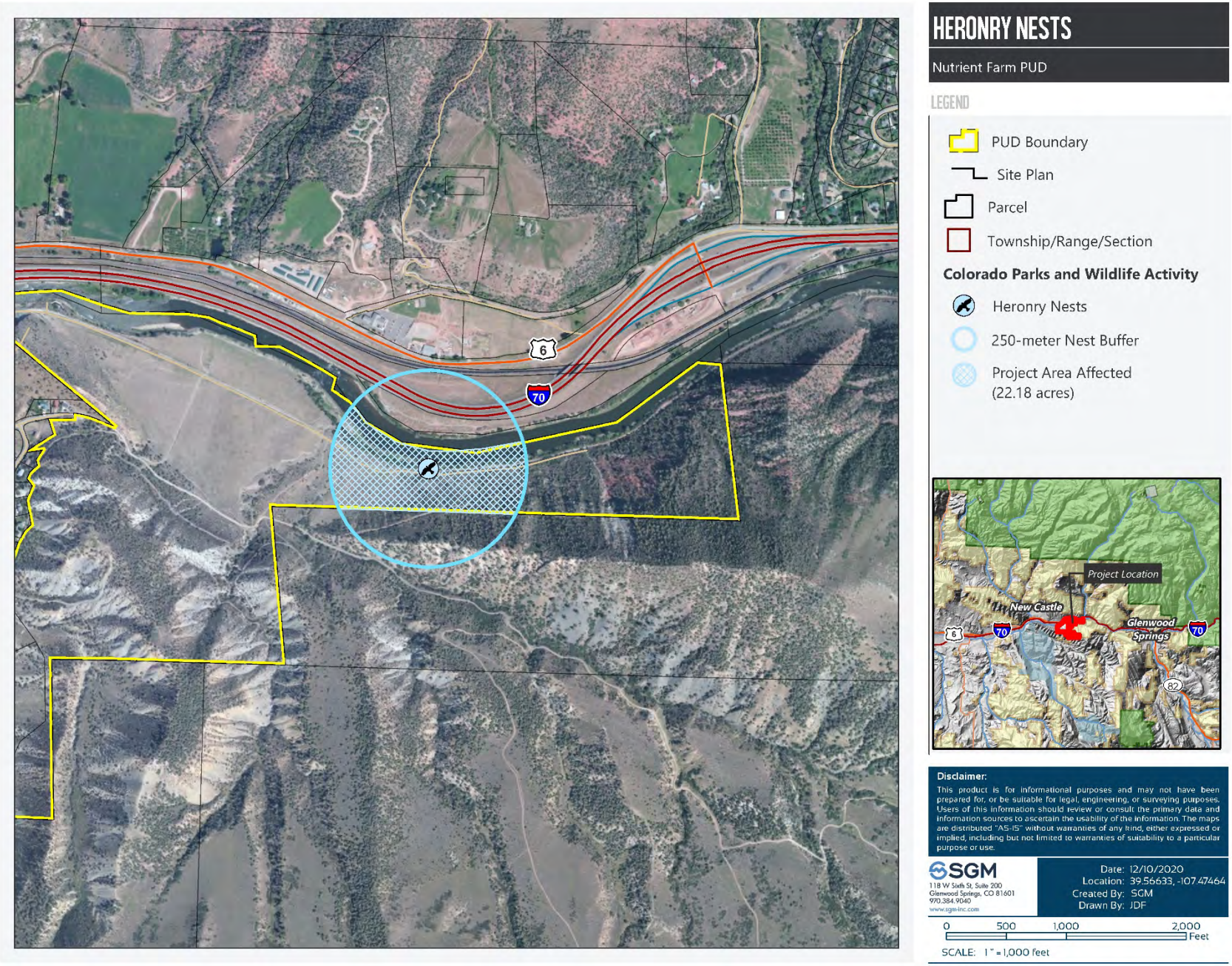

Rafters at base of heronry, June 3, 2007

To reduce flushing and negative impacts to nest success, various buffer distances are recommended. Buffer areas generally have restrictions limiting or modifying human access or activities which would allow nesting herons to still fulfill life history requirements un-harassed, but buffer areas can also include mitigations such as vegetative screening to hide human activities, which would still allow for herons to continue with their daily activities un-harassed. Buffer area restrictions generally only apply when herons are conducting reproduction activities (which in Colorado, is generally from mid-March through late July). In Colorado, most studies recommended a buffer distance of 200m (Miller 1994, Colorado State Parks 1998) while Vos (1985) recommended 250m.

Impact Analysis. Herons hunt all along the banks of the Colorado River, throughout the PUD area. Most proposed development, being 80 to 100 feet from the river, is likely far enough from the river's edge, and is separated by screening vegetation and topography, such that heron foraging would likely continue with little impact from the actual structures and development. However, human activities along the river (such as people walking down to the river), or off leash dogs, would likely flush and reduce habitat effectiveness for foraging herons along the river, and in the case of dogs, may also rarely cause mortality. These impacts are most likely to occur in only a few select areas, and most of the river's edge throughout the PUD would still provide foraging opportunities for herons.

The heronry at the far eastern side of the PUD is approximately 1,000 feet (312 meters) from the nearest development (a livestock barn), and the heronry should not see any notable impacts from development. Closer to the heronry would be the LoVa Trail, and those impacts are beyond the scope of this report. To err on the side of conservation, signage should be considered discouraging people from approaching the heronry during the spring and early summer months to prevent heronry disturbance. The pump station on the Colorado River is a static structure, with little human visitation; this structure would not have meaningful impacts on the heronry upriver.

Figure 12 – Heronry and Impacts



4.4.5. General Wildlife Impacts

The following section discusses considerations to minimize the potential impacts to wildlife from the proposed development. Many of these recommendations are considered to be "best management practices" for wildlife, which would allow for continued wildlife use of areas within the development.

Lighting: Because the area may still see use by mule deer and elk around the periphery at night, nighttime lighting of the Property and excessive lighting of roads (beyond what is required for safe driving conditions) is not recommended. Lighting for music and other recreational venues should only be on when sites are in use, and down-cast lighting is recommended.

Fencing: In order to continue the effective use of the surrounding area by big game animals, wildlife-friendly fencing should be utilized, unless necessary to protect orchards and other agricultural production areas. Fencing that is needed to keep pets and children within private yards encouraged. Nutrient Farms is working with CPW to develop areas with "laydown fencing" to allow for wintering foraging opportunities.

Landscaping & Revegetation: Because the surrounding area may still see some use as winter range, reclamation of road cuts, infrastructure routes and open spaces will occur using similar native plant species and vegetation profiles. Revegetation will also occur as soon as possible; however, any shrub planting in the spring after big game have left the area will be best as newly planted materials would likely be browsed first, and plants with little time to set roots will likely be pulled up by grazing big game. Seeding should occur in the fall. Noxious weeds will be treated in order to minimize their spread and impact on winter range and increase the success of revegetation activities. Please see the Nutrient Farm Reclamation Plan (SGM 2020c).

Domestic Dogs: Dogs can have a significant impact on wildlife and the ability for wildlife to effectively use otherwise-available habitats. Dogs can chase and kill wildlife, or so exhaust and injure wildlife that it dies later. To minimize the impacts of dogs on wildlife, the following practices will be employed:

1) Dogs will not be allowed outside of fenced yards unless under leash control.
2) Loose dogs will be prohibited outside of individual home lots and outside of the designated Dog Park on the Property.

Domestic Cats: Domestic cats can have significant impacts on local breeding bird, small mammal, amphibian, and reptile populations in area habitats. Keeping cats indoors or on leashes will protect a major component of the potential non-game wildlife use in the area from predation.

Impacts to Landscaping: Since the subject Property occurs within mule deer and elk Winter Ranges, there will likely be damage and use of landscaping by foraging big game. Any additional future property owners will be informed of this with the understanding that that Colorado Parks & Wildlife does not provide game-damage reimbursement for damage to landscaping.

Birds: Many bird species utilize the area; therefore, the following recommendations are presented:

1) Pet cats should remain indoors, as cats will readily prey upon these species and can have a significant impact on bird use in the area and on bird populations.
2) Bird feeders are discouraged during spring, summer, and fall months due to the black bear use in the area. Bird feeders can be used in the winter (from mid-November through mid-March), as bears are hibernating during this time.

3) All bird feeders, including hummingbird feeders, should be hung away from any window or deck, be at least 10 feet from the ground, and be suspended between two trees or posts. Any seed feeders should have a seed catchment pan to catch discarded seed.

4.5. Noxious Weeds

Noxious weeds can pose a threat to the integrity of the natural vegetation communities. A comprehensive weed survey and plan has been completed for this Property; this section provides background information regarding noxious weeds, outlines general goals, and provides suggestions for effective management. Please see the **Weed Management Plan** for more information.

4.5.1. Weed Survey Results

The PUD area currently has several infestations of Garfield County and State of Colorado listed noxious weeds. The banks of the Vulcan Ditch were noted as an area with a high concentration of weeds, including Russian knapweed (*Acroptilon repens*). The pasture areas have widespread, low to high densities of Scotch thistle (*Onopordum acanthium*), low densities of knapweed species, and some isolated areas of hoary cress (*Lepidium draba*). Pasture areas dominated by gamble's oak shrub communities along the banks of the Colorado River have low to medium densities of houndstongue (*Cynoglossum officianale*). Cheatgrass (*Anisantha* [*Bromus*] *tectorum*) is present in low to high densities throughout the project area, in pastures, along the Vulcan Ditch, near existing structures, and within native pinion-juniper shrublands. Individuals of salt cedar (*Tamarix Spp.*), Russian olive (*Elaeagnus angustifoilia*), common mullein (*Verbascum thapsus*), and curley dock (*Rumex crispus*) occur in pasture areas or along the banks of the Colorado River. Redstem filaree (*Erodium cicutarium*) and field bindweed (*Convolvulus arvensis*) are likely to be present but were not observed during field visits. A full noxious **Weed Management Plan** documenting conditions has been produced by SGM (2020) per section 4-203.E.18 of the LUDC.

Table 5 – Noxious Weeds Present on Site

Noxious Weeds			
Common Name	**Scientific Name**	**Colorado Listed Species**	**Garfield County Listed Species**
Cheatgrass	*Anisantha tectorum*	Yes (List C)	
Common Mullein	*Verbascum thapsus*	Yes (List C)	
Curley Dock	*Rumex crispus*	-	Yes
Hoary Cress	*Lepidium draba*	Yes (List B)	Yes
Houndstongue	*Cynoglossum officianale*	Yes (List B)	Yes
Russian knapweed	*Acroptilon repens*	Yes (List B & C)	Yes
Russian Olive	*Elaeagnus angustifoilia*	Yes (List B)	Yes
Salt Cedar	*Tamarix* sp.	Yes (List B)	Yes
Scotch Thistle	*Onopordum acanthium*	Yes (List B)	Yes

4.5.2. Weed Management

Nutrient Farm has developed a noxious weed management plan; please see that plan for additional details. In summary, the best technique (or techniques) for managing a given weed infestation is dependent on many factors: access, growth form of the weed species (e.g., annual, biennial, or perennial), size of the weed patch, and proximity of the weed patch to sensitive areas (water sources, rare plant or animal habitat, etc.), and the weather and temperature at the time of control. Nutrient Farm PUD will be a certified organic facility, and therefore use of traditional herbicides would not occur. Techniques for managing weeds could include mechanical (e.g., pulling, mowing, and cutting), cultural controls (e.g., maintaining native plant communities, reseeding, livestock grazing), organic-certified compliant products (vinegars), and biological controls (predator or competitor introductions).

Impact Analysis. As the area already has noxious weeds, new ground disturbing activities including agricultural activities, trails, and residential and commercial development, will undoubtedly allow noxious weeds to expand their cover. Mechanical, cultural control and biological controls will need to be aggressive and persistent, with ongoing efforts being conducted throughout the growing season in order to control existing and new infestations. Without aggressive and persistent weed management, it is highly likely that weeds could move beyond the boundaries of the PUD and into adjacent lands and even into native habitats.

4.5.3. Revegetation

Successful weed control programs may require aggressive and persistent revegetation efforts of areas formerly occupied by noxious weeds. In the case of this project, where agricultural development is proposed, cultivars are expected to provide ground cover for the majority of the disturbed areas. Since most weeds are ruderal species that prefer disturbed sites, coverage should be provided as soon as possible following disturbance; if agricultural species cannot be used due to timing conflicts, cover crops or artificial groundcover should be used. This will minimize the likelihood that existing weed populations will infest newly disturbed soil. If an area has been treated with organic certification compliant products (e.g., vinegar), refer to the label on the product/herbicide to determine how soon after treatment reseeding is recommended (some products/herbicides have varying residence time in the soils). Additionally, it is preferable to salvage topsoil to retain viable soil as well as a native seed bank. Please see the Reclamation Plan for more information (SGM 2020c).

The undeveloped areas of the Property will not be significantly disturbed; therefore, it is unlikely that weed abundance will increase dramatically in these areas.

4.6. Radiation Hazards

The farm will utilize biodynamic agricultural practices such as avoiding all synthetic chemical pesticides, fertilizers, and transgenic contamination. The farm will be a self-contained, self-sustaining ecosystem following biodynamic practices with the goal of becoming formally biodynamically certified in the near future.

Nutrient Farm is a sustainable holistic community revolving around an organic working farm. Non-organic chemical use will be prohibited, and electro-magnetic radiation emissions will be minimized on the property by the Owner/Developer, which could potentially cause contamination to the farm, its residents, or guests.

4.7. Nuisance

The proposed uses within the PUD area are not expected to produce any abnormal toxic or noxious substances, smoke, odors, gas, wastes, steam, or dust. Detailed erosion control and construction plans (e.g., Stormwater Management Plan) will guide development of the site during all construction phases, with a goal of minimizing fugitive dust emissions from the project site. There will likely be an increase in airborne

particulate matter as a result of equipment operations producing fugitive dust during construction access improvements, vegetation clearing, and during earthwork phases of construction. This area commonly has windy springtime months, and dust control will need to be adequately planned and scheduled during the spring months.

To mitigate these impacts, contractors will employ dust control, and CDPHE stormwater permitting will require the removal of mud from vehicles before they track mud onto local roads. The proposed land uses are anticipated to integrate well with neighboring existing land uses. For the above stated reasons, the PUD is considered to have minimal nuisance impacts on adjacent lands and is generally consistent with those adjacent uses and their associated impacts.

4.7.1. Noise

As part of Article 4-203.G of the Garfield County Land Use and Development Code (LUDC), an Impact Analysis is required that evaluates:

> "7. Nuisance. Impacts on adjacent land from generation of vapor, dust, smoke, noise, glare or vibration, or other emanations."

Additionally, Article 7-1001 of the LUDC has the following requirement:

> "F. Noise. Noise shall not exceed State noise standards pursuant to C.R.S., Title 25, Article 12 unless the use is regulated by the COGCC. In this case, the use shall be subject to COGCC rules in regard to noise abatement."

The Colorado Revised Statues (CRS) Title 25, Article 12, Section 103 provides state guidance for noise standards. The CRS code establishes permissible sound levels by type of property and time of day. For the purposes of the law, sound is measured as "*Levels of sound radiating from a property line at a distance of twenty-five feet*" and any sound "*In excess of the dB(A) established for the following time periods and zones shall constitute prima facie evidence that such sound is a public nuisance*". Defined sound levels are provided in **Table 5**.

Table 5 – CRS 25-12-103 Sound Standards

Zone	***7:00 a.m. to next 7:00 p.m.***	***7:00 p.m. to next 7:00 a.m.***
Residential	55 dB (A)	50 dB (A)
Commercial	60 dB (A)	55 dB (A)
Light Industrial	70 dB (A)	65 dB (A)
Industrial	80 dB (A)	75 dB (A)

The stringency of the sound requirements depends on the zoning of the site; however, the CRS 25-12-103 does not reference "PUD zoning", which is how Garfield County has zoned this area and will re-zone it. For the purpose of this report, we assume the closest CRS 25-12-103 zone standard to be Residential.

Construction activities utilizing heavy equipment can produce intensities of around 88 dB. Most amplified music (concerts) can range from 91 dB up to 115 dB. A motorcycle can range from 95 dB to 110 dB. Most of these sounds, at least at their source, exceed the CRS 25-12-103 Residential sound standards; however, this analysis would need to be conducted at the PUD boundary.

A formal sound study has been developed, based on cursory plans to determine preliminary sound levels (SGM 2020d). In summary, the predictive sound model focused on the proposed music venue and motorized OHV

track area, using sensitive sound receptor locations in accordance with the sound standards in CRS 25-12-103. The numerical and graphical sound modeling results for the music venue and for the OHV track indicated that "worst case scenarios" of sound generation are predicted to be over the CRS sound limits and would create a "public nuisance" for Residential zone standards for both daytime and nighttime operations. Low music amplification, sound dampening, and additional sound modelling work will be needed to develop a plan which would keep the sound levels consistent with CRS 25-12-103 standards.

Nutrient Farm PUD has already indicated that preventative sound barriers, insertion loss and sound mitigation strategies are being developed to reduce the numbers indicted above. By doing so, it will help prevent these proposed uses from being a public nuisance to nearby residences

4.8. Hours of Operation

The construction phases of the proposed PUD would be limited to daytime hours. Post-construction would have a range of hours depending on the proposed use within the PUD. The agricultural areas which include East and West farms would have the most activity during daylight hours on both weekdays and weekends.

The outdoor recreational areas and special events within the Property would operate until midnight. This would include potential concerts with amplified music. After midnight, all outdoor activities will cease or be brought inside an enclosed building. These special events will have parking management plans employed to effectively coordinate all vehicular parking needs. Other recreational uses include camping (RV and tent), motorized OHV tracks, boat ramps, etc., would involve seasonal hours of operation.

5. Summary of Impact Mitigation Recommendations

Most of these recommendations have already been considered and incorporated into the current development proposal. Additional recommendations, and black bear conflict avoidance measures, will be developed by Nutrient Farm and CPW through the proposed Wildlife Mitigation Plan.

1. Retain high value habitats by avoiding development (physical habitat modifications) and encroachment (designated and volunteer trails) into intact blocks of native habitats, mostly limited to the woodlands on the steep slopes on the south of the Property.
2. Locate and cluster development to the extent possible in non-native habitats and maximize setbacks from high value habitats, including the riparian fringe. This will maximize continued effectiveness of on-site habitats and buffer development effects on the Property from nearby habitats.
3. Recreational trails considered should be for non-motorized use (aside from OHV track) and should not extend into the riparian habitats. Seasonal closures to protect winter habitats should be considered.
4. A non-development zone of 50 feet wide should be considered for the riparian edge of the Colorado River, aside from limited facilities such as a boat ramp and the public access trail. The purpose of this buffer is to facilitate continued wildlife use of the riparian habitats by species such as bald eagle, blue heron, river otter, etc. Maintaining and establishing additional screening vegetation between the riparian area and human developments would enhance buffering. Birds within the riparian area are most sensitive to human disturbance during the nesting season, which extends from approximately April 1 through June 15.
5. With the exception of fencing required for safety and to protect agricultural production areas and orchards, fencing should be limited onsite. Fencing restricts big game movements, potential habitat use, and can result in wildlife mortality through entanglement and road-kill. Any decorative fencing should be designed to allow for wildlife movements. Nutrient Farm is working with CPW to develop areas with “laydown fencing” to allow for wintertime big game movements and use of pastures.
6. Black bears will be an issue; development should avoid planting of fruit trees around homes, feeding pets out-doors, and birdfeeders during the time when bears are active. Trash cans should be kept inside, or bear-proof trash storage facilities or at least bear-proof trash cans should be required. Bear awareness brochures and signage should be posted throughout the PUD Property and most importantly, in the campground area. Sturdy fences around orchards will be needed to minimize bear issues.
7. Dogs of residents, visitors, and contractors should not be allowed to run free. The Property is adjacent to wildlife habitats, and free running dogs will result in larger wildlife impacts and harassment. Cats should also not be allowed to run free, as cats are the number one predator and mortality factor to migratory birds. The use of a dog park will help reduce the risk of dogs running free.
8. Landscaping and berm construction will occur to reduce OHV and music venue sound emissions and to stay in compliance with CRS 25-12-103 standards.

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Appendix A - CPW Habitat Definitions

The following section defines the ungulate seasonal activity area definitions used by CDOW in their habitat mapping protocol.

ELK

HIGHWAY CROSSING: Those areas where elk movements traditionally cross roads, presenting potential conflicts between elk and motorists.

MIGRATION CORRIDORS: A specific Mappable site through which large numbers of animals migrate and loss of which would change migration routes.

OVERALL RANGE: The area which encompasses all known seasonal activity areas within the observed range of an elk population.

PRODUCTION AREA: That part of the overall range of elk occupied by the females from May 15 to June 15 for calving. (Only known areas are Mapped and this does not include all production areas for the DAU).

RESIDENT POPULATION: An area used year-round by a population of elk. Individuals could be found in any part of the area at any time of the year; the area cannot be subdivided into seasonal ranges. It is most likely included within the overall range of the larger population.

SEVERE WINTER: That part of the range of a species where 90 percent of the individuals are located when the annual snowpack is at its maximum and/or temperatures are at a minimum in the two worst winters out of ten. The winter of 1983-84 is a good example of a severe winter.

SUMMER CONCENTRATION: Those areas where elk concentrate from mid-June through mid-August. High quality forage, security, and lack of disturbance are characteristics of these areas to meet the high energy demands of lactation, calf rearing, antler growth, and general preparation for the rigors of fall and winter.

SUMMER RANGE: That part of the range of a species where 90% of the individuals are located between spring green-up and the first heavy snowfall, or during a site specific period of summer as defined for each DAU. Summer range is not necessarily exclusive of winter range; in some areas winter range and summer range may overlap.

WINTER CONCENTRATION: That part of the winter range of a species where densities are at least 200% greater than the surrounding winter range density during the same period used to define winter range in the average five winters out of ten.

WINTER RANGE: That part of the overall range of a species where 90 percent of the individuals are located during the average five winters out of ten from the first heavy snowfall to spring green-up, or during a site specific period of winter as defined for each DAU.

MULE DEER

CONCENTRATION AREA: That part of the overall range where higher quality habitat supports significantly higher densities than surrounding areas. These areas are typically occupied year round and are not necessarily associated with a specific season. Includes rough break country, riparian areas, small drainages, and large areas of irrigated cropland.

HIGHWAY CROSSING: Those areas where mule deer movements traditionally cross roads, presenting potential conflicts between mule deer and motorists.

MIGRATION CORRIDORS: A specific Mappable site through which large numbers of animals migrate and loss of which would change migration routes.

OVERALL RANGE: The area which encompasses all known seasonal activity areas within the observed range of a mule deer population.

RESIDENT POPULATION: An area that provides year-round range for a population of mule deer. The resident mule deer use all of the area all year; it cannot be subdivided into seasonal ranges although it may be included within the overall range of the larger population.

SEVERE WINTER: That part of the overall range where 90% of the individuals are located when the annual snowpack is at its maximum and/or temperatures are at a minimum in the two worst winters out of ten.

SUMMER RANGE: That part of the overall range where 90% of the individuals are located between spring green-up and the first heavy snowfall. Summer range is not necessarily exclusive of winter range; in some areas winter range and summer range may overlap.

WINTER CONCENTRATION: That part of the winter range where densities are at least 200% greater than the surrounding winter range density during the same period used to define winter range in the average five winters out of ten.

WINTER RANGE: That part of the overall range where 90 percent of the individuals are located during the average five winters out of ten from the first heavy snowfall to spring green-up, or during a site specific period of winter as defined for each DAU.

BLACK BEAR

FALL CONCENTRATION: That portion of the overall range occupied from August 15 until September 30 for the purpose of ingesting large quantities of mast and berries to establish fat reserves for the winter hibernation period.

HUMAN CONFLICT: That portion of the overall range where two or more confirmed black bear complaints per season were received which resulted in CDOW investigation, damage to persons or property (cabins, tents, vehicles, etc), and/or the removal of the problem bear(s). This does not include damage caused by bears to livestock.

OVERALL RANGE: The area which encompasses all known seasonal activity areas within the observed range of a population of black bear.

SUMMER CONCENTRATION: That portion of the overall range of the species where activity is greater than the surrounding overall range during that period from June 15 to August 15.

Appendix B - CPW Species of Concern

Species[1]	Occurrence	Habitat Association	Potential Habitat in Project Area?	Potential Impact/Issue?
MAMMALS				
American pika (SGCN) *Ochotona princeps*	Throughout state in suitable habitats	Alpine, rocky habitats	No	No
Black-footed ferret (FE, SE) *Mustela nigripes*	Rio Blanco & Moffat Counties	Reintroduced to Rio Blanco County, in white-tailed prairie dog colony	No	No
Black-tailed prairie dog (SGCN) Cynomys ludovicianus	Eastern plains	Shortgrass prairies	No	N
Botta's pocket gopher (SGCN) *Thomomy bottae rubidus*	Northern Front Range	Foothills	No	No
Gray wolf (SE) *Canis lupus*	Northern counties, no packs in State at this time	Shrublands, forests and areas away from human habitation	No	No
Grizzly bear (SE) *Ursus arctos*	Rare visitor from Wyoming	Forests, alpine and shrublands	No	No
Fringed myotis (SGCN) *Myotis thysanodes*	Throughout Colorado in suitable habitats	Roosts in montane and foothills conifers and oakbrush; may forage to as low as greasewood and saltbush shrublands. Roosts and hibernates in caves, mines, and buildings.	No	No
Gunnison prairie dog (SGCN) *Cynomys gunnisoni*	Parks in central Colorado	Shortgrass steppe, open shrublands in parks	No	No
Little brown myotis (SGCN) *Myotis lucifigus*	Throughout Colorado in suitable habitats	Widespread habitat types.	No	No
Lynx (FT, SE) *Lynx canadensis*	High mountain areas with large expanses of conifer forests in Colorado	Spruce/fir and lodgepole pine forests, sometimes aspen, shrublands	No	No
New Mexico meadow jumping mouse (FE, SGCN) *Zapus hudsonius leuteus*	Southwestern counties in Colorado	Wet, lush, grassy meadows and some hydric shrublands	No	No
Olive-backed pocket mouse (SGCN) *Perognathus fasciatus*	Southern grasslands in Colorado	Arid and semiarid grasslands with sparse vegetation, sandy to clayey soils	No	No
Preble's meadow jumping mouse (FT, ST) *Zapus hudsonius preblei*	Front range of Colorado north into Wyoming	Foothills riparian areas and along front range streams	No	No
Spotted bat (SCGN) *Euderma maculatum*	Throughout Colorado in suitable habitats	Areas near cliffs, including piñon-juniper woodlands and streams or water holes within ponderosa pine or mixed coniferous forest. Usually captured around a water source, including desert pools or cattle tanks.	No	No

Species[1]	Occurrence	Habitat Association	Potential Habitat in Project Area?	Potential Impact/Issue?
Townsend's big-eared bat (SGCN) *Plecotus townsendii townsendii*	Documented in Colorado in several cave locations	Semidesert shrublands, P-J, open montane forests; caves and abandoned mine roosts.	No	No
White-tailed prairie dog (SGCN) *Cynomys leucurus*	Western Colorado	Arid grasslands and sparse arid shrublands in western CO	No	No
River otter (ST) ***Lontra canadensis***	**Throughout state in suitable habitats**	**Larger rivers with high fish population levels**	**Yes**	**No**
Wolverine (FT, SE) *Gulo gulo*	Historical documentation several locations in Colorado-likely extinct	Boreal forests and tundra- large ungulate populations important	No	No
BIRDS				
Brown-capped rosy-finch (SGCN) *Leucosticte australis*	High mountains throughout state	Alpine and high-elevation coniferous forests	No	No
Bald eagle (SGCN) ***Haliaeetus leucocephalus***	**Throughout state near suitable habitats**	**Larger rivers and streams, near prairie dog towns**	**Yes**	**Yes**
Burrowing owl (ST) *Athene cunicularia*	Mostly found in eastern grasslands, some occurrence on west slope	Arid grassland and shrublands	No	No
Columbian sharp-tailed grouse (SGCN) *Tympanuchus phasianellus columbianus*	Mixed grassland/shrublands in northwest Colorado	Mixed shrubland/grasslands	No	No
Ferruginous hawk (SGCN) *Buteo regalis*	Eastern plains, larger parks	Grasslands and extensive shrublands	No	No
Golden eagle (SGCN) *Aquila chrysaetos*	Throughout Colorado in suitable habitats	Open habitats in alpine, shrublands, badlands, and grasslands	No	No
Greater sage-grouse (SGCN) *Centrocercus urophasianus*	Northwestern Colorado	Large sagebrush shrublands	No	No
Sandhill crane (SGCN) *Grus canadensis tabida*	Migrant through plains, west slope and mountain valleys, some nesting in northern parks	Large wetlands	No	No
Gunnison sage-grouse (SGCN) *Centrocercus minimus*	Gunnison Basin and western counties	Sagebrush shrublands	No	No
Least tern (FE, SE) *Sterna antillarum*	Eastern plains	Larger rivers, larger reservoir beaches	No	No
Lesser prairie chicken (FT, ST) *Tympanuchus pallidicinctus*	Extreme southeastern Colorado	Great plains grasslands and shrublands	No	No
Long-billed curlew (SGCN) *Numenius americanus*	Eastern plains and larger parks	Grasslands and sparse shrublands	No	No
Mexican spotted-owl (FT, ST) *Strix occidentalis lucida*	Southwest Colorado, and along Wet Mountains, Rampart Range	Deep shaded canyons with closed canopy conifers and cliffs	No	No

Species[1]	Occurrence	Habitat Association	Potential Habitat in Project Area?	Potential Impact/Issue?
Mountain plover (SGCN) *Charadrius montanus*	Eastern plains of Colorado	Summers on eastern plains in native short-grass steppe, winters in S. California & Mexico	No	No
Peregrine falcon (SGCN) *Falco peregrinus anatum*	Throughout state, but near cliffs and tall buildings	Needs tall cliffs or buildings for nesting, usually occurs near water	No	No
Plains sharp-tailed grouse (SE) *Tympanuchus phasianellus*	Extreme northeastern Colorado	Grasslands, river canyons	No	No
Piping plover (FT, ST) *Charadrius melodus circumcinctus*	Eastern plains	Large rivers, sandy shores around reservoirs in plains	No	No
Southern white-tailed ptarmigan (FP, SCGN) *Lagopus leucura altipetens*	Southern Rocky Mountains	Alpine habitats	No	No
Southwestern willow flycatcher (FE, SE) *Empidonax traillii extimus*	Extreme southwest Colorado, and Rio Grande River	Brushy riparian habitats at lower elevations	No	No
Western snowy plover (SGCN) *Caradrius alexandrius*	Eastern plains	Sandy bars in rivers and around reservoirs, playas	No	No
Western yellow-billed cuckoo (SGCN) *Coccyzus americanus*	North Fork of Gunnison, Colorado, Dolores, Yampa and Rio Grande rivers	Large cottonwood stands along larger rivers	No	No
Whooping crane (FE, SE) Grus americana	Migrates through eastern plains, possibly San Luis Valley	Migrant	No	No
AMPHIBIANS				
Boreal toad (SE) *Anaxyrus boreas boreas*	Small disjunct populations across higher elevations in the State	Subalpine forest habitats with marshes, wet meadows, streams, beaver ponds, and lakes.	No	No
Couch's Spadefoot (SGCN) *Scaphiopus couchii*	Southeastern Colorado	Sandy, dry soils with creosote bush and mesquite	No	No
Great Plains narrowmouth toad (SGCN) *Castrophryne olivacea*	Eastern Colorado	Grasslands, edges of marshes, rocky hills	No	No
Northern cricket frog (SGCN) *Acris crepitans*	Eastern Colorado	Edges of slow-moving bodies of water	No	No
Northern leopard frog (SGCN) *Lithobates pipiens*	Common throughout mid- and lower-elevations of Colorado	Wet meadows, marshes, ponds, beaver ponds, streams.	No	No
Plains leopard frog (SGCN) *Rana blairi*	Eastern Colorado	Sunny, grassy wetlands	No	No
Wood frog (SGCN) *Rana sylvatica*	Larimer and Grand Counties	Forested wetlands	No	No
FISHES				
Arkansas darter (ST) *Etheostoma cragini*	Arkansas River drainage in eastern Colorado	Clear, shallow, spring-fed streams with moderate current and lots of rooted aquatic vegetation	No	No

Species[1]	Occurrence	Habitat Association	Potential Habitat in Project Area?	Potential Impact/Issue?
Bonytail chub (FE, SE) ***Gila elegans***	**No known populations remain in Colorado**	**Large, swift-flowing waters of the Colorado River system**	**No**	**Yes**
Brassy minnow (ST) *Hybognathus kankinsoni*	Native to Republican and South Platte basins, possibly in Colorado River drainage	Moderately clear tributary streams with sand or gravel bottoms, also in small ponds	No	No
Colorado pikeminnow (FE, ST) ***Ptychocheilus lucius***	**Colorado, Dolores, Green, Gunnison, San Juan, White and Yampa**	**Large, swift-flowing rivers that are seasonally turbid with warm backwaters**	**No**	**Yes**
Colorado River cutthroat trout (SGCN) *Oncorhynchus clarkii pleuriticus*	Widespread localized reaches	Headwater streams and lakes	No	No
Colorado Roundtail chub (SGCN) *Gila robusta*	Colorado River through Glenwood Canyon, downstream on White River, Milk and Divide Creeks	Larger rivers of Colorado River basin	No	No
Common shiner (ST) *Luxilus cornutus*	South Platte basin	Lakes, rivers and streams, most common in the pools of streams and small rivers	No	No
Flannelmouth sucker (SGCN) *Catostomus latipinnis*	Western Colorado rivers	Utilizes mid-sized rivers and streams	No	No
Flathead chub (SGCN) *Platygobio gracilis*	Arkansas River basin	Main branches of turbid streams and rivers, fast currents with sand or gravel substrates	No	No
Greenback cutthroat trout (FT, ST) *Oncorhynchus clarkia stomias*	Front Range mountain streams, recently on west slope	Montane clear, cold streams	No	No
Humpback chub (FE, ST) ***Gila cypha***	**Green, Yampa and Colorado Rivers**	**Pools and eddies in areas of fast-flowing, deep, turbid water, often associated with cliffs and boulders**	**No**	**Yes**
Iowa darter (SGCN) *Etheostoma exile*	Plains rivers	Springs	No	No
Lake chub (SE) *Couesius plumbeus*	North Platte	Gravel bottomed pools and streams	No	No
Mountain sucker (SGCN) *Catostomus platyrhynchus*	Numerous small to medium streams below 8600' elevation.	Throughout west on both sides of Continental Divide-prefer clear cold creeks and small to medium rivers with rubble, gravel, or sand substrate	No	No
Northern redbelly dace (SE) *Phoxinus eos*	South Platte basin	Small slow-flowing streams and connected lakes with vegetation	No	No
Orangespotted sunfish (SGCN) *Lepomis humilis*	Widespread across middle and eastern U.S.	Shallow silt-laden waters, floodplain pools, backwater pools of larger streams on plains	No	No

Species[1]	Occurrence	Habitat Association	Potential Habitat in Project Area?	Potential Impact/Issue?
Plains orangethroat darter (SGCN) *Etheostoma spectabile*	Arikaree and Republican River drainages	Small, clear, spring-fed streams with sand, gravel or rocky bottoms and no silt	No	No
Plains minnow (SE) *Hybognathus placitus*	Arkansas & South Platte basins	Main channels of rivers, also in pools below diversion projects	No	No
Razorback sucker (FE, SE_ *Xyrauchen texanus*	**Lower Yampa and lower Colorado Rivers**	**Deep, clear to turbid waters of large rivers and reservoirs, with silt, mud, or gravel substrate. Quiet, soft-bottom river backwaters**	**No**	**Yes**
Rio Grande Chub (SGCN) *Gila pandora*	Rio Grande basin	Pools and streams with gravel substrate and overhanging banks and brush	No	No
Rio Grande cutthroat trout (SGCN) *Oncorhynchus clarkia virginalis*	Rio Grande basin	Clear, cold, swift moving creeks and streams in montane environs	No	No
Rio Grande sucker (SE) *Catostomas plebeius*	Rio Grande basin	Stream obligate using slow moving reaches	No	No
Southern redbelly dace (SE) *Phoxinus erythrogaster*	Arkansas River basin	small, low-order streams where the habitat includes permanent springs, seeps, and mats of vegetation	No	No
Stonecat (SGCN) *Noturus flavus*	South Platte and Republican basins	Fast riffles and runs in streams with sand or gravel bottoms with some rocks- found under rocks and debris	No	No
Suckermouth minnow SE) *Phenacobuis mirabilis*	South Platte and Arkansas River drainages	Shallow, clear riffles with sand and gravel substrates	No	No
REPTILES				
Triploid Checkered whiptail (SGCN) *Cnemidophorus neotesselatus*	Arkansas drainage in Eastern Colorado	Hillsides, arroyos and canyons associated w/ Arkansas River valley	No	No
Massasagua (SGCN) *Sistrurus catenatus*	Southeast Colorado below 5,500'	Dry plains grasslands and sandhills	No	No
MOLLUSKS				
Cylindrical papershell (SGCN) *Anodontoides ferussacianus*	Boulder County	Headwater creeks and streams with silty/muddy substrates	No	No
Rocky Mountain Capshell (SGCN) *Acroloxus coloradensis*	Rocky Mountains into Canada	8,500 to 10,000' mountain lakes	No	No

Source: CPW 2015
FE = Federally Endangered; FT = Federally Threatened; SE = State Endangered; ST = State Threatened; SGCN = Species of Greatest Conservation Need

RJ Engineering & Consulting, Inc.

October 17, 2018 Project No. 18-050G-C1

Mr. Andy Bruno
5670 Brentwood Drive
Hoffman Estates, IL 60192
andy@nutrientfarm.com

Subject: **Soils and Geohazard Evaluation, Riverbend PUD in Garfield County, Colorado**

Dear Mr. Bruno,

RJ Engineering & Consulting, Inc. was requested to provide a soil and geohazard evaluation for the proposed Riverbend PUD site in Garfield County, Colorado. The evaluation was conducted to address requirements of the Garfield County LUDC impact analysis as outlined in Section 4-203 G, items 3, 4 and a portion of 5. Figure 1 presents the approximate site location that we visited on October 10, 2018.

SITE GEOLOGY

We reviewed the "Geologic Map of the Storm King Mountain Quadrangle, Garfield County, Colorado by Bruce Bryan, Ralph R. Shroda, Anne E. Harding, and Kyle E. Murray, USGS Miscellaneous Field Studies Map MF-2389, 2002." A section of the map is shown on Figure 2. The mapping indicates the flatter areas of the site consist of alluvial deposits generally comprised of sands, silts, clays and gravel of river or stream origin (map symbol Qfy). Two older landslides are mapped near the base of the slopes along the south side of the property (map symbol Qls). Colluvial deposits (map symbol Qc) are mapped in the central and east portions of the site. These materials typically heterogenous and consist of a mixture of sand, clay and gravel depending on source materials.

The steeper slopes in the central portion, south and east sides of the side consist of varying bedrock formations. Bedrock below the west and south portions of the site generally consist of the Mancos Formation (map symbols Kmu, Kmn and Kml). The Mancos Formation generally consists of fine-grained shale and claystone bedrock with varying amounts of silt and sand. Bedrock below the east portion of the site appears to consist of Jurassic age Morrison Formation (map symbol Jm), and the Triassic age Chinle (map symbol Tc) and State Bridge (map symbol TPs) Formations. These formations generally consist of fine-grained shale and claystone bedrock with interbedded sandstone bedrock. The Dakota Formation (map symbol Kd) is mapped in the north-central section of the site. The Dakota Formation consists of sandstone bedrock and varies from weathered to very hard and typically forms ridge tops.

GEOHAZARDS

We reviewed the "Surficial Geology, Geomorphology, and General Engineering Geology of Parts of the Colorado River Valley, Roaring Fork River Valley, and Adjacent Areas, Garfield County, Colorado by B.K. Stover and J.M. Soule, Colorado Geologic Survey Open File Report 85-1, 1985." The geohazard map for the site is shown on Figure 3. Based on the mapping and our observations, we believe the following geohazards may be present at the site:

- Collapsible/Compressible Soils
- Expansive/Swelling Soils
- Debris Flows
- Landslides and Potentially Unstable Slopes
- Erosive Soils
- Previous Mining Operations

The lower sections of the site underlain by the alluvial soils may consist of potentially collapsible soils (map symbol CS). Our experience suggests that low density alluvial deposits can exhibit collapse or compression during and after development of a site.

The west and south sections of the site generally consist of the Mancos Formation (map symbols Kmu, Kmn and Kml). Mancos can exhibit very high swell potential depending on the location. Bedrock below the east section of the site appears to consist of Jurassic age Morrison Formation (map symbol Jm) and the Triassic age Chinle (map symbol Tc) Formations. Our experience suggests that shale and claystone within all these formations can exhibit moderate to very high swell potential.

The southern section of the site along the base of the steeper slopes is mapped as a debris/mud flow hazard (map symbol DMA). During moderate to heavy precipitation events, debris and/or mud flows can originate and mobilize down the drainages. These flows generally deposit materials in areas where the topography flattens. Field observation indicated that the southern section of the site is an area where debris flow deposition occurs.

Two older landslides are mapped near the base of the slopes along the south side of the property (See Figure 2, map symbol Qls). Site observations indicate that the landslides appear to be inactive at this time. However, excavation at the base of the slopes and changes in groundwater conditions can act to reactivate these slide areas or initiate a new slides. Cut slopes, excavations, and surface water management should be properly designed to address global slope stability.

A large portion of the site is mapped as moderate to high erosion potential (map symbols MEP and HEP). Erosion potential is defined as areas undergoing rapid headward erosion, gullying, and/or sheet erosion and exhibit moderate to high potential for continued erosion.

Previous coal mining activity has occurred in areas south and west of the site. A coal mine is mapped about 1000 feet west of the site (See Figure 3). Our review of available mapping suggests that mining did not occur on or below this site. Mapping did suggest several locations where mine dumping occurred (See Figure 3). These materials consist of waste-rock debris from mining operations. In addition, observations made during our site visit indicated that previous grading activity has occurred in the southwest portion of the site. The approximate extents of this area are shown on Figure 3 and in Photo 1 below. Poorly compacted/low density

fill may be present in this area. Low density fill material could consolidate under structural loading from buildings or other improvements.

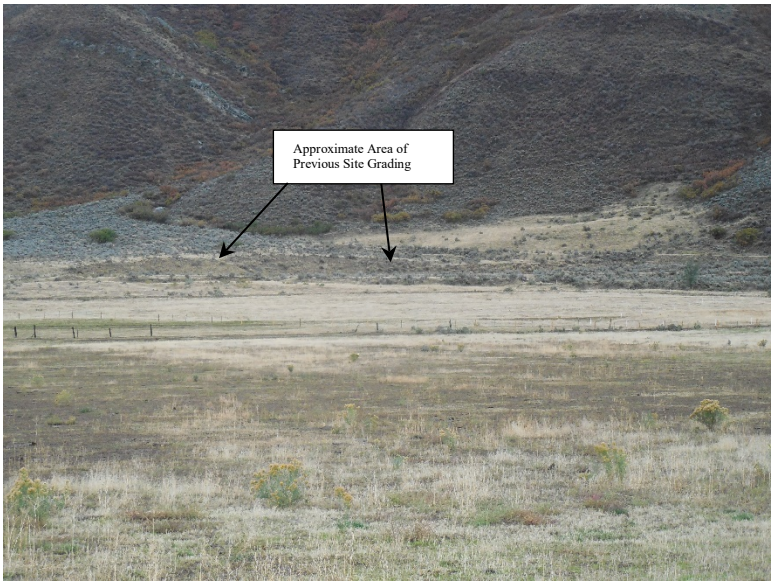


Photo 1 – Southwest portion of site looking south

CONCLUSIONS

Several potential geohazards were identified that could impact the development of this site. We believe these potential hazards can be mitigated with proper engineering design and planning. For example, collapsible and expansive soils can be mitigated using deep foundation systems for structures or engineered ground improvement techniques. Debris flow hazards can be mitigated through channeling of flows, avoidance of high-risk areas or through the use of fences or barriers. The risk of landslides and unstable slopes can be reduced through engineered cut slopes and surface water management that address global stability. Erosive soils can be mitigated with conventional erosion control techniques and proper drainage design.

A site-specific geotechnical investigation should be performed to determine which geohazards and to what extent they are present at this site. The investigation should consist of test hole drilling and subsoil sampling.

LIMITATIONS

This study has been conducted in accordance with generally accepted geological and geotechnical engineering practices in this area for use by the client. The suggestions submitted in this report are based upon the data obtained from field reconnaissance and available documentation. Geologic conditions will also change over time periods, so that results of the analyses and recommendations will also change over time. Changes in vegetation due to flooding, fires, or regrading will change the analyses and recommendations presented herein.

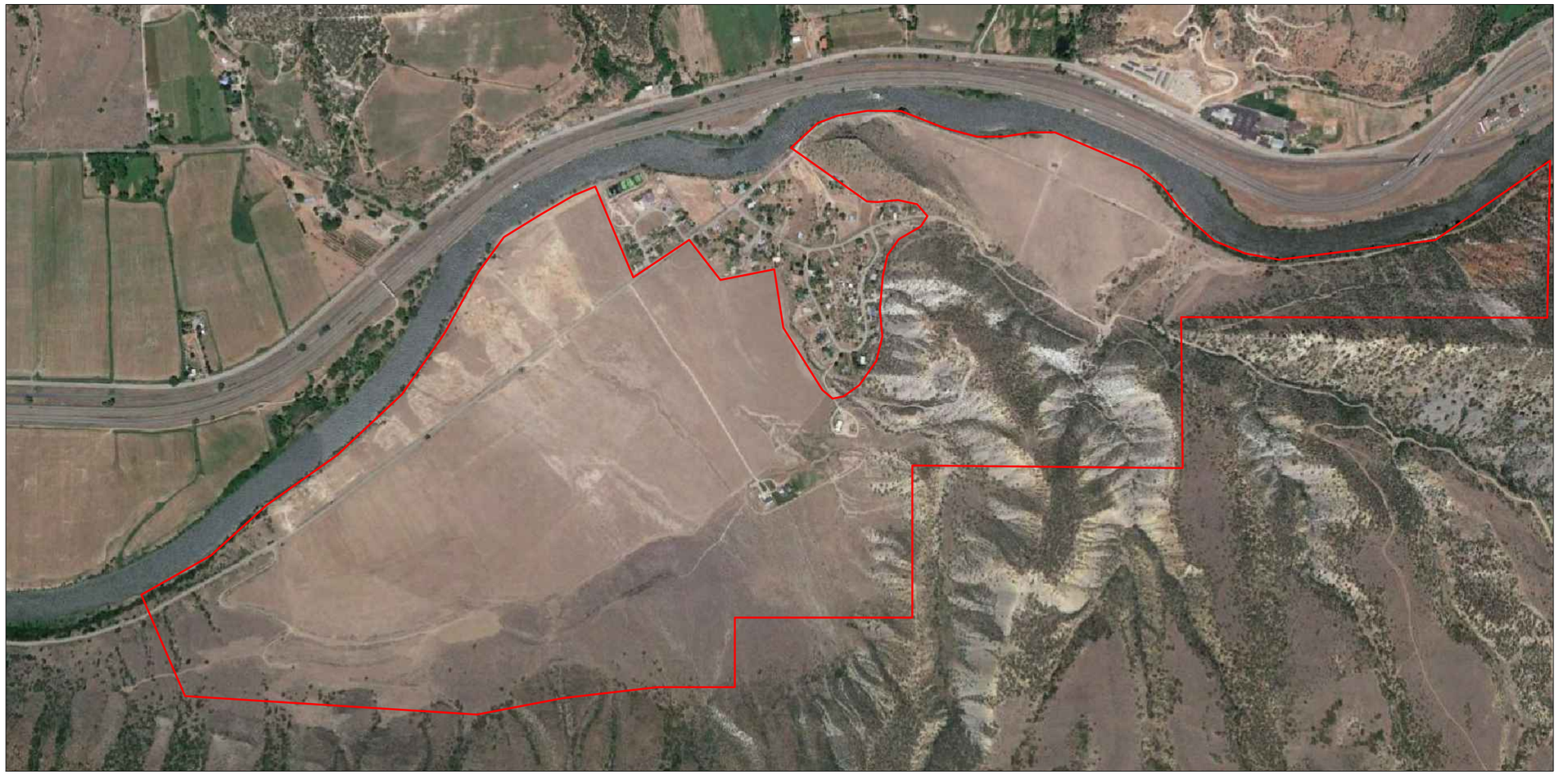
The report was prepared in substantial accordance with the generally accepted standards of practice for geotechnical engineering as exist in the site area at the time of our investigation. No warranties, express or implied, are intended or made.

If you have questions or need additional information, please call us at 970-230-9208.

Sincerely,

RJ Engineering & Consulting, Inc.

Richard D. Johnson, P.E.
Principal



N

0 500' 1000'

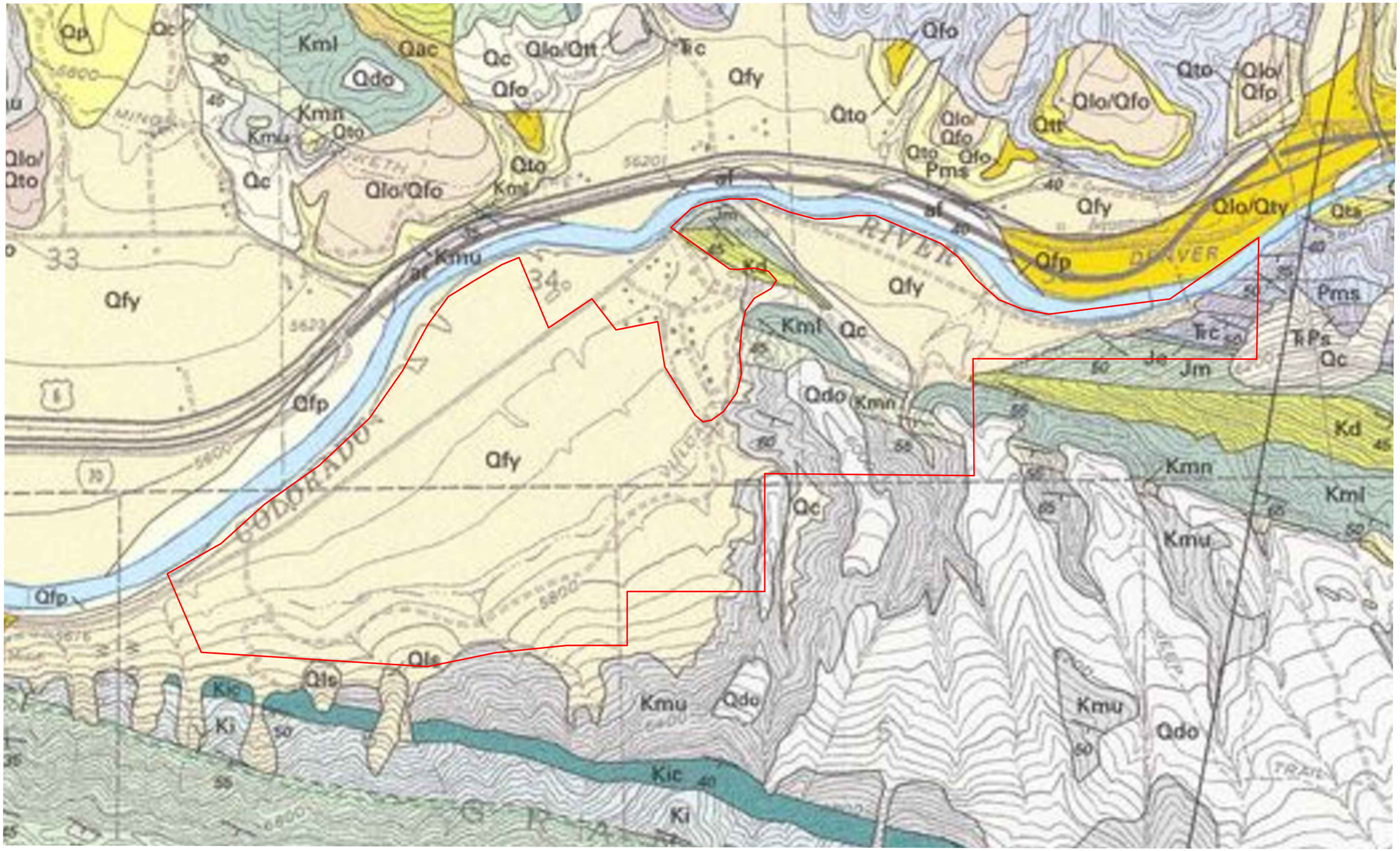
Approximate
SCALE: 1" = 1000'

PROJECT NO: 18-050G-C1

PROJECT: Riverbend PUD

Approximate Site Location

Figure 1



Note: Base map from "Geologic Map of the Storm King Mountain Quadrangle, Garfield County, Colorado by Bruce Bryant, Ralph R. Shroda, Anne E. Harding, and Kyle E. Murray, USGS Miscellaneous Field Studies Map MF-2389, 2002."

N

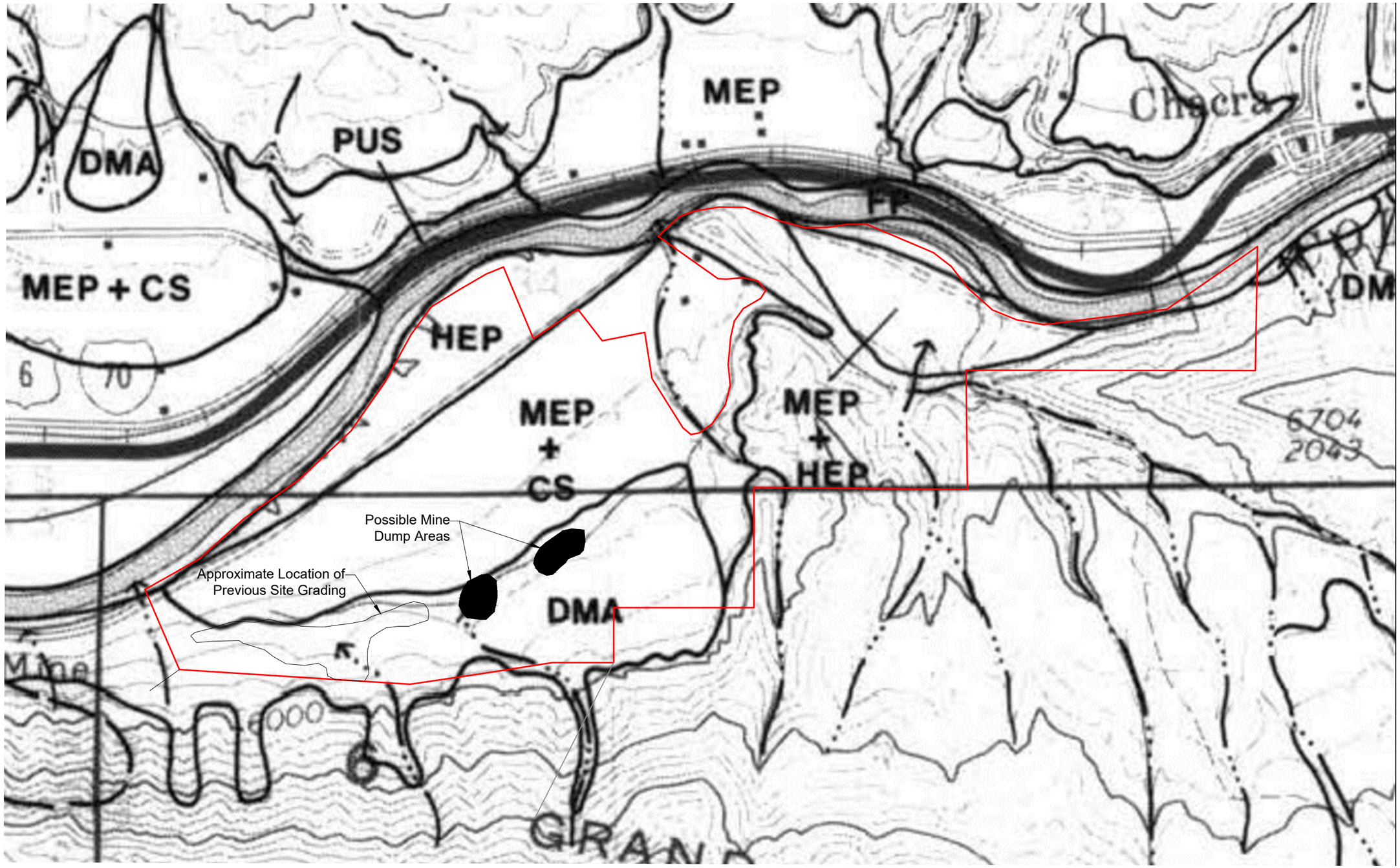
0 500 1000

Approximate
SCALE: 1" = 1000'

PROJECT NO:	PROJECT:
18-050G-C1	Riverbend PUD

Geologic Map

Figure 2



Note: Base map from "Surficial Geology, Geomorphology, and General Engineering Geology of Parts of the Colorado River Valley, Roaring Fork River Valley, and Adjacent Areas, Garfield County, Colorado by B.K. Stover and J.M. Soule, Colorado Geologic Survey Open-file Report 85-1, 1985."

N

0 500 1000

Approximate
SCALE: 1" = 1000'

PROJECT NO: 18-050G-C1

PROJECT: Riverbend PUD

Geohazards Map

Figure 3

Phase III Bond Release and Termination of Jurisdiction

Proposed Decision
and
Findings of Compliance
for the

Coal Ridge No. 1 Mine

PERMIT NUMBER C-1984-065
SL-03

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Prepared by
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Environmental Protection Specialist

7/29/20

Table of Contents

I. INTRODUCTION

This document is the proposed decision of the Colorado Division of Reclamation, Mining, and Safety (Division) in response to a request for Phase III Bond Release and Termination of Jurisdiction at the Coal Ridge No. 1 Mine (Coal Ridge), Permit Number C-1984-065, bond release application number SL-03. The package contains five parts. These include: 1) Introduction; 2) Procedures and Summary of the Bond Release Process; 3) Criteria and Schedule for Bond Release; 4) Observations and Findings of the Division regarding compliance with the bond release requirements of the Colorado Surface Coal Mining and Reclamation Act and regulations promulgated thereunder; and 5) the Division's Proposed Decision on the request for bond release.

Detailed information about the review process can be found in the Act and the Regulations of the Colorado Mined Land Reclamation Board for Coal Mining. All Rules referenced within this document are contained within the Regulations. Detailed information about the mining and reclamation operations can be found in the permit application package (PAP) on file at the Division offices, located at 1313 Sherman Street, Room 215, in Denver, Colorado.

Coal Ridge is an underground mine which is permitted and operated by C.B. Minerals Company, LLC. The total permit area encompasses 272.00 acres. The Coal Ridge Mine is located in Garfield County, Colorado approximately 7 miles west of the town of Glenwood Springs, CO. The land for which bond release has been requested is owned by APB Holdings, LLC as shown on Figure 2.1-1 of the Coal Ridge PAP. The coal within the Coal Ridge permit boundary is privately owned. A list of mineral ownership within the area of the SL-03 application can be found on Figure 2.4-1 of the Coal Ridge PAP. Reclamation work for which bond release has been requested was conducted during 1994 with the remaining sediment pond on site reclaimed in 2015.

II. PROCEDURES AND SUMMARY OF THE REVIEW PROCESS

Coal Ridge applied for a Phase III Bond Release for a total of 45.5 affected acres as shown on Figure 1 of the SL-03 application, as well as Figure 1 of this document. This area is located in

Garfield County, Colorado in portions of Township 6 South, Range 90 West (6th Principal Meridian), Sections 6. The permit area can be found on the USGS Quadrangle 7.5 Minute Series Maps of New Castle and Storm King Mountain. The permit area and surface ownership can be found on Map 1, and the coal ownership can be found on Map 2 of the Permit Application Package (PAP).

Background

Coal Ridge was developed as a room and pillar operation utilizing hydraulic mining techniques which use high pressured jets of water for cutting and breaking coal for extraction. Entries within the coal seam were designed to move upslope so that gravity would have caused the slurry of coal and water to flow from the mining section to the portal. Coal was to be transported by a water flume to a preparation facility where it would be dewatered and stored for shipment.

Development operations commenced in October 1986. Two portals were driven by a roadheader approximately 500 feet into the hillside. Coal Seams were not reached, hydraulic mining never began, and coal was not produced. Development operations discontinued in March 1987. The decision was made in 1993 to reclaim the site, and reclamation operations were initiated in 1994.

Reclamation for Coal Ridge involved sealing, backfilling, and regrading the portal areas to blend in with the pre-existing topography. A concrete wall section was built across the portals which were covered by 25 feet of backfill. Facilities were demolished and backfill and grading activities were accomplished. Disturbed areas were topsoiled and seeded in compliance with final reclamation specifications. The sediment control structures were the last features to be reclaimed at Coal Ridge during the fall of 2015. The features reclaimed were Sediment Pond A, the concrete splitter box and Culvert 5 at the inlet to the pond, and the Small Area Exemption ditches, berms and sump.

Permit, Performance Bond, and Bond Release History

The Coal Ridge No. 1 Mine was issued on October 9, 1985 and renewed on December 10, 1989, January 30, 1993, February 28, 1997, September 21, 2001, October 16, 2006, December 20, 2011, and January 10, 2017. The Division currently holds a reclamation bond in the amount of $43,200.00.

Coal Ridge has applied for two previous bond releases. In October 19, 1995, a partial Phase I Bond Release (SL-01) recognized accomplished reclamation work. A partial Phase I and II Bond Release (SL-02) for the remaining areas of the site was approved on August 17, 2001.

SL-03 Phase III Bond Release and Termination of Jurisdiction Application

The Coal Ridge SL-03 application was received by the Division on March 23, 2020 and originally deemed incomplete for the purpose of filing on May 7, 2020 for not including the vegetation reports for the Division's review to ensure all applicable Rules and site standards have been satisfied. The

vegetation reports were then received by the Division and the SL-03 application was deemed Complete on May 21, 2020. Coal Ridge published notice of the bond release application in the *Glenwood Springs Post Independent* once weekly for four consecutive weeks, beginning January 9, 2020 and ending on January 30, 2020. Coal Ridge notified land owners within and adjacent to the mine permit area, the Bureau of Land Management (BLM), Colorado Parks and Wildlife (CPW) and other interested parties of the application for bond release, as required by Rule 3.03.2(1). No comments, written objections or requests for an informal conference regarding the bond release application were received by the Division.

A bond release inspection was scheduled and conducted on June 3, 2020. The site inspection was conducted in accordance with Rule 3.03.2(2). Inspection attendees included: Zach Trujillo and Elliott Russell of the Division and Mr. Andy Bruno of APB Holdings, LLC, representing the landowner. No representatives from the BLM, CPW, local agencies, or adjacent land owners attended the inspection. A summary of the bond release inspection are presented in Section IV, below. Detailed observations of the inspection are documented in the inspection report that was conducted on June 3, 2020. See Figure 1 of this document for the location of the SL-03 Phase III Bond Release area.

III. CRITERIA FOR BOND RELEASE

Phase III Bond Release

The Division evaluated Coal Ridges' request for Phase III Bond Release on 45.5 acres in the SL-03 application, as shown on Figure 1 of this document. The process of releasing the reclamation bond for a coal mine site in Colorado is explained in Rule 3.03 and further described in the Division's 1995 *Guideline Regarding Selected Coal Mining Bond Release Issues*. The bond release process involves three phases. At Phase III, Rule 3.03.1(2) (c) states, "The remaining portion of the bond amount shall be released when the permittee has successfully completed all surface coal mining reclamation operations in accordance with the approved reclamation plan, and the final inspection and procedures of 3.03.2 have been satisfied. This shall not be before the expiration of the period specified for revegetation responsibility in 3.02.3."

Evaluation and inspection of the reclaimed areas was based on the specific requirements of the reclamation plan and the functional requirements of the post-mining land use. Criteria for bond release included the following:

1. The reclaimed logical management unit (LMU) must meet the vegetative cover standard for two out of the four years of sample data (Rule 4.15.8(3)(a));
2. The reclaimed LMU must meet the herbaceous productivity standard for two out of the four years of sample data. (Rule 4.15.8(4));
3. The reclaimed LMU must meet the approved species diversity standard for two out of the four years of sample data. (Rule 4.15.8(5));
4. On areas reclaimed prior to 2008, woody stem density shall be 150 stems per acre on 3% of the reclaimed area (Permit section 4.15.8 and Rule 4.15.8(7));

5. The reclamation supports the approved post-mining land use (Rule 4.16.1);
6. Sample adequacy and revegetation success for cover and productivity shall be made with one of the following statistically valid approaches in Rule 4.15.11(2)(a), (b), or (c). Demonstrations of sample adequacy and revegetation success for woody plant density shall be made with one of the following statistically valid approaches in (a), (b), or (c), or with one of the alternative approaches specified in 4.15.11(3); and
7. All areas requested for Phase III bond release meet the requirements for Phase I and Phase II bond release or have previously received Phase I and Phase II bond release approval.

Coal Ridge provided vegetation monitoring reports for the Phase III Bond Release area in the SL-03 application.

IV. OBSERVATIONS AND FINDINGS

The following discussion of observations and findings focuses on the results of vegetation re-establishment and compliance with the reclamation plan for the Coal Ridge No 1. Mine for Phase III Bond Release. Reclamation was initiated in 1994 for the majority of the site with the sediment control structures reclaimed during the fall of 2015. Vegetation sampling was conducted in 2018 and 2019. The area requested under the Coal Ridge SL-03 application have met or surpassed the minimum lability time frame of ten years in accordance with Rule 3.02.3(2)(b).

The evaluation of the bond release application included a review of past inspection reports, annual reclamation reports, and annual hydrology reports, as well as a pre-inspection meeting to discuss permit requirements and regulatory criteria and the bond release inspection. The bond release inspection was conducted on June 3, 2020. Revegetation success data that was included in the bond release application was reviewed by the Division in the office during the technical evaluation of the bond release application before, during and after the inspection.

During the Phase III Bond Release inspection, participants walked through each of the bond release request parcels to allow for visual assessment of compliance with pertinent requirements as described above in Section III of this document. A summary of the observations are discussed below and the details are further discussed in the associated inspection report.

Phase III

Coal Ridge is approved for Dry Land Pasture and Wildlife Habitat (Sagebrush Revegetation) post-mining land use as shown on Figure 1 of this document. Based on the 2018 and 2019 vegetation sampling results for Phase III Bond Release, the Division finds that Coal Ridge has achieved adequate cover, productivity and diversity in the SL-03 application area in conjunction with the approved post-mining land use. These results are summarized below.

<u>Phase III Bond Release Vegetation Results – Dry Land Pasture</u>

2018 Cover: Herbaceous cover: 51.5%

Herbaceous cover standard (90%): 24.3%
The 2018 sample data successfully exceeds 90% of the herbaceous cover standard.

2019 Cover: Herbaceous cover: 43.0%
Herbaceous cover standard (90%): 25.0%
The 2019 sample data successfully exceeds 90% of the herbaceous cover standard.

2018 Productivity: Herbaceous production: 702 lbs/acre
Herbaceous production standard (90%): 287 lbs/acre
The 2018 sample data successfully exceeds 90% of the herbaceous productivity standard.

2019 Productivity: Herbaceous production: 656 lbs/acre
Herbaceous production standard (90%): 283 lbs/acre
The 2019 sample data successfully exceeds 90% of the herbaceous productivity standard.

Diversity: Dry Land Pasture is not subject to the diversity standards per Rule 4.15.9.

Woody Plant Density: Dry Land Pasture is not subject to woody plant density standards per Rule 4.15.9.

Phase III Bond Release Vegetation Results – Wildlife Habitat (Sagebrush Revegetation)

2018 Cover: Herbaceous cover: 50.1%
Herbaceous cover standard (90%): 24.3%
The 2018 sample data successfully exceeds 90% of the herbaceous cover standard.

2019 Cover: Herbaceous cover: 49.2%
Herbaceous cover standard (90%): 25.0%
The 2019 sample data successfully exceeds 90% of the herbaceous cover standard.

2018 Productivity: Herbaceous production: 737 lbs/acre
Herbaceous production standard (90%): 287 lbs/acre
The 2018 sample data successfully exceeds 90% of the herbaceous productivity standard.

2019 Productivity: Herbaceous production: 655 lbs/acre
Herbaceous production standard (90%): 283 lbs/acre
The 2019 sample data successfully exceeds 90% of the herbaceous

productivity standard.

2018 Diversity: Five perennial species and three cool-season perennial grasses were sampled between 3% and 60% relative cover. This meets or exceeds the requirement for a minimum of at least four perennial species and three cool-season perennial grasses between 3% and 60% relative cover. The 2018 sample data successfully meets or exceeds reclamation success diversity standards.

2019 Diversity: Five perennial species and three cool-season perennial grasses were sampled between 3% and 60% relative cover. This meets or exceeds the requirement for a minimum of at least four perennial species and three cool-season perennial grasses between 3% and 60% relative cover. The 2019 sample data successfully meets or exceeds reclamation success diversity standards.

Woody Plant Density: The Coal Ridge No. 1 Mine is not subject to woody plant density standards per Rule 4.15.8(7) and Section 4.4.2.10 of the Coal Ridge Permit Application Package.

Post-mining Land Use

The post-mining land use at Coal Ridge is dryland pasture and wildlife habitat. The Phase III Bond Release area requested with the SL-03 application was walked during the inspection and the Division observed Smooth Brome (*Bromus inermis*), Western Wheatgrass (*Pascopyrum smithii*), Great Basin Wildrye (*Leymus cinereus*), Bulbous Bluegrass (*Poa bulbosa*), Wyoming Big Sagebrush (*Artemisia tridentata ssp. wyomingensis*), Rubber Rabbitbrush (*Ericameria nauseosa*), Scarlet Globemallow (*Sphaeralcea coccinea*), Alfalfa (Medicago sativa), Cicer Milkvetch (*Astragalus cicer*), and minor amounts of Field Bindweed (*Convolvulus arvensis)* within the wildlife habitat area. Within the dryland pasture area, Smooth Brome (*Bromus inermis*), Western Wheatgrass (*Pascopyrum smithii*), Crested Wheatgrass (*Agropyron cristatum*), Bulbous Bluegrass (*Poa bulbosa*), and minor amounts of Downy Brome (*Bromus tectorum)* was observed.

The vegetative ground cover and species diversity observed during the inspection in both the wildlife habitat and dryland pasture areas were consistent with the data presented in the SL-03 application. The Division observed small amounts of Musk Thistle (*Carduus nutans)* and Scotch Thistle (*Onopordum acanthium),* both are List B noxious weeds. There was no evidence these few observed Musk Thistle and Scotch Thistle plants have been established within the permit area for more than a growing season which likely explains why they are not present in the 2018 or 2019 vegetation sampling data.

Wildlife

During the inspection at Coal Ridge, Bald Eagles were observed adjacent to the permit boundary

along the Colorado River. Previous inspections have documented sage grouse, deer, and pronghorn in the area.

Hydrologic Balance - Evaluation of Hydrologic Impacts Required by Section 3.03.2(2)

Rule 3.03.2(2) requires the Division to evaluate hydrologic impacts prior to releasing reclamation lability. This evaluation must consider whether pollution or surface or subsurface water is occurring and the probability of future occurrence with such pollution. The Division's evaluation is summarized below.

Ground Water Impacts

Coal Ridge had a total of eight ground water monitoring wells and were reclaimed in 1994 and 1995 and ground water monitoring is no longer required. Prior to the reclamation of the ground water monitoring wells, no exceedances were reported in the Annual Hydrology Reports or quarterly monitoring reports. Additionally, based on the limited extent of operations at Coal Ridge, ground water impacts were not expected.

Surface Water Impacts

There has been no record of any discharge or runoff from Coal Ridge as reported in the Division's monthly inspection reports, discharge monitoring reports and Annual Hydrology Reports. As part of the Phase II bond release (SL-02) in 2001, Coal Ridge demonstrated that contributing suspended solids to streamflow or runoff was not in excess of levels determined on adjacent undisturbed areas. Additionally, Technical Revision No. 19 was submitted and approved in 2015 which provided a sediment control plan for reclaimed areas associated with the reclamation of Sediment Pond A. The Sediment Control Plan was designed to prevent an increase in the average annual sediment yield from pre-mine undisturbed conditions. Finally, as documented with the SL-03 inspection, vegetation has established itself and there were no signs of erosion or runoff throughout Coal Ridge.

Findings on Protection of Hydrologic Balance

Based on the foregoing observations, the Division finds that Coal Ridge has minimized disturbance of the hydrologic balance in the SL-03 bond release area and prevented material damage outside the permit area. The Division also finds that Coal Ridge has not caused hydrologic changes that adversely affect the approved post mining land use in the permit area.

Summary and Conclusions

The Division has completed its review and evaluation of the SL-03 Phase III Bond Release and Termination of Jurisdiction application submitted by C. B. Minerals Company, LLC for the Coal Ridge No. 1 Mine. The Division proposes a Bond Release on 45.5 acres of Phase III and termination of the Division's jurisdiction at the Coal Ridge No. 1 Mine.

Based upon a review of the mine permit, the applicant's bond release application, and site inspections, the Division finds that Coal Ridge has completed backfilling, grading, drainage reestablishment, topsoil replacement, revegetation, and all other reclamation requirements for which Phase III Bond Release was requested in accordance with the approved reclamation plan at the Coal Ridge No. 1 Mine. The reclaimed area included within the SL-03 Bond Release application have been restored to the approximate original contour of the pre-mining landscape. Slopes conform to post-mining contours as shown on the approved Post-mining Topography Map of the permit and remain stable to date. Proper blending of reclaimed areas with undisturbed slopes was achieved and reconstructed drainages are stabilized and in good condition. Topsoil has been replaced in accordance with the approved reclamation plan, the areas have been reseeded as required and the bond release areas have been reclaimed for a post-mining land use of dryland pasture and wildlife habitat. Coal Ridge has successfully demonstrated that the cover, production, and species diversity establishment on the Phase III bond release areas meets or exceeds the reclamation success standards on the reference areas. The Division finds that Coal Ridge has achieved the requirements for Bond Release on 45.5 acres of Phase III and termination of the Division's jurisdiction at the Coal Ridge No. 1 Mine.

V. PROPOSED DECISION

Based on the observations in Section IV above, the Colorado Division of Reclamation, Mining, and Safety proposes to approve the Coal Ridge No. 1 Mine SL-03 Phase III Bond Release application. This proposed decision will release the applicant from reclamation liability on 45.5 acres Phase III of the site and terminate the Division's jurisdiction of the lands associated with the Coal Ridge No. 1 Mine, as shown on Figure 1 at the end of this document.

The Division holds a performance bond in the amount of $43,200.00 for the Coal Ridge No. 1 Mine and proposes to release the entirety of that bond.

Any person with a valid legal interest which might be adversely affected by this proposed decision may request a formal public hearing before the Mined Land Reclamation Board in accordance with Rule 3.03.2(6). Public notice of this proposed decision will be published twice in the *Craig Daily Press* as soon as possible. Requests for public hearing must be submitted to the Division in writing within thirty days of the first publication in the *Glenwood Springs Post Independent*. If no hearing is requested within those thirty days, the Division's decision will become final.

TABLES AND FIGURES

Table 1. Summary of All Bond Release Dollars

Action	Liability	Released
SL-01	$ 288,000.00	$ 161,994.00
SL-02	$ 126,006.00	$ 82,806.00
SL-03	$ 43,200.00	$ 43,200.00
Totals	N/A	$ 288,000.00