Parking Summary

Use Area	Description	Spaces
Area 6	Energy	4
	Greenhouse (Ag)	14
	Processing Building	122
	Restaurant	112
	Adventure Farm	40
	Farm Store	16
	Nursery	8
	U-pick Orchard, Pumpkins, Maze, Lova Trail	59
Area 7	Commercial / Industrial Park	32
Area 8	Water Park	234
	Campground Office	16
	Retreat	16
	Performing Arts	32
	Adventure Park	60
	Music Festival	77
		842

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

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Nutrient Farm
Garfield County, Colorado

#	Revision	Date	By:
1	Preliminary Not For Construction		

Project Milestone:

Job No.	2018-271.002
Drawn by:	FJB
Date:	3.24.22
QC: DMK	PE: DMK
File:	RivRch-OverallSite

Title:
Conceptual Access, Circulation, and Parking Plan

Dwg No.
1

Of : 1

EXHIBIT D

TABLE 2 – NUTRIENT FARM LAND USE TABLE

Table 2 – Nutrient Farm Land Use Table

P = By-Right Use
A = Administrative Review Use
L = Limited Impact Review Use
M = Major Impact Review Use

Land Use Category	Land Use Type	Development Area								PUD or LUDC Standard[1]
		1 Residential	2 Residential	3 Res/Solar	4 Residential	5 E-Farm	6 W-Farm/Solar	7 Comm/Ind	8 Adv Park	
Agricultural and Animal-Related Uses										
General	Agriculture*	P	P	P	P	P	P	P	P	* Exempt
	Agriculture Equipment Cooperative Renting*						P	P	P	*
	Agritourism*	P	P	P	P	P	P	P	P	* Exempt
	Building or Structure Necessary to Agricultural Operations, Accessory	P	P	P	P	P	P	P	P	Exempt
	Forestry					P	P	P	P	Exempt
Products, Processing, Storage, Distribution and Sale	At Point of Production*			P		P	P	P	P	* Exempt
	Off-Site*			P		P	P	P	P	*
Animals and Related Services	Animal Keeping*		P			P	P			*
	Riding Stable					P	P			
Residential Uses										
Household Living	Dwelling Unit, Accessory (ADU)*	P		P	P	P				*
	Dwelling Unit, Accessory Guest House*		P							*
	Dwelling Unit, Bunkhouse*					A	A			*
	Dwelling Unit, On-Site Employee Housing*					A	A	A	A	*
	Dwelling Unit, Single-Unit or Single Family (per legal lot)	P	P	P	P	P				
	Short Term Rentals	P	P	P	P	P				
Office	Home Office/Business	P	P	P	P	P	P	P	P	7-702

Land Use Category	Land Use Type	Development Area								PUD or LUDC Standard[1]
		1 Residential	2 Residential	3 Res/Solar	4 Residential	5 E-Farm	6 W-Farm/Solar	7 Comm/Ind	8 Adv Park	
Public/Institutional Uses										
Assembly	Community Meeting Facility*			A			A	A	A	*
	Nutrient Farm Event*			P			P	P	P	*
	Public Gathering*			P			P	P	P	*
Parks and Open Space	Parks, Open Space and Trails*	P	P	P	P	P	P	P	P	*
Transportation	Aircraft, Ultralight Operation	P	P	P	P	P	P	P	P	7-801
	Helistop					L	L		L	7-802
	Trail, Trailhead, Road	P	P	P	P	P	P	P	P	
Commercial Uses										
Health and Wellness*	Health and Wellness Retreat*								L	*
Office	Professional Office						P	P	P	
Retail/Wholesale	Brewery, Winery, Cidery, Distillery			P		P	P	P	P	
	Nursery/Greenhouse			P		P	P	P		7-902
	Retail, General			P		P	P	P	P	
	Retail, Recreational Equipment and Vehicles*						P	P	P	*
Recreation and Entertainment	Theater, Indoor							P		
	Nutrient Farm Motor Sports Center*								M	*
	Outdoor Music and Entertainment*						M	M	M	*
	Recording/Production Studio*							P		*
	Recreational Activity, Outdoor – Adventure Farm Activity*						A			*
	Recreational Activity, Outdoor – Land Activity*						L	L	L	*
	Recreational Activity, Outdoor – Passive Recreational Activity*					P	P	P	P	*
	Recreational Activity, Outdoor – Private Non-Motorized Recreational Event*					P	P	P	P	*
	Recreational Activity, Outdoor – Recreational Adventure Tours*						P	P	P	
	Recreational Activity, Outdoor – River and Water Activity*						L	L	L	*
	Recreational Activity, Outdoor – Winter Activity*						L		L	*
Services	Eating or Drinking Establishment*			P			P	P	P	*
	Food Truck*	P	P	P	P	P	P	P	P	*

Land Use Category	Land Use Type	Development Area								PUD or LUDC Standard[1]
		1 Residential	2 Residential	3 Res/Solar	4 Residential	5 E-Farm	6 W.Farm/Solar	7 Comm/Ind	8 Adv Park	
	General Service Establishment					P	P	P	P	
Vehicles and Equipment	Temporary Parking Plan*			P			P	P	P	*
Visitor Accommodations	Campground/Recreational Vehicle (RV) Park*								M	*
	Small Camping Facility						A	A	A	7-906
	Lodging Facility*								P	*
Industrial Uses										
Service	Contractor's Yard, Small						P	P	P	7-1001[2]
	Contractor's Yard, Large						P	P	P	7-1001[2]
Fabrication	Cabinet Making, Wood and Metal Working, Glazing, Machining, Welding						P	P	P	7-1001[2]
	Goods Processed from Natural Resources					M	M	M	M	7-1001[2]
Waste and Salvage	Sewage Treatment Facility					L	L	L	L	7-1001[2] 7-1005
Utilities										
	Aerobic Aeration Plant or Disposal Method		A			A	A	A	A	
	Anaerobic Septic Tank (Subsurface) or Disposal Method		A			A	A	A	A	
	Cistern*	P	P	P	P	P	P	P	P	*
	Electric Power Generation Facility, Small*			L		L	L	L	L	*
	Electric Power Generation Facility, Large*			L		L	L	L	L	*
	Geothermal Energy Systems*	P	P	P	P	P	P	P	P	*
	Hydro-Electric Energy System*		L			L	L	L	L	*
	Hydrogen and Methane Generation and Storage Systems*		L			L	L	L	L	*
	Lines, Distribution	P	P	P	P	P	P	P	P	
	Lines, Transmission	L	L	L	L	L	L	L	L	
	On-Site Wastewater Treatment System (OWTS)		P			P	P	P	P	
	Pipeline	A	A	A	A	A	A	A	A	9-104
	Pit of Thermal Energy Storage (PTES)*	P	P	P	P	P	P	P	P	*
	Solar Energy System, Accessory*	P	P	P	P	P	P	P	P	*

Land Use Category	Land Use Type	Development Area								PUD or LUDC Standard[1]
		1 Residential	2 Residential	3 Res/Solar	4 Residential	5 E-Farm	6 W-Farm/Solar	7 Comm/Ind	8 Adv Park	
	Solar Energy System, Accessory Improvement*	P	P	P	P	P	P	P	P	*
	Solar Energy System, Large*			L		L	L	L	L	*
	Solar Energy System, Small*	A	P	A	A	P	P	P	P	*
	Storage Tank*	P	P	P	P	P	P	P	P	*
	Utility Distribution Facility	P	P	P	P	P	P	P	P	
	Water Reservoir		P			P	P	P	P	
	Water Tank or Treatment Facility			P		P	P	P	P	
	Wind Energy System, Small	L	L	L	L	L	L	P	L	
Accessory Uses and Improvements										
	Building, Accessory*	P	P	P	P	P	P	P	P	*
	Improvement, Major Accessory*	P	P	P	P	P	P	P	P	*
	Improvement, Minor Accessory*	P	P	P	P	P	P	P	P	*
	Improvement, Temporary*			P		P	P	P	P	*
	Structure, Accessory* (I.e., Fence, Hedge or Wall)	P	P	P	P	P	P	P	P	*
	Use, Accessory*	P	P	P	P	P	P	P	P	*
	Use, Temporary*					P	P	P	P	*

* Denotes unique land use defined and regulated in this PUD Guide or Nutrient Farm Land Use Definitions, attached as Exhibit E to this PUD Guide.

1 Unless specifically noted as Exempt, all land uses must comply with the regulations and standards of this PUD Guide or Nutrient Farm Land Use Definitions, or if not addressed therein, then the referenced Article 7 Standards sections of the LUDC.

2 Industrial uses are allowed in Development Areas 5-8 and these Areas shall be considered Industrial Zoned property for applying sections 7-1001. of the LUDC. Section 7-1001.D.3 shall not apply to any adjacent property line located within the Nutrient Farm PUD boundaries, but shall apply to an adjacent property line outside of the PUD boundaries.

EXHIBIT E

NUTRIENT FARM LAND USE DEFINITIONS
(Black = Code. Blue = Proposed/additional wording.)

The following Nutrient Farm Land Use Definitions contain use specific allowances that are unique to the Nutrient Farm Planned Unit Development ("PUD") and supersede the provisions of the Garfield County Land Use and Development Code ("LUDC"). When a land use is not defined below or regulated elsewhere in the PUD Guide, the definitions, standards, and requirements of the LUDC shall apply.

For the purposes of this PUD Guide, the following words and phrases are defined as follows:

Accessory Solar Energy System: A device and/or system that has a combined name plate DC rating of less than 25 kilowatt ("kW") and includes the equivalent kilowatt measurement of energy for systems other than photovoltaic that converts the sun's radiant energy into thermal, chemical, mechanical, or electric energy.

Accessory Use and Improvement: Accessory Use and Improvement are uses, buildings, structures, or other improvements of any manner which are subordinate and incidental to the primary use of the subject property and located on the same lot or on a common lot serving the primary use. An Accessory Use and Improvement may be located in any Development Area or Open Space Tract. All Accessory Uses and Improvements shall be:

1. Incidental and subordinate to a principal building or principal use;
2. Subordinate in area, extent, or purpose to the principal building or principal use served;
3. Contribute to the comfort, convenience, or necessity of occupants of the principal building or principal use;
4. Reasonably limited in distance from the primary use or structure; and
5. Listed as an Accessory Use, Accessory Building, Accessory Improvement, Accessory Structure, or noted as such in the Nutrient Farm PUD Guide or these Definitions.

Agriculture: The use of land for production, cultivation, growing and harvesting of crops and plants; grazing, raising, breeding, minor on-site processing of livestock, excluding commercial animal feed lot operations, as generally defined in the LUDC and allowed per this PUD Guide.

Agricultural Equipment Cooperative Renting: Cooperative operations located on Nutrient Farm, which may allow for the temporary renting of farm and construction equipment and land maintenance machinery to other agricultural operations in the community in the interests of efficiency and collaboration, as generally defined in the LUDC and allowed per this PUD Guide.

Agricultural Products, Processing, Storage, Distribution, and Sale at Point of Production: Operations on Nutrient Farm performing a variety of operations on livestock and crops after harvest, for sale within Nutrient Farm to direct consumers, as generally defined in the LUDC and allowed per this PUD Guide.

Agricultural Products, Processing, Storage, Distribution, and Sale Off-Site: Centralized operations located on Nutrient Farm, performing a variety of operations on livestock and crops after harvest, intended for distribution outside of Nutrient Farm to third party production facilities or further processing and packaging and commercial distribution. These facilities accept products from off-site locations for processing. Said off-site production and distribution shall only proceed as generally defined in the LUDC and allowed per this PUD Guide.

Agritourism: An agriculturally based operation or activity at a working farm or ranch, conducted for the enjoyment, education, or active involvement of visitors that adds to the economic viability of the agricultural operation.

Animal Keeping: An establishment for the harboring, keeping, care, and secure and humane containment of wild and/or domesticated animals as contemplated and regulated by this PUD Guide.

Campground/Recreational Vehicle ("RV") Park: A land parcel in single ownership that has been developed for visitor use by means of rustic furnished cabins, campsites, guest-owned tents, trailers, and RVs for stay on a temporary basis for recreational purposes.

Cistern: A waterproof container used to hold liquids, usually water; at below ground, at grade or above ground grade.

Community Meeting Facility: An indoor or outdoor facility for public social gatherings and for holding community and group events.

Dwelling Unit, Bunkhouse: A permanent residential dwelling unit providing living and sleeping quarters for on-site employees working on the Working Farm areas of Nutrient Farm or any other operations within the Nutrient Farm PUD Property, which may or may not include common kitchen, dining, or other living areas.

Dwelling Unit, On-Site Employee Housing: A permanent residential dwelling unit providing living and sleeping quarters for on-site employees working anywhere on the Nutrient Farm Property or employed within Garfield County. On-Site Employee Housing Dwelling Units are not required to be provided by the Owner/Developer but may be constructed and may be designed in a free standing Single-Unit, Two-Unit, or Multi-Unit Dwelling configuration, or may be located within other buildings in Nutrient Farm.

Eating or Drinking Establishment: An establishment for the sale and consumption of food and beverages on the premises or off-site, as contemplated and defined by the LUDC.

Electric Power Generation Facility, Small or Large: Per the LUDC, a facility designed to generate electricity by the conversion of natural resources such as wood, solar photons, coal, natural gas, wind, water, or the Earth's natural heat, with appurtenant facilities thereto. A Small Facility has a generating capacity of less than 10 megawatts, and a Large Facility is 10 megawatts or more.

Food Truck: A Food Truck is a vehicle from which food for consumption is sold to the public. Cooking facilities for the preparation of food may be, but are not required to be, located inside the vehicle.

Health and Wellness Retreat: A facility and associated activities and facilities that provides a variety of personal care services for the purpose of improving health in mind and body, including professional services, offices, and treatment rooms, meeting and conference rooms, Eating or Drinking Establishments, short term lodging associated with such retreat, and other similar uses and facilities.

Improvement, Temporary: An improvement without any permanent foundation that is intended to be erected and removed within a designated time period, when the activity or use for which the temporary improvement was erected has terminated.

Lodging Facility: An establishment that provides accommodation for a temporary stay that includes, but is not limited to, a resort lodge, guest ranch, motel, hotel, boarding house, bed and breakfast establishment, Campground/RV Park and rental cabins, and Small Camping Facilities. Lodging Facilities exclude Short Term rentals, Temporary Employee Housing on premises and contracted employee housing off premises.

Nutrient Farm Event: A Nutrient Farm Event includes a variety of entertainment, recreational, educational, and celebratory events that take place anywhere on the Nutrient Farm Property which are specifically regulated by the terms of this PUD Guide. A Nutrient Farm Event is an organized event or group activity, including but not limited to, festivals, performances, entertainment, live music, performing arts, educational presentations, retreats, meetings, parties, celebrations, assemblies, craft fairs, farmer's markets, contests, recreational or athletic competitions, or other similar social gatherings and activities.

Nutrient Farm Motor Sports Center: The Nutrient Farm "OHV Park" is a specifically designated area, with all Accessory Uses and Improvements, devoted to off road motorized recreation, using vehicles including, but not limited to, dirt bikes, all-terrain vehicles ("ATVs"), and other off highway vehicles ("OHV"), and all courses and operation areas accessory to such use, including the rental and sales of associated recreational equipment and vehicles are allowed.

Outdoor Music and Entertainment: Any activity, use, and related outdoor area, building or facility that offers performances, live music, entertainment, festivals, performing arts, and other similar events or activities that may include lighted areas for use after dusk, and all associated Accessory Uses and Improvements pertaining thereto. All Outdoor Music and Entertainment uses, events or activities are a Nutrient Farm Event as defined and regulated by this PUD Guide.

Parking Plan, Temporary: A short term, non-permanent, parking plan for all Nutrient Farm Events with an expected attendance of 350 persons or more. All temporary parking shall be on the Nutrient Farm Property and shall not be allowed within the County Road 335 right-of-way under any circumstances. The Temporary Parking Plan may be implemented within Development Areas 3, and 5-8 of Nutrient Farm according to the regulations of this PUD Guide.

Parks, Open Space and Trails: Any land or water area that provides active or passive recreation opportunities, or the conservation of natural areas and environmental resources. For the purposes of this Guide, Parks, Open Space and Trails shall be specifically distinguished from the Private Open Space Tracts A-D as said term is directly defined herein and within the PUD Guide. Landscaping, utilities, and infrastructure improvements may be located within Parks, Open Space and Trails areas. Temporary Uses, Improvements and/or Signs are allowed in Parks, Open Space and Trails areas per the terms of this PUD Guide.

Public Gathering: Any group of 350 or more persons assembled for an event, meeting, festival, social gathering, or similar purpose, open to the general public, for a period of time which exceed eight (8) hours within any 24-hour period.

Recording/Production Studio: A specialized commercial facility available to the public for multi-media audio/visual recording, mixing and production.

Recreational Activities, Outdoor: An area, building, facility or activity that offers entertainment or recreation, where any portion of the activity takes place outside, and may include lighted areas for use after dusk; and all Temporary Uses and Accessory Uses and Improvements associated with such recreational use.

Retail, Recreational Equipment and Vehicles: A business for the renting of recreational equipment and vehicles, including equipment to be used on-site within the Nutrient Farm PUD boundaries as well as off-site. Such establishments may include equipment and vehicle display areas, staff offices and break rooms, storage areas, restrooms, and other similar uses and areas.

Solar Energy System, Large: A device and/or system that has a combined name plate DC rating of greater than 500 kilowatt ("kW") and includes the equivalent kilowatt measurement of energy for systems other that photovoltaic that converts the sun's radiant energy into thermal, chemical, mechanical, or electrical energy.

Solar Energy System, Small: A device and/or system that has a combined name plate DC rating of 25 kilowatt to 500 kilowatt ("kW") and includes the equivalent kilowatt measurement of energy for systems other that photovoltaic that converts the sun's radiant energy into thermal, chemical, mechanical, or electrical energy.

Storage Tank: Above ground and below ground containers and associated infrastructure for water or heat transfer fluids and fuels to serve the various uses within the PUD boundaries.

Use, Temporary: A land use which does not require any new permanent structure or improvement for its operation, may use existing buildings or improvements, are active only on a seasonal or short term basis, and do not result in any long term impact on surrounding properties. A Temporary Use is less than one year in duration per the LUDC.

Wineries, Breweries, Cideries, Distilleries: A facility for brewing, packaging, and distribution of beer, mead, wine, cider, spirts and/or similar beverages. The facility may include the sale and consumption of the beverages and food on the premises or off-site.

EXHIBIT F

TABLE 10 – NUTRIENT FARM ALLOWED SIGNS DESIGN REQUIREMENTS

Table 10 – Nutrient Farm Allowed Signs Design Requirements				
Sign Type	**Structure Type**	**Maximum Height (Feet)**	**Maximum Sign Area per Face (Sq. Ft.)**[1]	*** Unique Definition/ Additional Requirements**[2]
Area Identification*	Freestanding	30	Areas 5-8/Tracts: 150	*
	Wall, Projecting, Suspended	Height of Wall	Areas 5-8/Tracts: 150	*
	Roof	Peak of Roof	Areas 5-8/Tracts: 150	*
Building Identification and Commemorative*	Freestanding	Areas 1-4: 20 Areas 5-8: 30	Areas 1-4: 90 Areas 5-8: 150	*
	Wall, Projecting, Suspended	Height of Wall	Areas 1-4: 32 Areas 5-8: 60	*
	Roof	Peak of Roof	Areas 1-4: 32 Areas 5-8: 60	*
Business*	Freestanding	Area 2: 20 Areas 3, 5-8: 30	Area 2: 90 Areas 3, 5-8: 150	*
	Wall, Projecting, Suspended	Height of Wall	Area 2: 32 Areas 3, 5-8: 60	*
	Roof	Peak of Roof	Area 2: 32 Areas 3, 5-8: 60	*
Construction*	Freestanding	Areas 1-4: 10 Areas 5-8: 30	Areas 1-4: 32 Areas 5-8: 150	*
	Wall, Projecting, Suspended	Height of Wall	Areas 1-4: 32 Areas 5-8: 60	*
	Roof	Peak of Roof	Areas 1-4: 32 Areas 5-8: 60	*
Directional*	Freestanding	30	Areas 3, 5-8/Tracts:150	*
	Wall, Projecting, Suspended	Height of Wall	Areas 3, 5-8/Tracts: 60	*
	Roof	Peak of Roof	Areas 3, 5-8/Tracts: 60	*
Exempt*[3]				*
Joint Identification*	Freestanding	30	Areas 3, 5-8: 150	*
	Wall, Projecting, Suspended	Height of Wall	Areas 3, 5-8: 60	*
	Roof	Peak of Roof	Areas 3, 5-8: 60	*
Menu Display Box*	Freestanding, Wall	6	Areas 5-8: 3	*
Subdivision Entrance*	Freestanding, Wall	6	Areas 1, 3-4: 32	*
Temporary*[4]	Freestanding	Areas 1-4: 10 Areas 5-8/Tracts: 30	Areas 1-4: 32 Areas 5-8/Tracts: 150	*
	Wall	Height of Wall	Areas 1-4: 32 Areas 5-8/Tracts: 60	*
	Projecting, Suspended		Not Allowed	
	Roof		Not Allowed	*
Welcome*	Freestanding	30	Areas 7-8,Tracts: 100	*

1 Regardless of the proposed use the sign is associated with, all signs must abide by the above requirements for the Development Area or Private Open Space Tract ("Tract") they are located in.

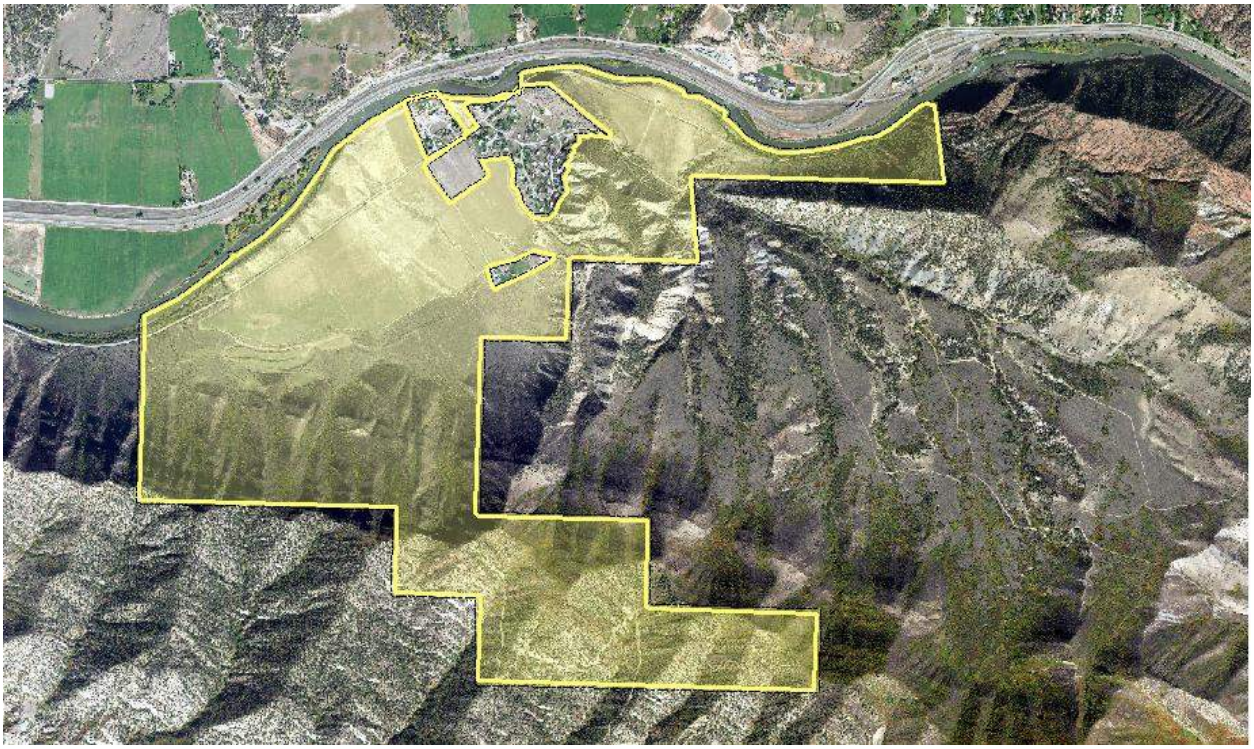
2 Additional requirements per the Nutrient Farm PUD Guide.

3 Exempt Signs are as listed and regulated by this PUD Guide. Unique Exempt Signs, definitions and design standards are noted therein.

4 The design requirements for Temporary Signs are as listed above. Temporary Signs are listed and regulated by this PUD Guide and do not require a Sign Permit provided all applicable standards of the PUD Guide are met, and all Building and Electrical Code provisions are complied with.

WATER ADEQUACY REPORT FOR PROPOSED DEVELOPMENT

NUTRIENT FARM



September 2020

Prepared by

SGM

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WATER ADEQUACY REPORT FOR PROPOSED DEVELOPMENT

NUTRIENT FARM

PREPARED BY

BAILEY LEPPEK, P.E.

REVIEWED BY

BRENDON LANGENHUIZEN, P.E.

SGM Project # 2018-271.002

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1.0 Introduction

SGM was engaged by Nutrient Holdings, LLC to complete a water supply adequacy report for the proposed development plans for the Nutrient Farm (Farm) property along the south bank of the Colorado River in Garfield County between the towns of New Castle and Glenwood Springs. The Farm is located approximately 2 miles east of New Castle, Colorado along Colorado River Road (County Road 335). The Farm is bordered on the north by the Colorado River and on the south by the steep hillsides of Coal Ridge, part of the Grand Hogback. The Riverbend Homeowners' Association (HOA) is located between the Farm and the Colorado River.

The Farm is mostly undeveloped except for one ranch house and historical irrigation ditches. The proposed development includes limited residential development, an existing ranch house, a working farm with irrigated crops and livestock, several farm-related tourism businesses (such as a farm store, adventure farm, and a u-pick orchard), commercial and professional buildings, several other tourist attractions (such as an off-road adventure park, campground, water pond park, music and performing arts venues, and a retreat), and open spaces.

This water supply adequacy assessment presents a summary of SGM's investigation of the water supply along with SGM's estimated water demands for the Farm.

2.0 Project Location, Description, and Background

2.1 Project Location

The entire Farm property covers approximately 1,140 acres (1.8 square miles). Of the total area, approximately 640 acres (1 square mile) is hilly terrain along Coal Ridge with sparse sage and scrubland cover, which is currently planned as open space. The Vulcan Ditch cuts through the property, with historically irrigated hay fields sloping gently from the ditch toward the Colorado River. **Figure 2-1** is an overview of the Farm location and associated water rights.

2.2 Background and History of Riverbend Development

The first Sketch Plan for the Riverbend planned unit development (PUD) was reviewed and approved by the Board of Garfield County Commissioners on June 26, 1973. This first plan was for a 617 residential dwelling unit community, including an outdoor education center, riding stables, open space, pasture, and a demonstration cattle ranch. A Preliminary Plat for that first plan was reviewed and approved by the Planning Commission on January 14, 1974. After this approval, the County adopted new zoning regulations, which mandated that later changes to the plan included a formal PUD zone change.

The second iteration of the PUD was documented in the Preliminary Map of the Riverbend Planned Unit Development dated August 1976. The August 1976 Map showed the 1,180.83-acre development would include 198 residential units (118 single family and 80 multi-family units), a school site, a commercial site, community center/common area, park/playground, stable, a sewage treatment area, and a 376-acre agricultural area, which was intended to operate as a working ranch and had sufficient water rights for planned irrigation.

The 1,180.83-acre property was divided into 11 development blocks, including the agricultural/open space area. At the time, the developer envisioned the PUD as homes for local working families and anticipated build-out of the PUD within 10 years. Only a few of the residential areas identified in the August 1976 Map have since been subdivided and developed with homes. Of the 1,180.83 acres, 1,140 acres not yet developed have been transferred and are now the Farm property.

2.3 Water Rights Background and History

Vulcan Ditch and Riverbend Wells

The property sale included significant ownership in the Vulcan Ditch as well as Coal Ridge Pump & Pipeline and associated Coal Ridge Reservoir. The Vulcan Ditch was decreed in 1908 for diversion from Canyon Creek, a tributary on the north (opposite) side of the Colorado River from the Farm. The Vulcan Ditch historically passed through an inverted siphon across the Colorado River, emerging high on the hillside on the south side of the River on the Farm property. From there the Vulcan Ditch cuts through the Farm property, terminating toward the western property boundary. The Vulcan Ditch was historically used to irrigate the hay fields on the Farm property. The Farm plans to make necessary repairs to the Vulcan Ditch and to replace the siphon across the Colorado River with an overpass to carry the ditch over the River to the Farm.

In the 1970s, the Farm property was owned by the Riverbend Development Corporation. At the time, 600 acres were slated to become a residential development with approximately 160 residential units and 120 acres of irrigated hay meadows. Riverbend Development Corporation obtained a Water Court decree, Case No. W2127, for a change of water rights from the Vulcan Ditch to supply the planned uses for the development. Case No. W2127 quantified the historical consumptive use of the Vulcan Ditch water rights (first and second priorities) to be 440 acre-feet (AF) per year in dry years. This quantification has been relied upon in subsequent Water Court cases.

Potable water supply for the PUD was to be supplied by five wells called Riverbend Well Nos. 1 through 5 (Riverbend Wells). The Riverbend Wells were awarded their own water right priority in W2125, for 0.67 cfs from each well with a cumulative volumetric limit of 340 AF/year from all five wells. The Riverbend Wells were also decreed in Case No. 2127 as alternate points of diversion for the changed 440 AF of Vulcan Ditch HCU credits. The maximum allowable diversion from each of the Riverbend Wells as alternate points is 0.67 cfs of Vulcan Ditch first and second priorities. Wastewater for the development was planned to be treated in a central treatment plant and then stored onsite for irrigation reuse.

The development plans in W2127 were never fully realized. The Riverbend Wells decreed in W2125 are now understood to be owned by the Riverbend Water Company and supply the Riverbend HOA located between the Farm and the Colorado River. The Riverbend HOA and Riverbend Wells are shown on **Figure 2-1.**

Of the Vulcan Ditch 440 AF of historical consumptive use quantified in W2127, 393 AF is now owned by the Farm and available for use in the Farm's water supply. Proposed Farm water use is consistent with the terms and conditions in the W2127 decree. In an effort to remain consistent with the W2127 decreed augmentation plan, SGM referenced many of the same demand and depletion factors when applicable.

Coal Ridge Pump & Pipeline and Coal Ridge Reservoir

The Coal Ridge Pump and Pipeline was decreed as an alternate point of diversion for the Vulcan Ditch first and second priorities in Case No. 84CW349. In addition, the Coal Ridge Pump and Pipeline has its own junior (1983 priority date) water right for 2.0 cfs, conditional, for municipal, commercial, industrial, domestic, irrigation, and recreation purposes, decreed in Case No. 83CW367. Coal Ridge Reservoir is a 2,000 AF conditional storage right that was decreed in 83CW368 for municipal, commercial, industrial, domestic, irrigation, and recreation purposes. Coal Ridge Reservoir was to be filled with the Coal Ridge Pump and Pipeline and/or the Vulcan Ditch. The two Coal Ridge water rights were owned by the Storm King Mines Inc. and were also transferred with the Farm property.

This report discusses the potential for diversions of the Farm's Vulcan Ditch ownership at the Coal Ridge Pump and Pipeline alternate point of diversion per Case No. 84CW349. The Farm may use the junior water rights in the Coal Ridge Pump and Pipeline and Coal Ridge Reservoir for supplemental or additional water supply. However, for the purposes of this Water Supply Adequacy Report these junior water rights are not relied upon to prove supply.

2.4 Planned Land Use Areas

Proposed uses for Nutrient Farm are divided into eight land use areas. **Figure 2-2** is a map of the Farm showing the eight land use areas. **Table 2-1** describes each land use area and its proposed uses for residential or commercial development. As planned, each residential lot will allow one residential dwelling plus one accessory dwelling unit (ADU).

2.4.1 Water supply from connection to Riverbend HOA System

The proposed residential developments in Areas 1, 3, and 4 will connect to the existing Riverbend Water Company potable water system (Riverbend System), which currently serves the Riverbend HOA. Riverbend System will provide all indoor and outdoor water use to these Areas through the potable water system.

2.4.2 Water supply from Vulcan Ditch

Areas 2, 5, 6, 7, and 8 will be entirely served by the Vulcan Ditch for indoor and outdoor water needs, with the exception of Area 5 receiving potable indoor supply from a new well to be drilled on the Farm. Water will be conveyed to the Farm through the Vulcan Ditch (which will eventually be piped) to the Supply Pond on the Farm. All outdoor (irrigation, livestock watering, and pond filling) uses in these areas will be served with raw water either directly from the Vulcan Ditch or untreated water from the Supply Pond.

Potable water for Area 2 and Areas 6 through 8 will be provided from the Supply Pond through individual water treatment systems to fit the specific water quality needs.

2.4.3 Water supply from New Exempt Well

In addition to the Working Farm East, Area 5 is also slated to have a farmhouse. All outdoor water demands for the farmhouse will be served by the Vulcan Ditch. A new well will be drilled and permitted to supply potable water (indoor uses only) to the farmhouse. This well will mostly likely qualify as an exempt well and would not need a new water right or augmentation. However, to be conservative for the purposes of planning water

supply adequacy, this plan assumes that a portion of the Farm's Vulcan Ditch consumptive use credits will be assigned to meet the depletions of this well.

Table 2-1: Overview of Planned Uses for Nutrient Farm Areas 1 - 8

Area	Proposed Uses
Area 1	Residential: 5 half-acre lots with single-family home + ADU
Area 2	Residential: Farmhouse (1 single-family home + ADU)
Area 3	Residential: 10 half-acre lots with single-family home + ADU
Area 4	Residential: 2 half-acre lots with single-family home + ADU
Area 5	Working Farm East: hay irrigation, cattle grazing, livestock pond. Working Farm East Farmhouse (1 single-family home + ADU)
Area 6	• Adventure farm (tourist attraction with amenities such as pavilion, picnic area, petting zoo) • Farm store • Working Farm West: irrigation of vegetables, fruit, and orchard (includes a U-pick orchard) • Greenhouse (indoor year-round irrigation of vegetables) • Utilities building (planned to house renewable energy operations and possibly water treatment operations) • Farm processing building (produce washing and food processing for agricultural products) • Restaurant • Supply pond (attenuation for supply from Vulcan Ditch) • Pond for irrigation and/or cooling • Ponds for aesthetic and/or waterfowl purposes
Area 7	Commercial, retail, and professional buildings
Area 8	• Off-road adventure park • Water park (recreational ponds for outdoor water sports, such as stand-up paddle boarding) • Campground (tent sites, cabins, and RV spaces) • Tree nursery • Music festival (outdoor lawn-based festival space, will occupy same area as tree nursery after trees are harvested) • Performing arts center (indoor and outdoor performing space) • Retreat center (small lodge with space for workshops and group activities)

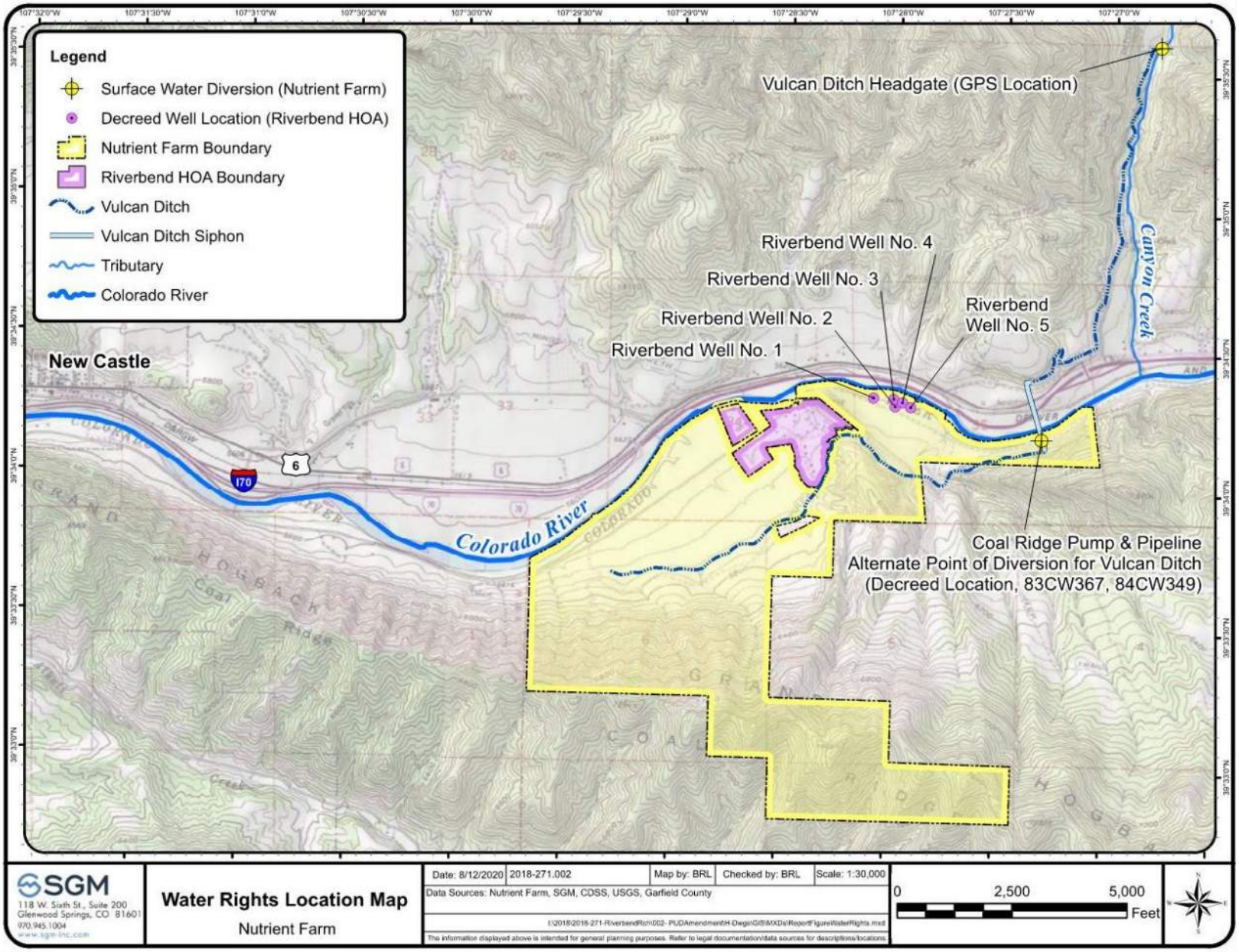


Figure 2-1: Nutrient Farm Water Rights Location Map

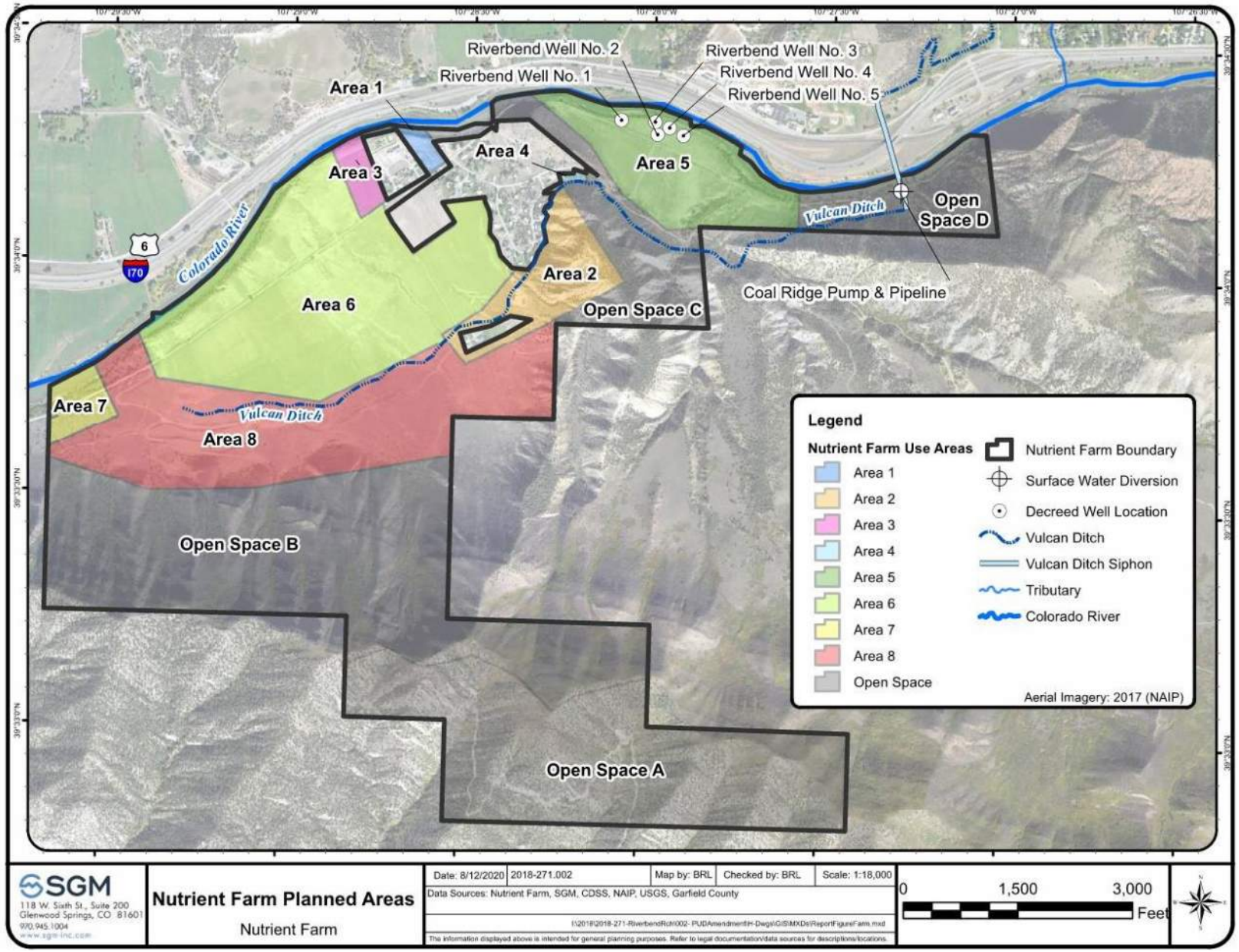


Figure 2-2: Nutrient Farm Planned Land Use Areas Map

3.0 Estimated Water Demands

To assess demands and peaking factors, SGM referred to the water adequacy requirements for Garfield County Land Use and Development Code, Section 4-203, Paragraph M: Water Supply and Distribution Plan.

Full buildout demands and consumptive use for Nutrient Farm are summarized by source (Riverbend Water Company or treated Vulcan Ditch water) in **Table 3-1**. Potable and non-potable demand calculations and assumptions are documented in the following sections for each Farm area by each respective planned land use.

Table 3-1: Nutrient Farm Buildout Demand Summary

		Served by Riverbend (Areas 1, 3, 4)	Served by Vulcan Ditch (Areas 2, 5, 6, 7, 8)	Served by New Exempt Well (Area 5)	Total for Farm (Areas 2, 5, 6, 7, 8)
Total Annual Consumptive Use		**2.31 AF/year**	391.7 AF/year	0.07 AF/year	**391.8 AF/year**
Indoor	**Annual Consumptive Use**	**0.36 AF/year**	2.7 AF/year	0.07 AF/year	**2.8 AF/year**
	Annual Demand	**12.00 AF/year**	27.5 AF/year	0.7 AF/year	**28 AF/year**
	Average Day Demand	**0.033 AF/day**	0.075 AF/day	0.002 AF/day	**0.08 AF/day**
	Max Day Demand [1]	**0.099 AF/day** **0.050 cfs**	0.226 AF/day 0.114 cfs	0.006 AF/day 0.003 cfs	**0.23 AF/day** **0.12 cfs**
	Peak Hour Demand [2]	**0.099 cfs**	0.23 cfs	0.01 cfs	**0.24 cfs**
Outdoor	**Annual Consumptive Use**	**1.95 AF/year**	389.0 AF/year	-	**389 AF/year**
	Annual Demand	**2.60 AF/year**	595.4 AF/year	-	**595 AF/year**
	Average Day Demand	**0.012 AF/day**	2.78 AF/day	-	**2.78 AF/day**
	Peak Month (July) Average Day Demand	**0.02 AF/day**	5.75 AF/day	-	**5.75 AF/day**
Non-Irrigation Season (Nov-Mar)	**Average Day Demand**	**0.033 AF/day** **0.017 cfs**	0.087 AF/day 0.044 cfs	0.002 AF/day 0.001 cfs	**0.09 AF/day** **0.05 cfs**
Irrigation Season (April - October)	**Average Day Demand**	**0.045 AF/day** **0.023 cfs**	2.86 AF/day 1.44 cfs	0.002 AF/day 0.001 AF/day	**2.9 AF/day** **1.4 cfs**
	Max Day Demand [1]	**0.135 AF/day** **0.068 cfs**	8.570 AF/day 4.32 cfs	0.006 AF/day 0.003 cfs	**8.6 AF/day** **4.32 cfs**
	Peak Hour Demand [2]	**0.136 cfs**	8.64 cfs	0.01 cfs	**8.7 cfs**

Notes: AF – acre-feet; cfs – cubic feet per second

Peaking factors are from Garfield County Land Use and Development Code, Section 4-203:

1. Maximum daily demand is calculated as 3.0 times the average day demand.
2. Peak hour demand is calculated as 6.0 times the average day demand.

Annual potable demands were distributed across the entire year (365 days) to get indoor average day demand. Year-round outdoor demands (greenhouse and livestock watering) were also distributed across the entire year (365 days). For other outdoor demands, the annual demand was distributed across the irrigation season (April through October, 214 days) to get the outdoor average day demand. Average day demand for the non-irrigation season, November through March, is equal to the average day

demand for potable use, livestock watering, and greenhouse irrigation. Average day demand for the irrigation season is equal to the potable average day demand plus the non-potable average day demand. Peaking factors were then applied to the average day demand to calculate maximum day demand and peak hour demand.

The Farm's peak hour demand from the Vulcan Ditch is 8.7 cfs (including non-potable irrigation), which is within the legal capacity of 8.93 cfs based on the Farm's Vulcan Ditch ownership. The annual consumptive use of Vulcan Ditch water is 391.8 AF (2.8 AF of potable and 389.0 AF of non-potable), within the Farm's ownership of 393 AF.

3.1 Potable Indoor Demands

For Areas 1, 3, and 4, potable indoor demands will be provided from the Riverbend System, and wastewater will be treated by a central wastewater collection and treatment facility. These demands are therefore assumed to have a consumptive use of 3%, consistent with the decreed factors in Case No. W2127 which contemplated wastewater to be treated with a centralized plant.

For Areas 2 and 5-8, potable indoor demands will be provided from separate potable systems maintained by the Farm, and wastewater will be treated by onsite wastewater treatment systems, likely septic system(s) with leach field(s), which typically have a higher consumptive use than central plants. Indoor demands for Areas 2 and 5 – 8 use an estimated 10% consumptive use. This indoor consumptive use factor differs from the factor of 3% consumptive use used in Case No. W2127 because of the difference in planned wastewater collection and disposal methods.

Areas 1 – 5: Residential Indoor Demands

To calculate potable indoor demands for residential uses, SGM used the definition of an equivalent residential unit (EQR) as a single-family dwelling with 3.5 people using 100 gallons per day (gpd) per person, equal to 350 gpd per EQR. This indoor demand is consistent with the decreed factors in Case No. W2127, which specifies 350 gpd/EQR as indoor demands, with demands for lawn and landscaping calculated separately. Garfield County Land Use and Development Code, Section 4-203.M, and Town of New Castle Municipal Code, Section 13.24.030 both also reference demand of 350 gpd/EQR, but these demands include 2,500 square feet of lawn and landscaping. To be consistent with Case No. W2127, this Report used an indoor demand of 350 gpd/EQR for residences, and separately calculated outdoor demands for irrigated lawn and landscaping. Each accessory dwelling unit (ADU) is considered 0.8 EQR, consistent with New Castle Municipal Code 13.20.060, with an additional indoor demand of 280 gpd.

Areas 6 – 8: Non-Residential Indoor Demands

SGM estimated potable indoor water demands for non-residential uses by relying on Water Quality Control Division (WQCD) Regulation No. 43, Table 6-2: Estimated Daily Wastewater Flow For Design Purposes, supplemented with planned number of employees or average public occupancy as provided by the Nutrient Farm planning team. Table 6-2 does not have flows tabulated for each exact use contemplated by the Farm, so SGM used the closest available use shown in the table.

Starting with these design standards, SGM converted from unit daily wastewater flow to unit daily water demands using 10% consumptive use for indoor purposes. Daily

demand was then converted to annual demand based on information from Nutrient Farm about planned seasonality and/or frequency of use.

Total Potable Demands

Potable demand calculations and assumptions are detailed for each business or land use type in **Table 3-2, Table 3-3,** and **Table 3-4**. Each table shows the annual total demand (or required diversions) and the consumptive use (CU) calculated for each use type.

Onsite potable water storage will be required to meet Garfield County water system requirements. Potable water storage will allow the Farm to handle peak potable water demands and daily and seasonal variations. Fire flow will be provided from non-potable storage and via dry hydrants, rather than from potable storage. Water storage requirements and preliminary siting of storage facilities are not addressed in this report.

Table 3-2: Potable Indoor Demands Served by New Exempt Well (Area 5)

Business or Land Use Type	Indoor Potable Demand Calculations								Annual (AF/year)		Note
	Indoor Potable Unit Demand (gpd/unit)		x	# Units (buildout/max)		x	Days/ year	(Seasonality)	Demand	CU	
Area 5 (Residential)	630	gpd/lot	x	1	lot	x	365	(Year Round)	0.71	0.071	1
Sum of Indoor Potable Demands Served by New Exempt Well:									**0.71**	**0.071**	

Notes: gpd – gallons per day; AF – acre-feet; SF – square foot; CU – consumptive use (depletions)
Calculations assume indoor water use is 10% consumptive (90% returns as wastewater).

1. Each lot as planned has one single-family home (1 EQR, 350 gpd) and one ADU (0.8 EQR, 280 gpd) for an indoor demand of 630 gpd per lot and will be occupied year-round.

Table 3-3: Potable Indoor Demands Served by Riverbend System (Areas 1, 3, 4)

Business or Land Use Type	Indoor Potable Demand Calculations								Annual (AF/year)		Note
	Indoor Potable Unit Demand (gpd/unit)		x	# Units (buildout/ max)		x	Days/ year	(Seasonality)	Demand	CU	
Area 1, 3, 4											
Area 1 (Residential)	630	gpd/lot	x	5	lots	x	365	(Year Round)	3.53	0.106	1
Area 3 (Residential)	630	gpd/lot	x	10	lots	x	365	(Year Round)	7.06	0.212	1
Area 4 (Residential)	630	gpd/lot	x	2	lots	x	365	(Year Round)	1.41	0.042	1
Sum of Indoor Potable Demands Served by Riverbend System (Areas 1, 3, 4):									**12.00**	**0.360**	

Notes: gpd – gallons per day; AF – acre-feet; SF – square foot; CU – consumptive use (depletions)
Calculations assume indoor water use for areas served by the Riverbend System is 3% consumptive (97% returns as wastewater), consistent with the decreed factors in Case No. W2127.

1. Each lot as planned has one single-family home (1 EQR, 350 gpd) and one ADU (0.8 EQR, 280 gpd) for an indoor demand of 630 gpd per lot and will be occupied year-round.

Table 3-4: Potable Indoor Demands Served by Treated Vulcan Ditch Water (Areas 2, 5, 6, 7, & 8)

Business or Land Use Type	Indoor Potable Demand Calculations								Annual (AF/year)		Note
	Indoor Potable Unit Demand (gpd/unit)		x	# Units (buildout/max)		x	Days/ year	(Seasonality)	Demand	CU	
Area 2											
Area 2 (Farmhouse)	630	gpd/lot	x	1	lot	x	365	(Year Round)	0.71	0.071	1
								Sum of Area 2:	**0.71**	**0.071**	
Area 5	**No Vulcan Ditch potable indoor demands, see Table 3-3**							**Sum of Area 5:**	**0.00**	**0.00**	
Area 6											**2**
Working Farm, U-Pick Orchard	5.6	gpd/visitor	x	25	visitors	x	214	(Summer, 7 mo.)	0.09	0.009	a
	22	gpd/employee	x	4	Employees	X	214	(Summer, 7 mo.)	0.06	0.006	b
Farm Store	0.11	gpd/SF	x	4,000	SF	x	365	(Year Round)	0.49	0.049	c
Adventure Farm	5.6	gpd/visitor	x	118	visitors	x	214	(Summer, 7 mo.)	0.43	0.043	a
Restaurant	56	gpd/seat	x	180	seats	x	365	(Year Round)	11.29	1.129	e
Utilities Bldg., Greenhouse, Processing Building	22	gpd/employee	x	27	employees	x	313	(Year round, 6 days/week)	0.57	0.057	b
	5,000	gpd processing water				x	313		4.80	0.480	f
								Sum of Area 6:	**17.74**	**1.77**	
Area 7											**2**
Commercial, professional, retail buildings	5.6	gpd/visitor	x	50	visitors	x	365	(Year Round)	0.31	0.031	a
	17	gpd/employee	x	50	employees	x	365	(Year Round)	0.95	0.095	d
								Sum of Area 7:	**1.27**	**0.13**	

Notes: gpd – gallons per day; AF – acre-feet; SF – square foot; CU – consumptive use (depletions); mo. – month
Calculations assume indoor water use is 10% consumptive (90% returns as wastewater).

1. Each lot as planned has one single-family home (1 EQR, 350 gpd) and one ADU (0.8 EQR, 280 gpd) for a demand of 630 gpd per lot and will be occupied year-round.
2. Demands based on WQCD Regulation No. 43, Table 6-2: Estimated Daily Wastewater Flow For Design Purposes:
   a. Demand of 5.6 gpd/visitor (5 gpd wastewater) is typical for facilities with short-term or transient visitors. Examples: fairgrounds, ball parks, racetracks, stadiums, theaters, airports, etc.
   b. Demand of 22 gpd/employee/8hr shift (20 gpd wastewater) is typical of factories and plants exclusive of industrial wastewater, no showers provided.
   c. Demand of 0.11 gpd/SF of retail space (0.1 gpd wastewater) is typical of stores and shopping centers.
   d. Demand of 17 gpd/employee (15 gpd wastewater) is typical for offices or businesses (no kitchens or showers).
   e. Demand of 56 gpd/seat (50 gpd wastewater) is typical for restaurants.
   f. Processing building water demands (produce washing, food processing, etc.) are estimated based on 50% of the daily potable water demand at the restaurant. This assumes that in addition to washing and processing water in the restaurant kitchen for prepared meals, a similar amount of water is used for processing and washing for farm goods for sale.

Table and notes continued on following page.

Table 3-4 (cont.): Potable Demands Served by Treated Vulcan Ditch Water (Areas 2, 5, 6, 7, & 8)

Business or Land Use Type	Indoor Potable Demand Calculations								Annual (AF/year)		Note
	Indoor Potable Unit Demand (gpd/unit)		x	# Units (buildout/max)		x	Days/ year	(Seasonality)	Demand	CU	
Area 8											**2**
Off-road Park	5.6	gpd/visitor	x	25	visitors	x	365	(Year Round)	0.16	0.016	a
Concessions	28	gpd/seat	x	13	seats	x	365	(Year Round)	0.41	0.041	g
Water Park	5.6	gpd/visitor	x	50	visitors	x	153	(Summer, 5 mo.)	0.13	0.013	a
Campground & Cabins	56	gpd/camp site	x	36	camp sites	x	214	(Summer, 7 mo.)	1.32	0.132	h
	111	gpd/cabin	x	13	cabins	x	365	(Year Round)	1.62	0.162	i
	111	gpd/RV spot	x	18	RV spots	x	365	(Year Round)	2.24	0.224	i
	444	gpd/laundry machine	x	2	laundry machines	x	365	(Year Round)	0.99	0.099	j
Campground pool	11	gpd/person	x	50	person capacity	x	214	(Summer, 7 mo.)	0.36	0.036	k
Music Festival	5.6	gpd/visitor	x	350	visitors	x	28	(Summer, 7 mo. 4 events/mo.)	0.17	0.017	l
Performing Arts Center	5.6	gpd/visitor	x	100	visitors	x	28	(Summer, 7 mo. 4 events/mo.)	0.05	0.005	a
Retreat	83	gpd/room	x	12	rooms (1 person per room)	x	96	(Year Round, two 4-day retreats/mo.)	0.29	0.029	m
								Sum of Area 8:	**7.74**	**0.77**	
Sum of Indoor Potable Demand Served by Treated Vulcan Ditch Water (Areas 2, 5, 6, 7, & 8):									**27.45**	**2.75**	

Notes Continued: gpd – gallons per day; AF – acre-feet; SF – square foot; CU – consumptive use (depletions)
Calculations assume indoor water use is 10% consumptive (90% returns as wastewater).

g. Demand of 28 gpd/seat (25 gpd wastewater) is typical for restaurant with paper service only.
h. Demand of 56 gpd/campsite (50 gpd wastewater) is typical for campsites (laundry calculated separately).
i. Demand of 111 gpd/unit (100 gpd wastewater) is typical for travel trailer parks with individual water and sewage hookup, also used for plumbed cabins (laundry calculated separately).
j. Demand of 444 gpd/commercial washing machine (400 gpd wastewater) is typical for self-service laundry.
k. Demand of 11 gpd/person capacity (10 gpd wastewater) is typical for swimming pools and bathhouses.
l. Music festival plans include portable restrooms. Demand per visitor is for drinking water only.
m. Demand of 83 gpd/room (75 gpd wastewater) is typical for hotels and motels.

3.2 Outdoor Demands

SGM estimated outdoor demands for irrigation, pond evaporation, and stock watering based on unit demands for each type of use, multiplied by the quantity (acres of irrigation or pond surface or the number of animals). Outdoor unit demands, consumptive use, and diversions are summarized by source (Riverbend potable system or Vulcan Ditch water) in **Table 3-5** and **Table 3-6.**

Calculations and assumptions are described for unit consumptive use in **Section 3.2.1**, for efficiency in **Section 3.2.2**, and for acreage and number of animals are in **Section 3.2.3**.

Table 3-5: Outdoor Demands Served by Riverbend System (Areas 1, 3, 4)

Type of Unit Demand (Crop or Use)	Annual Unit CU (AF/unit)	Number of Units (buildout/max)		Total Consumptive Use (AF)	Efficiency (% Consumptive)	Demand Diversions (AF/year)
Lawn / Landscaping	2.00	0.98	acres	1.95	75%	2.60
			SUM	**1.95**		**2.60**

Table 3-6: Non-Potable (Outdoor) Demands Served by Vulcan Ditch (Areas 2, 5, 6, 7, & 8)

Type of Unit Demand (Crop or Use)	Annual Unit CU (AF/unit)	Number of Units (buildout/max)		Total Consumptive Use (AF/year)	Efficiency (% Consumptive)	Demand Diversions (AF/year)
Lawn / Landscaping	2.00	12.67	acres	25.33	75%	33.78
Hay / Native Grass	2.00	43.00	acres	86.00	60%	143.33
Orchard (with ground-cover)	2.44	46.00	acres	112.24	75%	149.65
Orchard (without ground-cover)	1.87	2.00	acres	3.74	75%	4.98
Tree Nursery	1.87	2.50	acres	4.67	43%	10.86
Corn & Vegetables	1.48	96.00	acres	142.27	60%	237.12
Vegetables Greenhouse	6.53	0.25	acres	1.63	65%	2.51
Evaporation	1.00	11.46	acres	11.46	100%	11.46
Livestock Watering	0.01	130.00	livestock	1.60	100%	1.60
Fowl Watering	0.07	1.00	1,000 fowl	0.07	100%	0.07
			SUM	**389.01**		**595.37**

3.2.1 Unit Consumptive Use

Methodology for determining the annual unit consumptive use for each crop or use type is summarized in **Table 3-6**, and is described in this section.

Unit Irrigation Water Requirement for Irrigation

Monthly crop unit irrigation water requirement (IWR) is the portion of total crop evapotranspiration (on a per acre basis) which is not supplied by effective precipitation. It is determined for a specific crop and a specific location. IWR represents the consumptive use (CU) of a crop. Annual values of IWR for each crop type are given in **Table 3-6**.

Where possible, SGM used CU factors from Case No. W2127, the original change of use case for the Vulcan Ditch, for consistency. The W2127 Decree specifies a unit IWR of 2.0 AF/acre annually for lawn/landscaping and for hay/pasture grass. Because monthly distribution was not specified in W2127, the annual IWR of lawn and pasture grass obtained from the W2127 Decree was distributed monthly using the seasonal distribution from SGM's modified Blaney-Criddle analysis.

For crops not contemplated in Case No. W2127, SGM calculated monthly crop IWR using the Modified Blaney-Criddle method using the State's StateCU software. IWR was calculated over a 30-year study period of 1988 - 2017. Climate station data (temperature and precipitation) is from the Glenwood Springs No. 2 climate station (the closest climate station to the Farm with an adequate period of record). Gaps in climate data were filled with historical averages. An orographic temperature adjustment of 3.6 °F / 1,000 feet was applied from the climate station elevation to the approximate elevation of the Vulcan Ditch headgate, 5,850 feet. SGM selected elevation-adjusted TR-21 crop coefficients specific to each crop type (such as corn and vegetables, orchard, etc.). For vegetables grown in the greenhouse, the total crop evapotranspiration is used to determine consumptive use, rather than IWR, to account for the fact that no natural precipitation falls in the greenhouse. Because the greenhouse is productive year-round, consumptive use of greenhouse-grown vegetables for each month is set equal to the maximum month (July) evapotranspiration.

Unit Evaporation Demands

The W2127 Decree also specifies a unit evaporation rate of 1.0 AF/acre of pond surface annually. The annual evaporation for pond surfaces is distributed monthly using the evaporation distribution pattern for elevations below 6,500 feet from the Colorado State Engineer's Office (SEO) General Guidelines for Substitute Water Supply Plans for Sand and Gravel Pits (version 4/1/2011).

Unit Livestock Demands

Demands for livestock watering are based on 11 gpd per head (annual unit CU of 0.012 AF per head), the typical livestock water demands used by the Division 5 State Engineer's Office. The Farm also plans to have a small number of livestock for the petting zoo, but the exact type of animals is not yet known; for simplicity SGM assumed the same demands for all mammals. The farm also plans to have fowl, such as chickens and ducks. Demands for all fowl are estimated at 66 gpd per 1,000 birds (annual unit CU of 0.07 AF per 1,000 birds), based on resources from PoultryHub on caring for chickens.

3.2.2 **Outdoor Use Efficiency**

Once unit consumptive use is calculated, it must be converted to demands (diversions). Outdoor use efficiency is the portion of demands which are consumptively used. The portion of demands which is not consumptively used returns to the stream either as surface water runoff or delayed groundwater return flows.

- **Pond evaporation and livestock** are both considered to be 100% consumptive in this analysis, as is typically done.
- **Hay, corn, and vegetable** irrigation are assumed to be 60% efficient, which is a typical efficiency for flood irrigation. The Farm plans to convert much of the hay irrigation to more efficient sprinkler irrigation in the future and plans to convert much of the vegetable irrigation to a more efficient method such as sprinklers, micro-emitters, or drip irrigation. However, to represent the higher diversions required for initial less-efficient flood irrigation plans, SGM used 60% efficiency.
- **Lawn and landscaping** are assumed to have an irrigation efficiency of 75%, which is typical of sprinkler irrigation. While some landscaping may have more efficient drip irrigation systems, 75% is used for a conservative approach.
- **Orchard trees** are estimated at 75% efficiency, which is typical of sprinkler irrigation, although more efficient micro-emitter and/or drip systems will likely be installed eventually.
- **Greenhouse-grown vegetables** and other plants can have varying efficiencies depending on the irrigation methods. Nutrient Farm is considering hydroponic, aquaponic, drip, or other highly water efficient methods that can have efficiency as high as 90-percent. However, if overhead sprinklers are used, as much as 50-percent of water applied can fall between the containers, depending on container spacing [(1)], with 50-percent reaching the container. A typical leaching fraction of 20-percent represents water applied to container plants which leaches or drains out of the container [(2)], with 80-percent used by the plant. A resulting low-end estimate for efficiency if overhead sprinkler irrigation is used is 40-percent (50-percent of water applied reaching the container * 80-percent retained by the plant). Greenhouse irrigation methods have not yet been determined. Therefore, a mid-range estimate of 65-percent efficiency is used for greenhouse demands to represent a mix of overhead sprinkler irrigation and more efficient drip or hydroponic irrigation practices.
- **Nursery trees** have significantly lower irrigation efficiency than mature orchards for several reasons. Part of this difference is due to the roots being contained (either by a container or by the root-ball size for balled and burlapped trees grown in the ground) and therefore do not have the same ability to absorb water compared to trees grown in the ground with established and fully developed root structures. Recently planted trees require frequent irrigation and consistent soil moisture to allow for proper root absorption and to prevent disease, pests, and branch dieback[(3)]. Additional water is also often applied to leaves as pest control. Tree nursery irrigation efficiency is estimated at 43-percent, using similar concepts described for greenhouse-grown vegetables: (60-percent of water applied reaches the root-ball or container) * (80-percent of water retained by the plant) * (90-percent to reflect an additional 10-percent application for pest control).

[1] University of Tennessee Extension, Institute of Agriculture. PB 1836 - Nursery Irrigation: A Guide for Reducing Risk and Improving Production.
[2] University of Tennessee Extension, Institute of Agriculture. Sustainable Nursery Irrigation Management Series Part II: Strategies to Increase Nursery Crop Irrigation Efficiency.
[3] Colorado State Forest Service & Colorado State University, 2020. Watering. https://csfs.colostate.edu/colorado-trees/selecting-planting-and-caring-for-trees/watering/

3.2.3 Irrigated Area, Pond Area, and Number of Livestock

SGM estimated irrigated acreage and number of livestock for each Farm Area at buildout in coordination with the Nutrient Farm planning team.

Area 2: Farmhouse

- The Farmhouse is planned to have 2,500 square feet of irrigated lawn and landscaping.

Area 5: Working Farm East

- Demands are estimated for 120 head of livestock.
- The livestock pond on Area 5 has been designed with a surface area of 0.25 acre.
- Irrigated area of pasture grass is estimated at 43 acres. Portions of Area 5 will not be irrigated pasture grass due to hilly terrain or because of ponds, paddocks, barns, and road cover.
- Area 5 will also have a farmhouse, for which indoor demands will be supplied by an exempt well and outdoor demands will be supplied by the Vulcan Ditch. The Area 5 farmhouse is estimated to have 2,500 square feet of irrigated lawn and landscaping, and no additional irrigated hay or livestock.

Area 6: Working Farm West and Farm Related Attractions

- Pond surface area for Area 6, based on information from the Nutrient Farm planning team, includes: 5 acres of surface area at buildout for both the Supply Pond and an irrigation and cooling pond, and 1.5 acres for planned ponds for waterfowl, aesthetics, and possible collaboration with Colorado Parks and Wildlife for ponds related to the wildlife mitigation plan.
- The total planned area of lawn and landscaping in Area 6 is 3.23 acres. This includes 3 acres of lawn and landscaping for the adventure farm, which would include picnic and pavilion areas and landscaping beds. This also includes an estimated 2,500 square feet of lawn and landscaping around each building: the utilities building, processing building, farm store, and restaurant.
- Greenhouse irrigation is assumed to be non-potable. The planned irrigated area within the greenhouse is 0.25 acres.
- Demands for outdoor-grown vegetables and corn were grouped together, as the exact planting types are not yet known. These planting types may include corn (for corn maze), pumpkins (for u-pick pumpkins), other squash and melons, flower and herb gardens, and any other vegetables. A total area of 96 acres is planned for corn and vegetables at buildout.
- The planned area of orchard is estimated at 46 acres, including berries and the area designated as u-pick orchard (part of the adventure farm attraction). Orchard areas will also have groundcover.
- Livestock watering demands for the petting zoo are estimated at 10 livestock, as the exact number and type of animals are not yet known.
- Fowl watering demands are conservatively based 1,000 birds, which would include any petting zoo fowl and planned uses for ducks and egg-laying hens.

Area 7: Commercial, Retail, and Professional Buildings

- The only planned outdoor demand for Area 7 is lawn and landscaping around the buildings. Demands are based on an estimated 5,000 square feet (0.11 acres) total of irrigated lawn and landscaping for Area 7.

Area 8: Campground, Water Park, Off-Road Park, Festival, Performing Arts, Retreat, Tree Nursery

- Pond surface area for Area 8, based on information from the Nutrient Farm planning team, includes 4 acres for the water park recreational ponds plus an estimated 0.08 acres for evaporation from the campground swimming pool.
- Lawn and landscaping for the off-road adventure park are assumed to be a small portion of the overall area. Demands are based on 2 acres of lawn and landscaping and 2 acres of non-native trees requiring irrigation (uses crop coefficients of orchard trees). Of the roughly 70 acres of total footprint of the off-road adventure park, most of the area will be dirt/gravel roadways for motor sports. Other landscaping is assumed to be non-irrigated native vegetation.
- Demands for the campground assume 900 square feet of lawn and landscaping for each of 59 sites (including tent sites, RV sites, and cabins), plus 8,100 square feet each for eight group sites, for a total of 2.71 acres. Remaining campground area is assumed to be non-irrigated native vegetation.
- The performing arts center is planned to have indoor and outdoor performing space within its approximately four-acre footprint, so demands are conservatively based on 1 acre of irrigated lawn and landscaping.
- The retreat is planned to have a lodge with space for workshops and group activities. Because this may include significant outdoor space for events such as yoga retreats, this area is conservatively estimated to have 1 acre of irrigated lawn and landscaping.
- The plan for the music festival and tree farm is to start the approximately 5-acre area as a tree nursery, raising trees to be used for landscaping elsewhere on the property. As the trees are moved from the nursery to other areas of the Farm, space would be made for lawn, eventually leaving an outdoor festival venue of lawn surrounded by trees. Buildout demands were based on 2.5 acres of lawn and 2.5 acres of trees (nursery trees).

Augmentation Pond

- Because onsite augmentation may be required, evaporation demands conservatively included approximately 0.6 acres of augmentation pond surface area (which would allow for a 5 AF pond 8-feet deep).

3.3 Fire Flow

Garfield County requires that developments properly address fire flow needs through storage or water supplies and infrastructure sizing. Water supply for fire flows at the Farm will be provided from non-potable storage (rather than potable storage tanks) and through dry hydrants. The Farm will incorporate the necessary storage and flow requirements to address the required fire flows during the design process.

3.4 Water Conservation Measures

Historical irrigation on the property has been flood irrigation, which is relatively inefficient. While initial irrigation on the Farm will likely be largely flood irrigation, the Farm anticipates converting to more efficient irrigation practices (such as sprinklers, micro-emitters, and drip irrigation). Efficient irrigation methods will reduce the diversions required to deliver the needed consumptive use water to crops. The Farm also plans to pipe major sections of the Vulcan Ditch, reducing losses along the length of piped ditch due to seepage and evaporation.

During times of water shortage in Canyon Creek or the Colorado River, Farm staff can prioritize irrigation of key crops while reducing irrigation of lawns and landscaping. Farm staff can also use deficit irrigation or rotational irrigation as a tool for reducing demands while keeping the farm operational during a critical water shortage.

4.0 Water Quantity

Based on the quantity and seniority of the Vulcan Ditch water rights associated with the Farm property and the analysis of streamflow availability in Canyon Creek and the Colorado River, SGM believes that there is sufficient supply for the projected demand of Nutrient Farm. The physical and legal supply is sufficient to support both for the annual consumptive use and the peak hourly demands.

4.1 Legal Supply

Legal supply is discussed for the Vulcan Ditch and for the Riverbend system. Based on a comparison of the Farm's water rights to anticipated demands and consumptive use, the Farm's legal supply is sufficient.

4.1.1 Vulcan Ditch Legal Supply

Nutrient Farm owns the right to 393 AF of consumptive use (CU) in the Vulcan Ditch. Nutrient Farm's Vulcan Ditch water can be taken either from Canyon Creek at the headgate of the Vulcan Ditch or from the Colorado River at the Coal Ridge Pump and Pipeline, an alternate point of diversion for the Vulcan Ditch decreed in Case No. 84CW349.

The total historical consumptive use of the Vulcan Ditch first and second priorities was quantified in Case No. W2127 to be 440 AF per year in dry years. Subsequent cases have relied upon this quantification. As documented in Case No. 84CW349, 395 AF of the total 440 AF of CU were conveyed to Storm King Mines, Inc. Of the 395 AF of CU, 2 AF now belongs to Chris Lake, a property owner located along the Vulcan Ditch alignment south of the Riverbend Development. The remaining 393 AF of CU, along with the Coal Ridge Pump and Pipeline and Coal Ridge Reservoir water rights, were transferred to APB Holdings, LLC (the owner of Nutrient Farm) via special warranty deed dated November 8, 2018, included in **Appendix A**.

The Vulcan Ditch has three water right priorities as outlined in **Table 4-1**. Nutrient Farm's ownership of 393 AF of the total 440 AF of CU entitles it to 8.93 cfs of the total 10 cfs in the Vulcan Ditch under the first and second priorities, as detailed in **Table 4-1** below. Nutrient Farm does not own any of the third priority (Temple Enlargement).

The Farm's peak hour demand is calculated at 8.7 cfs, based on the peaking factors identified in Garfield County Land Use and Development Code, Section 4-203.M. The peak hour demand is within the Farm's legal ownership of 8.93 cfs in the Vulcan Ditch. The annual consumptive use of Vulcan Ditch water is 391.8 AF (2.8 AF of potable and 389.0 AF of non-potable), which is within the Farm's ownership of 393 AF of the Vulcan Ditch HCU credits quantified in W2127.

Table 4-1: Vulcan Ditch Water Rights Summary

Water Right Priority Name	Adjudication Date	Appropriation Date	Administration Number	Case No. Originally Decreed Amount	Total Amount Decreed (cfs)	Amount Owned by Nutrient Farm * (cfs)
First (Senior)	9/14/1908	4/1/1907	21000.20909	CA1319	6	5.36
Second (Junior)	9/5/1952	10/8/1942	33978.33883	CA4004	4	3.57
Third (Temple Enlargement)	12/31/1993	9/4/1980	52230.47729	93CW91	0.13	0.00
				Sum of three priorities:	**10.13**	**8.93**
Notes: Nutrient Farm owns 393 AF of the 440 AF of CU quantified under the Vulcan Ditch first and second priorities per Case No. W2127; its ownership in the first and second priorities corresponds to the 393/440.						

Case No. 84CW349 also explicitly states the right to use these Vulcan Ditch credits year-round:

> *"The Court also finds that Applicant's water rights in the Vulcan Ditch …may be used for year-round municipal use (including commercial, industrial, domestic, irrigation incident thereto, and sewage treatment including land disposal) irrigation, recreation, fish wildlife propagation, and all other beneficial purposes, including storage for each of the above purposes."*

Canyon Creek Calls

There are no decreed Colorado Water Conservation Board (CWCB) instream flow rights on Canyon Creek downstream of the Vulcan Ditch.

A formal call had not been recorded on Canyon Creek until 2018, when a call was placed by the Williams Canal, which is located on Canyon Creek above the Vulcan Ditch headgate. Williams Canal was on call between August 13, 2018 and October 5, 2018, and is senior to the Vulcan Ditch first priority. The swing right (most senior water right that was curtailed due to the call) during this time frame was also senior to the Vulcan Ditch first priority. The Williams Canal is located above the Canyon Creek stream gage that is used in **Section 4.2.1** to evaluate physical supply; therefore, the physical supply analysis already reflects the availability after senior diversions by the Williams Canal. Between the Williams Canal point of diversion and the Vulcan Ditch headgate, three other tributaries join Canyon Creek and contribute flow that would be available to the Vulcan Ditch: East Canyon Creek, Possum Creek, and Bearwallow Creek. Williams Canal and other key water rights on Canyon Creek and its tributaries are shown in **Figure 4-1**.

The first priority in the Vulcan Ditch is relatively senior on Canyon Creek, and a call has not historically been placed by a downstream senior diverter; however, there are water rights senior to the Vulcan Ditch that are located downstream that could place a call.

Ditches located on Canyon Creek downstream of the Vulcan Ditch which have senior water rights are:

- Canon Creek Ditch: Historical structure only, all Canon Creek Ditch water rights have been transferred to the Williams Canal upstream on Canyon Creek.
- Mings-Chenoweth-Wolverton Ditch
- Wolverton Ditch
- Johnson Ditch

The availability of Canyon Creek physical supply to support diversions by the Vulcan Ditch and other senior diverters is discussed in more detail in **Section 4.2.1.**

Colorado River Calls

The Colorado River typically calls every year near the Grand Junction area by a collection of irrigation and power water rights commonly referred to as the Cameo Call. Water rights that were perfected before October 16, 1977 are beneficiaries of the Green Mountain Reservoir Historic Users Pool (HUP). HUP-protected water rights benefit from replacement water releases from Green Mountain Reservoir which allows them to divert during times of a Cameo Call.

While even the first priority under the Vulcan Ditch is junior to the Cameo Call, both the first and second priorities are HUP-protected and may therefore divert even during times of a Cameo Call.

4.1.2 Riverbend System Legal Supply

Nutrient Farm residential developments in Areas 1, 3, and 4 will be connected to the existing Riverbend Water Company's potable water distribution system and wastewater collection system. The Riverbend HOA's potable water supply comes from the five Riverbend Wells. The Riverbend Wells were awarded their own water rights in W2125, for 0.67 cfs from each well with a cumulative volumetric limit of 340 AF/year from all five wells.

The anticipated additional demand on the Riverbend System (including indoor use and outdoor use) is estimated at average day demand of 0.02 cfs and a peak hour demand of 0.14 cfs based on a peaking factor of six times the average daily demand (as specified in Garfield County Land Use and Development Code, Section 4-203). The annual demands are estimated at 14.6 AF, with 2.3 AF of consumptive use. These demands include indoor and outdoor demands, as Areas 1, 3 and 4 will have potable irrigation. Initial assessment of the Riverbend Water Company water rights shows it has sufficient water to supply the proposed 17 lots.

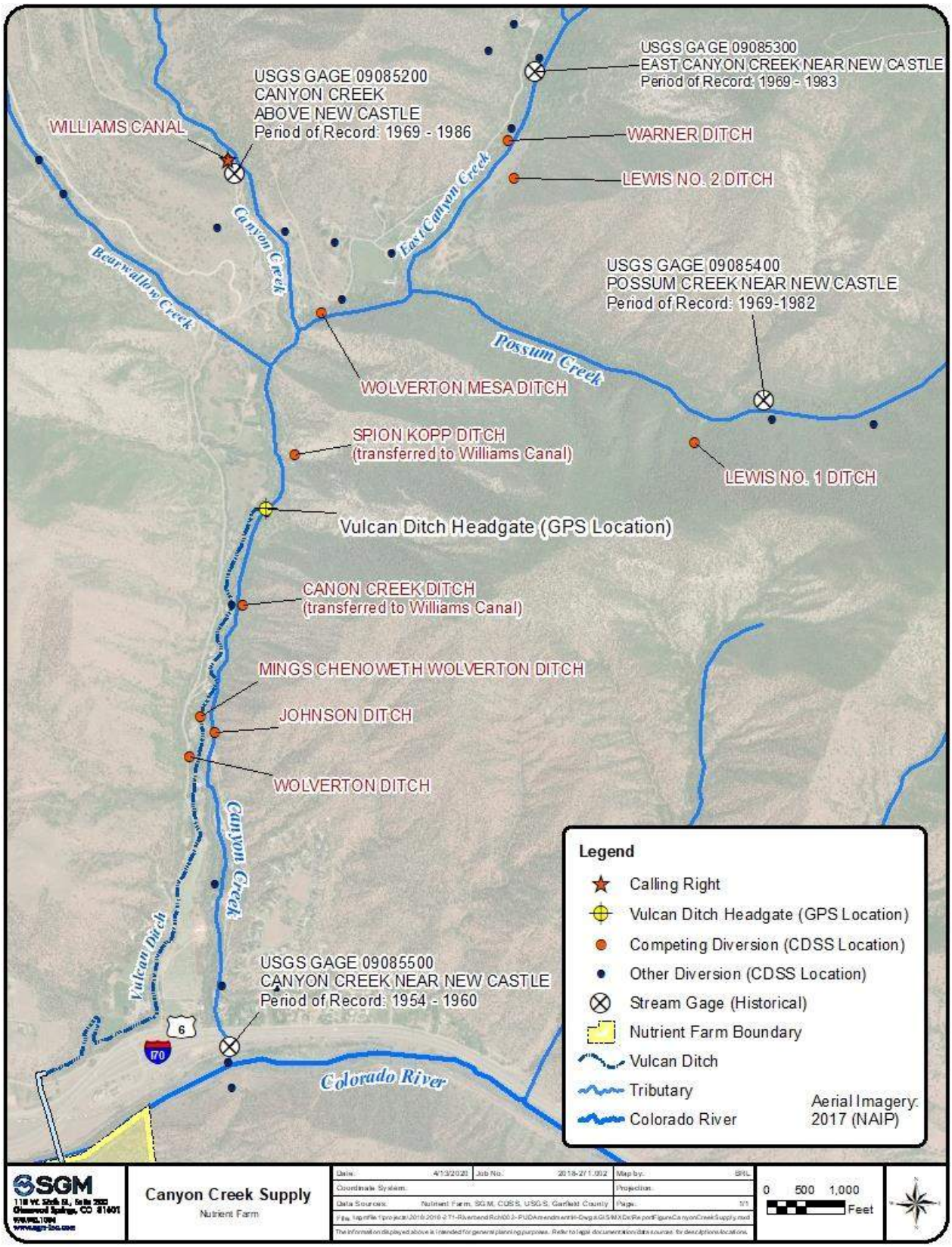


Figure 4-1: Canyon Creek Physical and Legal Supply Map

4.2 Physical Water Supply

Physical water supply is discussed for each of the two proposed sources: the Vulcan Ditch which will serve Areas 2, 5, 6, 7, and 8, and the Riverbend System which will serve Areas 1, 3, and 4. Based on the analysis of stream flow, the Farm's Vulcan Ditch physical supply can support anticipated demands. Based on analysis of streamflow and hydrogeology near the Riverbend Wells, there is sufficient supply to support the additional demands to the Riverbend System from Areas 1, 3, and 4.

4.2.1 Vulcan Ditch Physical Water Supply

The Farm's Vulcan Ditch water can legally be taken at the Vulcan Ditch headgate or at its decreed alternate point of diversion at the Coal Ridge Pump and Pipeline.

The Vulcan Ditch headgate is located on Canyon Creek approximately 1.5 miles north of the confluence of Canyon Creek and the Colorado River as shown in **Figure 2-1**. The Vulcan Ditch historically crossed the Colorado River in an inverted siphon and flowed through the Nutrient Farm property; however, the siphon and other areas of the ditch need repair. Necessary repairs are planned to re-establish the historical ditch and replace the siphon with a hanging pipeline over the Colorado River allowing delivery of Vulcan Ditch water to the Farm.

The Coal Ridge Pump and Pipeline diverts from the south bank of the Colorado River on the eastern portion of the Farm property. Until the planned repairs and replacement of the Vulcan Ditch and siphon are complete, the Farm plans to pump water to the property from the Coal Ridge Pump and Pipeline for immediate irrigation needs in Area 5. In the future, the Coal Ridge Pump and Pipeline will remain an alternate point of diversion.

Because the Farm's water supply may be diverted from either Canyon Creek or the Colorado River, physical water supply adequacy is discussed for both sources.

Canyon Creek Physical Water Supply

There are no currently recording stream gages on Canyon Creek. Historical data was available from 1970 through 1982 for Canyon Creek above the Vulcan Ditch and for two tributaries that flow into Canyon Creek below that gage and above the Vulcan Ditch, East Canyon Creek and Possum Creek. To accurately represent the total flow available at the Vulcan Ditch headgate, SGM added together the daily flow for each of these three gages: Canyon Creek Above New Castle (USGS Gage 09085200), East Canyon Creek Near New Castle (USGS Gage 09085300), and Possum Creek near New Castle (USGS Gage 09085400). Bearwallow Creek also flows into Canyon Creek above the Vulcan Ditch headgate, as shown in **Figure 4-1,** but streamflow in this tributary is not gaged. A historical gage was also located downstream of the Vulcan Ditch headgate (USGS Gage 0908550) but was not used due to limited period of record and its downstream location. The stream gages are shown on **Figure 4-1**.

Figure 4-2 shows the average Canyon Creek streamflow above the Vulcan Ditch headgate (sum of flow at the three gages) for each month of the year, for the average of wet years, normal years, and dry years. Dry years were defined as the lowest yielding 25 percentile years during the period of record for the total annual streamflow for the sum of the three gages. Wet years were defined as the highest yielding 75 percentile during the period of record. Normal years were defined as the middle 50 percentile during the period of record.

The Vulcan Ditch is subordinate to other senior diverters for use of the physically available water in Canyon Creek. To account for this, SGM summarized the water rights which are senior to the Vulcan ditch first and second priorities and which divert below the three gages and above the confluence of Canyon Creek and the Colorado River; these senior diverters are shown on **Figure 4-1** as "competing diversions" because they are competing for the water physically available based on SGM's streamflow analysis. Competing diverters located downstream of the Vulcan Ditch headgate could place a call on Canyon Creek limiting available diversions by the Vulcan Ditch. Competing diverters located upstream of the Vulcan Ditch headgate but downstream of the gages could divert water upstream and the Vulcan Ditch could not call them out. Any diversions by senior diverters located above these three gages are already reflected in the physical water availability measured by the gages.

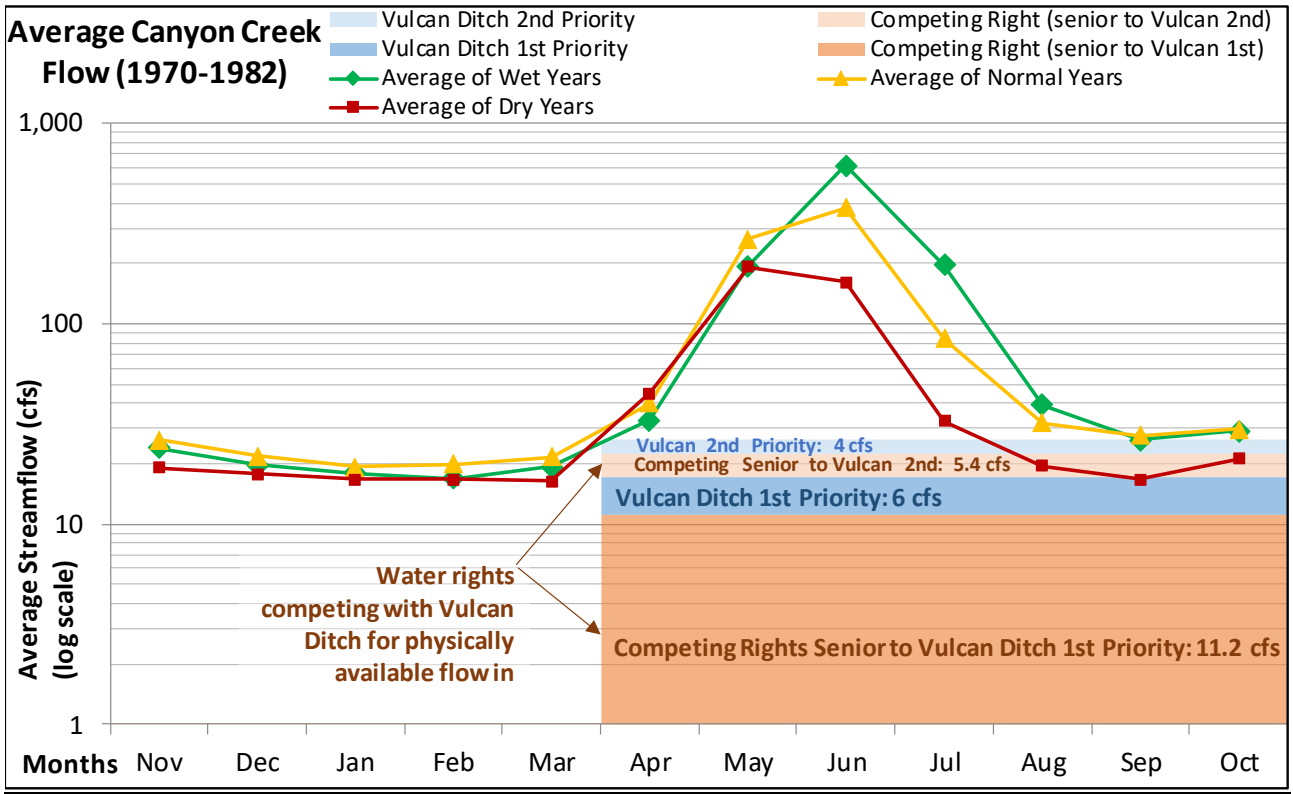
In addition to showing the average Canyon Creek streamflow, **Figure 4-2** shows an overlay of the competing water rights: other water rights which divert in the stretch between the stream gages and the Colorado River confluence and which would be competing with the Vulcan Ditch for physically available water supply.

A total of 11.2 cfs of competing water rights are senior to the Vulcan Ditch first priority. All of these senior water rights are decreed for irrigation use only (resulting in diversions from April through October only) with the exception of 1.0 cfs in the Mings Chenoweth Wolverton Ditch, which is decreed for domestic use. These competing water rights including:

- Mings Chenoweth Wolverton Ditch: 9.0 cfs from Canyon Creek
- Wolverton Ditch: 0.4 cfs from Canyon Creek
- Johnson Ditch: 0.56 from Canyon Creek
- Wolverton Mesa Ditch: 0.32 cfs from Canyon Creek
- Warner Ditch: 0.40 cfs from East Canyon Creek
- Lewis No. 1 Ditch 0.44 cfs from Possum Creek
- Lewis No. 2 Ditch 0.04 cfs from East Canyon Creek

A total of 5.4 cfs of competing water rights are senior to the Vulcan Ditch second priority, all of which are decreed for irrigation only. These competing water rights include:

- Mings Chenoweth Wolverton Ditch: 5.2 cfs from Canyon Creek
- Warner Ditch, Lewis No. 1 Ditch, or Lewis No. 2 Ditch: 0.243 cfs, with each headgate decreed as alternate points of diversion for the same water right.



Avg of:	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
Wet	24	20	18	17	19	33	195	616	196	39	26	29
Normal	26	22	19	20	22	40	265	378	84	32	28	30
Dry	19	18	17	17	16	45	192	161	33	20	17	21

Figure 4-2: Canyon Creek Stream Flow Analysis Above Vulcan Ditch Headgate

The Canyon Creek hydrograph follows the typical pattern of a snowmelt-driven stream. Flows rise steeply during runoff season, typically April through June, and then taper back down to base flow by the fall. Flows are higher in April for normal years and dry years than for wet years, likely related to warmer temperatures and earlier runoff. Peak flow occurs in May for dry years and in June for wet and normal years. From April through July there is enough water in Canyon Creek during wet, normal, and dry years to provide for the 10 cfs of Vulcan Ditch first and second priority water rights and for all of the competing water rights.

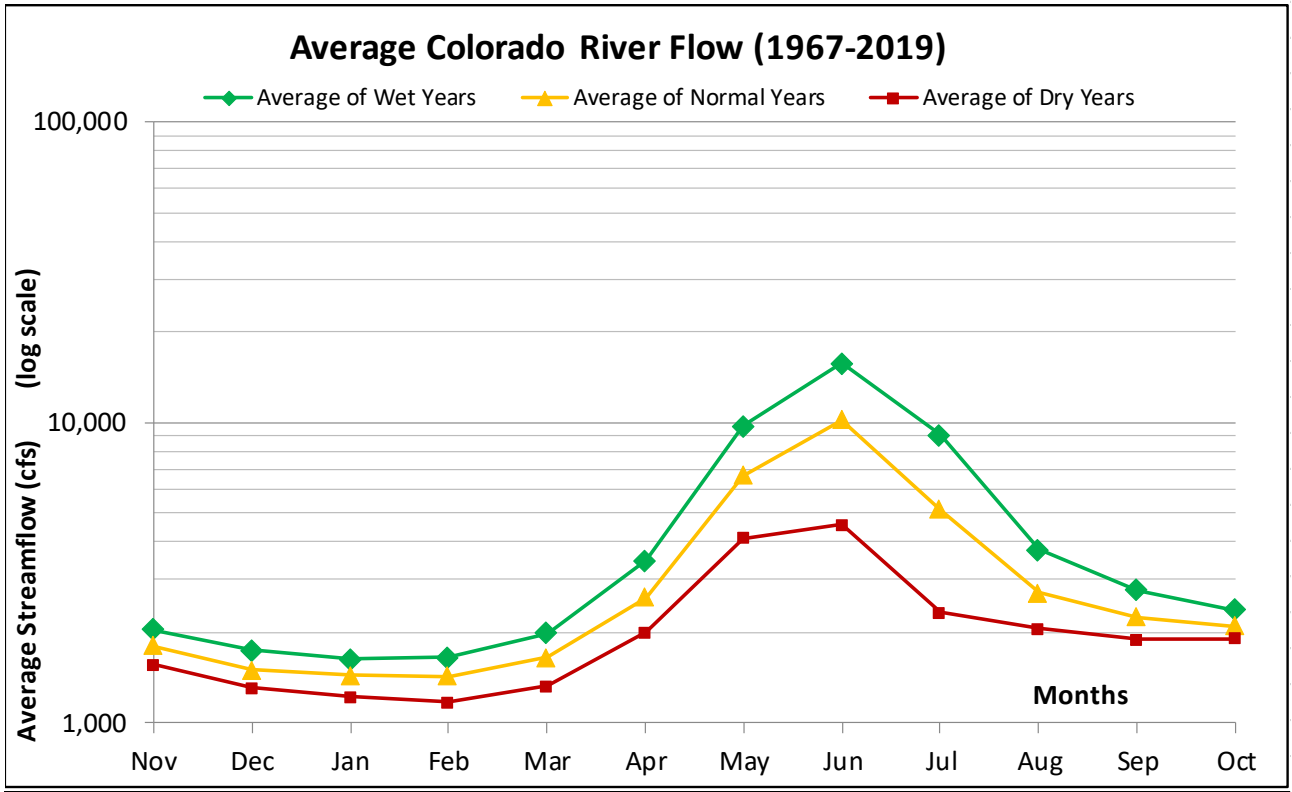
During late irrigation season, August through October, Canyon Creek flows are declining toward base flows. During late irrigation season of wet and normal years there is enough flow in Canyon Creek to provide for the 10 cfs of Vulcan Ditch first and second priority water rights and for all of the competing water rights. However, during late irrigation season of a dry year, Canyon Creek flows will be restricted, and there may only be enough physical and legal availability for the Farm to divert under the Vulcan Ditch first priority (6 cfs total, 5.36 cfs owned by the Farm). This amount of water would be enough to supply peak hour demands for the potable systems and the maximum day demand for the non-potable system. If supply is limited for the non-potable system, the Farm can reduce irrigation of lawn and landscaping and prioritize irrigation of key crops or can rotate irrigation of different areas.

Flows are typically lowest between January and March when other senior irrigation water rights holders on Canyon Creek are not diverting. During dry years, the average streamflow is at its lowest in March, at 16 cfs. During the period of record, flow only dropped below 10 cfs twice, in January of 1979 and in August of 1979 (the driest year during the period of record). Typically, even during low flow times of dry years, Canyon Creek can supply more than the total 10 cfs of water rights under the Vulcan Ditch first and second priority. The peak hour demand during non-irrigation season (to supply the potable needs) is less than 1 cfs. Canyon Creek flow during non-irrigation is sufficient to provide for the Farm's potable demands.

In summary, the Canyon Creek physical and legal supply is sufficient to provide for the Farm's demands during all months in wet and normal years, and during November through July of dry years. During late irrigation season of dry years, the Canyon Creek physical and legal supply is sufficient to provide for the Farm's peak hour potable demands. However, dry year supply available for non-potable demands may be limited to the Farm's 5.36 cfs in the Vulcan Ditch first priority. The Farms 5.36 cfs is sufficient to meet max day demand but may require some irrigation reductions or storage to meet peak hour demand.

Colorado River Physical Supply

SGM summarized daily flow in the Colorado River at the gage located below Glenwood Springs (USGS Gage 09085100) for the entire available period of record, 1967 through 2019. **Figure 4-3** shows average Colorado River streamflow for each month of the year, for the average of wet years, normal years, and dry years. Dry years were defined as the lowest yielding 25 percentile years during the period of record. Wet years were defined as the highest yielding 75 percentile, and normal years as the middle 50 percentile during the period of record. The 53-year period of record had 13 dry years, 13 wet years, and 27 normal years.



Avg of:	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
Wet	2,050	1,747	1,636	1,652	1,991	3,484	9,726	15,752	9,064	3,774	2,765	2,388
Normal	1,808	1,507	1,441	1,437	1,651	2,616	6,691	10,192	5,128	2,722	2,262	2,106
Dry	1,568	1,313	1,220	1,177	1,331	2,010	4,117	4,564	2,341	2,064	1,896	1,907

Figure 4-3: Colorado River Streamflow Analysis

As seen in **Figure 4-3,** average flow in the Colorado River stays above 1,000 cfs even during the winter, largely due to the influence of the Shoshone Power Plant located upstream in Glenwood Canyon. The senior 1905 Shoshone water right for 1,250 cfs and junior 1941 water right for 158 cfs effectively "pull" water to the plant's diversion point and past other upstream diverters (including transmountain diversions). As the hydroelectric use is non-consumptive, this operation ensures adequate Colorado River flows in the Middle Colorado River, where the Farm is located. Physical supply from the Colorado River is adequate. Supply availability from the Colorado River is more driven by the water rights (legal availability).

Diversions at the Coal Ridge Pump and Pipeline alternate point of diversion will be limited to the amount of water physically and legally available at the original point of diversion at the Vulcan Ditch headgate on Canyon Creek. Based on SGM's analysis, the physical and legal availability at the Vulcan Ditch headgate is adequate, as described previously in **Section 4.2.1.** To confirm in real time that water is physically available at the original point of diversion and allow for diversions at the Coal Ridge Pump and Pipeline from the Colorado River, the Division of Water Resources may require the Farm to install a measuring structure in Canyon Creek near the Vulcan Ditch headgate.

4.2.2 Riverbend System Physical Supply

Based on previous use, and based on the hydrogeology of the setting in which the Riverbend Wells are drilled, these wells are not likely to be limited by physical supply as long as they have sufficient water rights to allow them to continue diverting. A new well drilled for the Area 5 farmhouse would also be in the Colorado River alluvium and would also not likely be limited by physical supply.

Hydrogeology

The Riverbend Wells are drilled between 43 feet and 61 feet deep in the Colorado River alluvium, and all of the five wells are located within 300 feet of the south bank of the Colorado River. Based on well completion and pump installation report for Riverbend Well Nos. 3 and 4 (Permit Nos. 018146-F and 018147-F, respectively), 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 Well No. 4, and 5 feet below ground surface for Well No. 3, indicating that the elevation of the groundwater table is similar to the elevation of surface water in the Colorado River.

The Riverbend Wells are pulling water from the Colorado River alluvium, in close proximity to the Colorado River and through loose alluvial deposits that allow groundwater to flow relatively quickly. Physical water supply from these wells is therefore not expected to be a limiting factor, compared to the water rights.

Riverbend Wells

All of the Riverbend Wells have been drilled. For Well No. 3, the well test completed on January 14, 1977 during the well completion and pump installation showed a sustained yield of 97 gpm (0.22 cfs) over eight hours. However, Well No. 3 is apparently capable of producing up to 197 gpm (0.44 cfs) as evidenced by the fact that 0.44 cfs have been made absolute from this well. For Well No. 4, the well test completed on June 1, 1975 during well completion and pump installation showed a sustained yield of 75 gpm (0.17 cfs) over four hours. It is expected that when Well Nos. 1, 2, and 5 are developed they can be expected to produce at similar rates due to the loose alluvial aquifer characteristics. Based on the individual observed pumping rates of Well Nos. 3 and 4 (0.44 cfs and 0.17 cfs respectively) and the geology of the area the Riverbend Wells likely would be able to produce up to their decreed rates of 0.67 cfs. Therefore, the Riverbend Wells are not likely to be limited by physical supply, and it is expected that the wells will be able to accommodate the additional demands from the 17 lots in Areas 1, 3, and 4.

5.0 Water Quality

Water supply from the Vulcan Ditch may come from either Canyon Creek or the mainstem of the Colorado River. Water quality samples have not been collected. SGM consulted the Colorado Department of Public Health and Environment (CDPHE) Water Quality Control Commission (WQCC) Regulation 93 Section 303(d) list of impaired waters and monitoring and evaluation list, for information about general water quality parameters of concern from each source.

5.1 Water Supply Quality

Water quality is discussed for both possible Vulcan Ditch sources, Canyon Creek and the Colorado River.

Canyon Creek

Canyon Creek should be the preferred source for the Farm's water supply from a water quality perspective, based on information available from CDPHE, and because smaller tributaries generally have better water quality and less sediment than the mainstem of the Colorado River. Many existing homes and farms already use Canyon Creek as a water source.

Canyon Creek, segment ID COLCLC07a, is not listed for any parameters under the 303(d) list, either for impairment or for monitoring and evaluation.

Colorado River

The section of the Colorado River that runs past Nutrient Farm is segment ID COLCLC01_A, Colorado River from Paradise Creek to below the confluence with Rifle Creek. COLCLC01_A is on the 303(d) list for arsenic (total) and temperature impairment and is on the monitoring and evaluation list for sediment. Temperature is a problem for aquatic life, but not a concern for the Farm's water supply. Water with arsenic can be treated for potable use by reduction, coagulation, and filtration, depending on its oxidized form, or by membrane filtration. Nutrient Farm should also further investigate arsenic levels with respect to planned agricultural uses if it plans to use Colorado River water. Sediment issues could be mitigated by the Farm's plan to deliver ditch water first to the Supply Pond, allowing some settling of sediment to occur in the pond.

The City of Rifle, located about twenty miles downstream, uses the Colorado River for its municipal supply. The City of Rifle recently constructed a new microfiltration membrane water treatment plant, the Rifle Regional Water Purification Facility. The major water quality issues considered during the design of the new Rifle plant were iron and manganese, which mainly cause issues with taste and color. Iron and manganese will likely also be water quality parameters of concern for the Farm's potable water treatment design. The plant's design also treats the elevated levels of arsenic, but arsenic was not one of the main drivers for the new plant. Rifle also must manage sediment from its Colorado River supply; it does so by settling the river water in settling ponds before treatment. Similarly, settling will occur in the Farm Supply Pond and will help mitigate sediment issues.

6.0 Summary of Findings

Based upon Nutrient Farm's development plans and other information considered within this report, SGM has developed the following preliminary conclusions regarding the Farm's water supply adequacy.

6.1 Conclusions

1. Nutrient Farm owns 8.93 cfs of diversions and 393 AF of consumptive use in the Vulcan Ditch, which may legally be used year-round for uses including municipal, commercial, industrial, irrigation, domestic, fish, recreational, and others as decreed in W2127 and 84CW349.

2. The total annual consumptive use of Nutrient Farm's anticipated demands is estimated to be 391.8 AF/year. This amount is within the Farm's ownership of 393 AF of Vulcan Ditch consumptive use. The annual demands (diversions) associated with the calculated consumptive use are anticipated to be 623 AF/year. These annual amounts include demands and consumptive use to be served by the Farm's Vulcan Ditch water and by a proposed new well for Area 5, as itemized below:

    a. The annual consumptive use of demands to be supplied by the Farm's Vulcan Ditch water is estimated at 391.7 AF.

    b. The annual consumptive use of indoor demands for the Area 5 farmhouse to be supplied by a new well is 0.07 AF. While this new well will likely qualify as an exempt well (would not require augmentation), Nutrient Farm has conservatively set aside 0.07 AF of Vulcan Ditch HCU credits for this use in the event that the credits are needed to augment the well uses.

3. The Farm's anticipated diversion rates (including demands to be served by the Farm's Vulcan Ditch water and by a proposed new well for Area 5) are within its legal water rights ownership.

    a. The peak hour demand for the Farm during irrigation season is estimated, based on County peaking factors, at 8.7 cfs, which includes non-potable demand for farm irrigation operations. The peak hour demand is within the Farm's legal ownership of 8.93 cfs in the Vulcan Ditch. The peak hour demand on the Farm's potable system for Areas 2 and 5 – 8 is estimated at 0.24 cfs. The Farm's potable treatment and distribution system(s) will be designed to accommodate this peak hour demand.

    b. The maximum day demand for the Farm during irrigation season is estimated at 8.6 AF/day (4.3 cfs), which includes non-potable demand for farm operations such as irrigation. The maximum day demand on the Farm's potable system is estimated at 0.23 AF/day (0.12 cfs).

    c. The entire Farm is estimated to have an average day demand during non-irrigation season (November through March) of 0.09 AF/day (0.05 cfs). The average day demand during irrigation season (April through October) is estimated at 2.9 AF/day (1.4 cfs), which includes non-potable demand for farm operations such as irrigation.

4. The Farm can operate under the decrees for Case No. W2127 and Case No. 84CW349, and does not require additional water rights or augmentation sources.

5. The annual consumptive use of demands to be supplied by the Riverbend System (Areas 1, 3, and 4) is estimated at 2.3 AF, with an annual diversion volume of 14.6 AF. Riverbend Water Company has water rights decreed to the five Riverbend Wells in Case No W2125, with an annual cumulative volumetric limit of 340 AF/year from all five wells. Initial assessment shows that the Riverbend Water Company has enough water to support this added consumptive use from the 17 proposed lots.

6. The anticipated diversion rates for Areas 1, 3, and 4 to be served by connection to the Riverbend System are within the legal diversion rates decreed in W2125 for 0.67 cfs from each of the five Riverbend Wells.

    a. The additional peak hour demand on the Riverbend System from Areas 1, 3 and 4, is estimated at 0.14 cfs (for indoor and outdoor uses).

    b. The additional maximum day demand on the Riverbend System from Areas 1, 3 and 4, is estimated at 0.135 AF/day (0.07 cfs), which occurs during summer and includes irrigation of lawns from the potable system.

    c. The additional average day demand on the Riverbend System from Areas 1, 3 and 4 during non-irrigation season (November through March) is estimated at 0.033 AF/day (0.017 cfs). The average day demand during irrigation season (April through October) is estimated at 0.045 AF/day (0.023 cfs), which includes potable irrigation of lawn and landscaping.

    d. Riverbend Water Company is willing to commit and has the ability to provide an adequate water supply for the proposed development of 17 lots in Areas 1, 3, and 4.

7. Areas 2, 5, 6, 7, and 8 will be supplied from the Vulcan Ditch. Based on the quantity and seniority of the Vulcan Ditch water rights associated with the Farm property and the analysis of streamflow availability in Canyon Creek and the Colorado River, SGM believes that water is physically and legally available to support both for the annual consumptive use (392.7 AF/year) and the peak hourly demands (8.7 cfs) for the areas served directly by the Vulcan Ditch.

    a. Canyon Creek physical and legal supply is adequate for the Farm's peak hour demand during wet and normal years and November through July of dry years.

    b. During late irrigation season (August through October) of dry years, the Canyon Creek physical and legal supply is sufficient to provide for the Farm's peak hour potable demands and max day non-potable demands. During dry years in the late irrigation season available stream flow may be limited to the Farms 5.36 cfs ownership in the first priority due to competing senior diversions and reduced streamflows. Limited diversions of 5.36 cfs is sufficient to meet max day demand of 4.3 cfs, and peak hour non-potable demand can be met with storage and irrigation schedule modifications. If required during times of key supply shortage, Farm staff can prioritize irrigation of key crops while reducing irrigation of lawns and landscaping.

8. The physical supply to the Riverbend Wells is sufficient for the anticipated additional demand from Areas 1, 3, and 4, based on the hydrogeology and measured pumping rates from the drilled wells.

9. The Farm can legally divert its Vulcan Ditch water at the original Vulcan Ditch headgate on Canyon Creek or at the decreed alternate point of diversion at the Coal Ridge Pump and Pipeline on the Colorado River. Diversions at the Coal Ridge Pump and Pipeline will be limited to the amount of water physically and legally available at the original point of diversion at the Vulcan Ditch headgate on Canyon Creek. SGM's streamflow analysis suggests that the physical and legal availability from Canyon Creek is sufficient.

10. Canyon Creek should be the preferred source for the Farm's water supply over the Colorado River from a water quality perspective. Potable use from either source will require treatment.

7.0 References

- Garfield County Land Use and Development Code, Section 4-203 Paragraph M: Water Supply and Distribution Plan
- Town of New Castle Municipal Code, Sections 13.24.030 and 13.20.060.
- Water Quality Control Division (WQCD) Regulation No. 43, Table 6-2: Design Wastewater Flow
- Colorado State Engineer's Office (SEO) General Guidelines for Substitute Water Supply Plans for Sand and Gravel Pits (version 4/1/2011)
- PoultryHub. Water consumption rates for chickens. http://www.poultryhub.org/nutrition/nutrient-requirements/water-consumption-rates-for-chickens/
- University of Tennessee Extension, Institute of Agriculture. PB 1836 - Nursery Irrigation: A Guide for Reducing Risk and Improving Production.
- University of Tennessee Extension, Institute of Agriculture. Sustainable Nursery Irrigation Management Series Part II: Strategies to Increase Nursery Crop Irrigation Efficiency.
- Colorado State Forest Service & Colorado State University, 2020. Watering. https://csfs.colostate.edu/colorado-trees/selecting-planting-and-caring-for-trees/watering/
- Colorado Department of Public Health and Environment (CDPHE) Water Quality Control Commission (WQCC). Regulation 93: Section 303(d) list; and Regulation 37: Stream Classifications and water Quality Standards

APPENDICES

Appendix A: Warranty Deeds (Water Rights)

APPENDIX A

WARRANTY DEEDS (WATER RIGHTS)

SPECIAL WARRANTY DEED
(Water Rights)

THIS DEED, made this 9th day of November, 2018, between **NCIG Financial, Inc., a Minnesota corporation**, ("Grantor"), and **APB Holdings LLC, a Colorado limited liability company**, whose legal address is 5670 Brentwood Drive, Hoffman Estates, Illinois 60192 ("Grantee");

WITNESSETH, that Grantor, for and in consideration of the sum of **Ten Dollars ($10.00) and other good and valuable consideration**, the receipt and sufficiency of which are hereby acknowledged, has granted, bargained, sold, and conveyed, and by these presents does grant, bargain, sell, convey, and confirm, unto Grantee, and Grantee's heirs, successors, and assigns forever, 100% of the following described water and water rights:

See **Exhibit A**, attached hereto and incorporated herein,

TOGETHER WITH all and singular the hereditaments and appurtenances thereto belonging, or in anywise appertaining, and the reversion and reversions, remainder and remainders, rents, issues, and profits thereof; and all the estate, right, title, interest, claim, and demand whatsoever of Grantor, either in law or equity, of, in, and to the above bargained premises, with the hereditaments and appurtenances;

TO HAVE AND TO HOLD the said premises above bargained and described with the appurtenances, unto Grantee, and Grantee's heirs, successors, and assigns forever. Grantor, for Grantor and Grantor's heirs, successors, and assigns, does covenant and agree that Grantor shall and will WARRANT AND FOREVER DEFEND the above bargained premises in the quiet and peaceable possession of Grantee, and Grantee's heirs, successors, and assigns, against all and every person or persons claiming the whole or any part thereof, by, through or under Grantor.

IN WITNESS WHEREOF, Grantor has executed this deed on the date set forth above.

NCIG Financial, Inc., a Minnesota corporation

By: Regan Backer
Regan Backer, its President

STATE OF New York)
) ss.
COUNTY OF New York)

The foregoing instrument was acknowledged before me this 8th day of November, 2018 by Regan Backer, as President of NCIG Financial, Inc., a Minnesota corporation, on behalf of said corporation.

Witness my hand and official seal:

DAISYMAY M PARKS
Notary Public, State of New York
No. 01PA6355194
Qualified in New York County
Commission Expires 2/27/2021

Daisymay M Parks
Notary Public

Recorded Electronically
ID 913981
County
Date 11.9.18 Time
Simplifile.com 800.460.5657 CSC

1805028

EXHIBIT A

WATER RIGHTS

VULCAN DITCH WATER RIGHTS

393 of the total 440 acre feet per year of consumptive use water decreed on June 26, 1974, in Case No. W-2127, Water Division No. 5, to the Vulcan Ditch and Vulcan Ditch First Enlargement, together with the associated pro rata interest (393/440) in the right to divert from Canyon Creek the total rates of flow of six (6) c.f.s., having been decreed in Civil Action No. 1313, Garfield County District Court, on August 21, 1908, to the Vulcan Ditch with a date of appropriation of April 1, 1907, Priority No. 175 in the Water District No. 39, and four (4) c.f.s. having been decreed in Civil Action No. 4004, Garfield County District Court, on August 11, 1952, to the Vulcan Ditch First Enlargement with a date of appropriation of October 8, 1942, priority No. 242 in Water District No. 39, and together with the right to divert said rights at an alternate point of diversion on the Colorado River as decreed in Case No. 84CW349, entered on April 30, 1985, Water Division No. 5, together with a pro-rata interest in Riverbend Wells Nos. 1 through 5, inclusive, as described in Case No W-2127, Permit Nos. 018144F through 018148F. These water rights are subject to the terms, conditions and stipulations in Case Nos. W-2127and 84CW349 and the following covenants:

1. A Covenant Regarding the Vulcan Ditch entered into between NCIG Financial, Inc. and Frank A. and Bonnie M. Mills, recorded in the real property records of Garfield County, Colorado on September 22, 2003, at reception no. 637024, effective date July 15, 2003.

2. A Covenant Regarding the Vulcan Ditch entered into between NCIG Financial, Inc. and Jeffrey S. and Brenda S. Simpson, recorded in the real property records of Garfield County, Colorado on September 22, 2003, at reception no. 637025, effective date July 15, 2003.

3. A Covenant Regarding the Vulcan Ditch entered into between NCIG Financial, Inc. and Susan E. Santos, formerly Susan A. Edstrom, recorded in the real property records of Garfield County, Colorado on September 22, 2003, at reception no. 637026, effective date July 15, 2003.

4. A Notice of Settlement and Release of Claims entered into between NCIG Financial, Inc. and Harlan and Rebekah Baldridge, recorded in the real property records of Garfield County, Colorado on August 26, 2003, at reception no. 634943, executed on August 13, 2003.

SPECIAL WARRANTY DEED
(Water Rights)

THIS DEED, made this 8th day of November, 2018, between **CB Minerals Company, LLC, a Colorado limited liability company**, ("Grantor"), and **APB Holdings LLC, a Colorado limited liability company,** whose legal address is 5670 Brentwood Drive, Hoffman Estates, Illinois 60192 ("Grantee");

WITNESSETH, that Grantor, for and in consideration of the sum of **Ten Dollars ($10.00) and other good and valuable consideration**, the receipt and sufficiency of which are hereby acknowledged, has granted, bargained, sold, and conveyed, and by these presents does grant, bargain, sell, convey, and confirm, unto Grantee, and Grantee's heirs, successors, and assigns forever, 100% of the following described water and water rights:

See **Exhibit A**, attached hereto and incorporated herein,

TOGETHER WITH all and singular the hereditaments and appurtenances thereto belonging, or in anywise appertaining, and the reversion and reversions, remainder and remainders, rents, issues, and profits thereof; and all the estate, right, title, interest, claim, and demand whatsoever of Grantor, either in law or equity, of, in, and to the above bargained premises, with the hereditaments and appurtenances;

TO HAVE AND TO HOLD the said premises above bargained and described with the appurtenances, unto Grantee, and Grantee's heirs, successors, and assigns forever. Grantor, for Grantor and Grantor's heirs, successors, and assigns, does covenant and agree that Grantor shall and will WARRANT AND FOREVER DEFEND the above bargained premises in the quiet and peaceable possession of Grantee, and Grantee's heirs, successors, and assigns, against all and every person or persons claiming the whole or any part thereof, by, through or under Grantor.

IN WITNESS WHEREOF, Grantor has executed this deed on the date set forth above.

CB Minerals Company, LLC, a Colorado limited liability company

By: Regan Backer
Regan Backer, its President

STATE OF New York)
) ss.
COUNTY OF New York)

The foregoing instrument was acknowledged before me this 8th day of November, 2018 by Regan Backer, as President of CB Minerals Company, LLC, a Colorado limited liability company, on behalf of said corporation.

Witness my hand and official seal:

DAISYMAY M PARKS
Notary Public, State of New York
No. 01PA6355194
Qualified in New York County
Commission Expires 2/27/2021

Daisymay M Parks
Notary Public

Recorded Electronically
ID 913982
County
Date 11-9-18 Time
Simplifile.com 800.460.5657 CSC

1805028

EXHIBIT A

Coal Ridge Pump and Pipeline: All rights conditionally decreed to the Coal Ridge Pump and Pipeline in Case No. 83CW367, Water Division No. 5, Colorado, to divert 2 cfs of water from the Colorado River, with an appropriation date of September 14, 1983, at a point of diversion located in Garfield County, Colorado on the South Bank of the Colorado River in Section 35, Township 5 South, Range 90 West of the 6th P.M., at a point 1,260 ft. West of the East line and 1840 feet North of the South line of said Section 35.

Coal Ridge Reservoir: The right to store up to 2,000 acre-feet of water, as conditionally decreed in Case No. 83CW368, Water Division No. 5, Colorado, with an appropriation date of September 14, 1983, at a place of storage in Garfield County, Colorado, at which the center of the dam axis is located in Section 35, Township 5 South, Range 90 West of the 6th P.M. at a point 1,900 ft. West of the East line and 210 feet North of the South line of said Section 35.

CENTRAL WATER DISTRIBUTION AND WASTEWATER SYSTEMS

NUTRIENT FARM

February 2021

Prepared by

SGM

118 West Sixth Street, Suite 200
Glenwood Springs, CO 81601
970.945.1004
970.945.5948 fax

CENTRAL WATER DISTRIBUTION AND WASTEWATER SYSTEMS

NUTRIENT FARM

PREPARED BY

DAVID M. KOTZ, P. E.

SGM Project # 2018-271.002

TABLE OF CONTENTS

1.0 Introduction

This report fulfills the requirements of 7-105 CENTRAL WATER DISTIRIBUTION AND WASTEWATER SYSTEMS of the Garfield County Land Use and Development Code (LUDC) for the Nutrient Farm Planned Unit Development (PUD). Detailed information about the legal and physical supply of water is contained elsewhere in this submission in the Nutrient Farm Water Supply Adequacy Report.

The proposed residential developments in Areas 1, 3 and 4 of the PUD are immediately adjacent to the existing Riverbend Subdivisions and within 400' of water and sewer infrastructure. The Garfield County LUDC encourages connection to the existing central water and wastewater systems owned and operated by the Riverbend Water and Sewer Company (RWSC). The existing Riverbend systems serve only residential uses and have capacity to serve the ultimate 17 ½ acre lots with up to 17 Accessory Dwelling Units (ADU).

Real Estate development is not the primary focus of the Nutrient Farm PUD and these lots will be phased in gradually over time as the owner chooses to provide living opportunities for family, friends, employees and others. Even so, there is the potential for private sale of these lots. With the strictly residential use and proximity to RWSC infrastructure, it makes sense for Areas 1, 3 and 4 to connect into the central systems. Both RWSC and Nutrient Farm anticipate a future agreement that will define the terms and connection requirements, based on then current Colorado Department of Public Health and Environment (CDPHE) regulations, rate studies, etc.

The other proposed mixed uses on Nutrient Farm are located downstream from Riverbend and significantly beyond the 400' threshold cited in 7-105 and, as such, Nutrient Farm plans to develop its own on-site water and wastewater systems. Initially, the farm operations, produce stand/store, greenhouse and processing buildings will be served by point of use water treatment and on-site wastewater treatment systems (OWTS). As public uses like the restaurant, campground and commercial areas develop, public water system triggers will be met, and Nutrient Farm will construct its own public water system in accordance with CDPHE regulations.

This report provides a discussion of the existing Riverbend water and wastewater systems and those proposed by Nutrient Farm. Industry standard design criteria for the water distribution, storage and supply systems and wastewater treatment are summarized. A Conceptual Water and Sewer Plan is presented in which illustrates the overall systems necessary to serve Nutrient Farm.

2.0 Riverbend Water and Sewer Company

2.1 Riverbend Potable Water Supply

The following paragraphs discuss the existing Riverbend water supply system with proposed Nutrient Farm demands. A reliable water system should be capable of providing water at rates exceeding maximum day demands. The calculations presented show that both the existing and the future system will be capable of providing flows well in excess of expected maximum day demands.

Based on our research, review and understanding of information provided by Steve Boat, former President of the RWSC, the water for the existing Riverbend Subdivisions is currently supplied by Riverbend Well Nos. 3 and 4 which are located in the Nutrient Farm "East Pasture". These are permitted under Well Permit Nos. 018146-F and 018147-F with a max pumping rate of 300 gallons per minute (gpm). Well Nos. 3 (10 hp) and 4 (7 ½ hp) have proved to be a very reliable wells with current pumping rates of about 65 gpm and 50 gpm, respectively.

Three additional wells, Riverbend Wells Nos. 1, 2 and 5 have been drilled near the existing well house in the East Pasture. Pump tests on these wells indicate similar production in excess of 180 gallons per minute. These wells provide reserve capacity and can provide increased mechanical reliability to the overall system when placed on-line. These wells are permitted under Well Permit Nos. 018144-F, 018145-F and 018148-F, all with max pumping rates of 300 gpm. (Refer to the Nutrient Farm Water Supply Adequacy report contain elsewhere in the PUD submittal materials for complete information on the wells and legal water supply.)

The existing water system currently serves sixty-six (66) users within the Riverbend area and has seven (7) additional obligations. Per the adopted covenants, Riverbend users are allowed to irrigate up to 3,500 square feet of lawn area plus 500 square feet of garden in addition to an average in-house use.

This past summer water production from 7/16/2020 to 8/8/2020 was 1,528,828 gal/22 days = 69,492 per day. Dividing by 66 users, this equates to 1,053 gallon per day (gpd). Because of the hot, dry weather over that period, SGM considers this to approximate the maximum day demand (MDD). The average day demand (ADD) is typically approximated by the engineering standard of 100 gallons per person per day and 3.5 people per lot. This equates to one 1 Single Family Equivalent (SFE) = 350 gpd. So, this summer the actual Riverbend max day peaking factor could be estimated by 1,053/350 = 3.0.

Water system supplies should be able to provide water at maximum day demand rate. The 69,492 gpd observed this summer equate to 48.3 gpm. With Wells Nos. 3 and 4 providing 65 gpm and 50 gpm the supply is satisfactory for existing conditions. The 7 additional obligations would add in only 7/66 x 48.3 = 5.1 gpm to the MDD and the system supply would still be adequate.

In order to determine the projected increase in water demand of Nutrient Farm Residential Area 1, 3 and 4 (maximum of 17 lots) a calculation was done using the engineering standard of 100 gallons per person per day and 3.5 people per lot. This equates to one 1 Single Family Equivalent (SFE) = 350 gpd. Each of the proposed lots could have an Accessory Dwelling Unit (ADU) which could conservatively be accounted for as 0.8 SFE = 280 gpd. Thus, each lot could produce an additional average daily demand (ADD) of 350 + 280 = 630 gpd. In the unlikely event that every lot builds an ADU, the added Nutrient Farm average daily demand (ADD) would be 17 x 630 = 10,710 gpd or 7.44 gpm.

A maximum day demand (MDD) peaking factor of 4.0 x ADD is a conservatively high value planning value for water systems this size in Western Colorado and the Garfield County LUDC specifies that peak hour flows are to be 6.0 x ADD. These, figures include the limited outside irrigation use typical of subdivisions. Thus, Nutrient Farm could add 4.0 x 7.44 = 29.8 gpm under maximum day demand (MDD) conditions and 6.0 x 7.44 = 44.6 gpm for peak hour. (These ultimate planning figures are conservatively high given the observed flows in Riverbend and the low probability of having ADUs on each Nutrient Farm lot.)

In Nutrient Farm, the potable water system will provide water for in house use and a limited amount of outside use on the ½ acre lots. The water supply adequacy report contemplates 2,500 square feet of irrigated area. Nutrient Farm may or may not choose to provide raw water for additional lawn irrigation or supplemental fire protection, if needed. This secondary irrigation system would take its water from a pipeline off the Vulcan Ditch and would not burden the RWSC system. All this will be factored into the future RWSC/Nutrient Farm agreement.

As for ultimate water supply needs, the total MDD would be 48.3 (existing RWSC) + 5.1 (7 obligations) + 29.8 (Nutrient Farm) = 83.2 gpm MDD. Again, for supply concerns, the system should be able to provide reliable max day demand. Current capacity of Well 3 is 65 gpm and Well 4 has 50 gpm with the current 10 hp and 7 ½ hp pumps. The two wells, if pumped concurrently, have the capability of providing about 115 gpm. For redundancy, the RWSC and Nutrient Farm should consider having a spare pump on site to minimize the drawdown of storage when a motor goes out.

2.2 Riverbend Water Treatment

The water system is operated by RWSC under the regulations of the Colorado Department of Public Health and Environment (CDPHE) governing public water systems (PWS). (The nuances and details of CDPHE regulations are discussed later in this report.) Both wells have been shown to be a true groundwater source requiring only disinfection. Water from the Riverbend Well Nos. 3 and 4 is pumped through the chlorination facility in the Nutrient Farm East Pasture and then in an 8" PVC main that provides contact time prior to the distribution system.

2.3 Riverbend Distribution System

The water for the existing Riverbend Subdivisions is supplied by Riverbend Wells in the Nutrient Farm East Pasture. Pumped flow travels through the chlorination and an 8″ PVC transmission main to the subdivisions. A series of 8″ and 6″ distribution mains and service lines provide water to each individual lot within Riverbend. The pumped flow then travels through the distribution system to underground ground water storage tanks located on Nutrient Farm Residential Area 2 above and east of Riverbend Filing 2. Refer to the Nutrient Farm PUD Water & Sewer Plan for a graphic depiction of the existing and proposed systems.

New 8″ water mains will be connected to the existing RWSC mains and then be extended within the road rights of way of Nutrient Farm Residential Areas 1 and 3 to provide a distribution system for the new lots. The two lots in Residential Area 4 will simply connect services to the existing main. Fire hydrants will be placed at a maximum spacing of 500 feet apart throughout the subdivision and will be located for maximum accessibility for firefighting personnel.

The normal water level elevation in the existing Riverbend tanks is approximately 5955 feet. Normal system pressures in the Nutrient Farm residential areas will range from about 90 psi in Residential Area 4 to a maximum of about 145 psi at the lowest lots in Residential Areas 1 and 3.

Standard domestic water service sizes of 1" will be utilized throughout the entire system. The water service lines will be tapped from the distribution mains to the lot line. A curb valve will be located at this point and will delineate the responsibility between the private property owner and the RWSC. Each new domestic water service will be metered.

2.4 Riverbend Water Storage

The Riverbend potable water system is currently served by two existing underground, steel water storage tanks located east of the Riverbend Subdivision Filing 2 in Nutrient Farm proposed Residential Area 2. These tanks are located high above the users and will provide sufficient pressures throughout Riverbend and Nutrient Farm Residential Areas 1, 3 and 4. The water levels in both tanks fluctuate together and capacities are about 25,000 and 23,000 gallons for a total storage of about 48,000 gallons.

The storage capacity for a water system can be evaluated in terms of equalization, fire and emergency needs. Equalization storage accounts for normal drawdown in peak usage periods when consumption exceeds production and occupies the upper portion of the tanks. Fire storage is allocated immediately below equalization, with the emergency storage reserve filling the bottom levels of the tank. Emergency storage is the most subjective of the components. It should be based upon the owner's assessment of the reliability of the water system and the possible ramifications of running out of water during an emergency event.

Regarding equalization storage, Riverbend has and will have the benefit of having a water supply which is capable of providing water at about 115 gpm which exceeds the max day demands for both existing and proposed ultimate conditions with all Nutrient Farm connections. Estimated ultimate peak hour demands are 1.5 X 83.2 = 124.8 gpm in comparison to water production of 115 gpm. Tank drawdown can be estimated by 6 hours of peak hour flow – production. So here we have (124.8 – 115 = 9.8 gpm) x 6 hours x 60 min./hour = 3,528 gallons.

Required fire storage is usually determined by the Fire Chief or department having jurisdiction over the area. Based on our July 2020 site meeting with Fire Prevention Division Chief Orrin Moon, we expect specific comment on storage needs and other system requirements from Colorado River Fire and Rescue (CRFR) upon review of this PUD application and future review at the time of platting for Residential Areas 1, 3 and 4. For now, we'll plan on the typical residential requirement for homes < 3600 sf of 1000 gpm for 2 hours = 120,000 gallons.

For emergency storage, the RWSC and Nutrient Farm will have to decide on the amount to provide. A minimum value equivalent to one average day demand or about 30,000 gallons would be reasonable by today's municipal standards.

The total of the ultimate recommended equalization, fire and emergency storage components is slightly over 150,000 gallons. With existing storage at about 48,000 gallons, the RWSC and

Nutrient Farm should plan on phasing in additional storage over time. The actual Nutrient Farm development schedule and CRFD recommendations will factor in.

Additionally, it is beneficial to have a dual fire protection system if either of these systems is out of service for any reason. Nutrient Farm will be providing ample raw water storage, dry hydrants, and wet hydrants for CRFR use on the western ranch near the existing subdivision. These facilities may reduce the potable water storage requirements that CRFR has for the Riverbend system.

2.5 Riverbend Wastewater Treatment

The existing RWSC wastewater treatment facility at Riverbend is permitted by the CDPHE under the Colorado Discharge Permit System – Domestic Wastewater Treatment Facilities With 100:1 Dilution Permit, Permit Number COG588000 Certification Number: COG588006. It is a domestic, minor municipal lagoon system consisting of two aerated lagoons, a polishing pond and chlorination followed by a 2" Parshall Flume with a continuous recorder and totalizer and must be operated by a Class D certified operator. The hydraulic and organic capacities 0.0247 MGD and 40.1 lbs BOD5/day.

Per the RWSC, there are currently 63 lots online with 7 additional obligations. The 30-day average daily flow in July 2020 was 8200 gpd as reported by the RWSC. That equates to 130 gpd per each of the 63 lots rather than the 280 gpd typically used for planning purposes. With a permitted hydraulic capacity of 24,700 gallons per day, the facility currently operates at approximately 33% hydraulic capacity. Considering the 7 additional obligations at the planning value of 280 gpd adds 1960 gpd and the facility would be at 10,160 gpd or 41% hydraulic capacity. This suggests there is approximately 59 % available capacity for service area expansion into Nutrient Farm.

Like the water system, only Residential Areas 1, 3 and 4 (up to 17 lots plus up to 17 ADUs) are planned for connection. These residential uses will be phased in gradually over time. Both RWSC and Nutrient Farm anticipate a future agreement at the time of platting that will define the terms and connection requirements, based on then current CDPHE regulations, engineering analyses, rate studies, etc. Based on planning numbers each lot would add 280 gpd and each ADU would add 224 gpd to the wastewater stream. Considering ultimate Nutrient Farm development with an unlikely ADU on each lot would add 17 x (280 + 224) = 8568 gpd. Total flow for Riverbend, additional obligations and ultimate Nutrient Farm would be 18,728 gpd or about 76% hydraulic capacity.

3.0 Nutrient Farm Water and Sewer

3.1 Nutrient Farm Potable Water Supply

While the proposed Nutrient Farm residential uses are located next to the existing subdivisions, by design, and will connect to that water infrastructure, the remainder of the Farm's proposed uses are located well beyond the 400' threshold listed in the LUDC. Given the large size of the ranch, food processing needs, and eventual commercial uses open to the public, Nutrient Farm will develop its own potable system to serve all uses other than Residential Areas 1, 3 and 4.

The Vulcan Ditch and associated pump station for the Coal Ridge Pump and Pipeline will supply raw water to Nutrient Farm via the existing 18" HDPE pressurized pipeline. Ample storage will be provided in lined farm ponds linked to the raw water pressurized system and open channel ditches that will deliver water to various points of use throughout the ranch.

3.2 Nutrient Farm Potable Water Treatment

Initially, Nutrient Farm will have its own private system that serves only the Farm's agricultural operations and facilities as well as the owner's personal residence in Area 2. As such, simple point-of-entry or point-of-use treatment systems will be utilized. At such time when commercial uses are developed, the potable system will eventually meet the various user thresholds defined by the CDPHE as described in Regulation 11 – Colorado Primary Drinking Water Regulations 5 CCR 1002-11 and will become a regulated "Public Water System" (PWS). The Water Supply Adequacy report contain elsewhere in the PUD submittal materials for complete information proposed uses and the legal water supply.

For the initial private system, Nutrient Farm will utilize various means for treating drinking water ranging from simple distillation, and filters to sophisticated reverse osmosis, ultra-violet (UV), ozone and proprietary point-of-use treatment systems. Refer to the Conceptual Water and Sewer Plan contained in the PUD submittal for a graphic depiction of the existing and proposed water infrastructure envisioned at this time.

With the commercial uses to occur in the future, the planning, design and CDPHE regulatory review and approvals for all treatment, distribution and storage components of the Public Water System will occur prior to public commercial use beyond any of the user thresholds. The definition of a public water system (PWS) can be paraphrased as follows:

- A system for the provision of water to the public through pipes or other constructed conveyance, including collection, treatment, storage, or distribution facilities used in connection with such a system (whether under the system's control or not)

- Distribution system with more than 15 services connections or that regularly services 25 individuals daily at least 60 days per year.

To fully understand the triggers and classifications of PWS it is necessary to review the full definitions contained in Regulation 11:

(60) “PUBLIC WATER SYSTEM” or “PWS” means a system for the provision to the public of water for human consumption through pipes or other constructed conveyances, if such system has at least fifteen service connections or regularly serves an average of at least 25 individuals daily at least 60 days per year. A public water system is either a community water system or a non-community water system. Such term does not include any special irrigation district. Such term includes: (a) Any collection, treatment, storage, and distribution facilities under control of the supplier of such system and used primarily in connection with such system. (b) Any collection or pretreatment storage facilities not under such control, which are used primarily in connection with such system.

(11) “COMMUNITY WATER SYSTEM” means a public water system that supplies at least 15 service connections used by year-round residents or that regularly supplies at least 25 year-round residents.

(50) “NON-COMMUNITY WATER SYSTEM” means a public water system that is not a community water system. A non-community water system is either a “transient, non-community water system” or a “non-transient, non-community water system.”

(51) “NON-TRANSIENT, NON-COMMUNITY WATER SYSTEM” means a public water system that regularly serves a population of at least 25 of the same people for at least six months per year and is not a community water system.

(52) “NON-TRANSIENT POPULATION” means the average number of people served per day during the year or normal operating period(s), who do not reside at the place supplied by the system, but have a regular opportunity to consume water produced by the system. Regular opportunity is defined as four or more hours per day, for four or more days per week, for six or more months per year.

(84) “TRANSIENT, NON-COMMUNITY WATER SYSTEM” means a non-community water system that serves a population of at least 25 people per day for at least 60 days per year and is not a non-transient, non-community water system or a community water system.

(85) “TRANSIENT POPULATION” means the average number of individuals served per day during the year or annual operating period(s), who have an opportunity to consume water from the system, but who do not meet the definition of either resident population or non-transient population.

For Nutrient Farm, we see the commercial uses serving the public (restaurant, adventure park, campground, etc.) as the probable trigger for the PWS rather than farm operations. This would likely be a “TRANSIENT, NON-COMMUNITY WATER SYSTEM” (TNC) classification and 25 persons for more than 60 days per year using the system.

There are numerous requirements for the operation of a PWS. As a baseline, CDPHE requires all PWS to have a chlorine residual. This is to ensure disinfection of the entire distribution system up to the point of use. CDPHE does not allow point of use treatment for primary, acute health concerns like bacteria and viruses (which is the purpose of chlorine). The only other approved product for residual disinfectant is chloramines, which is a combination of ammonia and chlorine. There are several compliance requirements for a PWS, including chlorine residual, total coliform and Lead & Copper. The compliance point for these items is at the point of entry to the served facilities. The reason being is that the PWS must ensure they are delivering a safe product. This is typically done at a sink so that it can be collected year-round. Beyond this compliance point, CDPHE does not regulate what happens to the water. Meaning a facility can, at their own risk, do additional

treatments such as Reverse Osmosis, Softening, Carbon filtration, Ozone, etc. These additional treatments must be carefully applied to avoid creating unintended consequences like corrosive water.

For the PWS, an inventory form is submitted to the CDPHE, which will review the submission and assign a Public Water Supply Identification number (PWSID) and an initial monitoring plan that specifies the water quality sampling requirements. During the first year of monitoring, the initial monitoring plan will be reviewed quarterly by CDPHE and the system should submit permit application. The permit application process for a Transient Non-Community? (TNC) system is a single form and review is expedited.

In brief, the regulatory compliance requirements for this PWS are ultimately determined by CDPHE but would likely include at least:

- Continuous chlorination and weekly chlorine monitoring of the water supply
- Quarterly, Semi-annual, and Annual water quality reporting to CDPHE
- D-licensed operator to maintain and operate the water supply system
- All pertinent CDPHE requirements in Regulation No. 11 (5 CCR 1002-11)

Given the above, Nutrient Farm envisions putting a central water treatment facility online prior to exceeding the PWS user thresholds. The location of the facility is currently planned at the southern end of Nutrient Farm Road in the central portion of the west ranch as shown on the Conceptual Water and Sewer Plan. The supply ponds southeast of the intersection of Adventure Road and Nutrient Farm Road will provide raw water to the treatment facility. For the ultimate, potable West Ranch uses (Areas 6, 7 & 8), maximum day demands are expected to be on the order of 50 to 60 gpm. The treatment facility will be designed for a slightly higher capacity.

Many technologies could be utilized for the treatment facility, but the overall processes are likely to consist of sedimentation in the ranch supply ponds, filtration, chlorination, and pumping to contact piping, the potable distribution system and storage tank(s). The Garfield County PUD approval will essentially fix the approved uses and allowable timelines. As ranch operations are gearing up over the next couple of years, SGM will work with Nutrient Farm to finalize the details of the Basis of Design Report (BDR) and initiate CDPHE permitting of the facility.

3.3 Nutrient Farm Distribution System

The Nutrient Farm potable water distribution system is located entirely on the West Ranch as shown on the Conceptual Water and Sewer Plan. Treated water will be pumped through a 10” HDPE transmission main to a tank on the hill side south of the West Ranch.

New 8” HDPE water mains will be connected to the transmission mains to form a loop serving all of the individual uses within Areas 5, 6, 7 and 8. In some cases, 6” HDPE branches will spur off the 8” loop to serve an area. Fire hydrants will be placed at a maximum spacing of 500 feet in all developed areas with buildings and will be located for maximum accessibility for fire-fighting personnel. (Also, note there will be additional hydrants off the ponds and raw water piping to provide supplemental fire protection. Specifics, will be worked out with CRFR during the design stage as the various uses develop.)

If the new tank is set at an elevation of approximately 5955 feet to match the normal water level elevation in the existing Riverbend tanks as shown, normal system pressures in the Nutrient Farm

Areas 5, 6, 7 and 8 will range from about 45 psi at the retreat in Area 8 South to a maximum of about 145 psi at the restaurant and other facilities in Area 6 North.

Mainline valves will be placed at tees and regular intervals along the mains so minimal service disruption occurs in the event of a break or leak repair. Minimum water service sizes of 1" will be utilized throughout the entire system. Each water service line will be tapped from the distribution main and have its own curb valve. Nutrient Farm will likely use master meters to track production but may not have individual meters at each service.

3.4 Nutrient Farm Water Storage

The Nutrient Farm potable water system can be served by storage tank placed at an elevation roughly equivalent to the Riverbend Subdivision Filing 2 tanks or about 5955' The Conceptual Water and Sewer Plan shows a potential location for a 150,000 gallon tank south of the intersect of Adventure Road and Nutrient Farm Road. This tank location is high above the users and will provide sufficient pressures throughout Nutrient Farm Areas 6, 7 and 8.

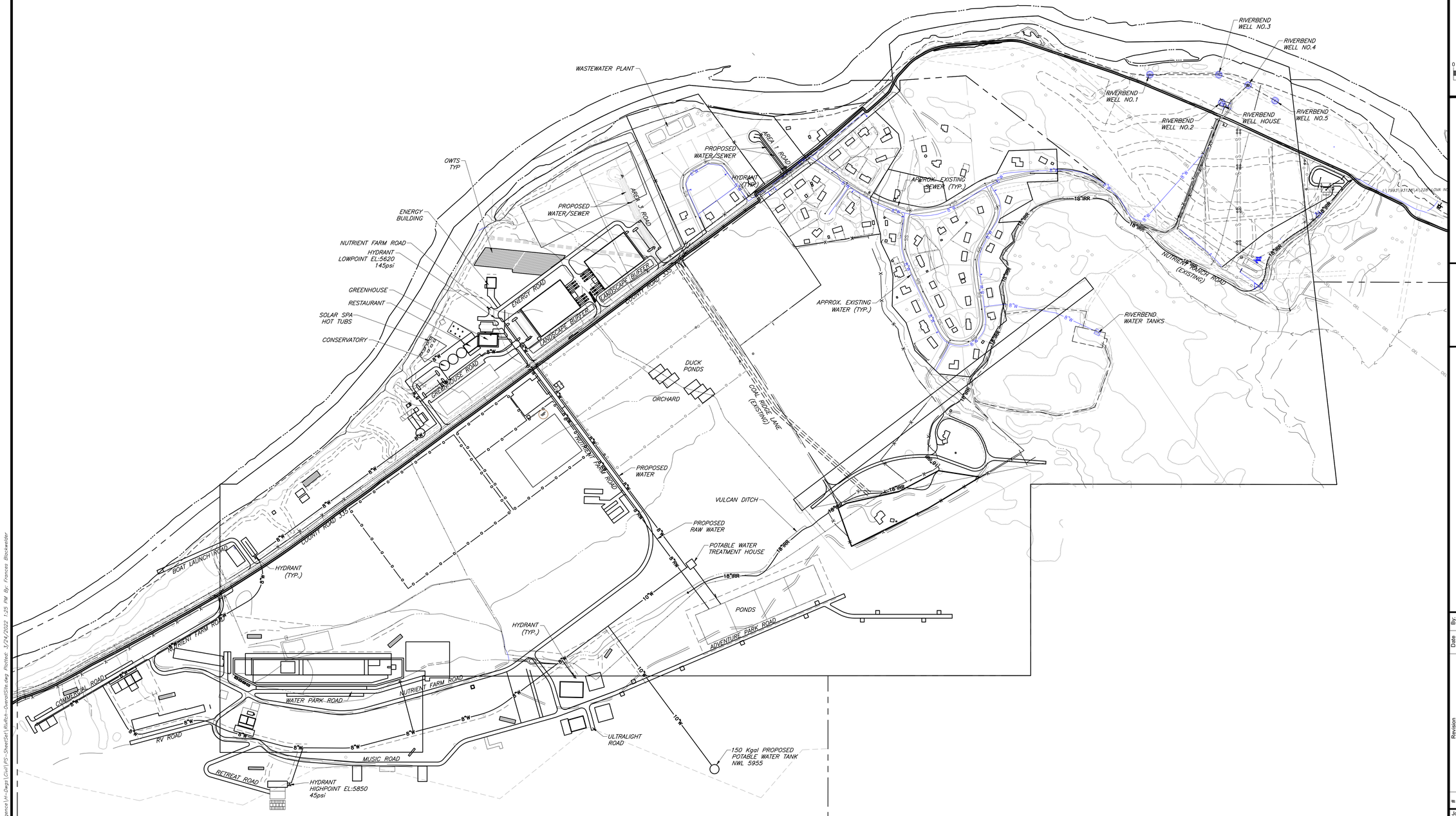
Just like the Riverbend system, the required storage capacity for a Nutrient Farm can be evaluated in terms of equalization, fire and emergency needs. One difference is that Nutrient Farm will be providing abundant raw water storage in ponds in various locations in the West Ranch. There will be both dry hydrants and wet hydrants available for CRFR adjacent to the proposed uses. These facilities may reduce the potable fire storage requirements that CRFR has for the Nutrient Farm system.

Regarding equalization storage, the Nutrient Farm potable water supply will be designed to provide water at the max day demand (50 to 60 gpm) for proposed ultimate conditions. Estimated ultimate peak hour demands are 1.5 X 60 = 90 gpm. Tank drawdown can be estimated by 6 hours of peak hour flow – production. So here we have (90 – 60 = 30 gpm) x 6 hours x 60 min./hour = 10,800 gallons.

For the required fire storage, we'll plan on the same 1000 gpm for 2 hours = 120,000 gallons allotted for the Riverbend system.

For emergency storage component, that leaves 150,000 – 10,800 – 120,000 = 19.200 gallons. Nutrient Farm may elect to provide a larger or smaller tank based on CRFR recommendations. Again, it is beneficial to have a dual fire protection system if either of these systems is out of service for any reason.

----------End----------



NOTE:

There is no central wastewater system proposed for the Nutrient Farm West Ranch Areas 6, 7 and 8. Refer to the OWTS report that accompanies the PUD submittal.

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:	3.24.22
QC: DMK	PE: DMK
File:	RivRch-OverallSite

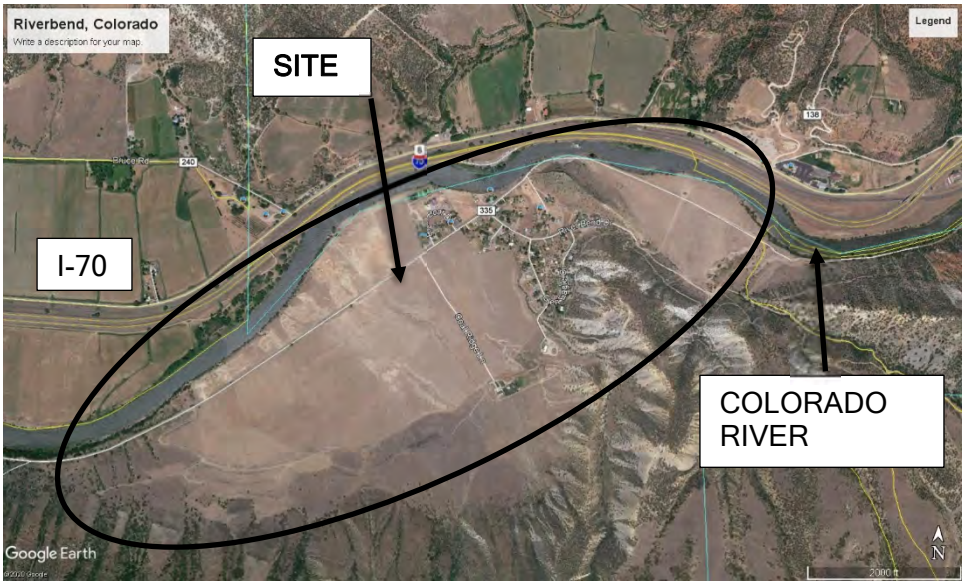
Title: Water and Sewer Plan

Dwg No. 1

Of : 1

OWTS ENGINEERING REPORT

NUTRIENT FARM P.U.D.



Prepared by

SGM

SEPTEMBER 2021

NUTRIENT FARM P.U.D

"I hereby affirm that this report for the Onsite Wastewater Treatment System (OWTS) for Nutrient Farm was prepared by me or under my direct supervision for the Owners thereof in accordance with the provisions of Garfield County's Land Use and OWTS Regulations and approved variances and exceptions listed thereto. I understand the County does not and will not assume liability for OWTS facilities designed by others."

Terrence L. Bendetto

Licensed Professional Engineer, State of Colorado

License No. _____
(Affix Seal)

PREPARED BY:
TERRY BENDETTI, P.E.
SGM Project # 2021-145-NoreTrust

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1.0 Introduction

SGM was engaged by Nutrient Holdings, LLC to complete a sewage disposal adequacy report to support their Planned Unit Development (PUD) application to Garfield County. The property is situated in Garfield County on the south bank of the Colorado River approximately 2 miles east of New Castle, on Colorado River Road (County Road 335). The Colorado River borders the north boundary of the property and the south boundary is bordered by the steep hillsides of Coal Ridge, which is part of the Grand Hogback.

1.1 Land Use History

The entire property covers approximately 1,140 acres (1.8 square miles). Of the total area, approximately 640 acres (1 square mile) is hilly terrain with sparse sage and scrubland cover, planned for open space in the PUD application. An existing irrigation ditch, Vulcan Ditch, cuts through the property at the base of Coal Ridge providing irrigation water to hay fields that slope gently away from the ditch toward the Colorado River.

The first Sketch Plan for the Riverbend PUD was reviewed and approved by the Board of Garfield County Commissioners on June 26, 1973. This first plan was for a 617 residential community, which included

- An outdoor education center.
- Riding stables.
- Open space.
- Pasture.
- A demonstration cattle ranch.

The sketch plan was reviewed and approved by the Planning Commission on January 14, 1974. After approval, changes to the plan were sought by the Developer. The County had adopted new zoning regulations between approval of the plan and changes being sought, so a formal PUD zone change accompanied the change request.

The second iteration of the PUD was documented in the Preliminary Map of the Riverbend PUD, dated August 1976. The August 1976 Map showed the 1,180.83-acre development to include:

- Residential units (118 single family and 80 multi-family).
- A school site.
- A commercial site.
- A community center/common area.
- Park/playground space.
- A stable.
- A sewage treatment area.
- A 376-acre agricultural area intended to operate as a working ranch.

The 1,180.83-acre property was divided into 11 development blocks, including the agricultural/open space area. At the time, the developer envisioned the PUD as homes for local working families and anticipated build-out of the PUD within 10 years. However, only a

few of the residential areas identified in the August 1976 Map have since been subdivided and developed with homes. Of the original 1,180.83-acre PUD, approximately 1,140 acres has not been developed. This acreage has been transferred to Nutrient Holdings, LLC and is the subject property for this sewage disposal adequacy report.

2.0 Planned Land Use

2.1 Planned Land Use

Except for one ranch house, the subject property is undeveloped. Proposed development for the property under the PUD application includes:

- Existing and proposed residential development, proposed land use areas 1 through 4.
- A working farm with irrigated crops and livestock, proposed land use area 5.
- Several farm-related tourism businesses (such as a farm store, adventure farm, and a u-pick orchard), proposed land use area 6.
- Restaurants, proposed land use area 6.
- Commercial and professional buildings, proposed land use area 7.
- Several other tourist attractions (such as an off-road adventure park, campground, water park, music and performing arts venues, and a retreat), proposed land use area 8.
- Open space areas, proposed open space areas A, B, C and D.

2.2 Wastewater Systems for Planned Land Uses

The PUD application for the subject property proposes eight land use areas, shown on Figure 2 of the OWTS Preliminary Analysis and Design Report, found in the Appendix. Table 1 indicates the type of wastewater disposal system proposed for each land use area.

TABLE 1 - Proposed Sewage Disposal System

Land Use	Type of Sewage Disposal System	Approximate Acreage
Area 1	Riverbend Water and Sewer Company	5.50
Area 2	Onsite Wastewater Treatment System	42.14
Area 3	Riverbend Water and Sewer Company	9.46
Area 4	Riverbend Water and Sewer Company	1.12
Area 5	Onsite Wastewater Treatment System	73.99
Area 6	Onsite Wastewater Treatment System	54.70
Area 7	Onsite Wastewater Treatment System	12.31
Area 8	Onsite Wastewater Treatment System	168.25

2.3 Existing Riverbend Wastewater System

Land use areas 1, 3 and 4 are proposed for residential development and are immediately adjacent to the existing Riverbend Subdivision. These three areas will be connected to the existing wastewater treatment system for the Riverbend Subdivision. The existing system is owned, operated, and maintained by Riverbend Water and Sewer Company.

Seventeen, one-half acre lots with one additional dwelling unit (ADU) are proposed for land use areas 1, 3 and 4. The calculated EQR for these land use areas is 30.6 (17 + 17(0.8)). The existing treatment system has the design capacity to treat the additional wastewater flow from these proposed areas.

2.4 Planned Onsite Wastewater Treatment Systems (OWTS)

Land use areas 2, 5, 6, 7 and 8 will have onsite wastewater treatment systems (OWTS) installed to treat sewage wastewater. This type of wastewater system is applicable in Garfield County if the following criteria stated in Article 7-105.B of the County's Land Use Code is met. The criteria is:

- The areas are located farther than 400 feet from a sewage treatment facility.
- Existing facilities are not adequate to serve the proposed development.
- Connection is not practicable and feasible.
- The proposed areas are greater than one acre in size.

Land use areas 2, 5, 6, 7 and 8 are located farther than 400 feet from the closest sewage treatment facility, which is the existing Riverbend Wastewater Treatment Facility. This facility does not have the design capacity to treat the estimated wastewater generated in these land use areas without being physically enlarged.

The next nearest wastewater facility connection is to the west, which is the Town of New Castle. To connect to the Town's system would require installation of a lift station and over two miles of piping. In addition, the sewer extension would need to cross the Colorado River and I-70.

SGM is of the opinion that:

- Connection to either of the nearest treatment facilities is neither physically nor economically feasible.
- These land use areas meet requirements outlined in Section 7-105.B of the County's Land Use Code, so OWTSs are acceptable for these areas.

3.0 Regulatory Authority

The State of Colorado mandated local boards of health adopt Colorado State Regulation 43 in order to preserve the environment and protect the public health and water quality; to eliminate and control causes of disease, infection and aerosol contamination; and to reduce and control the pollution of the air, land and water. Garfield County adopted Colorado State Regulation 43 on July 2, 2018 as "Garfield County On-site Wastewater Treatment System (OWTS) Regulations", hereinafter called Reg43. Reg43 establishes minimum standards for the location, design, construction, installation, and alteration of septic systems within Garfield County and gives the local authority, Garfield County's Environmental Health Department, the authority to administer and enforce minimum standards outlined in Reg43.

In order for a sanitary sewer OWTS to be administered and enforced by a local authority, the site the system is to serve:

1. Must have a wastewater design capacity less than or equal to 2,000 gallons per day (gpd) and must comply with Reg43.
2. Or, if certain requirements contained in the Colorado Water Quality Control Division's (CWQCD) "Water Quality Site Application Policy" (WQSA-6) are met and OWTS designs meet Reg43 requirements, a site may be allowed to have multiple OWTS capable of treating up to 6,000 gpd of wastewater flow.

If a site's daily wastewater flow rate exceeds 2,000 gpd and item 2 cannot be met, or a site produces more than 6,000 gpd of wastewater flow, a site location and design approval under the requirements of Colorado's Regulation No. 22 is required.

3.1 Water Quality Site Application Policy - WQSA-6

WQSA-6 was published by the Colorado Water Quality Control Division (CWQCD) in order to clarify the applicability of Regulation 22 to multiple OWTSs that have a total design capacity of 2,000 gpd or more and are serving as a community system, a single property or wastewater generator. Lack of guidance led to inconsistent interpretation as to whether a site application approval and discharge permit are required for sites with multiple systems. Guidelines established in WQSA-6 clarifies when sites with multiple OWTSs shall be treated as a single wastewater treatment works subject to Regulation No. 22.

The policy of WQSA-6 is that multiple OWTSs shall be treated as a single wastewater treatment works subject to Regulation 22 if the combined design capacity of the systems is 2,000 gpd or more, irrespective of whether the systems were constructed at the same time or at different times, and where one or more of six conditions is/are met.

A copy of WQSA-6 is included in the Appendix where the six conditions can be reviewed, in addition to other requirements should the combined capacity of individual site systems under consideration be greater than 6,000 gpd.

3.2 Applicability of WQSA-6 to Subject Property

Subsection 2.4 states land use areas 2, 5, 6, 7 and 8 will utilize OWTSs for disposal of wastewater. Each land use area has sufficient acreage to be considered separate, distinct sites when applying WQSA-6.

To determine how WQSA-6 applies to each land use area the following is required:

- Total design flow for each land use area.
- Number of OWTS to be installed in each land use area.
- Calculation of the horizontal influence area for each system per note 1criteria of WQSA-6.

3.2.1 Daily Wastewater Flows and Number of OWTS at Full P.U.D. Development

SGM performed a preliminary OWTS design for each proposed land use area. Ultimate design flows at full development and the number of systems for each land use area were determined as part of the preliminary designs and are shown in the following table.

TABLE 2 - Ultimate Wastewater Flows and Number OWTS

Area	Proposed Land Use Operations	Wastewater Flow Classification	Design gpd	Number of OWTS
2	Existing Rural Single Family Residence	Residential	N/A	1
5	Rural Single Family Residence, 4 Bedroom + 1 ADU, assumed	Residential	600	1
6	Farm Store, Restaurant, Adventure Farm	Commercial	10,735	2
7	Commercial/Professional/Retail Buildings	Commercial	1,000	1
8	Adventure Park; Water Park, Pool and Campground; Self-Service Laundry; RV Park; Retreat and Cabins	Commercial	9,455	7
Total Combined Design Capacity			21,790	12

3.3 Horizontal Influence Areas (HIA)

It was previously stated in Section 3.1 that multiple OWTSs having a combined design capacity greater that 2,000 gpd could be considered separate systems if they do not serve a single occupied structure, are not interconnected and their HIA's do not overlap. Of the six conditions stated in WQSA-6, found in the Appendix, condition 2 applies to the Nutrient Farm P.U.D. Application.

Condition 2 requires that the septic systems serve more than one habitable structure on a single property, owned by one person or company, and the HIA to be maintained from one system's STA overlaps the minimum horizontal separations of another facility's STA, wells, streams, lakes, water course, or potable water lines as calculated using the method described in note 1, WQSA-6.

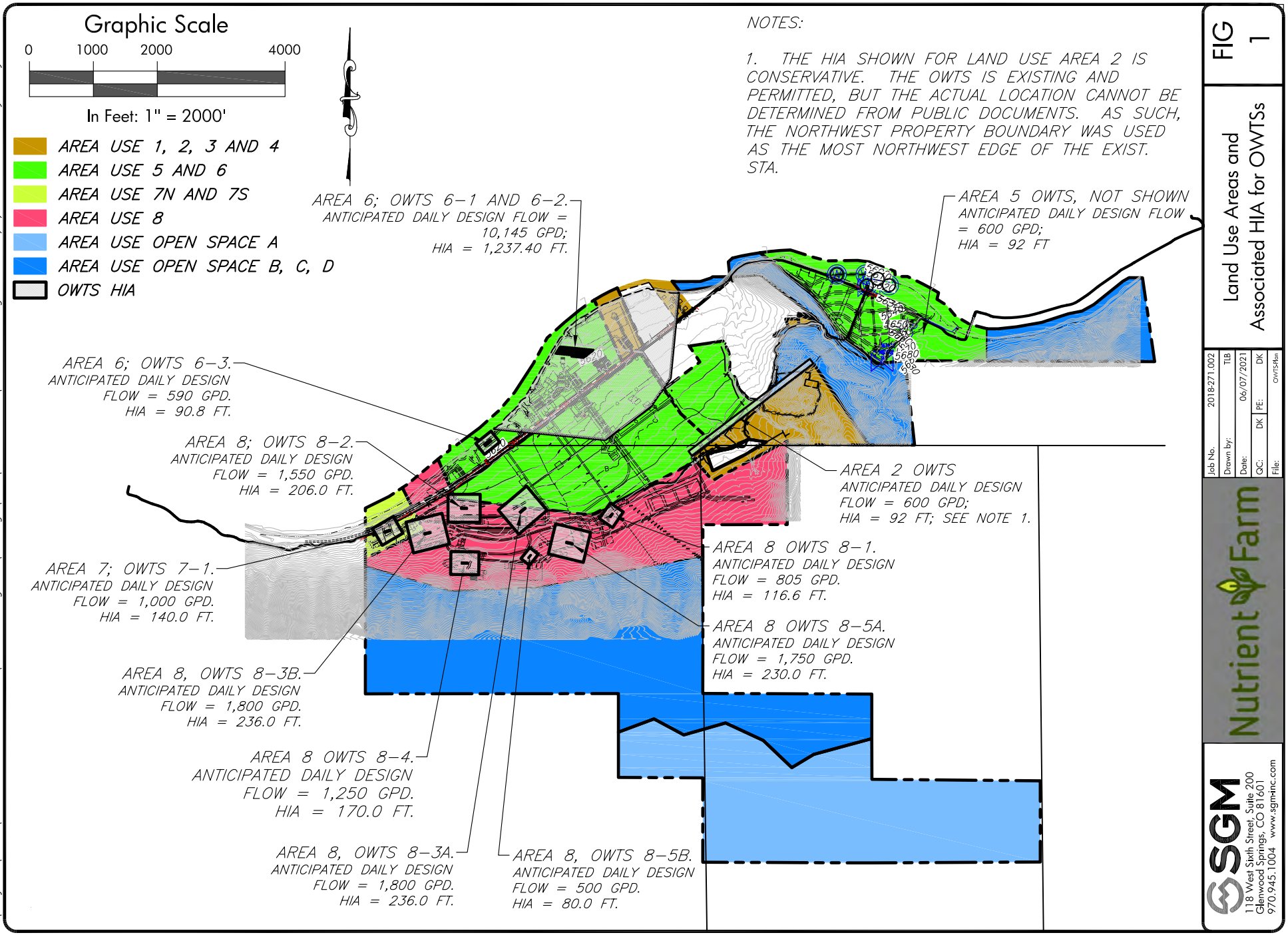
The OWTSs proposed for the land use areas of this P.U.D. do not serve a single occupied structure and are not interconnected. The last requirement is to determine if the HIA of any OWTS's STA overlaps another systems STA.

Note 1 of WQSA-6 requires the following formula be used to calculate the offset distance for an OWTS's HIA.

HIA Required = 100 + [(DF - 1000) / 100] X 8,
Where DF = Design Flow = 1.5 x DC.
DC = Design Capacity = Average Daily Flow at Maximum Occupancy.

The outer boundary of the STA is offset the calculated HIA distance for each OWTS, if the offset boundaries overlap, the systems are considered one system. If there is no overlap, each system is considered separate and can have a daily wastewater flow capacity of up to 2,000 gpd.

In the preliminary design, each STA was sized and had their respective HIAs calculated under full development. Location for each OWTS was selected to ensure no overlapping of any systems HIA would occur, see Figure 1. As such, each OWTS is considered a separate system and can have a design capacity of up to 2,000 gpd, which allows each land use area to have a total design capacity of up to 6,000 gpd before triggering review under Regulation 22 by CWQCD.



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4.0 Environmental Protection Agency (EPA) Class V Injection Wells

Also contained in WQSA-6 is the requirement that in Colorado, the Environmental Protection Agency (EPA) regulates certain septic systems under the "Underground Injection Control Program" (UIC). Any septic system, regardless of size, that:

- Receives any amount of industrial or commercial wastewater (industrial waste disposal wells or motor vehicle waste disposal wells),
- Receives solely sanitary waste with a capacity to serve over 20 or more people per day, also known as large-capacity septic systems,

is considered a Class V Injection Well by the EPA and governed by the UIC Program. General requirement for all Class V wells (with the exception of motor vehicle waste disposal and large-capacity cesspools) is "authorized by rule", which means class V wells may inject as long as:

- They do not endanger USDWs (United States Drinking Waters).
- The well owners or operators submit basic inventory information.

A permit is not required unless the UIC Program Director determines USDWs are being endangered.

The preliminary design indicates that the majority of the STAs will serve more than 20 people per day and will therefore be classified by the EPA as large capacity septic systems. It should be noted that a large capacity septic system is not the same as a large capacity cesspool. According to EPA, a large capacity cesspool is:

> "Typically, a drywell that receives untreated sanitary waste, containing human excreta, which have an open bottom and sometimes perforated sides."

As such, the UIC Program requirements will be met for any OWTS that will serve 20 or more people per day.

5.0 Process Water

According to the Water Adequacy Report, 5,000 gallons of water per day (Process Water) will be used in the process building for cleaning floors, tables and food preparation. This water will not be treated by any of the OWTSs, but will be treated by a separate system for reuse as landscape and agricultural irrigation. Treatment of the process water for water quality will meet requirements of Colorado's Regulation No. 84, Reclaimed Water Control Regulation prior to its use.

6.0 Conclusion

SGM concludes that:

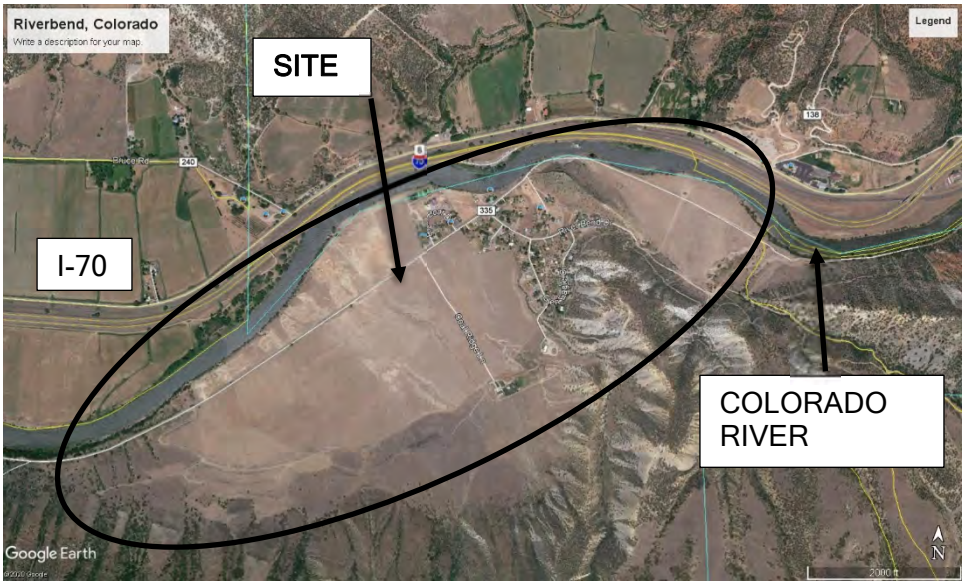
- The subject property has the ability to provide adequate sewage disposal per State and Local regulations for the proposed P.U.D. application.
- Administration and enforcement should be under Garfield County's Environmental Health Department until the 6,000 gpd capacity is reached for each land use area.
- When the 6,000 gpd capacity for any land use area is reached, a review by CWQCD under requirements of Regulation 22 will be required.
- Basic inventory information should be provided to the EPA to comply with their UIC program for each OWTS's STA serving 20 or more individuals per day.
- Process water is not sewage waste and should not be treated by any of the OWTS, but should be treated in accordance with Regulation No. 84 for reuse as landscape and agricultural irrigation water.

Appendix A

OWTS Preliminary Analysis and Design

OWTS PRELIMINARY ANALYSIS AND DESIGN

NUTRIENT FARM



Prepared by

SGM

SEPTEMBER 2021

NUTRIENT FARM

"I hereby affirm that this report and the accompanying plans for the Onsite Wastewater Treatment System (OWTS) for Nutrient Farm were prepared by me or under my direct supervision for the owners thereof in accordance with the provisions of Garfield County's Regulation 43 and approved variances and exceptions listed thereto. I understand the County does not and will not assume liability for OWTS facilities designed by others."

Terrence L. Bendetto

Licensed Professional Engineer, State of Colorado

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(Affix Seal)

PREPARED BY:
TERRY BENDETTI, P.E.
SGM Project # 2018-271.002

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1.0 Introduction

The purpose of this report is to describe results of a preliminary investigation and reconnaissance for the installation of onsite wastewater treatment systems (OWTS) for the property areas described in section 2.1. Reports describing detailed soil evaluations and final OWTS design documents will be prepared for each area as required by Garfield County's Regulation 43 at the time permit applications for development of each property area is/are submitted to the County.

2.0 Preliminary Investigation

2.1 Property Information

Owner: Nutrient Holdings, LLC.

Legal Description for Property Areas 1, 4 and 5: Found in Garfield County Accessors Office for Account Number R017237, Parcel Number 212335300081.

Legal Description for Property Area 2: Found in Garfield County Accessors Office for Account Number R170297, Parcel Number 212334400007.

Legal Description for Property Areas 3, 6, 7 and 8: Found in Garfield County Accessors Office for Account Number R170278, Parcel Number 218306100057.

Existing Structures: There is an existing 4 bedroom residence with outbuildings located in proposed Area 2. These structures are to remain with no proposed alterations in this PUD. The following is according to the County's Assessor:

- The structure is a farm/ranch home.
- The structure has two stories with a basement.
- The structure is wood framed.
- The structure was built in 1993.
- The structure has a gross living area of 2,728 sf with 748 sf of finished basement and 666 sf of unfinished basement.
- The structure has 3.5 baths.

Domestic Water: There are five existing wells located in the northeast portion of the property shown on the OWTS site plan.

2.2 Local Public Health Agency Records

Existing Sewage Disposal Systems: According to County Public Records, a Building Permit for the existing residence located in proposed area 2 was:

- Applied for on 6/1/1993.
- Issued on 6/1/1993.
- Final inspection of 1/3/1994
- And a Certificate of Occupancy issued on 1/20/1994.

The existing residence uses an ISDS (Individual Sewage Disposal System) and the building permit indicates an ISDS permit was included, but no information on the ISDS permit could be obtained. Therefore,

- The size of the septic tank is not known.
- The square footage of the soil treatment area is not known.
- The type of soil treatment area is not known, i.e. bed or trench.
- The distribution media in the soil treatment area is not known.
- And the method of effluent application in the soil treatment area is not known, i.e. gravity, dosed or pressure.

2.3 Topography

Topography showing existing conditions has been provided for the subject property. The topography indicates slope shapes are favorable to support soil treatment areas (STA) in accordance with criteria outlined in Reg43. It also indicates the landscape position is favorable per Reg43, which is further described in following sections for each preliminary OWTS design.

OWTS can be installed on slopes up to 30 percent (3.3H:1V) without having to be designed by a professional engineer registered and licensed to practice in the State of Colorado. Per the NRCS soil unit data, there may be some areas that may be in excess of the 30 percent criterion that would require engineered design.

2.4 Soil Data

The National Resource Conservation Service (NRCS) provides soil data and information produced by the National Cooperative Soil Survey. This data can be used for many purposes, which one is developing a preliminary understanding of the soil type expected to be encountered in areas where STA are to be located. The proposed STA for each proposed OWTS will be located in one of the following NRCS soil units, 29, 30, 47 or 51as shown on F.

Soil Units 29 and 30 consists of Heldt clay loam, which has grades between 3 to 6 percent for soil unit 29 and 6 to 12 percent for unit 30. NRCS ratings for the percentage of clays, sands and silts for these soil units are 47.5%, 23.3% and 29.2%, respectively. NRCS reports the depth to the most restrictive layer for these soil units to be greater than 6.5 feet.

Using the NRCS percentages for clays, sands and silts in the United States Department of Agriculture (USDA) textural triangle, these soil units have a soil texture of silty clay and a soil type of 4 or 4A. More information is required to determine the true soil type classification and long term application rate (LTAR) to use, which will be collected during the detailed soil investigation. However, until this information is obtained, the soil type classification of 4A is used for preliminary design. Soil type 4A has a more stringent LTAR than soil type 4, 0.15 g/d/ft^2 compared to 0.20 g/d/ft^2, respectively.

Soil type classification of 4 or 4A for soil units 29 and 30 is consistent with the reported NRCS septic tank absorption field rating, which is very limited due to slow movement of water through these soil units, having a rating of 1.0.

Soil unit 47 consist of Nihill channery loam, which has grades between 6 to 25 percent. NRCS ratings for the percentage of clays is 21.0%. NRCS ratings for sands and silts are not

provided. NRCS reports the depth to the most restrictive layer as being greater than 6.5 feet.

Using the USDA textural triangle, a soil with a clay percentage of 21% would contain 79% sand and classify as loamy, or soil type 1. More information is required to determine the true soil type classification and LTAR to use, which will be collected during the detailed soil investigation. However, until this information is obtained, the soil type classification of 1 is used for preliminary design for OWTS proposed in this soil unit. Type 1 soils have a LTAR of 0.80 for TL-1.

Soil type classification of 1 for soil unit 47 is consistent with the reported NRCS septic tank absorption field rating, which is very limited, primarily due to slopes and secondary to the possibility of large stones being found in this soil unit. However, these limitations can be overcome by engineered design.

Soil unit 51 consists of Olney loam, which has grades between 6 to 12 percent. NRCS ratings for the percentage of clays, sands and silts for this soil unit are 19.0%, 66.0% and 15.0%, respectively. NRCS reports the depth to the most restrictive layer as being greater than 6.5 feet. Under preliminary design conditions, this soil unit has a USDA soil texture of loam and a soil type of 2 or 2A. More information is required to determine the true soil type classification and LTAR to use, which will be collected as part of the detailed soil investigation. However, until this information is obtained, the soil type classification of 2A will be used. Soil type 2A has a more stringent LTAR than soil type 2, 0.50 g/d/ft^2 compared to 0.60 g/d/ft^2, respectively.

Soil type classification of 2 or 2A for soil unit 51 is consistent with the reported NRCS septic tank absorption field rating, which is somewhat limited due to slopes and slow water movement through this soil unit. The slow water movement is rated as 0.47, which is indicative of a LTAR of 0.5 g/d/ft^2 and the slope as 0.04.

The following table summarizes soil type classification for the NRCS soil units. Figure 1 shows their relationship to the proposed development.

NRCS Soil Unit	29	30	47	51
Soil Type Classification	4A	4A	1	2A
LTAR	0.15	0.15	0.8	0.5

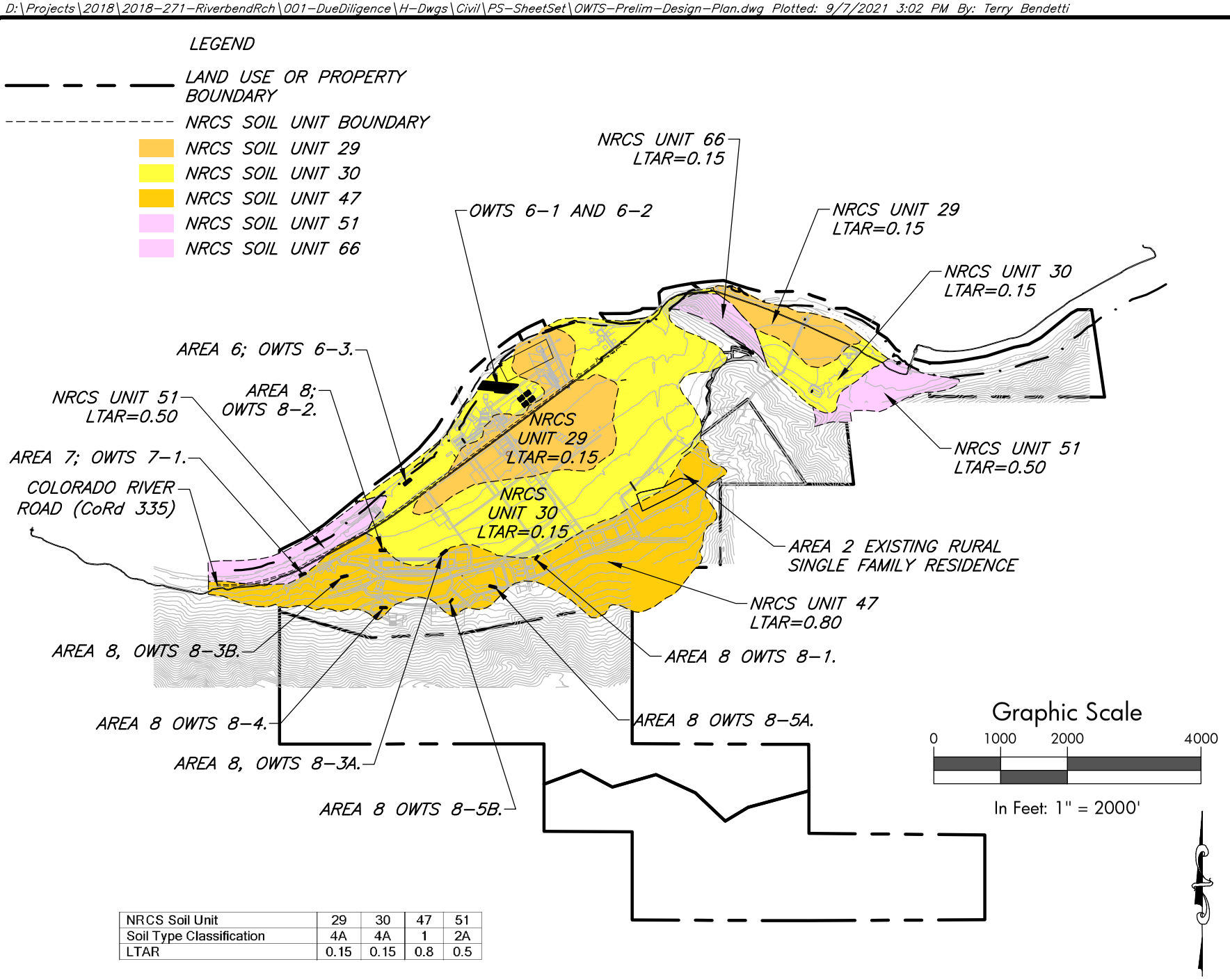
2.5 Location of Physical Features Requiring Setbacks

Setbacks per Table 7-1 of Reg43 are shown in the following table and on Figures 3 through 11. The minimum required setback distances can be met in all land use areas where wastewater is proposed to be treated by an OWTS.

	Well	Potable Water Supply Line	Structure with Footing Drains	Property Lines	Intermittent Irrigation	Cut Bank, Dry Gulch	Septic Tank
Septic Tank	50	10	5	10	10	10	--
Effluent Line	50	5	N/A	10	10	10	--
STA	100	25	20	10	25	25	5

*All setback distances are in feet.

See OWTS Figures 3-11 for setbacks required for each individual system.



NRCS Soil Unit	29	30	47	51
Soil Type Classification	4A	4A	1	2A
LTAR	0.15	0.15	0.8	0.5

FIG 1

NRCS Soil Unit Map

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3.0 Daily Wastewater Flow Estimates

Daily wastewater flow estimates for land use areas 2, 5, 6, 7 and 8 are based on daily wastewater flows outlined in Tables 6-1 and 6-2 of Reg43 and data published in the Water Adequacy Report.

TABLE 2 - Design Wastewater Flow for Areas 2, 5, 6, 7, & 8

Area	Proposed Land Use Operations	Wastewater Flow Classification	GPD/ Person	No. Persons	Design gpd
2	Existing Rural Single Family Residence	Residential	N/A	N/A	N/A
Anticipated Total Daily Design Flow for Area 2					N/A
Area	Proposed Land Use Operations	Wastewater Flow Classification	GPD/ Person	No. Persons	Design gpd
5	[1]Rural Single Family Residence, 4 Bedroom + 1 ADU, assumed	Residential	75	8	600
Total Design Wastewater Flow to Size OWTS 5					600
Anticipated Total Daily Design Flow for Area 5					600
Area	Proposed Land Use Operations	Wastewater Flow Classification	GPD/ Person	No. Persons	Design gpd
6-1	[2]Farm Store	Commercial	0.1/ft^2 of Retail space	4,000 ft^2	400
	[3,4]Working Farm, U-Pick Orchard	Commercial	20/ Employee	4 Employees	80
		Commercial	5/ Visitors	25 Visitors	125
	[3]Processing Building, Greenhouse and Utility Buildings	Commercial	20/ Employee	27 Employees	540
	[11]Process water	Commercial	Reuse	5,000	5,000
Total Design Wastewater Flow to Size OWTS 6-1					1,145
Area	Proposed Land Use Operations	Wastewater Flow Classification	GPD/ Person	No. Persons	Design gpd
6-2	[5]Restaurant	Commercial	50/Seat	180 Seats	9,000
Total Design Wastewater Flow to Size OWTS 6-2					9,000

Area	Proposed Land Use Operations	Wastewater Flow Classification	GPD/ Person	No. Persons	Design gpd
6-3	[4]Adventure Farm	Commercial	5/Visitor	118 Visitors	590
Total Design Wastewater Flow to Size OWTS 6-3					590
Anticipated Total Daily Design Flow for Area 6					10,735
7	[6]Commercial/Professional/Retail Buildings	Commercial	15/ Employee	50 Employees	750
	[4]Short-term Transient Visitors	Commercial	5/Visitor	50 Visitors	250
Total Design Wastewater Flow to Size OWTS 7					1,000
Anticipated Total Daily Design Flow for Area 7					1,000
8-1	[4]Adventure Park	Commercial	5/ Visitor	25 Visitors	125
	[5]Restaraunt	Commercial	50/Seat	13 Seats	650
	[6]Office	Commercial	15/ Employee	2	30
Total Design Wastewater Flow to Size OWTS 8-1					805
8-2	[7]Water Park and Pool	Commercial	10/Visitor	50 Visitors	250
	[7]Campground Pool	Commercial	10/Visitor	50 Visitors	500
	[8]Self-service Laundry	Commercial	400/ Machine	2 Machines	800
Total Design Wastewater Flow to Size OWTS 8-2					1,550
8-3A	[9]Camp Sites	Commercial	50/Site	36 Sites	1,800
Total Design Wastewater Flow to Size OWTS 8-3A					1,800
8-3B	[10]RV Park	Commercial	100/Site	18 Sites	1,800
Total Design Wastewater Flow to Size OWTS 8-3B					1,800
8-4	[9]Retreat	Commercial	50/Room	12 Rooms	600
	[9]Cabins	Commercial	50/Cabin	13 Cabins	650
Total Design Wastewater Flow to Size OWTS 8-4					1,250
8-5A	[4]Music Festival	Commercial	5/Visitor	350	1,750
Total Design Wastewater Flow to Size OWTS 8-5A					1,750
8-5B	[4]Performing Arts Center	Commercial	5/Visitor	100	500
Total Daily Design Flow to Area 8-5B					500
TOTAL DESIGN FLOW FOR AREA 8					9,455

[1] Table 6-1 of Reg43 – 5 bedroom home.
[2] Table 6-2 of Reg43 – Stores and shopping centers.
[3] Table 6-2 of Reg43 – Factories and plants exclusive of industrial wastewater per employee per eight-hour shift with no showers.
[4] Table 6-2 of Reg43 – Facilities with short term or transient visitors.
[5] Table 6-2 of Reg43 – Restaurant open for 1 or 2 meals per day.
[6] Table 6-2 of Reg43 – Office Building per employee per 8 hour shift.
[7] Table 6-2 of Reg43 – Swimming pools and bathhouses.
[8] Table 6-2 of Reg43 – Self-service laundry per machine.
[9] Table 6-2 of Reg43 – Resort night and day or Campground per camp site.
[10] Table 6-2 of Reg43 – Travel trailer park with individual water and sewage hookup per site.
[11] This water will not be discharged to a soil treatment area, but use will be applied for under Regulation 84 – Reclaimed Water Control Regulation.

The daily wastewater design flow estimates presented in Table 2 are at full development. Figure 2 depicts the areas associated with the proposed development.

FIG 2

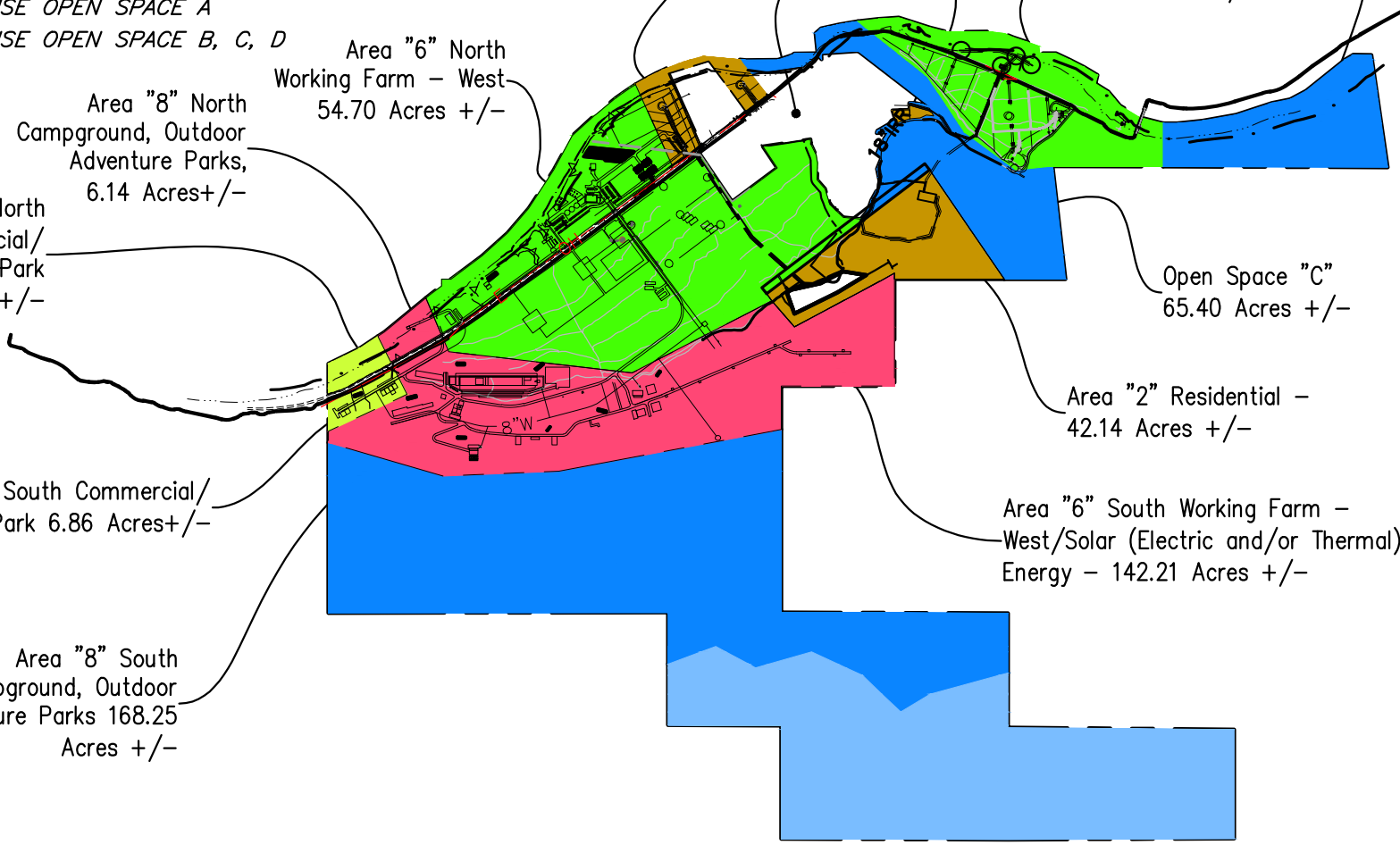
Proposed Land Use

Graphic Scale

0 1000 2000 4000

In Feet: 1" = 2000'

- AREA USE 1, 2, 3 AND 4
- AREA USE 5 AND 6
- AREA USE 7N AND 7S
- AREA USE 8
- AREA USE OPEN SPACE A
- AREA USE OPEN SPACE B, C, D



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4.0 Preliminary Onsite Wastewater Treatment System (OWTS) Design

The following subsections describe designs for preliminary OWTSs for each land use area. Preliminary designs are based on appropriate NRCS soil unit LTARs, described in subsection 2.4 and the daily wastewater flow rates for each land use area described in section 3.0.

4.1 Land Use Area 2

Proposed land use area 2 is for an existing rural single family residence. The existing residence has a permitted OWTS system issued in 1993 and certified for use in 1994. At present, there is no expected changes for this land use area or the existing wastewater treatment system.

No preliminary plan is shown for this system.

4.2 Land Use Area 5

A proposed 4 bedroom single family residence with one additional dwelling unit (ADU) is proposed to be constructed on the area designated for land use 5. A 4 bedroom single family residence with one ADU will require the following.

No. Bedrooms	Design Flow (gpd)
5	600

The STA will be installed in NRCS soil units 29, 30, or 51. Soil units 29 and 30 both classify as soil type 4A, having a LTAR of 0.15. The size of a STA in these soil units, prior to any allowed reductions, will be 4,000 square feet (600 gpd/0.15 g/d/ft^2).

The best design for a STA in this soil type is:

- Use of a trench type treatment area for the STA.
- Use of pressure dosing as the method of effluent application.
- Use of chambers as the type of distribution media in the STA.

Pressure dosing to a trench STA will allow for a reduction factor of 0.8 and using chambers in the STA will allow for a reduction factor of 0.7. Applying these reduction factors to the size of the STA will allow for the STA in soil units 29 or 30 to be reduced to 2,240 square feet, which will require 187 chambers (12 square feet/chamber).

Requirements for this preliminary design based on treatment level 1 (TL-1) for soil units 29 or 30 are shown in the following table.

Septic Tank (gal.)	STA (ft^2)	No. Chambers (dependent on 12ft^2/chamber)	[1]Pump	[2]Automatic Distribution Valve (ATV)
1,500	2,240	187	Yes	(1) x 4

[1]Spacing and sizing of orifices in the distribution pipe and sizing for the pump must be such that a 30-72 inch operating head is present at the distal end orifice. In addition, orifice spacing and sizing will not cause more than a 10% flow differential between the initial orifice to the most distal end orifice.
[2]The ATV should be (1) with 4 outlets.

If the STA for this land use is located in NRCS soil unit 51, which has a soil type classification of 2A and a LTAR of 0.50, the size of the STA, prior to any allowed reductions, will be 1,200 square feet (600 gpd/0.50 g/d/ft^2).

The best design for the STA in this soil type is:

- Use of a trench type treatment area for the STA.
- Use of pressure dosing as the method of effluent application.
- Use of chambers as the type of distribution media in the STA.

Pressure dosing to a trench STA will allow for a reduction factor of 0.8 and using chambers in the STA will allow for a reduction factor of 0.7. Applying these reduction factors to the size of the STA will allow the STA to be reduced to 672 square feet, which will require 56 chambers (12 square feet/chamber).

Requirements for this preliminary design based on TL-1 are shown in the following table.

[1]Septic Tanks (gal.)	STA (ft^2)	No. Chambers (dependent on 12ft^2/chamber)	[2]Pump	[3]Automatic Distribution Valve (ATV)
1,500	672	56	Yes	(1) x 2

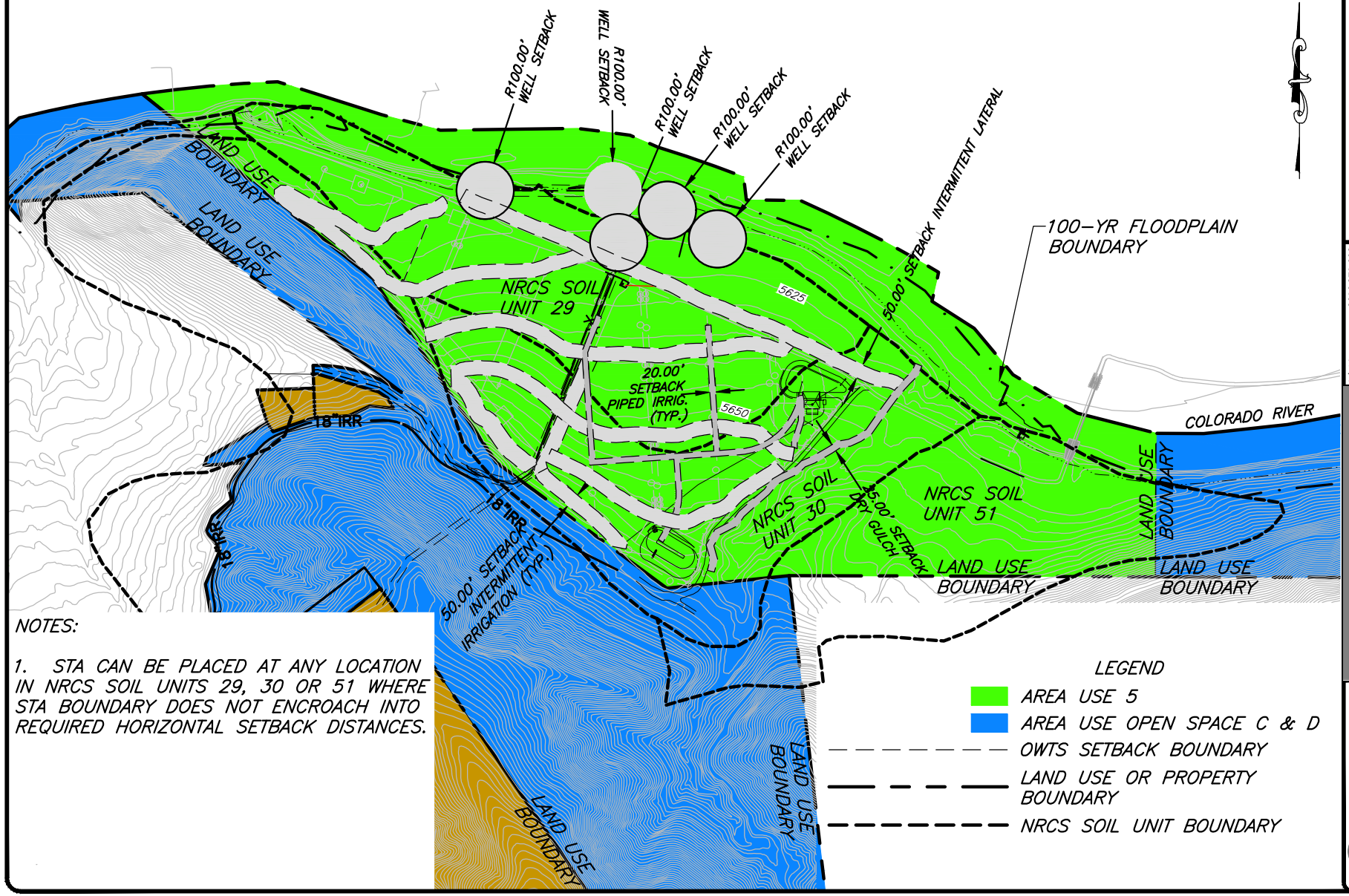
[1]Spacing and sizing of orifices in the distribution pipe and sizing for the pump must be such that a 30-72 inch operating head is present at the distal end orifice. In addition, orifice spacing and sizing will not cause more than a 10% flow differential between the initial orifice to the most distal end orifice.
[2]The ATV should be (1) with 2 outlets.

No. Bedrooms	Design Flow (gpd)	Septic Tank (gal.)	STA (ft^2)	No. Chambers ($12ft^2$)	Pressure Dosed	Automatic Distribution Valve	Soil Type
5	1,500	(1) @ 1,500	672	56	Yes	(1) x2	2A
5	1,500	(1) @ 1,500	2,240	187	Yes	(1) x 4	4A

Graphic Scale

0 250 500 1000

In Feet: 1" = 500'



NOTES:

1. STA CAN BE PLACED AT ANY LOCATION IN NRCS SOIL UNITS 29, 30 OR 51 WHERE STA BOUNDARY DOES NOT ENCROACH INTO REQUIRED HORIZONTAL SETBACK DISTANCES.

LEGEND

- AREA USE 5
- AREA USE OPEN SPACE C & D
- OWTS SETBACK BOUNDARY
- LAND USE OR PROPERTY BOUNDARY
- NRCS SOIL UNIT BOUNDARY

FIG 3

Preliminary OWTS f0r Land Use Area 5

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4.3 Land Use Area 6

There are 3 preliminary OWTS designs for land use area 6.

4.3.1 Land Use Area 6.1 and 6.2

Land use area 6.1 is proposed to be utilized for a farm store, working farm, u-pick orchard, process buildings, a green house and utility buildings. The daily design flow rate for this land use area at full development is calculated to be 1,145 gallons per day.

A restaurant is proposed to be located in land use area 6.2. The daily design flow rate at full development for this land use area is calculated to be 9,000 gallons per day.

At full development, this land use area will generate wastewater flow of 10,145 gallons per day. The STA for these land use areas will be located in NRCS soil unit 30, which has a soil type classification of 4A and a LTAR of 0.20 gal/day/ft^2 for treatment levels TL-2 or higher. The size of the STA, prior to any allowed reductions, will be 50,725 square feet (10,145 gpd/0.20 g/d/ft^2).

The best design for the STA in this soil type is:

- Pretreatment of the effluent to TL-3N or higher
- Use of a trench type treatment area for the STA.
- Use of pressure dosing as the method of effluent application.
- Use of chambers as the type of distribution media in the STA.

Pressure dosing to a trench STA will allow for a reduction factor of 0.8 and using chambers in the STA will allow for a reduction factor of 0.7. Applying these reduction factors to the size of the STA will allow for the STA to be reduced to 28,406 square feet, which will require 2,368 chambers (12 square feet/chamber).

Requirements for this preliminary design based on treatment level 3N (TL-3N) are shown in the following table.

[1]Septic Tanks (gal.)	[2]Pretreatment to TL-3N	STA (ft^2)	No. Chambers (dependent on 12ft^2/chamber)	[3]Pump	[4]Automatic Distribution Valve (ATV)
(1) @ 1,250 ea. (3) @ 6,000 ea.	Yes	28,406	2,368	Yes	(1) x 2 (1) x 3 (7) x 6

[1]Tanks are sized to permit detention for a minimum of 48 hours.
[2]Orenco's Advantex AX-Max treatment system, or equal.
[3]Spacing and sizing of orifices in the distribution pipe and sizing for the pump must be such that a 30-72 inch operating head is present at the distal end orifice. In addition, orifice spacing and sizing will not cause more than a 10% flow differential between the initial orifice to the most distal end orifice.
[4]The ATV should be (1) with 2 outlets, (1) with 3 outlets and (7) with 6 outlets.

Design Flow (gpd)	Septic Tank (gal.)	STA (ft^2)	No. Chambers (12ft^2)	Pressure Dosed	Automatic Distribution Valve
10,145	(1) @ 1,250 (3) @ 6,000 ea.	28,406	2,368	Yes	(1) x 2; (1) x 3; (7) x 6

PROPOSED STA

25.00' EMBANKMENT SETBACK

20.00' FOUNDATION SETBACK

5620

6" RW

HO

Graphic Scale

0 50 100 200

In Feet: 1" = 100'

FIG 4

Preliminary OWTS for Land Use Areas 6-1 and 6-2

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4.3.2 Land Use Area 6.3

An adventure farm is proposed for land use area 6.3. The daily design flow rate for this land use area is calculated to be 590 gallons per day at full development. The STA for this land use will be located in NRCS soil unit 30, which has a soil type classification of 4A and a LTAR of 0.15. The size of the STA, prior to any allowed reductions, will be 3,934 square feet (590 gpd/0.15 g/d/ft^2).

The best design for the STA in this soil type is:

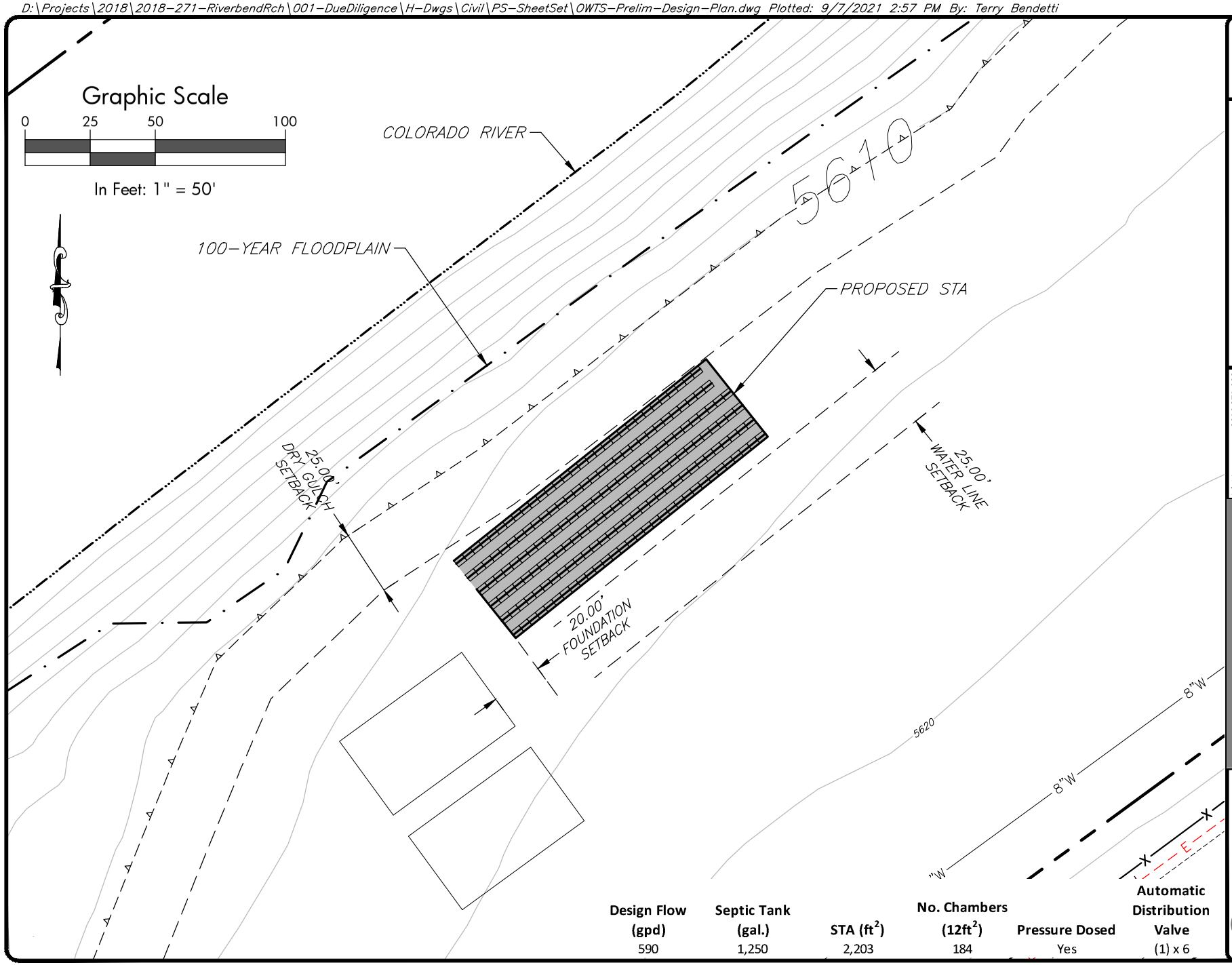
- Use of a trench type treatment area for the STA.
- Use of pressure dosing as the method of effluent application.
- Use of chambers as the type of distribution media in the STA.

Pressure dosing to a trench STA will allow for a reduction factor of 0.8 and using chambers in the STA will allow for a reduction factor of 0.7. Applying these reduction factors to the size of the STA will allow for the STA to be reduced to 2,203 square feet, which will require 184 chambers (12 square feet/chamber).

Requirements for this preliminary design based on TL-1 are shown in the following table.

[1]Septic Tanks (gal.)	STA (ft^2)	No. Chambers (dependent on 12ft^2/chamber)	[2]Pump	[3]Automatic Distribution Valve (ATV)
(1) @ 1,250	2,203	184	Yes	(1) x 6

[1]Tank is sized to permit detention for a minimum of 48 hours.
[2]Spacing and sizing of orifices in the distribution pipe and sizing for the pump must be such that a 30-72 inch operating head is present at the distal end orifice. In addition, orifice spacing and sizing will not cause more than a 10% flow differential between the initial orifice to the most distal end orifice.
[3]The ATV should be (1) with 6 outlets.



Design Flow (gpd)	Septic Tank (gal.)	STA (ft^2)	No. Chambers ($12ft^2$)	Pressure Dosed	Automatic Distribution Valve
590	1,250	2,203	184	Yes	(1) x 6

FIG 5

Preliminary OWTS for Land Use Area 6-3

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4.4 Land Use Area 7

Professional, commercial and retail buildings are proposed to be constructed in land use area 7. The daily design flow rate at full development for this land use area is calculated to be 1,000 gallons per day. The STA for this land use will be located in NRCS soil unit 51, which has a soil type classification of 2A and a LTAR of 0.50. The size of the STA, prior to any allowed reductions, will be 2,000 square feet (1,000 gpd/0.50 g/d/ft^2).

The best design for the STA in this soil type is:

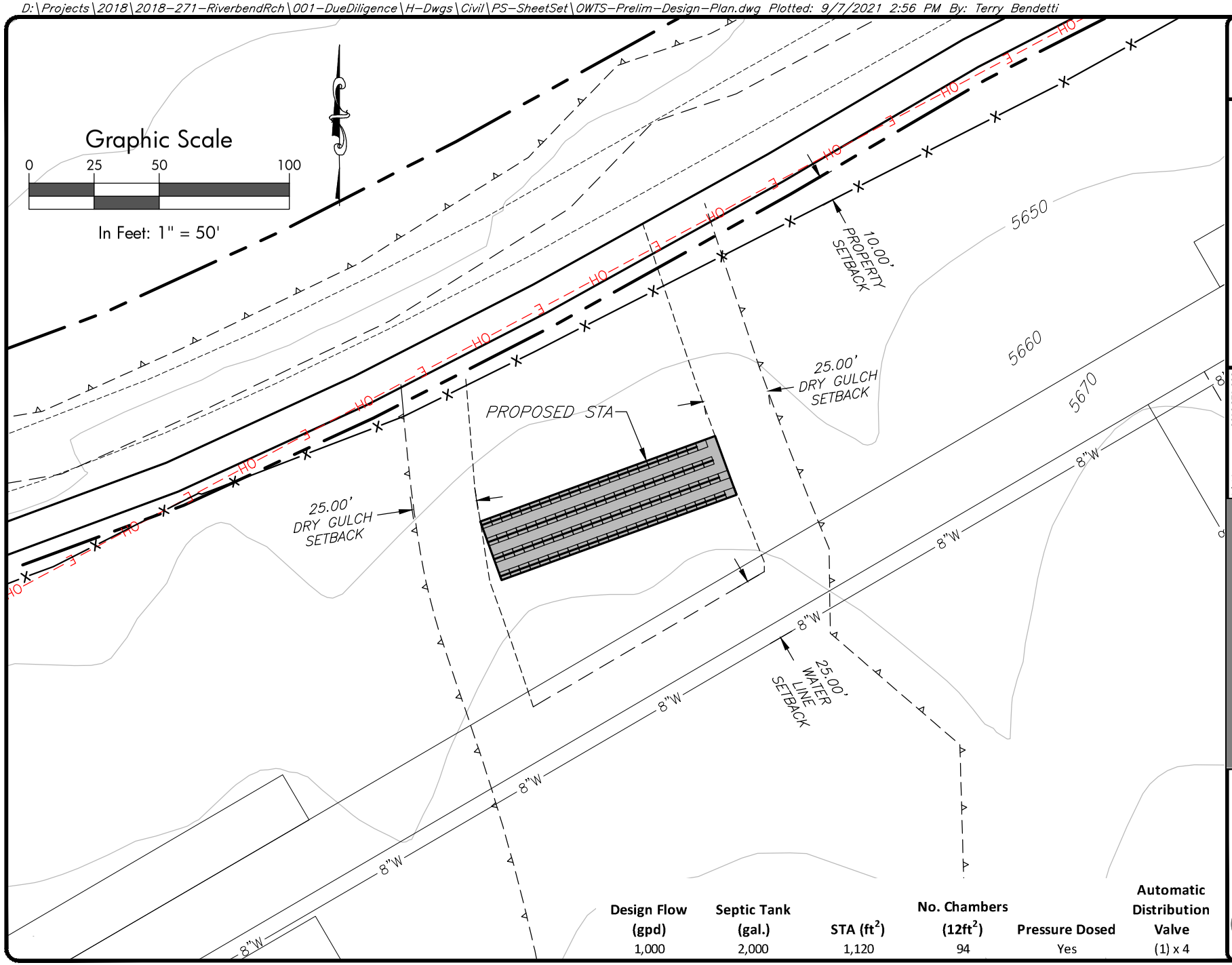
- Use of a trench type treatment area for the STA.
- Use of pressure dosing as the method of effluent application.
- Use of chambers as the type of distribution media in the STA.

Pressure dosing to a trench STA will allow for a reduction factor of 0.8 and using chambers in the STA will allow for a reduction factor of 0.7. Applying these reduction factors to the size of the STA will allow for the STA to be reduced to 1,120 square feet, which will require 94 chambers (12 square feet/chamber).

Requirements for this preliminary design based on TL-1 are shown in the following table.

[1]Septic Tanks (gal.)	STA (ft^2)	No. Chambers (dependent on 12ft^2/chamber)	[2]Pump	[3]Automatic Distribution Valve (ATV)
(1) @ 2,000	1,120	94	Yes	(1) x 4

[1]Tank is sized to permit detention for a minimum of 48 hours.
[2]Spacing and sizing of orifices in the distribution pipe and sizing for the pump must be such that a 30-72 inch operating head is present at the distal end orifice. In addition, orifice spacing and sizing will not cause more than a 10% flow differential between the initial orifice to the most distal end orifice.
[3]The ATV should be (1) with 4 outlets.



Design Flow (gpd)	Septic Tank (gal.)	STA (ft^2)	No. Chambers ($12ft^2$)	Pressure Dosed	Automatic Distribution Valve
1,000	2,000	1,120	94	Yes	(1) x 4

FIG 6

Preliminary OWTS for Land Use Area 7-1

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4.5 Land Use Area 8

Proposed land use area 8 will require six OWTSs to serve proposed uses.

4.5.1 Land Use Area 8.1

Land use area 8.1 is proposed for an Adventure Park. The daily design flow rate for this land use area at full development is calculated to be 805 gallons per day. The STA for this land use will be located in NRCS soil unit 47, which has a soil type classification of 1 and a LTAR of 0.80. The size of the STA, prior to any allowed reductions, will be 1,007 square feet (805 gpd/0.80 g/d/ft^2).

The best design for the STA in this soil type is:

- Use of a trench type treatment area for the STA.
- Use of pressure dosing as the method of effluent application.
- Use of chambers as the type of distribution media in the STA.

Pressure dosing to a trench STA will allow for a reduction factor of 0.8 and using chambers in the STA will allow for a reduction factor of 0.7. Applying these reduction factors to the size of the STA will allow for the STA to be reduced to 564 square feet, which will require 47 chambers (12 square feet/chamber).

Requirements for this preliminary design based on TL-1 are shown in the following table.

[1]Septic Tanks (gal.)	STA (ft^2)	No. Chambers (dependent on 12ft^2/chamber)	[2]Pump	[3]Automatic Distribution Valve (ATV)
(1) @ 2,000	564	47	Yes	(1) x 2

[1]Tank is sized to permit detention for a minimum of 48 hours.
[2]Spacing and sizing of orifices in the distribution pipe and sizing for the pump must be such that a 30-72 inch operating head is present at the distal end orifice. In addition, orifice spacing and sizing will not cause more than a 10% flow differential between the initial orifice to the most distal end orifice.
[3]The ATV should be (1) with 2 outlets.

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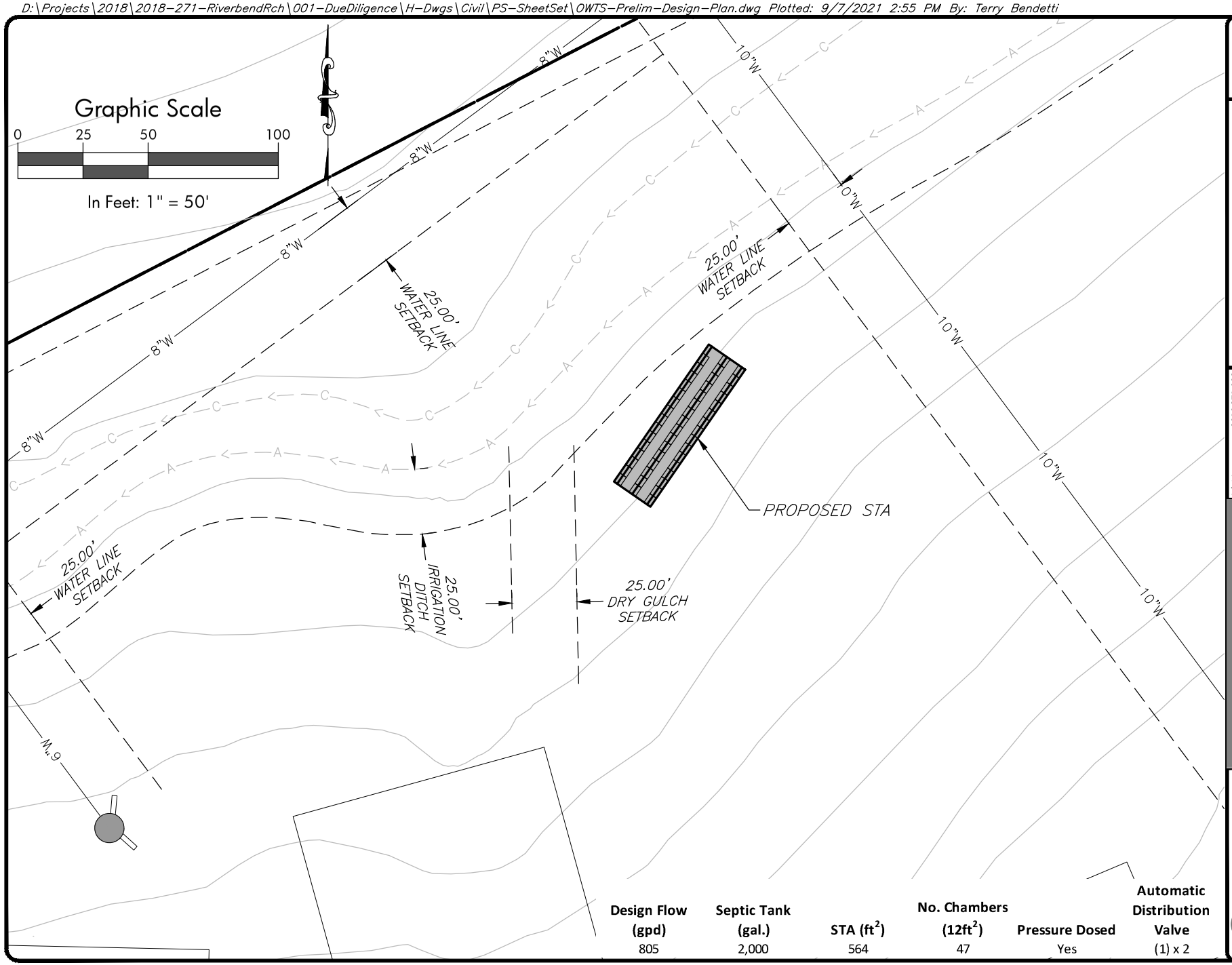

Design Flow (gpd)	Septic Tank (gal.)	STA (ft^2)	No. Chambers ($12ft^2$)	Pressure Dosed	Automatic Distribution Valve
805	2,000	564	47	Yes	(1) x 2

FIG 7

Preliminary OWTS for Land Use Area 8-1

Job No.	2018-271.002		
Drawn by:	TLB		
Date:	06/07/2021		
QC:	DK	PE:	DK
File:	OWTS-Prelim-Design-Plan		

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970.945.1004 www.sgm-inc.com

4.5.2 Land Use Area 8.2

Land use area 8.2 is proposed for a water park and pool. The daily design flow rate for this land use area at full development is calculated to be 1,550 gallons per day. The STA for this land use will be located in NRCS soil unit 47, which has a soil type classification of 1 and a LTAR of 0.80. The size of the STA, prior to any allowed reductions, will be 1,938 square feet (1,550 gpd/0.80 g/d/ft^2).

The best design for the STA in this soil type is:

- Use of a trench type treatment area for the STA.
- Use of pressure dosing as the method of effluent application.
- Use of chambers as the type of distribution media in the STA.

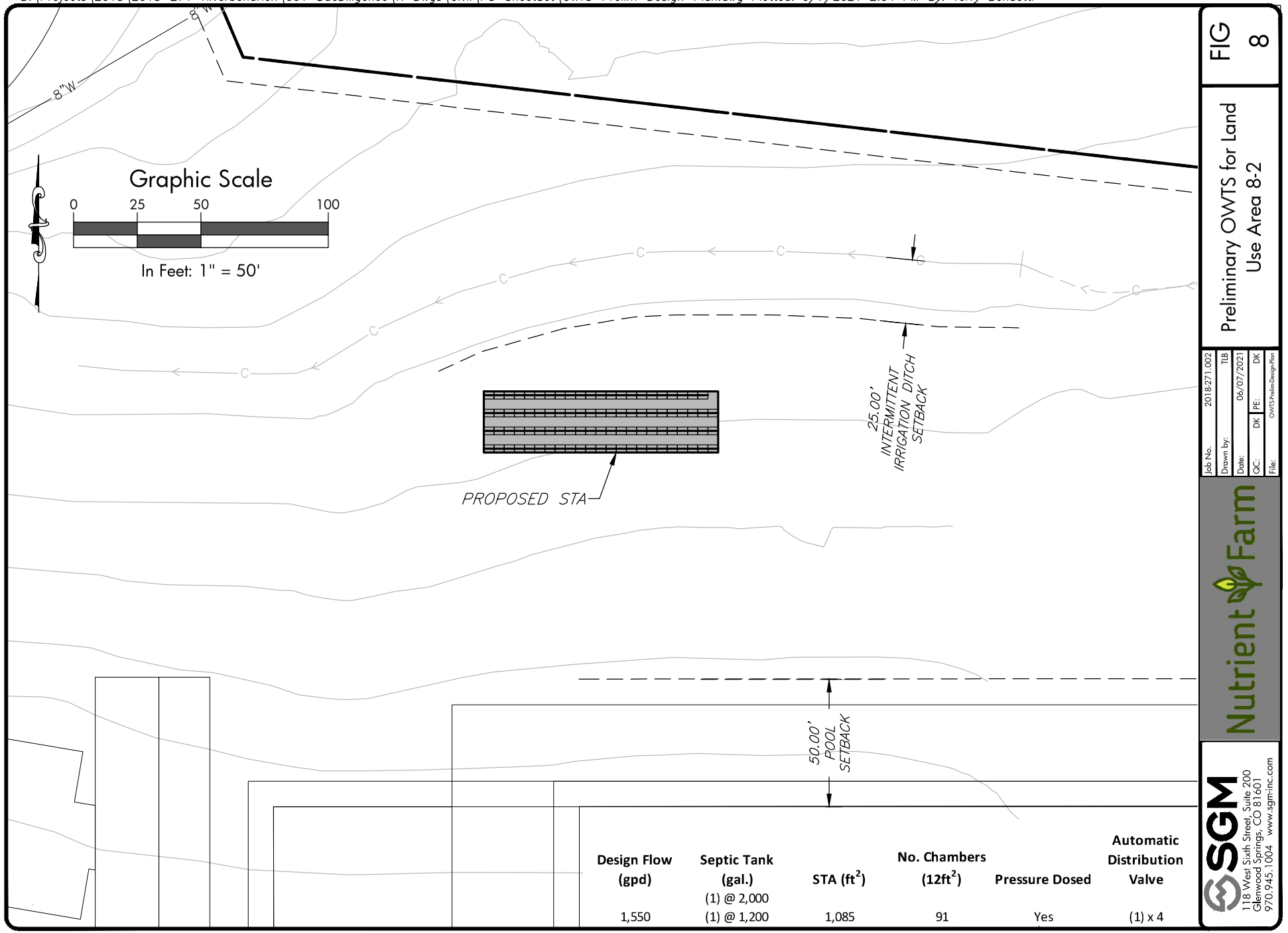
Pressure dosing to a trench STA will allow for a reduction factor of 0.8 and using chambers in the STA will allow for a reduction factor of 0.7. Applying these reduction factors to the size of the STA will allow for the STA to be reduced to 1085 square feet, which will require 91 chambers (12 square feet/chamber).

Requirements for this preliminary design based on TL-1 are shown in the following table.

[1]Septic Tanks (gal.)	STA (ft^2)	No. Chambers (dependent on 12ft^2/chamber)	[2]Pump	[3]Automatic Distribution Valve (ATV)
(1) @ 2,000, (1) @ 1,250	1,085	91	Yes	(1) x 4

[1]Tanks are sized to permit detention for a minimum of 48 hours.
[2]Spacing and sizing of orifices in the distribution pipe and sizing for the pump must be such that a 30-72 inch operating head is present at the distal end orifice. In addition, orifice spacing and sizing will not cause more than a 10% flow differential between the initial orifice to the most distal end orifice.
[3]The ATV should be (1) with 4 outlets.

D:\Projects\2018\2018-271-RiverbendRch\001-DueDiligence\H-Dwgs\Civil\PS-SheetSet\OWTS-Prelim-Design-Plan.dwg Plotted: 9/7/2021 2:54 PM By: Terry Bendetti



Design Flow (gpd)	Septic Tank (gal.)	STA (ft^2)	No. Chambers ($12ft^2$)	Pressure Dosed	Automatic Distribution Valve
1,550	(1) @ 2,000 (1) @ 1,200	1,085	91	Yes	(1) x 4

FIG 8

Preliminary OWTS for Land Use Area 8-2

Job No.	2018-271.002		
Drawn by:	TLB		
Date:	06/07/2021		
QC:	DK	PE:	DK
File:	OWTS-PrelimDesignPlan		

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4.5.3 Land Use Area 8.3A

Land use area 8.3A is proposed for camp sites, which will have a central bath and shower facility plumbed to an OWTS. The daily design flow rate for this land use area at full development is calculated to be 1,800 gallons per day. The STA for this land use will be located in NRCS soil unit 47, which has a soil type classification of 1 and a LTAR of 0.80. The size of the STA, prior to any allowed reductions, will be 2,250 square feet (1,800 gpd/0.80 g/d/ft^2).

The best design for the STA in this soil type is:

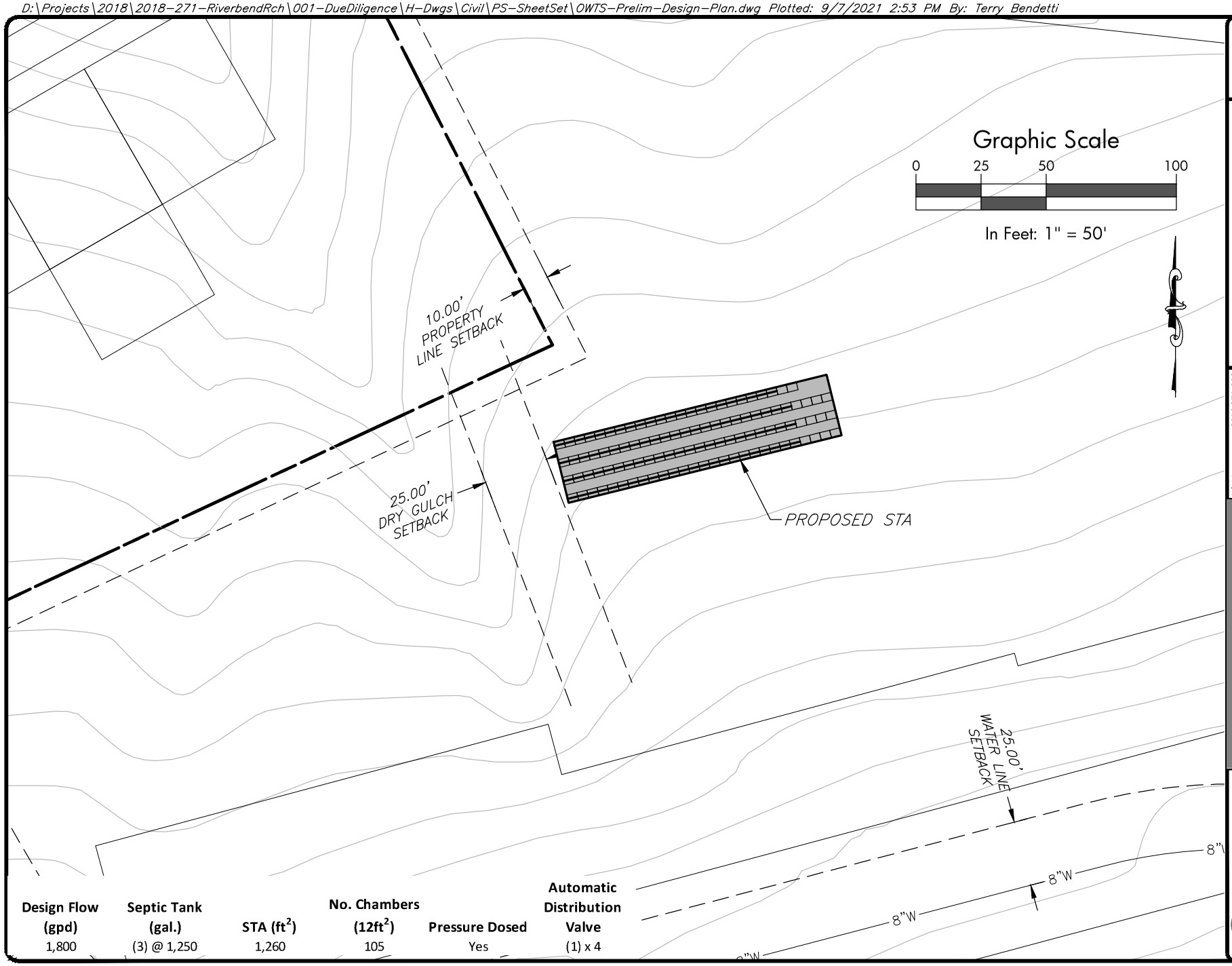
- Use of a trench type treatment area for the STA.
- Use of pressure dosing as the method of effluent application.
- Use of chambers as the type of distribution media in the STA.

Pressure dosing to a trench STA will allow for a reduction factor of 0.8 and using chambers in the STA will allow for a reduction factor of 0.7. Applying these reduction factors to the size of the STA will allow for the STA to be reduced to 1,260 square feet, which will require 105 chambers (12 square feet/chamber).

Requirements for this preliminary design based on TL-1 are shown in the following table.

[1]Septic Tanks (gal.)	STA (ft^2)	No. Chambers (dependent on 12ft^2/chamber)	[2]Pump	[3]Automatic Distribution Valve (ATV)
(3) @ 1,250	1,260	105	Yes	(1) x 4

[1]Tanks are sized to permit detention for a minimum of 48 hours.
[2]Spacing and sizing of orifices in the distribution pipe and sizing for the pump must be such that a 30-72 inch operating head is present at the distal end orifice. In addition, orifice spacing and sizing will not cause more than a 10% flow differential between the initial orifice to the most distal end orifice.
[3]The ATV should be (1) with 4 outlets.



Design Flow (gpd)	Septic Tank (gal.)	STA (ft^2)	No. Chambers ($12ft^2$)	Pressure Dosed	Automatic Distribution Valve
1,800	(3) @ 1,250	1,260	105	Yes	(1) x 4

FIG 9

Preliminary OWTS for Land Use Area 8-3A

Job No.	2018-271.002		
Drawn by:	TLB		
Date:	06/07/2021		
QC:	DK	PE:	DK
File:	OWTS-Prelim-Design-Plan		

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4.5.4 Land Use Area 8.3B

Land use area 8.3B is proposed for an RV Park. The daily design flow rate for this land use area at full development is calculated to be 1,800 gallons per day. The STA for this land use will be located in NRCS soil unit 47, which has a soil type classification of 1 and a LTAR of 0.80. The size of the STA, prior to any allowed reductions, will be 2,250 square feet (1,800 gpd/0.80 g/d/ft^2).

The best design for the STA in this soil type is:

- Use of a trench type treatment area for the STA.
- Use of pressure dosing as the method of effluent application.
- Use of chambers as the type of distribution media in the STA.

Pressure dosing to a trench STA will allow for a reduction factor of 0.8 and using chambers in the STA will allow for a reduction factor of 0.7. Applying these reduction factors to the size of the STA will allow for the STA to be reduced to 1,260 square feet, which will require 105 chambers (12 square feet/chamber).

Requirements for this preliminary design based on TL-1 are shown in the following table.

[1]Septic Tanks (gal.)	STA (ft^2)	No. Chambers (dependent on 12ft^2/chamber)	[2]Pump	[3]Automatic Distribution Valve (ATV)
(3) @ 1,250	1,260	105	Yes	(1) x 4

[1]Tanks are sized to permit detention for a minimum of 48 hours.
[2]Spacing and sizing of orifices in the distribution pipe and sizing for the pump must be such that a 30-72 inch operating head is present at the distal end orifice. In addition, orifice spacing and sizing will not cause more than a 10% flow differential between the initial orifice to the most distal end orifice.
[3]The ATV should be (1) with 4 outlets.

Design Flow (gpd)	Septic Tank (gal.)	STA (ft^2)	No. Chambers ($12ft^2$)	Pressure Dosed	Automatic Distribution Valve
1,800	(3) @ 1,250	1,260	105	Yes	(1) x 4

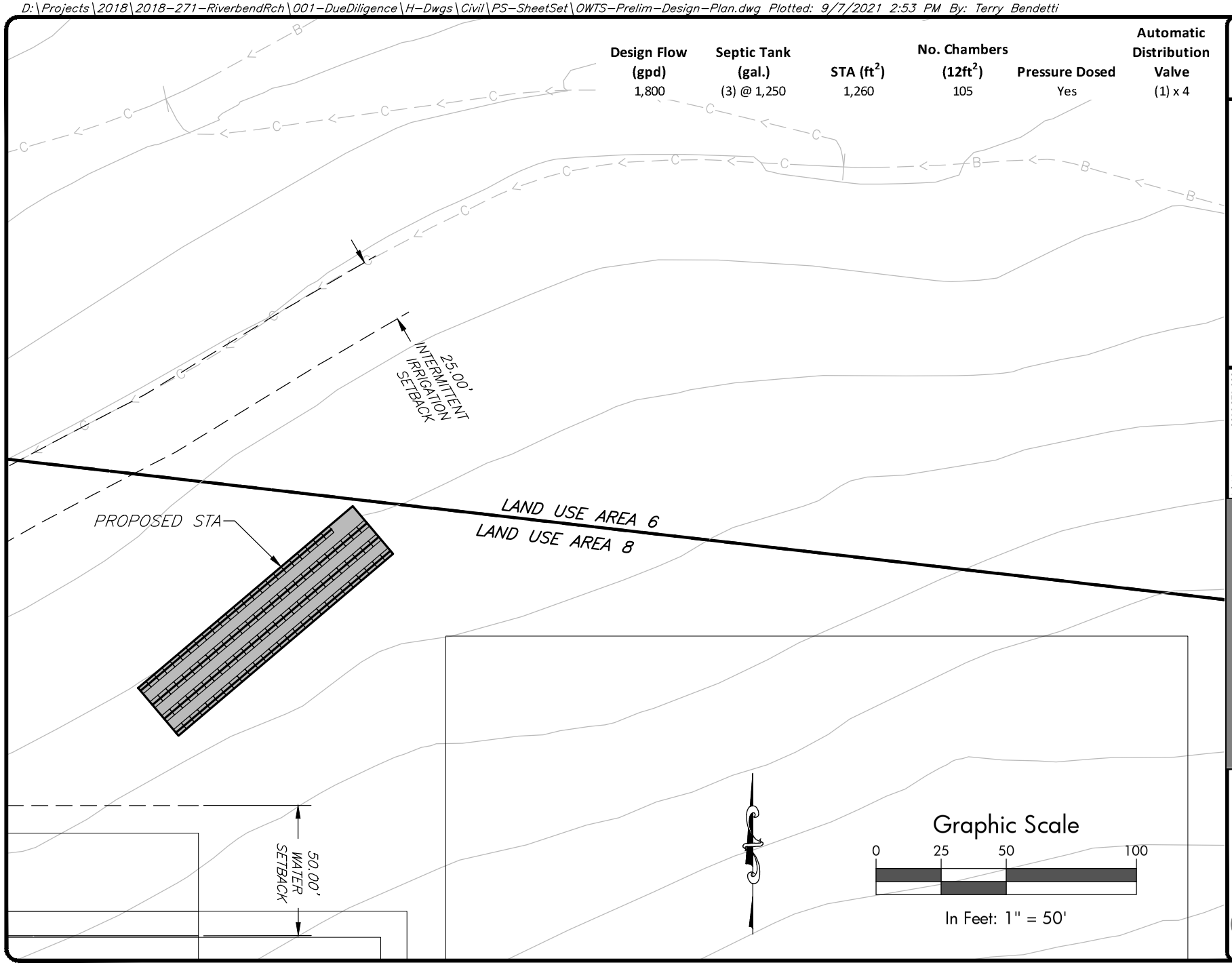

FIG 10

Preliminary OWTS for Land Use Area 8-3B

Job No.	2018-271.002		
Drawn by:	TLB		
Date:	06/07/2021		
QC:	DK	PE:	DK
File:	OWTS-PrelimDesignPlan		

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4.5.5 Land Use Area 8.4

Land use area 8.4 is proposed for a retreat. The daily design flow rate for this land use area calculated at full development is calculated to be 1,250 gallons per day. The STA for this land use will be located in NRCS soil unit 47, which has a soil type classification of 1 and a LTAR of 0.80. The size of the STA, prior to any allowed reductions, will be 1,563 square feet (1,250 gpd/0.80 g/d/ft^2).

The best design for the STA in this soil type is:

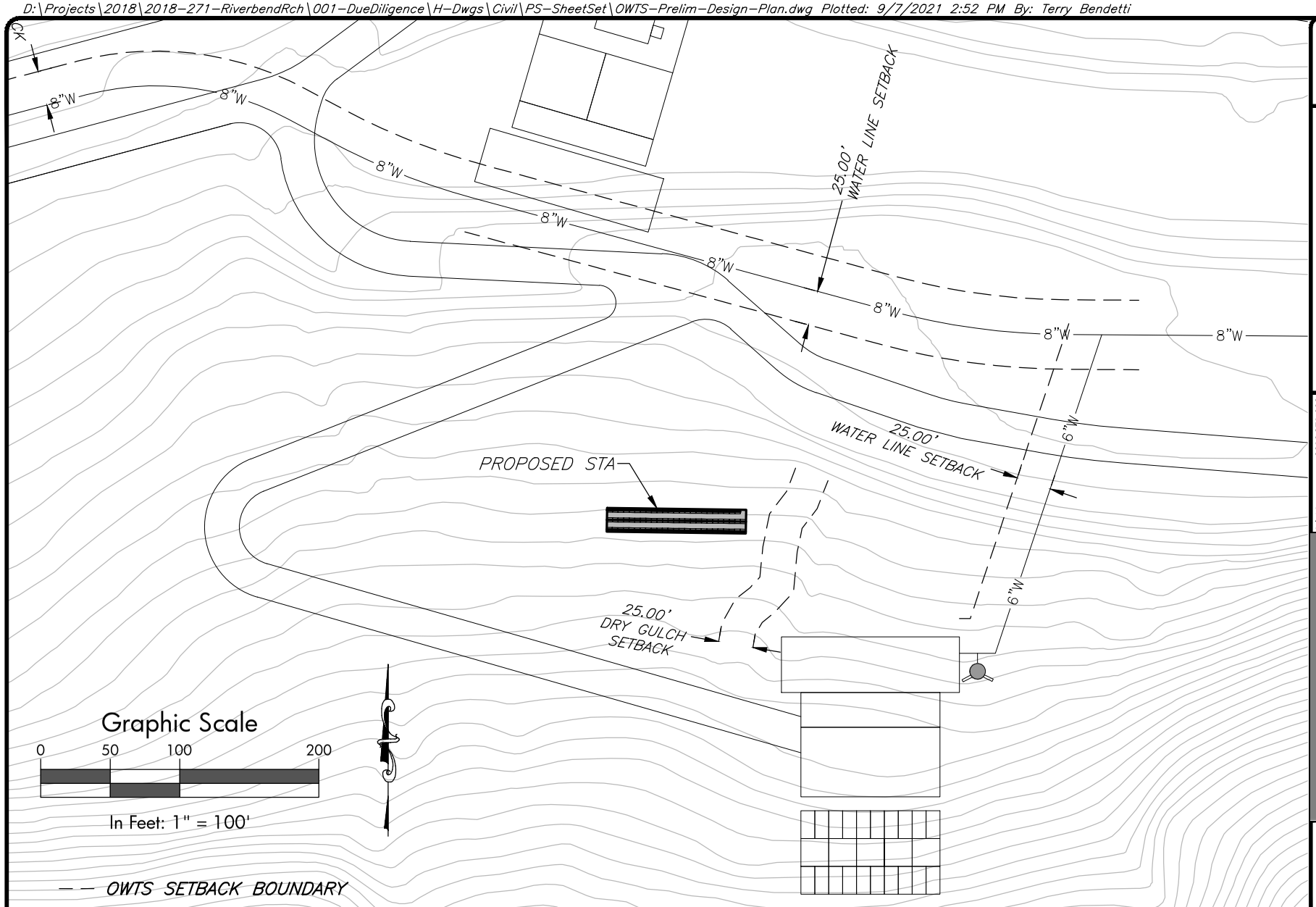
- Use of a trench type treatment area for the STA.
- Use of pressure dosing as the method of effluent application.
- Use of chambers as the type of distribution media in the STA.

Pressure dosing to a trench STA will allow for a reduction factor of 0.8 and using chambers in the STA will allow for a reduction factor of 0.7. Applying these reduction factors to the size of the STA will allow for the STA to be reduced to 876 square feet, which will require 73 chambers (12 square feet/chamber).

Requirements for this preliminary design based on TL-1 are shown in the following table.

[1]Septic Tanks (gal.)	STA (ft^2)	No. Chambers (dependent on 12ft^2/chamber)	[2]Pump	[3]Automatic Distribution Valve (ATV)
(2) @ 1,250	876	73	Yes	(1) x 3

[1]Tanks are sized to permit detention for a minimum of 48 hours.
[2]Spacing and sizing of orifices in the distribution pipe and sizing for the pump must be such that a 30-72 inch operating head is present at the distal end orifice. In addition, orifice spacing and sizing will not cause more than a 10% flow differential between the initial orifice to the most distal end orifice.
[3]The ATV should be (1) with 3 outlets.



Design Flow (gpd)	Septic Tank (gal.)	STA (ft^2)	No. Chambers ($12ft^2$)	Pressure Dosed	Automatic Distribution Valve
1,250	(1) @ 1,250	876	73	Yes	(1) x3

FIG 11

Preliminary OWTS for Land Use Area 8-4

Job No.	2018-271.002		
Drawn by:	TLB		
Date:	06/07/2021		
QC:	DK	PE:	DK
File:	OWTS-PrelimDesignPlan		

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4.5.6 Land Use Area 8.5A

Land use area 8.5A is proposed for use as a music festival area. Use is planned to be seasonal, approximately 7 months out of the year. At full development the daily design flow rate for this land use area is calculated to be 1,750 gallons per day. The STA for this land use will be located in NRCS soil unit 47, which has a soil type classification of 1 and a LTAR of 0.80. The size of the STA, prior to any allowed reductions, will be 2,188 square feet (1,750 gpd/0.80 g/d/ft^2).

The best design for the STA in this soil type is:

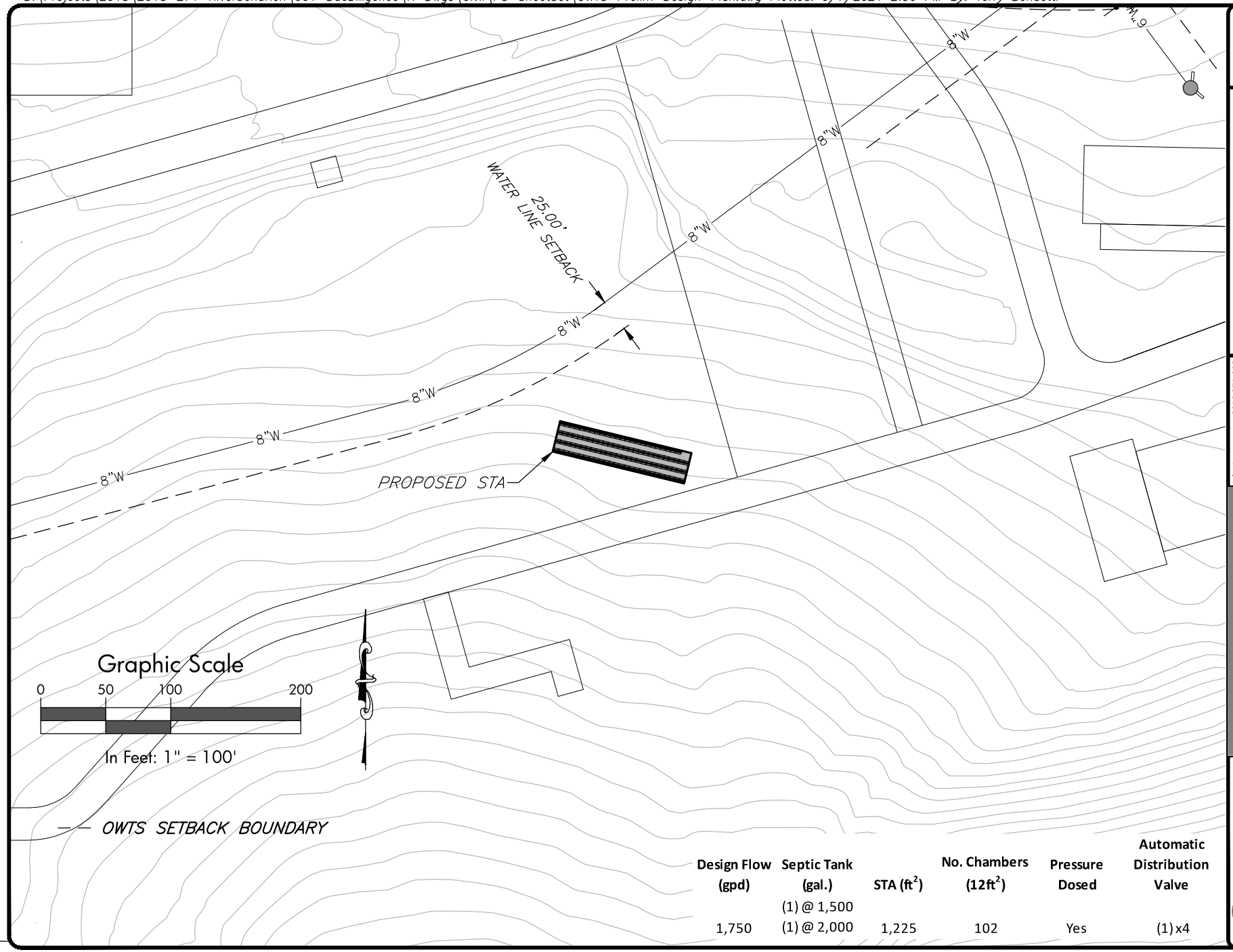
- Use of a trench type treatment area for the STA.
- Use of pressure dosing as the method of effluent application.
- Use of chambers as the type of distribution media in the STA.

Pressure dosing to a trench STA will allow for a reduction factor of 0.8 and using chambers in the STA will allow for a reduction factor of 0.7. Applying these reduction factors to the size of the STA will allow for the STA to be reduced to 1,225 square feet, which will require 102 chambers (12 square feet/chamber).

Requirements for this preliminary design based on TL-1 are shown in the following table.

[1]Septic Tanks (gal.)	STA (ft^2)	No. Chambers (dependent on 12ft^2/chamber)	[2]Pump	[3]Automatic Distribution Valve (ATV)
(1) @ 1,500 (1) @ 2,000	1,225	102	Yes	(1) x 4

[1]Tanks are sized to permit detention for a minimum of 48 hours.
[2]Spacing and sizing of orifices in the distribution pipe and sizing for the pump must be such that a 30-72 inch operating head is present at the distal end orifice. In addition, orifice spacing and sizing will not cause more than a 10% flow differential between the initial orifice to the most distal end orifice.
[3]The ATV should be (1) with 4 outlets.



Design Flow (gpd)	Septic Tank (gal.)	STA (ft^2)	No. Chambers ($12ft^2$)	Pressure Dosed	Automatic Distribution Valve
1,750	(1) @ 1,500 (1) @ 2,000	1,225	102	Yes	(1) x4

FIG 12

Preliminary OWTS for Land Use Area 8-5A

Job No.	2018-271.002		
Drawn by:	TLB		
Date:	06/07/2021		
QC:	DK	PE:	TLB
File:	OWTS-PrelimDesign-Plan		

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4.5.7 Land Use Area 8.5B

Land use area 8.5B is proposed for use as a performing arts center. Use is planned to be seasonal, approximately 7 months out of the year. At full development the daily design flow rate for this land use area is calculated to be 500 gallons per day. The STA for this land use will be located in NRCS soil unit 47, which has a soil type classification of 1 and a LTAR of 0.80. The size of the STA, prior to any allowed reductions, will be 625 square feet (500 gpd/0.80 g/d/ft^2).

The best design for the STA in this soil type is:

- Use of a trench type treatment area for the STA.
- Use of pressure dosing as the method of effluent application.
- Use of chambers as the type of distribution media in the STA.

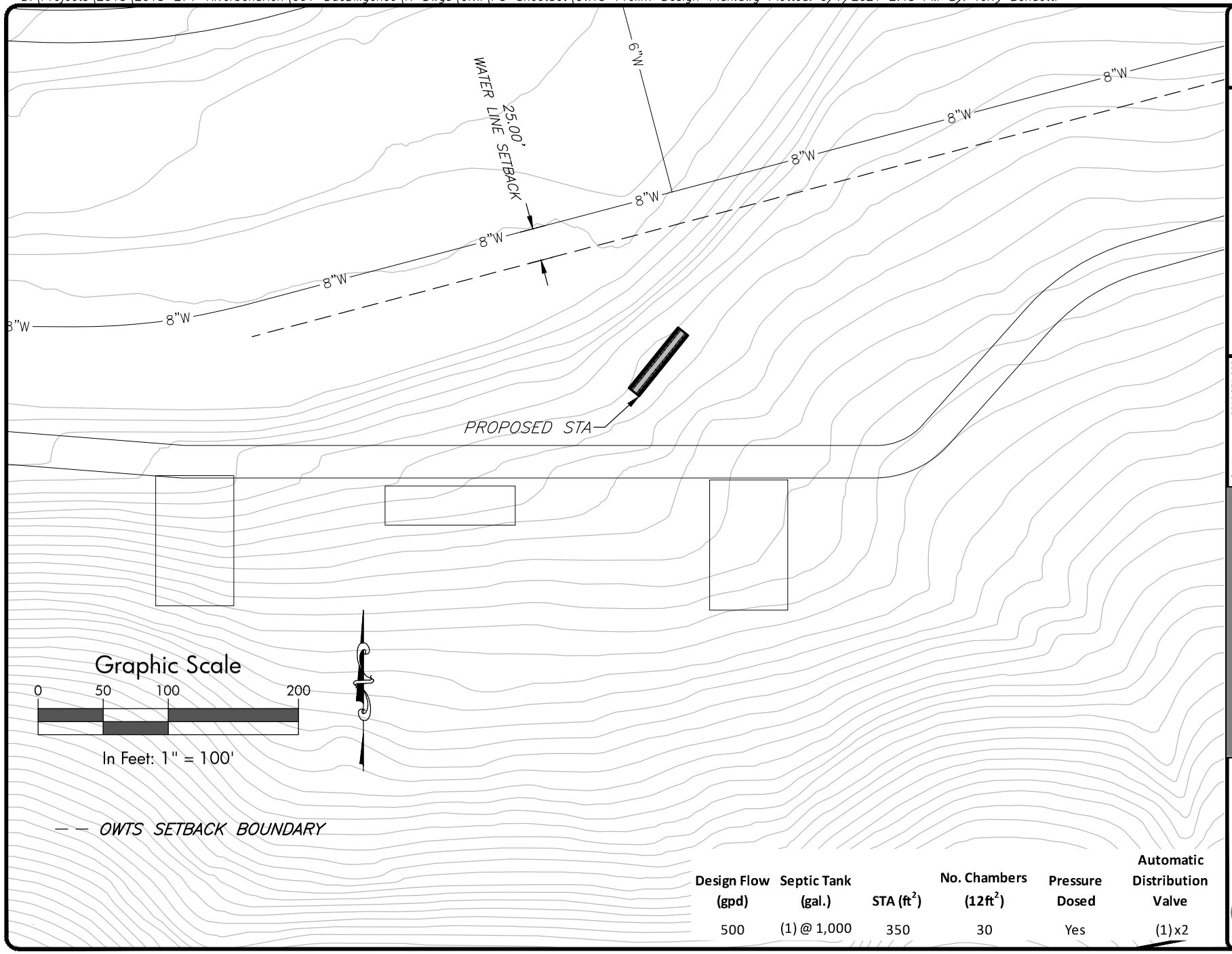
Pressure dosing to a trench STA will allow for a reduction factor of 0.8 and using chambers in the STA will allow for a reduction factor of 0.7. Applying these reduction factors to the size of the STA will allow for the STA to be reduced to 350 square feet, which will require 30 chambers (12 square feet/chamber).

Requirements for this preliminary design based on TL-1 are shown in the following table.

[1]Septic Tanks (gal.)	STA (ft^2)	No. Chambers (dependent on 12ft^2/chamber)	[2]Pump	[3]Automatic Distribution Valve (ATV)
(1) @ 1,000	350	30	Yes	(1) x 2

[1]Tanks are sized to permit detention for a minimum of 48 hours.
[2]Spacing and sizing of orifices in the distribution pipe and sizing for the pump must be such that a 30-72 inch operating head is present at the distal end orifice. In addition, orifice spacing and sizing will not cause more than a 10% flow differential between the initial orifice to the most distal end orifice.
[3]The ATV should be (1) with 2 outlets.

D:\Projects\2018\2018-271-RiverbendRch\001-DueDiligence\H-Dwgs\Civil\PS-SheetSet\OWTS-Prelim-Design-Plan.dwg Plotted: 9/7/2021 2:48 PM By: Terry Bendetti



Design Flow (gpd)	Septic Tank (gal.)	STA (ft^2)	No. Chambers ($12ft^2$)	Pressure Dosed	Automatic Distribution Valve
500	(1) @ 1,000	350	30	Yes	(1) x2

FIG 13

Preliminary OWTS for Land Use Area 8-5B

Job No.	2018-271.002
Drawn by:	TLB
Date:	06/07/2021
QC:	DK
PE:	TLB
File:	OWTS-Prelim-Design-Plan

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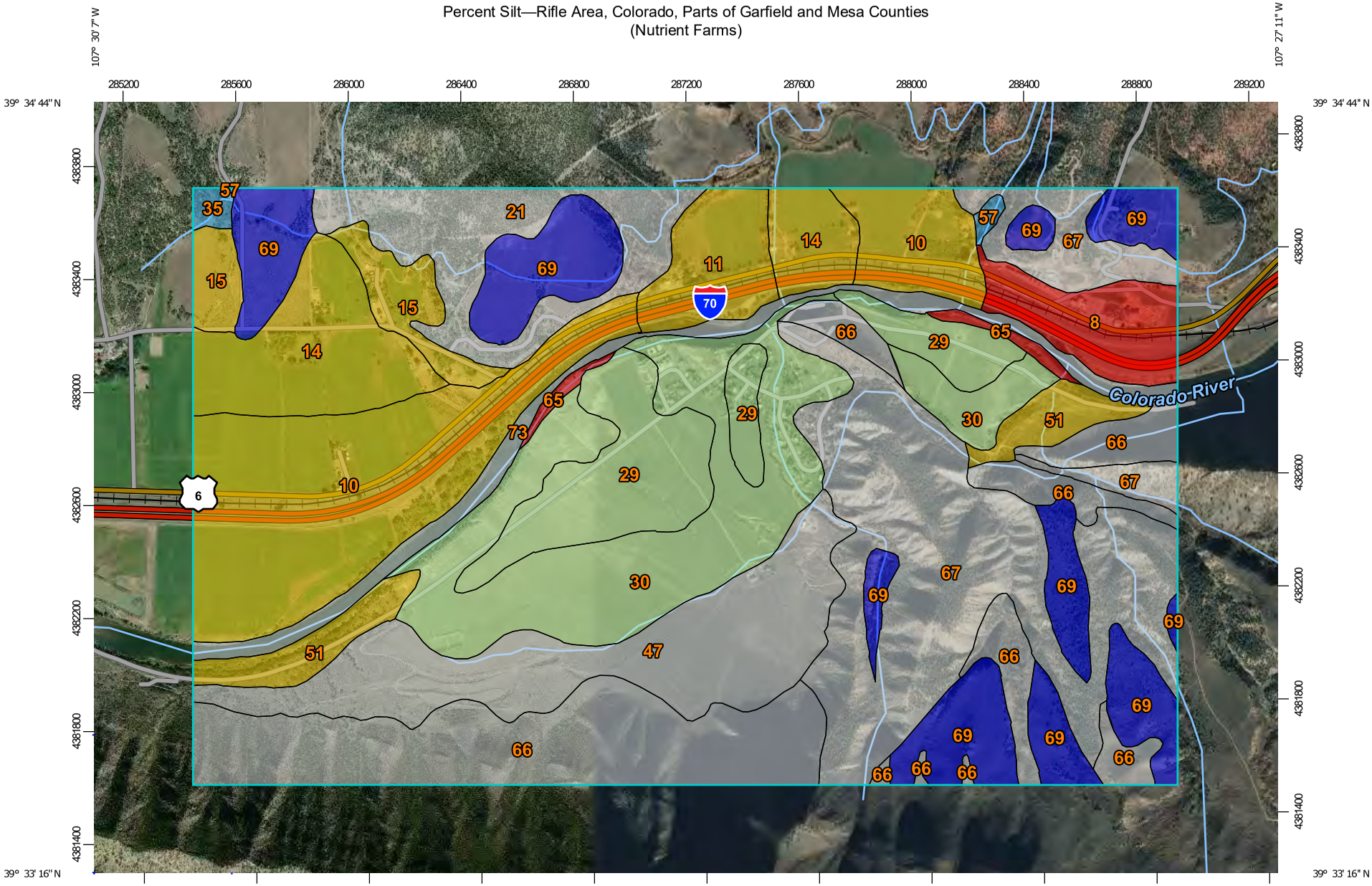
Appendix

NRCS Soil Data - Percent Silt
NRCS Soil Data - Percent Sand
NRCS Soil Data - Percent Clay
NRCS Soil Unit 29 and 30 USDA Textural Triangle
NRCS Soil Unit 47 and 51 USDA Textural Triangle
NRCS Soil Data - Depth to any Restrictive Layer
NRCS Soil Data - Septic Tank Absorption Fields

NRCS Soil Data - Percent Silt

Percent Silt—Rifle Area, Colorado, Parts of Garfield and Mesa Counties
(Nutrient Farms)



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- <= 1.5
- > 1.5 and <= 19.6
- > 19.6 and <= 29.2
- > 29.2 and <= 37.9
- > 37.9 and <= 67.1
- Not rated or not available

Soil Rating Lines

- <= 1.5
- > 1.5 and <= 19.6
- > 19.6 and <= 29.2
- > 29.2 and <= 37.9
- > 37.9 and <= 67.1
- Not rated or not available

Soil Rating Points

- <= 1.5
- > 1.5 and <= 19.6
- > 19.6 and <= 29.2
- > 29.2 and <= 37.9
- > 37.9 and <= 67.1
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Rifle Area, Colorado, Parts of Garfield and Mesa Counties
Survey Area Data: Version 13, Jun 5, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 14, 2010—Nov 1, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Percent Silt

Map unit symbol	Map unit name	Rating (percent)	Acres in AOI	Percent of AOI
8	Atencio-Azeltine complex, 1 to 3 percent slopes	1.5	46.3	2.5%
10	Begay sandy loam, 1 to 6 percent slopes	19.6	225.1	12.3%
11	Begay sandy loam, 6 to 12 percent slopes	19.6	44.2	2.4%
14	Chilton channery loam, 6 to 12 percent slopes	19.2	105.9	5.8%
15	Chilton channery loam, 12 to 25 percent slopes	19.2	41.1	2.2%
21	Cushman-Lazear stony loams, 15 to 65 percent slopes		86.4	4.7%
29	Heldt clay loam, 3 to 6 percent slopes	29.2	114.9	6.3%
30	Heldt clay loam, 6 to 12 percent slopes	29.2	209.1	11.4%
35	Ildefonso-Lazear complex, 6 to 65 percent slopes	37.9	4.8	0.3%
47	Nihill channery loam, 6 to 25 percent slopes		154.1	8.4%
51	Olney loam, 6 to 12 percent slopes	15.0	44.5	2.4%
57	Potts-Ildefonso complex, 3 to 12 percent slopes	37.9	2.6	0.1%
65	Torrifluvents, nearly level	1.5	8.8	0.5%
66	Torriorthents-Camborthids-Rock outcrop complex, steep		229.9	12.5%
67	Torriorthents-Rock outcrop complex, steep		285.9	15.6%
69	Vale silt loam, 6 to 12 percent slopes	67.1	183.9	10.0%
73	Water		46.9	2.6%
Totals for Area of Interest			**1,834.3**	**100.0%**

Description

Silt as a soil separate consists of mineral soil particles that are 0.002 to 0.05 millimeter in diameter. In the database, the estimated silt content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Rating Options

Units of Measure: percent

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Interpret Nulls as Zero: No

Layer Options (Horizon Aggregation Method): Depth Range (Weighted Average)

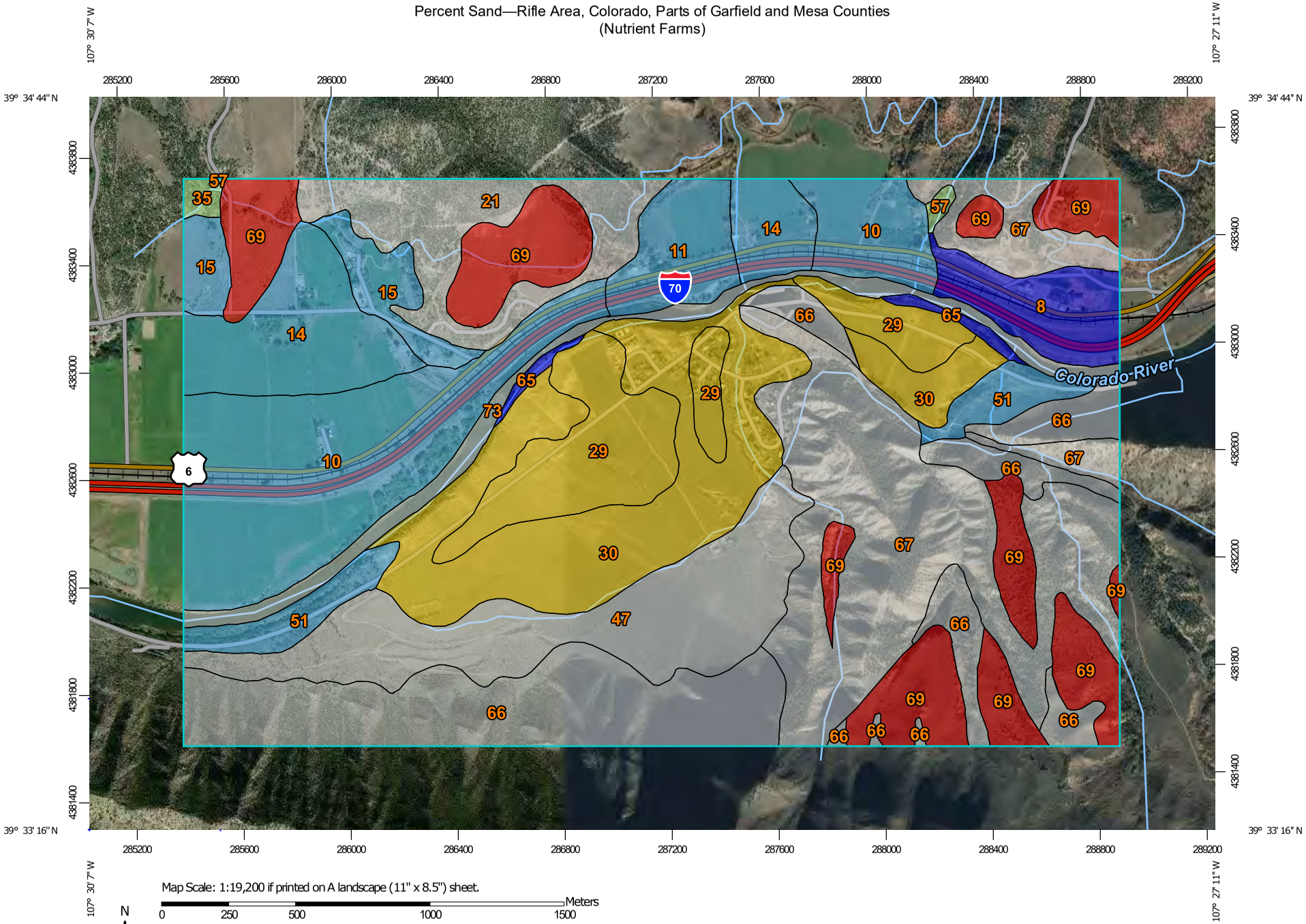
Top Depth: 48

Bottom Depth: 96

Units of Measure: Inches

NRCS Soil Data - Percent Sand

Percent Sand—Rifle Area, Colorado, Parts of Garfield and Mesa Counties
(Nutrient Farms)



Map Scale: 1:19,200 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 250 500 1000 1500

Feet
0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- <= 9.4
- > 9.4 and <= 23.3
- > 23.3 and <= 42.1
- > 42.1 and <= 67.9
- > 67.9 and <= 97.0
- Not rated or not available

Soil Rating Lines
- <= 9.4
- > 9.4 and <= 23.3
- > 23.3 and <= 42.1
- > 42.1 and <= 67.9
- > 67.9 and <= 97.0
- Not rated or not available

Soil Rating Points
- <= 9.4
- > 9.4 and <= 23.3
- > 23.3 and <= 42.1
- > 42.1 and <= 67.9
- > 67.9 and <= 97.0
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Rifle Area, Colorado, Parts of Garfield and Mesa Counties
Survey Area Data: Version 13, Jun 5, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 14, 2010—Nov 1, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Percent Sand

Map unit symbol	Map unit name	Rating (percent)	Acres in AOI	Percent of AOI
8	Atencio-Azeltine complex, 1 to 3 percent slopes	95.0	46.3	2.5%
10	Begay sandy loam, 1 to 6 percent slopes	67.9	225.1	12.3%
11	Begay sandy loam, 6 to 12 percent slopes	67.9	44.2	2.4%
14	Chilton channery loam, 6 to 12 percent slopes	66.8	105.9	5.8%
15	Chilton channery loam, 12 to 25 percent slopes	66.8	41.1	2.2%
21	Cushman-Lazear stony loams, 15 to 65 percent slopes		86.4	4.7%
29	Heldt clay loam, 3 to 6 percent slopes	23.3	114.9	6.3%
30	Heldt clay loam, 6 to 12 percent slopes	23.3	209.1	11.4%
35	Ildefonso-Lazear complex, 6 to 65 percent slopes	42.1	4.8	0.3%
47	Nihill channery loam, 6 to 25 percent slopes		154.1	8.4%
51	Olney loam, 6 to 12 percent slopes	66.0	44.5	2.4%
57	Potts-Ildefonso complex, 3 to 12 percent slopes	42.1	2.6	0.1%
65	Torrifluvents, nearly level	97.0	8.8	0.5%
66	Torriorthents-Camborthids-Rock outcrop complex, steep		229.9	12.5%
67	Torriorthents-Rock outcrop complex, steep		285.9	15.6%
69	Vale silt loam, 6 to 12 percent slopes	9.4	183.9	10.0%
73	Water		46.9	2.6%
Totals for Area of Interest			**1,834.3**	**100.0%**

Description

Sand as a soil separate consists of mineral soil particles that are 0.05 millimeter to 2 millimeters in diameter. In the database, the estimated sand content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter. The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Rating Options

Units of Measure: percent

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Interpret Nulls as Zero: No

Layer Options (Horizon Aggregation Method): Depth Range (Weighted Average)

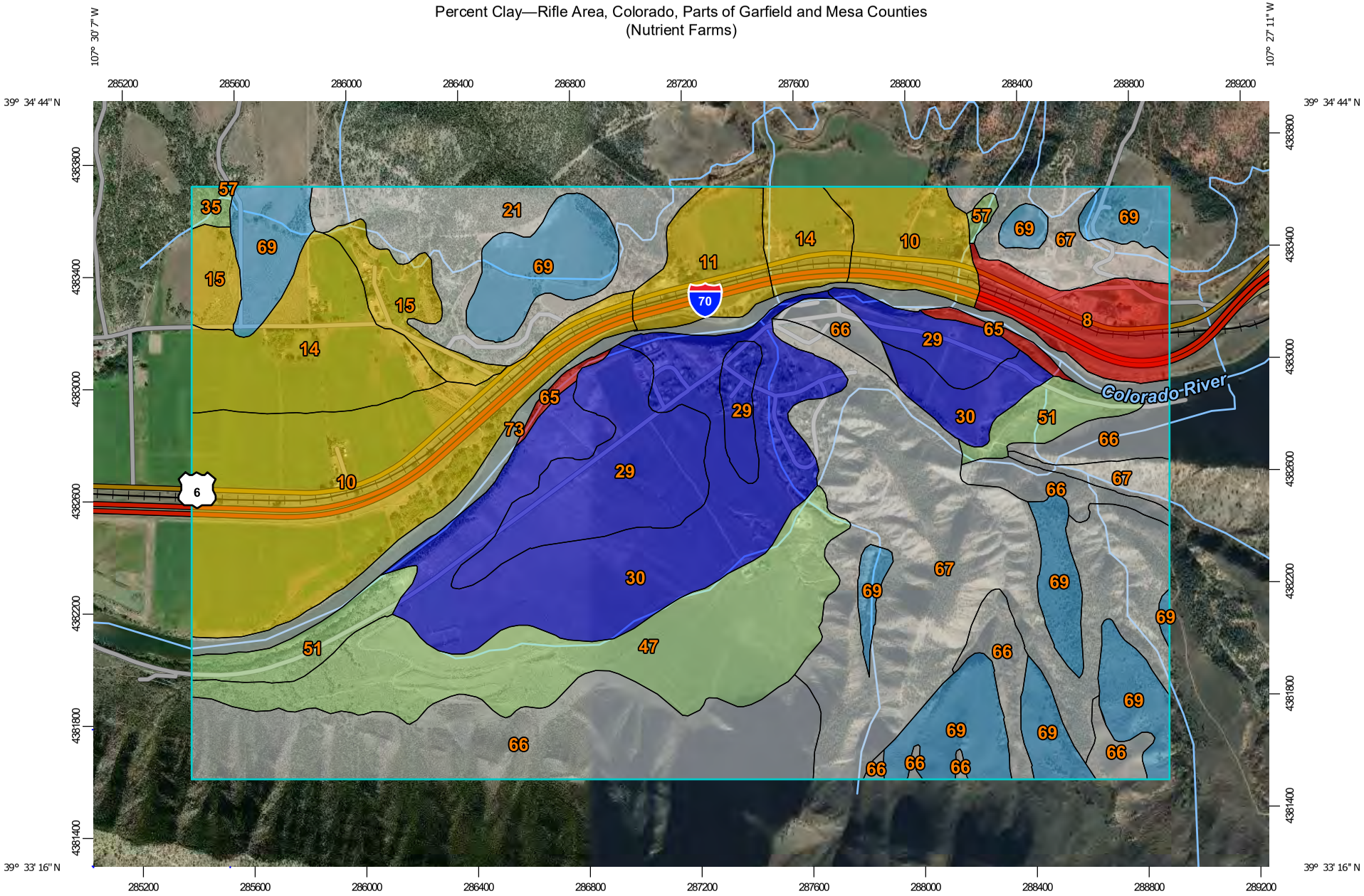
Top Depth: 48

Bottom Depth: 96

Units of Measure: Inches

NRCS Soil Data - Percent Clay

Percent Clay—Rifle Area, Colorado, Parts of Garfield and Mesa Counties
(Nutrient Farms)



Map Scale: 1:19,200 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 250 500 1000 1500

Feet
0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- <= 3.5
- > 3.5 and <= 14.0
- > 14.0 and <= 21.0
- > 21.0 and <= 23.5
- > 23.5 and <= 47.5
- Not rated or not available

Soil Rating Lines

- <= 3.5
- > 3.5 and <= 14.0
- > 14.0 and <= 21.0
- > 21.0 and <= 23.5
- > 23.5 and <= 47.5
- Not rated or not available

Soil Rating Points

- <= 3.5
- > 3.5 and <= 14.0
- > 14.0 and <= 21.0
- > 21.0 and <= 23.5
- > 23.5 and <= 47.5
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Rifle Area, Colorado, Parts of Garfield and Mesa Counties
Survey Area Data: Version 13, Jun 5, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 14, 2010—Nov 1, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Percent Clay

Map unit symbol	Map unit name	Rating (percent)	Acres in AOI	Percent of AOI
8	Atencio-Azeltine complex, 1 to 3 percent slopes	3.5	46.3	2.5%
10	Begay sandy loam, 1 to 6 percent slopes	12.5	225.1	12.3%
11	Begay sandy loam, 6 to 12 percent slopes	12.5	44.2	2.4%
14	Chilton channery loam, 6 to 12 percent slopes	14.0	105.9	5.8%
15	Chilton channery loam, 12 to 25 percent slopes	14.0	41.1	2.2%
21	Cushman-Lazear stony loams, 15 to 65 percent slopes		86.4	4.7%
29	Heldt clay loam, 3 to 6 percent slopes	47.5	114.9	6.3%
30	Heldt clay loam, 6 to 12 percent slopes	47.5	209.1	11.4%
35	Ildefonso-Lazear complex, 6 to 65 percent slopes	20.0	4.8	0.3%
47	Nihill channery loam, 6 to 25 percent slopes	21.0	154.1	8.4%
51	Olney loam, 6 to 12 percent slopes	19.0	44.5	2.4%
57	Potts-Ildefonso complex, 3 to 12 percent slopes	20.0	2.6	0.1%
65	Torrifluvents, nearly level	1.5	8.8	0.5%
66	Torriorthents-Camborthids-Rock outcrop complex, steep		229.9	12.5%
67	Torriorthents-Rock outcrop complex, steep		285.9	15.6%
69	Vale silt loam, 6 to 12 percent slopes	23.5	183.9	10.0%
73	Water		46.9	2.6%
Totals for Area of Interest			**1,834.3**	**100.0%**

Description

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. The estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter. The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, saturated hydraulic conductivity (Ksat), plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

Most of the material is in one of three groups of clay minerals or a mixture of these clay minerals. The groups are kaolinite, smectite, and hydrous mica, the best known member of which is illite.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Rating Options

Units of Measure: percent

Aggregation Method: Dominant Component

Aggregation is the process by which a set of component attribute values is reduced to a single value that represents the map unit as a whole.

A map unit is typically composed of one or more "components". A component is either some type of soil or some nonsoil entity, e.g., rock outcrop. For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's components. From this set of component attributes, the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be rendered. Aggregation must be done because, on any soil map, map units are delineated but components are not.

For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

The aggregation method "Dominant Component" returns the attribute value associated with the component with the highest percent composition in the map unit. If more than one component shares the highest percent composition, the corresponding "tie-break" rule determines which value should be returned. The "tie-break" rule indicates whether the lower or higher attribute value should be returned in the case of a percent composition tie. The result returned by this aggregation method may or may not represent the dominant condition throughout the map unit.

Component Percent Cutoff: None Specified

Components whose percent composition is below the cutoff value will not be considered. If no cutoff value is specified, all components in the database will be considered. The data for some contrasting soils of minor extent may not be in the database, and therefore are not considered.

Tie-break Rule: Higher

The tie-break rule indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie.

Interpret Nulls as Zero: No

This option indicates if a null value for a component should be converted to zero before aggregation occurs. This will be done only if a map unit has at least one component where this value is not null.

Layer Options (Horizon Aggregation Method): Depth Range (Weighted Average)

For an attribute of a soil horizon, a depth qualification must be specified. In most cases it is probably most appropriate to specify a fixed depth range, either in centimeters or inches. The Bottom Depth must be greater than the Top Depth, and the Top Depth can be greater than zero. The choice of "inches" or "centimeters" only applies to the depth of soil to be evaluated. It has no influence on the units of measure the data are presented in.

When "Surface Layer" is specified as the depth qualifier, only the surface layer or horizon is considered when deriving a value for a component, but keep in mind that the thickness of the surface layer varies from component to component.

When "All Layers" is specified as the depth qualifier, all layers recorded for a component are considered when deriving the value for that component.

Whenever more than one layer or horizon is considered when deriving a value for a component, and the attribute being aggregated is a numeric attribute, a weighted average value is returned, where the weighting factor is the layer or horizon thickness.

Top Depth: 48

Bottom Depth: 96

Units of Measure: Inches

NRCS Soil Unit 29 and 30 USDA
Textural Triangle

NRCS Soil Units 29 & 30

BASED ON REGULATION 43 TABLE 10-1

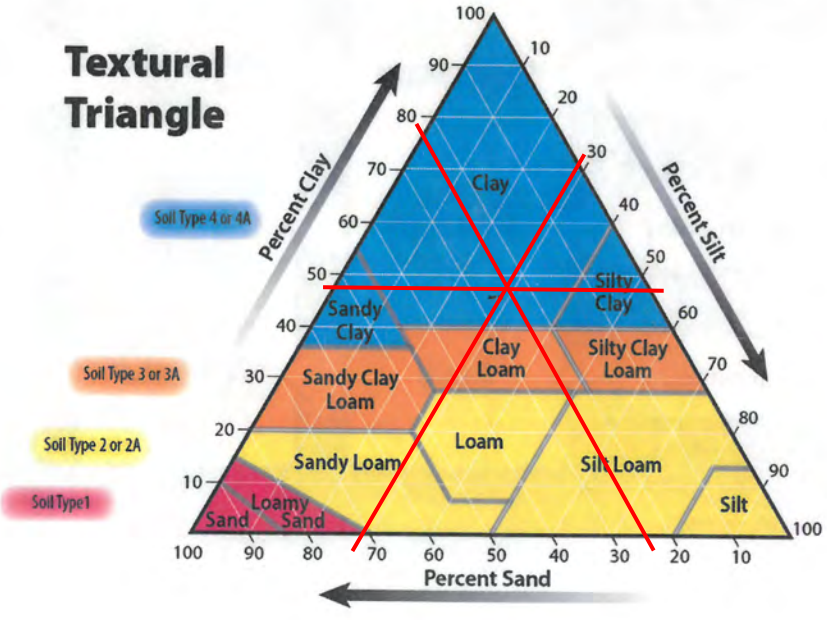
For Soils with Less Than 35 Percent Rock Fragments. Rock Fragments are larger than 2 millimeters.

Soil Treatment Area Long Term Acceptance Rates by Soil Texture, Soil Structure, Percolation Rates and Treatment Level

Soil Type, Texture, Structure and Percolation Rate Range					Long-term Acceptance Rate (LTAR) Gallons per day per square foot				
Soil Type	USDA Soil Texture	USDA Soil Structure-Type	USDA Soil Structure-Grade	Percolation Rate (MPI)	Treatment Level 1[1]	Treatment Level 2[1]	Treatment Level 2N[1]	Treatment Level 3[1]	Treatment Level 3N[1]*
1	Sand Loamy Sand	Single Grain	Structureless	5-15	0.80	1.40	1.40	1.55	1.55
2	Sandy Loam Loam Silt Loam	Prismatic Blocky Granular	Moderate Strong	16-25	0.60	1.00	1.00	1.10	1.10
2A	Sandy Loam Loam Silt Loam	Prismatic Blocky Granular	Weak	26-40	0.50	0.80	0.80	0.90	0.90
		Massive	Structureless						
3	Sandy Clay Loam Clay Loam Silty Clay Loam	Prismatic Blocky Granular	Moderate Strong	41-60	0.35	0.55	0.55	0.65	0.65
3A	Sandy Clay Loam Clay Loam Silty Clay Loam	Prismatic Blocky Granular	Weak	61-75	0.30	0.45	0.45	0.55	0.55
		Massive	Structureless						
4	Sandy Clay Clay Silty Clay	Prismatic Blocky Granular	Moderate Strong	76-90	0.20	0.30	0.30	0.30	0.30
4A	Sandy Clay Clay Silty Clay	Prismatic Blocky Granular	Weak	91-120	0.15	0.20	0.20	0.20	0.20
		Massive	Structureless						
5	Soil Types 2-4A	Platy	Weak Moderate Strong	121+	0.10	0.15	0.15	0.15	0.15

Treatment levels are defined in Table 6.3

Areas outside the dashed box require design by a professional engineer



NRCS Soil Unit 47 and 51 USDA
Textural Triangle

NRCS Soil Units Assumed 47 & 51

BASED ON REGULATION 43 TABLE 10-1

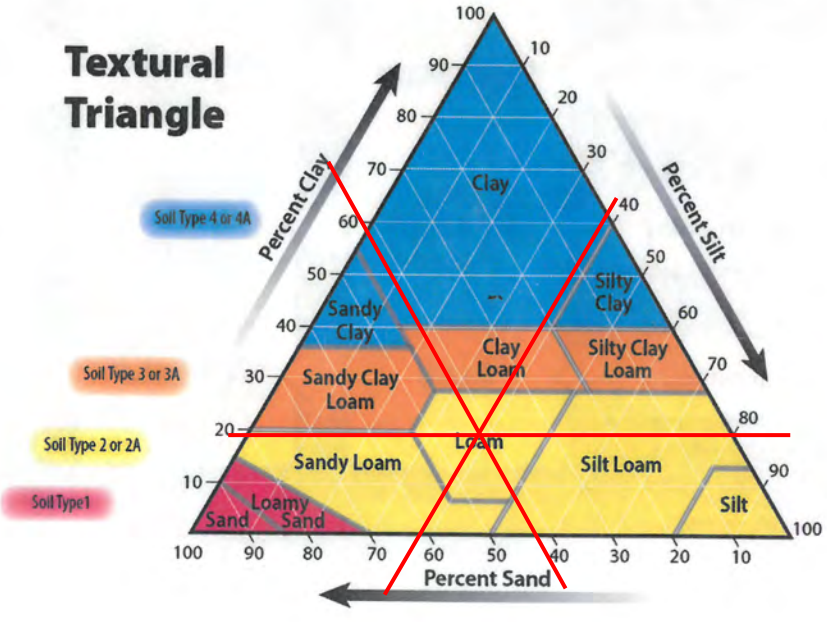
For Soils with Less Than 35 Percent Rock Fragments. Rock Fragments are larger than 2 millimeters.

Soil Treatment Area Long Term Acceptance Rates by Soil Texture, Soil Structure, Percolation Rates and Treatment Level

Soil Type, Texture, Structure and Percolation Rate Range					Long-term Acceptance Rate (LTAR) Gallons per day per square foot				
Soil Type	USDA Soil Texture	USDA Soil Structure-Type	USDA Soil Structure-Grade	Percolation Rate (MPI)	Treatment Level 1[1]	Treatment Level 2[1]	Treatment Level 2N[1]	Treatment Level 3[1]	Treatment Level 3N[1]*
1	Sand Loamy Sand	Single Grain	Structureless	5-15	0.80	1.40	1.40	1.55	1.55
2	Sandy Loam Loam Silt Loam	Prismatic Blocky Granular	Moderate Strong	16-25	0.60	1.00	1.00	1.10	1.10
2A	Sandy Loam Loam Silt Loam	Prismatic Blocky Granular	Weak	26-40	0.50	0.80	0.80	0.90	0.90
		Massive	Structureless						
3	Sandy Clay Loam Clay Loam Silty Clay Loam	Prismatic Blocky Granular	Moderate Strong	41-60	0.35	0.55	0.55	0.65	0.65
3A	Sandy Clay Loam Clay Loam Silty Clay Loam	Prismatic Blocky Granular	Weak	61-75	0.30	0.45	0.45	0.55	0.55
		Massive	Structureless						
4	Sandy Clay Clay Silty Clay	Prismatic Blocky Granular	Moderate Strong	76-90	0.20	0.30	0.30	0.30	0.30
4A	Sandy Clay Clay Silty Clay	Prismatic Blocky Granular	Weak	91-120	0.15	0.20	0.20	0.20	0.20
		Massive	Structureless						
5	Soil Types 2-4A	Platy	Weak Moderate Strong	121+	0.10	0.15	0.15	0.15	0.15

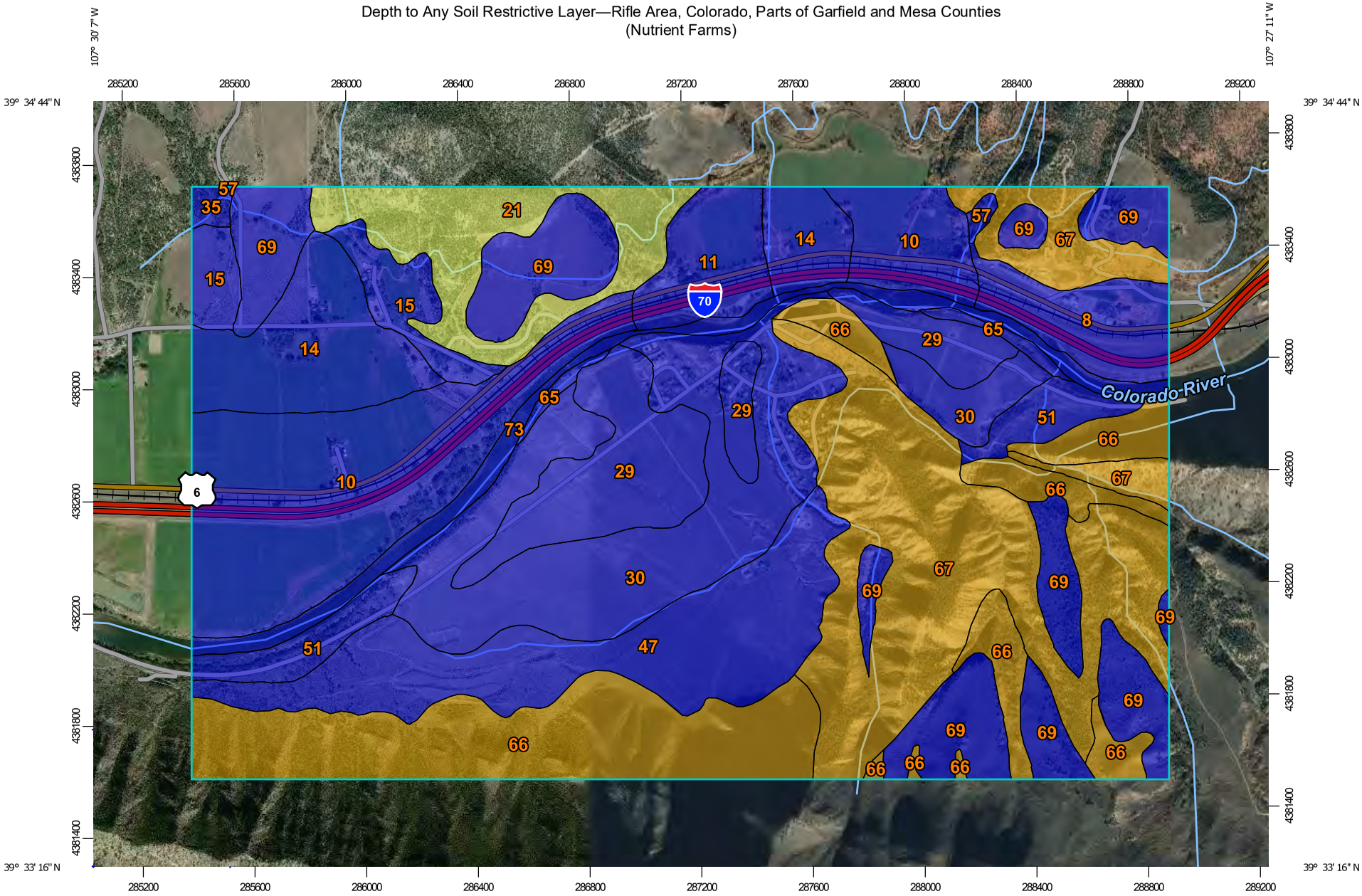
Treatment levels are defined in Table 6.3

Areas outside the dashed box require design by a professional engineer



NRCS Soil Data - Depth to any Restrictive Layer

Depth to Any Soil Restrictive Layer—Rifle Area, Colorado, Parts of Garfield and Mesa Counties
(Nutrient Farms)



Map Scale: 1:19,200 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 250 500 1000 1500

Feet
0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

Soil Rating Lines

- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

Soil Rating Points

- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Rifle Area, Colorado, Parts of Garfield and Mesa Counties
Survey Area Data: Version 13, Jun 5, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 14, 2010—Nov 1, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Depth to Any Soil Restrictive Layer

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
8	Atencio-Azeltine complex, 1 to 3 percent slopes	>200	46.3	2.5%
10	Begay sandy loam, 1 to 6 percent slopes	>200	225.1	12.3%
11	Begay sandy loam, 6 to 12 percent slopes	>200	44.2	2.4%
14	Chilton channery loam, 6 to 12 percent slopes	>200	105.9	5.8%
15	Chilton channery loam, 12 to 25 percent slopes	>200	41.1	2.2%
21	Cushman-Lazear stony loams, 15 to 65 percent slopes	77	86.4	4.7%
29	Heldt clay loam, 3 to 6 percent slopes	>200	114.9	6.3%
30	Heldt clay loam, 6 to 12 percent slopes	>200	209.1	11.4%
35	Ildefonso-Lazear complex, 6 to 65 percent slopes	>200	4.8	0.3%
47	Nihill channery loam, 6 to 25 percent slopes	>200	154.1	8.4%
51	Olney loam, 6 to 12 percent slopes	>200	44.5	2.4%
57	Potts-Ildefonso complex, 3 to 12 percent slopes	>200	2.6	0.1%
65	Torrifluvents, nearly level	>200	8.8	0.5%
66	Torriorthents-Camborthids-Rock outcrop complex, steep	43	229.9	12.5%
67	Torriorthents-Rock outcrop complex, steep	43	285.9	15.6%
69	Vale silt loam, 6 to 12 percent slopes	>200	183.9	10.0%
73	Water	>200	46.9	2.6%
Totals for Area of Interest			**1,834.3**	**100.0%**

Description

A "restrictive layer" is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers.

This theme presents the depth to any type of restrictive layer that is described for each map unit. If more than one type of restrictive layer is described for an individual soil type, the depth to the shallowest one is presented. If no restrictive layer is described in a map unit, it is represented by the "> 200" depth class.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Rating Options

Units of Measure: centimeters

Aggregation Method: Dominant Component

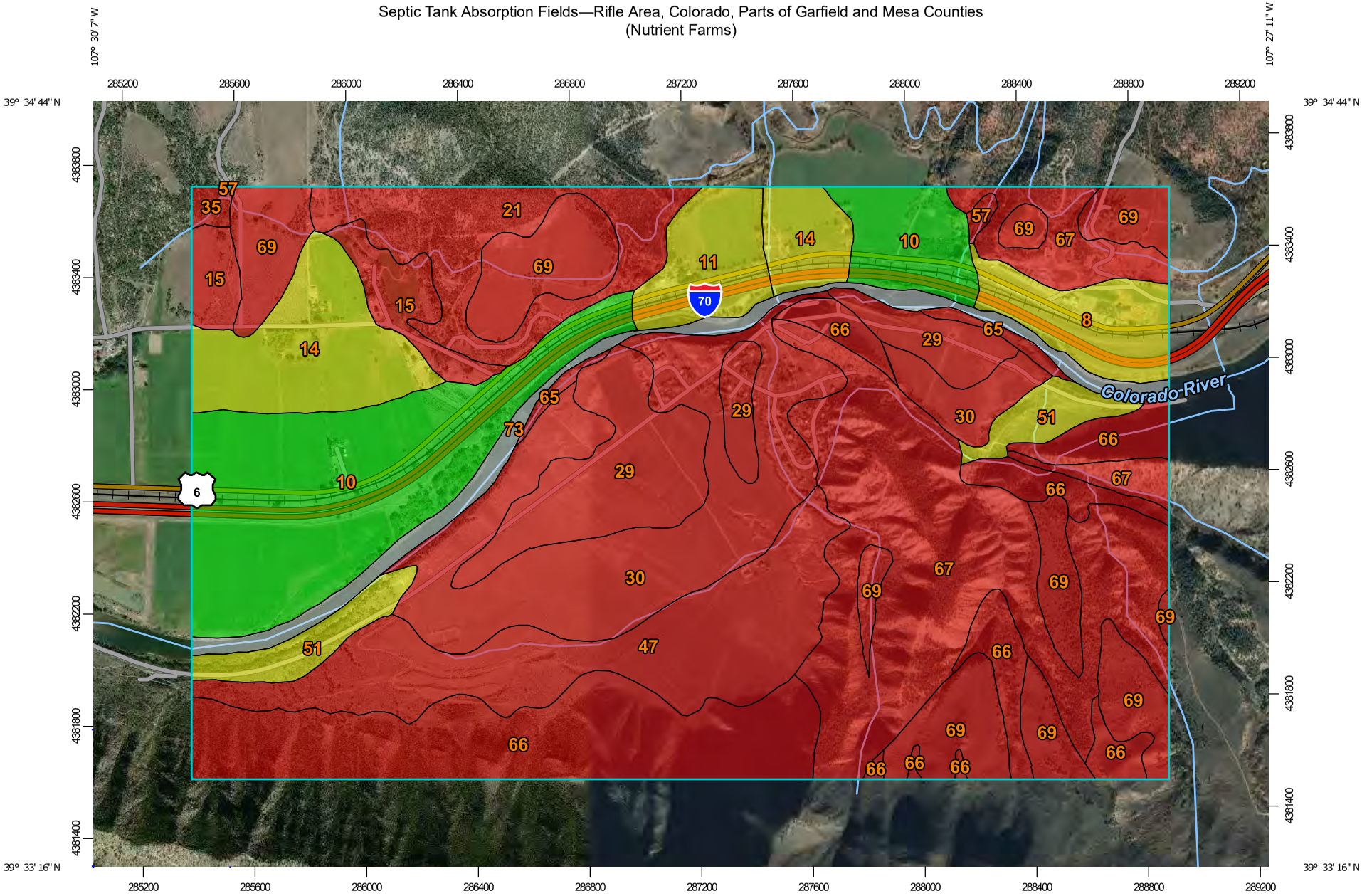
Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Interpret Nulls as Zero: No

NRCS Soil Data - Septic Tank Absorption Fields

Septic Tank Absorption Fields—Rifle Area, Colorado, Parts of Garfield and Mesa Counties
(Nutrient Farms)



Map Scale: 1:19,200 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 250 500 1000 1500

Feet: 0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- Very limited
- Somewhat limited
- Not limited
- Not rated or not available

Soil Rating Lines
- Very limited
- Somewhat limited
- Not limited
- Not rated or not available

Soil Rating Points
- Very limited
- Somewhat limited
- Not limited
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Rifle Area, Colorado, Parts of Garfield and Mesa Counties
Survey Area Data: Version 13, Jun 5, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 14, 2010—Nov 1, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Septic Tank Absorption Fields

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
8	Atencio-Azeltine complex, 1 to 3 percent slopes	Somewhat limited	Atencio (50%)	Large stones (0.01)	46.3	2.5%
10	Begay sandy loam, 1 to 6 percent slopes	Not limited	Begay (90%)		225.1	12.3%
11	Begay sandy loam, 6 to 12 percent slopes	Somewhat limited	Begay (90%)	Large stones (0.17)	44.2	2.4%
				Slope (0.04)		
14	Chilton channery loam, 6 to 12 percent slopes	Somewhat limited	Chilton (85%)	Large stones (0.48)	105.9	5.8%
				Slope (0.04)		
15	Chilton channery loam, 12 to 25 percent slopes	Very limited	Chilton (85%)	Slope (1.00)	41.1	2.2%
				Large stones (0.48)		
21	Cushman-Lazear stony loams, 15 to 65 percent slopes	Very limited	Cushman (45%)	Slope (1.00)	86.4	4.7%
				Depth to bedrock (1.00)		
			Lazear (40%)	Depth to bedrock (1.00)		
				Slope (1.00)		
				Large stones (0.47)		
29	Heldt clay loam, 3 to 6 percent slopes	Very limited	Heldt (90%)	Slow water movement (1.00)	114.9	6.3%
30	Heldt clay loam, 6 to 12 percent slopes	Very limited	Heldt (90%)	Slow water movement (1.00)	209.1	11.4%
				Slope (0.04)		
35	Ildefonso-Lazear complex, 6 to 65 percent slopes	Very limited	Ildefonso (50%)	Slope (1.00)	4.8	0.3%
				Large stones (1.00)		
			Lazear (30%)	Depth to bedrock (1.00)		
				Slope (1.00)		
				Large stones (0.06)		

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
47	Nihill channery loam, 6 to 25 percent slopes	Very limited	Nihill (85%)	Slope (1.00)	154.1	8.4%
				Large stones (0.05)		
51	Olney loam, 6 to 12 percent slopes	Somewhat limited	Olney (85%)	Slow water movement (0.47)	44.5	2.4%
				Slope (0.04)		
57	Potts-Ildefonso complex, 3 to 12 percent slopes	Very limited	Potts (60%)	Slow water movement (1.00)	2.6	0.1%
			Ildefonso (30%)	Large stones (1.00)		
				Slope (0.04)		
65	Torrifluvents, nearly level	Very limited	Torrifluvents (85%)	Flooding (1.00)	8.8	0.5%
				Depth to saturated zone (1.00)		
				Slow water movement (0.47)		
66	Torriorthents-Camborthids-Rock outcrop complex, steep	Very limited	Torriorthents, steep (45%)	Depth to bedrock (1.00)	229.9	12.5%
				Slope (1.00)		
			Camborthids, steep (20%)	Slow water movement (1.00)		
				Slope (1.00)		
				Depth to bedrock (1.00)		
67	Torriorthents-Rock outcrop complex, steep	Very limited	Torriorthents, steep (60%)	Depth to bedrock (1.00)	285.9	15.6%
				Slope (1.00)		
69	Vale silt loam, 6 to 12 percent slopes	Very limited	Vale (90%)	Slow water movement (1.00)	183.9	10.0%
				Slope (0.04)		
73	Water	Not rated	Water (100%)		46.9	2.6%
Totals for Area of Interest					**1,834.3**	**100.0%**

Rating	Acres in AOI	Percent of AOI
Very limited	1,321.5	72.0%
Somewhat limited	240.9	13.1%
Not limited	225.1	12.3%

Rating	Acres in AOI	Percent of AOI
Null or Not Rated	46.9	2.6%
Totals for Area of Interest	**1,834.3**	**100.0%**

Description

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 60 inches is evaluated. The ratings are based on the soil properties that affect absorption of the effluent, construction and maintenance of the system, and public health. Saturated hydraulic conductivity (Ksat), depth to a water table, ponding, depth to bedrock or a cemented pan, and flooding affect absorption of the effluent. Stones and boulders, ice, and bedrock or a cemented pan interfere with installation. Subsidence interferes with installation and maintenance. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas.

Some soils are underlain by loose sand and gravel or fractured bedrock at a depth of less than 4 feet below the distribution lines. In these soils the absorption field may not adequately filter the effluent, particularly when the system is new. As a result, the ground water may become contaminated.

The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the specified use. "Not limited" indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. "Somewhat limited" indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. "Very limited" indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

Rating Options

Aggregation Method: Dominant Condition

Aggregation is the process by which a set of component attribute values is reduced to a single value that represents the map unit as a whole.

A map unit is typically composed of one or more "components". A component is either some type of soil or some nonsoil entity, e.g., rock outcrop. For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's components. From this set of component attributes, the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be rendered. Aggregation must be done because, on any soil map, map units are delineated but components are not.

For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

The aggregation method "Dominant Condition" first groups like attribute values for the components in a map unit. For each group, percent composition is set to the sum of the percent composition of all components participating in that group. These groups now represent "conditions" rather than components. The attribute value associated with the group with the highest cumulative percent composition is returned. If more than one group shares the highest cumulative percent composition, the corresponding "tie-break" rule determines which value should be returned. The "tie-break" rule indicates whether the lower or higher group value should be returned in the case of a percent composition tie. The result returned by this aggregation method represents the dominant condition throughout the map unit only when no tie has occurred.

Component Percent Cutoff: None Specified

Components whose percent composition is below the cutoff value will not be considered. If no cutoff value is specified, all components in the database will be considered. The data for some contrasting soils of minor extent may not be in the database, and therefore are not considered.

Tie-break Rule: Higher

The tie-break rule indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie.

Appendix B

WQSA-6

Colorado Water Quality Control Division

WATER QUALITY SITE APPLICATION POLICY

Policy No: WQSA-6
Initiated By: Engineering Section
Approved By: Steve H. Hall
Effective Date: January 29 2007

POLICY NUMBER 6: MULTIPLE INDIVIDUAL SEWAGE DISPOSAL SYSTEMS

Purpose: To clarify the applicability of Regulation No. 22 to multiple Individual Sewage Disposal Systems (ISDS) with a total design capacity of 2,000 gallons per day (gpd) or more serving as a community system or serving a single property or wastewater generator.

Background: In the past, the lack of guidance with regard to such circumstances led to inconsistent interpretation as to whether a site application approval and a discharge permit are required for these systems. Instances have also arisen in which entities have been advised that the Division's processes could be circumvented through the use of multiple systems, no one of which has a capacity of 2,000 gpd. If multiple septic systems under common ownership do not receive proper operation and maintenance, they could potentially have an adverse affect on ground water quality. In at least one instance, a community water supply well was impacted by an array of septic tank/leachfield systems surrounding it. Recognizing that poorly maintained and functioning septic systems can occur throughout Colorado regardless of ownership, the Division has developed this policy to address multiple septic systems and intends to address single septic systems at a later date when the Guidelines on Individual Sewage Disposal Systems are revised.

Class V injection wells: In Colorado, EPA regulates certain septic systems under the Underground Injection Control (UIC) Program (40 CFR Part 144). A septic system is required to meet UIC Program requirements and is considered a Class V injection well if either one of the following conditions is met:

The septic system, regardless of size, receives any amount of industrial or commercial wastewater (also known as industrial waste disposal wells or motor vehicle waste disposal wells); or the septic system receives solely sanitary waste from multiple family residences or a non-residential establishment and has the capacity to serve 20 or more persons per day (also known as large-capacity septic systems).

Additional information on the Class V injection well program is available on EPA's website at http://www.epa.gov/safewater/uic/classv.html.

Policy:

Multiple ISDS shall be treated as a single domestic wastewater treatment works subject to the site location and design approval requirements in Regulation No. 22 if the combined design capacity of the systems is 2,000 gpd or more, irrespective of whether the systems were constructed at the same time or at different times, and where one or more of the following conditions is met:

1. the septic systems serve a single occupied structure (i.e., school, church, apartment building);

2. the septic systems serve more than one habitable structure on a single property (a property owned by one person or company) (e.g., mobile home park, lodge or resort, shopping center) **and** the horizontal influence area to be maintained from one system's soil treatment system overlaps the minimum horizontal separations of another facility's soil treatment system, or any wells, streams, lakes, water course, or potable water lines, as calculated using the method described in note 1 below or as determined in Table II in the "Guidelines in Individual Sewage Disposal Systems;"

3. the septic systems are commonly owned and serve more than one habitable structure on separate properties (e.g., condominiums, townhouses, single family houses, etc.) **and** the horizontal influence area to be maintained from one system's soil treatment system overlaps the minimum horizontal separations of another facility's soil treatment system, or any wells, streams, lakes, water course, or potable water lines, as calculated using the method described in note 1 below or as determined in Table II in the "Guidelines in Individual Sewage Disposal Systems;" unless the properties are divided by legal property lines approved by the local land use planning authority, are identified on a final plat or deed, and a site-specific analysis (see note 2 below) shows that the properties can support the multiple ISDS without negatively impacting public health or water quality;

4. the systems are interconnected such that wastewater may flow from one system to another;

5. the septic tank and/or absorption field is within the 100-year flood plain or within 500 feet, if the 100-year floodplain has not been mapped, of a stream or river that is listed on the 303 (d) list of impaired water bodies for a contaminant (e.g. BOD, ammonia, phosphorus, solids, or e-coli) likely present in significant concentrations in sewage; or,

6. after consultation between the Local Health Department and the Division it is determined that site location and plans and specifications reviews are warranted due to public concerns, public health, and/or environmental risk.

Additionally, should the combined design capacity of all systems under consideration be greater than 6,000 gpd, the Division will determine, based on information similar to the site-specific analysis described in note 2 below.

whether a site location application and plans and specifications must be submitted for review.

This policy does not apply to subdivisions where a developer or builder may construct the ISDS and the properties are sold to individuals and the individuals are then responsible to meet the requirements contained in the ISDS permit issued by the Local Health Department.

According to Regulation No. 22, Design Capacity for ISDS is the average daily flow at full occupancy, prior to the application of the 150 percent design flow factor.

Example calculations for determining minimum horizontal influence area distance are attached. Also attached is a flow chart for determining when a site location application may be required.

References: Guidelines on Individual Sewage Disposal Systems, Revised 2000
Site Location and Design Approval Regulations for Domestic Wastewater Treatment Works, Regulation No. 22 (5 CCR 1002-22)
40 CFR Part 144 – Underground Injection Control Program

Note 1- Method to Determine the Horizontal Influence Area

The minimum distance between any of the septic system components including the absorption fields is calculated using the following formula:

$100 + [(DF - 1000) / 100] \times 8 =$ Horizontal influence area required

Where: DF = Design Flow = 1.5 X DC
DC = Design Capacity = Average Daily Flow at maximum occupancy

To determine whether the systems overlap, the distance in feet is obtained from the formula above, and a line is drawn around the outside edge of each absorption field generating the horizontal influence area for that component. If the horizontal influence areas of two or more septic systems overlap, the systems are added together to determine the total design capacity (see examples on pages 7 & 8).

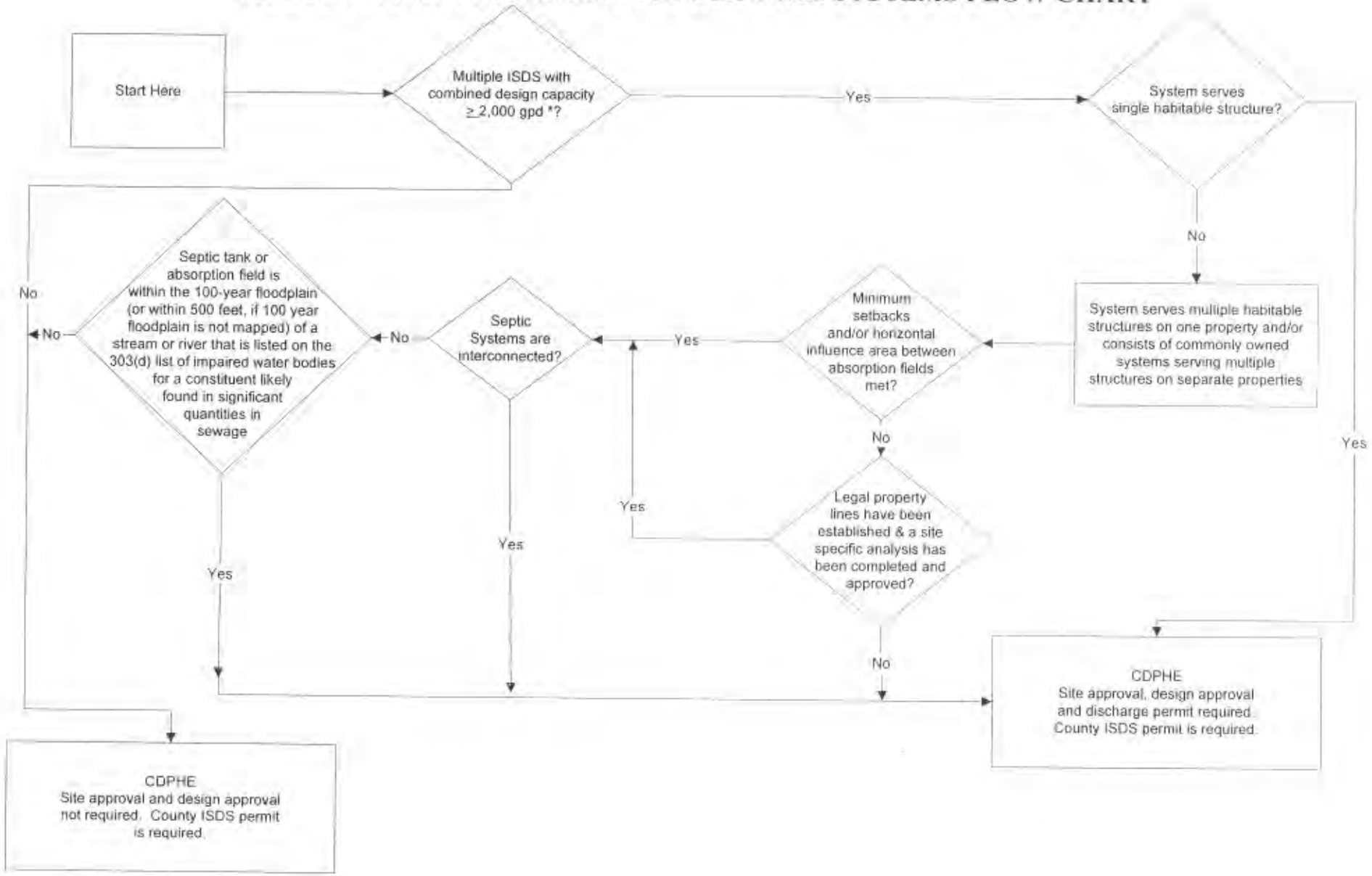
Note 2 – Description of Site Specific Analysis

The site-specific analysis shall be conducted by a qualified person, e.g. Professional Geologist, geotechnical engineer or other similarly qualified professional hired or employed by the permit applicant. The results of the site-specific analysis shall be submitted to the local health department and the Division. The Division and local health department will review the submittal for completeness and technical adequacy. The Division, in consultation with the local health department, will then determine if site approval, design approval, and a state-issued discharge permit are required. Construction at the site cannot commence until this decision is reached. The site-specific analysis shall include:

1. Detailed site plan showing proposed structures and proposed setback distances from features as defined in the ISDS Guidelines.
2. Population to be served by the septic system and calculation of sewage flows using the Table 1 in the "Guidelines on Individual Sewage Disposal Systems" or actual water usage records.
3. Discussion of known future developments in the area
4. Discussion of the area's population density, location and density of other septic systems, topography, geology, and hydrology, ground cover.

5. Distance to nearest central wastewater treatment facility.
6. Location and depth of existing wells within one mile of the property and any proposed wells associated with the subject development.
7. Groundwater level, including any seasonal variations.
8. Soil type, profile hole, and percolation test results.
9. Any available groundwater quality sampling results, particularly for nitrates.
10. ISDS pollutant modeling to assess whether the proposed ISDS have the potential to cause impacts to the groundwater, particularly for nitrates.
11. Cost to install proposed septic systems.
12. Operation and maintenance plan including costs.

MULTIPLE INDIVIDUAL SEWAGE DISPOSAL SYSTEMS FLOW CHART



Example ISDS Calculations

Formula used: 100 + [(DF – 1000) / 100] X 8 = Horizontal influence area (from Table II – Guidelines on ISDS)

Where: DF = Design Flow = 1.5 X DC
DC = Design Capacity = Average Daily Flow at maximum occupancy

Calculation:

Assumptions: DC System 1 = 1500 gpd, DF System 1 = 2250 gpd
DC System 2 = 1000 gpd, DF System 2 = 1500 gpd

Case I (see below for diagram)

Horizontal influence area for System 1= 100 + [(2250 – 1000) / 100] X 8 = 200 feet

Requirement for horizontal influence area from absorption fields, springs or wells are met. Site location and design approval not required; it remains under Local Health Department jurisdiction.

Case II (see below for diagram)

Horizontal influence area for System 1= 100 + [(2250 – 1000) / 100] X 8 = 200 feet
Horizontal influence area for System 2= 100 + [(1500 – 1000) / 100] X 8 = 140 feet

Systems 1 and 2 do **not** overlap.
Requirement for horizontal influence area from absorption fields, springs or wells are met. Site location and design approval not required; it remains under Local Health Department jurisdiction.

Case III A (see below for diagram)

Horizontal influence area for System 1= 100 + [(2250 – 1000) / 100] X 8 = 200 feet
Horizontal influence area for System 2= 100 + [(1500 – 1000) / 100] X 8 = 140 feet

Systems 1 and 2 **do** overlap. Add design flows (2250+1500=3750) and recalculate required horizontal influence area as in Case III B. Site location and design approval required, unless system components are relocated.

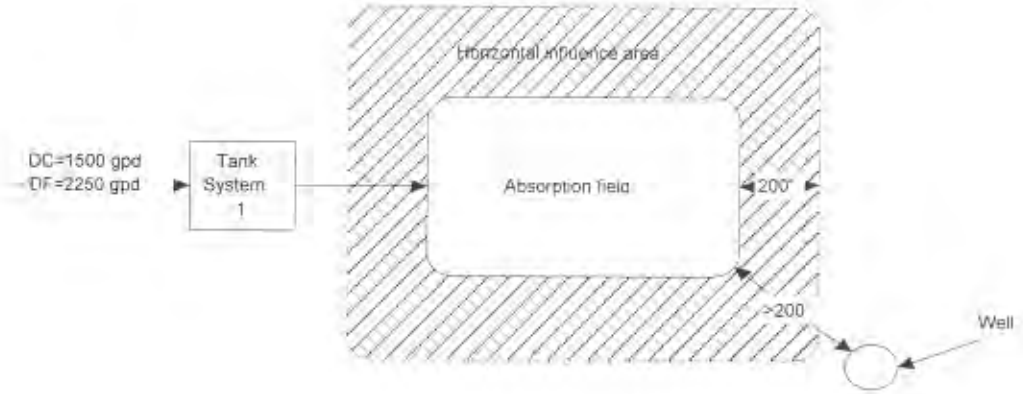
Case III B (see below for diagram)

Horizontal influence area for combined System 1 and 2
= 100 + [(3750 – 1000) / 100] X 8 = 320 feet

Systems 1 and 2 **do** overlap. Site location and design approval required, unless system components are relocated.

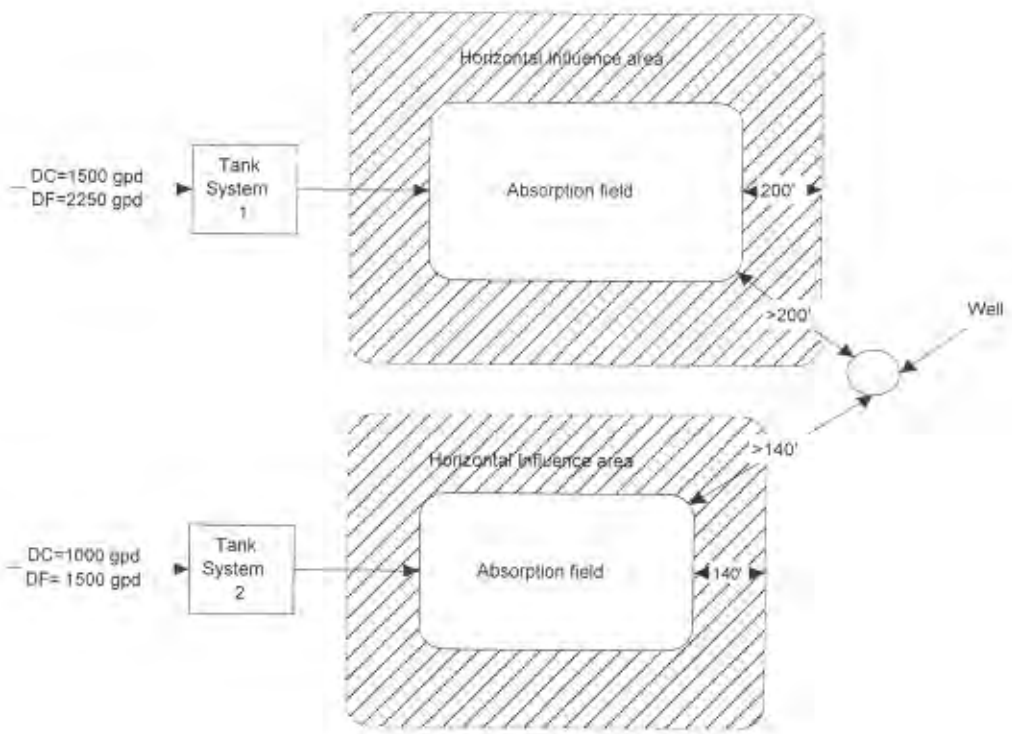
Case I

Single system - All horizontal influence area distance requirements met. Remains under Local Health Department Control
(If DC ≥ 2000 gpd then Site Application required and horizontal influence area to well would increase)



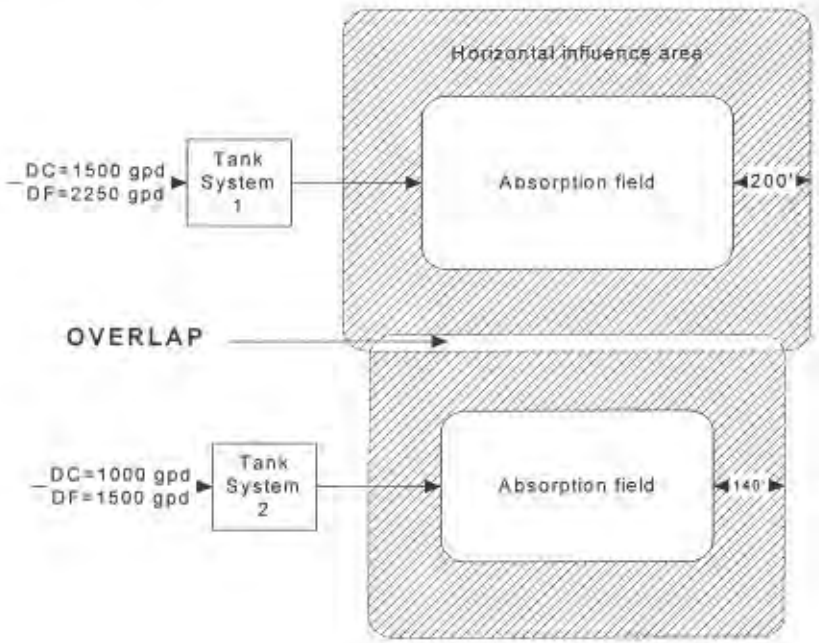
Case II

Two systems - All horizontal influence area distance requirements met. Remains under Local Health Department Control
(Each DC <2000 gpd, and horizontal influence areas do not overlap)



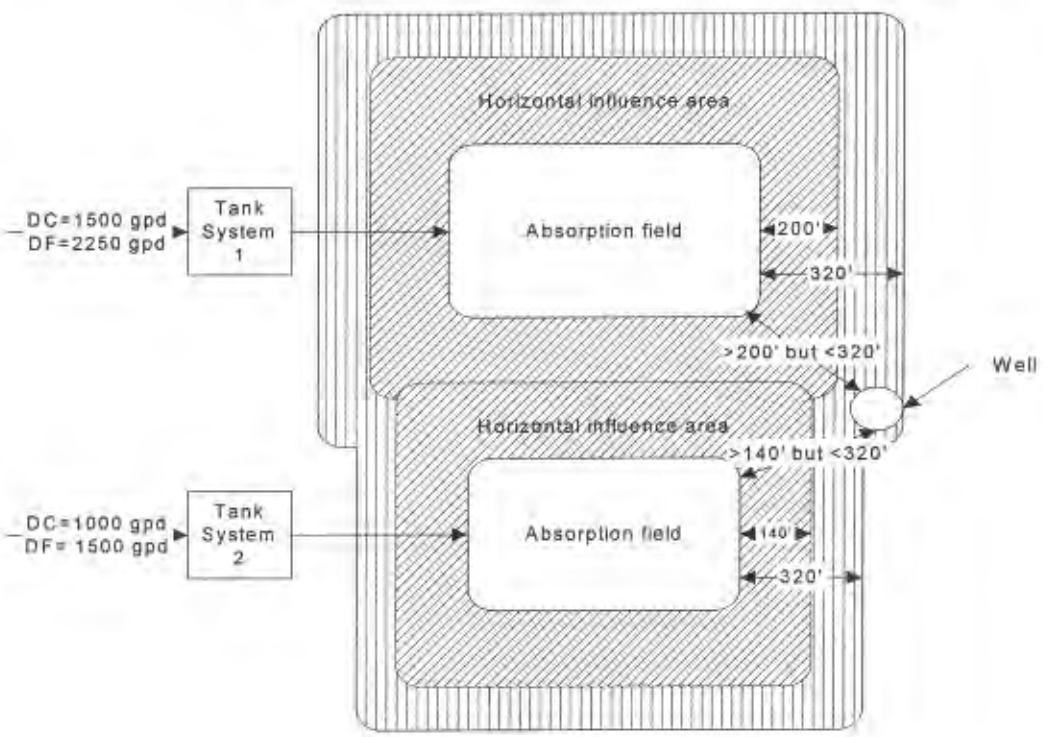
Case III A

Two systems - Absorption field horizontal influence areas overlap. Two systems are added together and DC is ≥ 2,000 gpd. System is required to obtain site location and design approval. (Must recalculate combined horizontal influence area distance for any well or stream etc. as in Case III B).



Case III B

Two systems - Absorption field horizontal influence areas overlap. Recalculate horizontal influence area distance. Well is now in zone of influence Cannot meet horizontal influence area requirements. Possible solution is to move System 1 or 2 such that Case II applies.



Appendix C

HIA Calculations

HIA = 100 + [(DF - 1000) / 100] x 8

OWTS I.D.	Design Capacity (gpd)	Design Flow (1.5 x DC)	Horizontal Influence Area (HIA)
2	600	900	**92**
5	600	900	**92**
6-1/6-2	10145	15217.5	**1237.4**
6-3	590	885	**90.8**
7-1	1000	1500	**140**
8-1	805	1207.5	**116.6**
8-2	1550	2325	**206**
8-3A	1800	2700	**236**
8-3B	1800	2700	**236**
8-4	1250	1875	**170**
8-5A	1750	2625	**230**
8-5B	500	750	**80**

949448 01/28/2021 02:14:17 PM Page 1 of 2
Jean Alberico, Garfield County, Colorado
Rec Fee: $18.00 Doc Fee: $0.00 eRecorded

SPECIAL WARRANTY DEED
(Water Rights)

THIS DEED, made this 26 day of January, 2021, between **APB Holdings LLC, a Colorado limited liability company** ("Grantor"), and **Nutrient Holdings LLC, a Colorado limited liability company**, whose legal address is 520 River View Drive, Unit 506, New Castle, CO 81647 ("Grantee");

WITNESSETH, that Grantor, for and in consideration of the sum of **Ten Dollars ($10.00) and other good and valuable consideration**, the receipt and sufficiency of which are hereby acknowledged, has granted, bargained, sold, and conveyed, and by these presents does grant, bargain, sell, convey, and confirm, unto Grantee, and Grantee's heirs, successors, and assigns forever, 100% of the following described water and water rights:

See **Exhibit A**, attached hereto and incorporated herein,

TOGETHER WITH all and singular the hereditaments and appurtenances thereto belonging, or in anywise appertaining, and the reversion and reversions, remainder and remainders, rents, issues, and profits thereof; and all the estate, right, title, interest, claim, and demand whatsoever of Grantor, either in law or equity, of, in, and to the above bargained premises, with the hereditaments and appurtenances;

TO HAVE AND TO HOLD the said premises above bargained and described with the appurtenances, unto Grantee, and Grantee's heirs, successors, and assigns forever. Grantor, for Grantor and Grantor's heirs, successors, and assigns, does covenant and agree that Grantor shall and will WARRANT AND FOREVER DEFEND the above bargained premises in the quiet and peaceable possession of Grantee, and Grantee's heirs, successors, and assigns, against all and every person or persons claiming the whole or any part thereof, by, through or under Grantor.

IN WITNESS WHEREOF, Grantor has executed this deed on the date set forth above.

APB Holdings LLC,
a Colorado limited liability company

By: _____
Andrew Bruno, its Member

STATE OF COLORADO)
) ss.
COUNTY OF GARFIELD)

The foregoing instrument was acknowledged before me this 26th day of January, 2021 by Andrew Bruno, as Member of APB Holdings LLC, a Colorado limited liability company, on behalf of said corporation.

Witness my hand and official seal:

_____
Notary Public

SHAWN MCKINNEY
Notary Public – State of Colorado
Notary ID 20174046288
My Commission Expires Nov 8, 2021

EXHIBIT A

Coal Ridge Pump and Pipeline: All rights conditionally decreed to the Coal Ridge Pump and Pipeline in Case No. 83CW367, Water Division No. 5, Colorado, to divert 2 cfs of water from the Colorado River, with an appropriation date of September 14, 1983, at a point of diversion located in Garfield County, Colorado on the South Bank of the Colorado River in Section 35, Township 5 South, Range 90 West of the 6th P.M., at a point 1,260 ft. West of the East line and 1840 feet North of the South line of said Section 35.

Coal Ridge Reservoir: The right to store up to 2,000 acre-feet of water, as conditionally decreed in Case No. 83CW368, Water Division No. 5, Colorado, with an appropriation date of September 14, 1983, at a place of storage in Garfield County, Colorado, at which the center of the dam axis is located in Section 35, Township 5 South, Range 90 West of the 6th P.M. at a point 1,900 ft. West of the East line and 210 feet North of the South line of said Section 35.

949449 01/28/2021 02:14:17 PM Page 1 of 2
Jean Alberico, Garfield County, Colorado
Rec Fee: $18.00 Doc Fee: $0.00 eRecorded

SPECIAL WARRANTY DEED
(Water Rights)

THIS DEED, made this 26 day of January, 2021, between **APB Holdings LLC, a Colorado limited liability company** ("Grantor"), and **Nutrient Holdings LLC, a Colorado limited liability company**, whose legal address is 520 River View Drive, Unit 506, New Castle, CO 81647 ("Grantee");

WITNESSETH, that Grantor, for and in consideration of the sum of **Ten Dollars ($10.00) and other good and valuable consideration**, the receipt and sufficiency of which are hereby acknowledged, has granted, bargained, sold, and conveyed, and by these presents does grant, bargain, sell, convey, and confirm, unto Grantee, and Grantee's heirs, successors, and assigns forever, 100% of the following described water and water rights:

See **Exhibit A**, attached hereto and incorporated herein,

TOGETHER WITH all and singular the hereditaments and appurtenances thereto belonging, or in anywise appertaining, and the reversion and reversions, remainder and remainders, rents, issues, and profits thereof; and all the estate, right, title, interest, claim, and demand whatsoever of Grantor, either in law or equity, of, in, and to the above bargained premises, with the hereditaments and appurtenances;

TO HAVE AND TO HOLD the said premises above bargained and described with the appurtenances, unto Grantee, and Grantee's heirs, successors, and assigns forever. Grantor, for Grantor and Grantor's heirs, successors, and assigns, does covenant and agree that Grantor shall and will WARRANT AND FOREVER DEFEND the above bargained premises in the quiet and peaceable possession of Grantee, and Grantee's heirs, successors, and assigns, against all and every person or persons claiming the whole or any part thereof, by, through or under Grantor.

IN WITNESS WHEREOF, Grantor has executed this deed on the date set forth above.

APB Holdings LLC,
a Colorado limited liability company

By: _____
Andrew Bruno, its Member

STATE OF COLORADO)
) ss.
COUNTY OF GARFIELD)

The foregoing instrument was acknowledged before me this 26th day of January, 2021 by Andrew Bruno, as Member of APB Holdings LLC, a Colorado limited liability company, on behalf of said corporation.

Witness my hand and official seal:

_____
Notary Public

SHAWN MCKINNEY
Notary Public – State of Colorado
Notary ID 20174046288
My Commission Expires Nov 8, 2021

EXHIBIT A

WATER RIGHTS

VULCAN DITCH WATER RIGHTS

393 of the total 440 acre feet per year of consumptive use water decreed on June 26, 1974, in Case No. W-2127, Water Division No. 5, to the Vulcan Ditch and Vulcan Ditch First Enlargement, together with the associated pro rata interest (393/440) in the right to divert from Canyon Creek the total rates of flow of six (6) c.f.s., having been decreed in Civil Action No. 1313, Garfield County District Court, on August 21, 1908, to the Vulcan Ditch with a date of appropriation of April 1, 1907, Priority No. 175 in the Water District No. 39, and four (4) c.f.s. having been decreed in Civil Action No. 4004, Garfield County District Court, on August 11, 1952, to the Vulcan Ditch First Enlargement with a date of appropriation of October 8, 1942, priority No. 242 in Water District No. 39, and together with the right to divert said rights at an alternate point of diversion on the Colorado River as decreed in Case No. 84CW349, entered on April 30, 1985, Water Division No. 5, together with a pro-rata interest in Riverbend Wells Nos. 1 through 5, inclusive, as described in Case No W-2127, Permit Nos. 018144F through 018148F. These water rights are subject to the terms, conditions and stipulations in Case Nos. W-2127and 84CW349 and the following covenants:

1. A Covenant Regarding the Vulcan Ditch entered into between NCIG Financial, Inc. and Frank A. and Bonnie M. Mills, recorded in the real property records of Garfield County, Colorado on September 22, 2003, at reception no. 637024, effective date July 15, 2003.

2. A Covenant Regarding the Vulcan Ditch entered into between NCIG Financial, Inc. and Jeffrey S. and Brenda S. Simpson, recorded in the real property records of Garfield County, Colorado on September 22, 2003, at reception no. 637025, effective date July 15, 2003.

3. A Covenant Regarding the Vulcan Ditch entered into between NCIG Financial, Inc. and Susan E. Santos, formerly Susan A. Edstrom, recorded in the real property records of Garfield County, Colorado on September 22, 2003, at reception no. 637026, effective date July 15, 2003.

4. A Notice of Settlement and Release of Claims entered into between NCIG Financial, Inc. and Harlan and Rebekah Baldridge, recorded in the real property records of Garfield County, Colorado on August 26, 2003, at reception no. 634943, executed on August 13, 2003.