Feasibility of Trinchera Unconfined Augmentation Well Purchase

Sponsored by Groundwater Subdistrict of the Trinchera Water Conservancy District acting by and through its Water Activity Enterprise

In conjunction with the Colorado Water Conservation Board

September 2023

Executive Summary

Trinchera Subdistrict is required to replace injurious stream depletions from groundwater wells that are part of the Subdistrict. If the Subdistrict is unable to replace these injurious stream depletions eleven commercial wells, three municipal wells and 164 irrigation wells will be forced to cease pumping.

Trinchera Subdistrict is requesting a loan in the amount of $2,300,000 to purchase 10 unconfined wells to be a physical source and a source of historical consumptive use to supply augmentation water for the replacement of depletions to the Rio Grande River. This purchase of wells will provide five wells which will be a physical supply of water and historical consumptive use and an additional five wells that will initially be used as a source of historical consumptive use and potentially a physical source in the future should the need arrise. The historical consumptive use associated with these ten wells is 985 acre-ft. Additionally, these wells may be used deliver augmentation water obtained through the dry up of other unconfined wells in the subdistrict. The Trinchera Subdistrict has the authority to set an allocation limiting the consumptive use of its member wells for the purposes of reaching a sustainable aquifer and as a source of "dry-up" for use in a change case and or substitute water supply plan. Such water that is made available for replacement of depletions through said change is to be delivered to reach 3 of the Rio Grande River. In the Subdistrict there are 129 unconfined wells which have historic consumptive use that could be used as an additional source source of "dry-up" such that augmentation well water is made available through an substitute water supply plan, a change case. In 2022 the Subdistrict constructed a pipeline for delivering augmentation water from nine unconfined wells, five of which are included in this purchase, to the Rio Grande River for replacement of depletions. In the 2022 and 2023 annual replacement plans dry up of unconfined wells has yielded a 1,459 acre-ft of augmentation water per year. Since coming into operation in 2021 the Subdistrict has had to replace depletions to the Rio Grande River and the Conejos River averaging 3,100 acre-ft per year.

Trinchera Subdistrict will assess its members an annual variable fee (per acre-ft) in an amount sufficient to cover both loan and interest payments and the operation and maintenance costs for the project.

Trinchera Water Conservancy District
P.O. Box 145
Blanca, CO 81123

Board of Directors
President: Monty Smith
Vice President: Shane Lancaster
Secretary: Cade Kunugi
Member: Bradley Christensen
Member: Byron Kunugi

Trinchera Groundwater Subdistrict
President: Monty Smith
Vice President: Shane Lancaster
Secretary: Cade Kunugi
Member: Bradley Christensen
Member: Byron Kunugi

Management and Staff
District Manager: Kim Wakasugi

Attorney
John Justus, Esq.
1333 West 120th Avenue, Suite 302
Westminster, CO 80234
(303) 595-9441

Engineer
Jason Lorenz, P.E.
Agro Engineering, Inc.
0210 County Road 2 South
Alamosa, CO 81101
(719) 852-4957

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1.0 Introduction

1.1 Purpose of the Trinchera Unconfined Augmentation Well Pipeline

Members of the Subdistrict are landowners within the Trinchera Water Conservancy District who rely on groundwater for all or part of their commercial, irrigation, and or municipal uses within the area defined by the Rio Grande Decision Support System (RGDSS) Ground Water Model and the Rules Governing the Withdrawal of Groundwater in Water Division No. 3, Case No 15CW3024 as the Trinchera Response Area. See figure 1 below showing a map of the Subdistrict and Response Area. The RGDSS Groundwater Model has calculated stream depletions occuring to surface water caused by wells withdrawing water from the the confined and unconfined aquifer in the Trinchera Response Area. These depletions may cause injury to senior surface water rights and/or interfere with the state's ability to fufill its obligations under the Rio Grande Compact. In order to remedy the injury or interference, the State Engineer has promulgated Ground Water Rules (Case No. 15CW3024, District Court in and for Water Division No. 3) that have a direct impact on the use of ground water within the Trinchera Response Area. Under the Groundwater Rules nonexempt wells can only continue groundwater withdrawals if they have either: an individual Plan for Augmentation, a Substitute Water Supply Plan, or their well is included in a Subdistrict's Groundwater Management Plan and Annual Replacement Plan. The Subdistrict's Annual Replacement Plan must demonstrate that the Subdistrict has a sufficient source of replacement water available to replace injurious stream depletions resulting from Subdistrict Well's groundwater withdrawals. Using a CWCB Water Project Loan, the subdistrict constructed a pipeline connecting nine unconfined wells to the Rio Grande River. The Subdistrict has used this pipeline to replace a portion of its injurious stream depletions occurring to the Rio Grande River and to the Conejos River through exchange. The Trinchera Subdistrict intends to purchase ten wells as source of historic consumptive use to change to augmentation use. Of these ten wells, five are currently connected to the pipeline and will be used as a physical source of augmentation water. Within the Trinchera Subdistrict there are an additional 129 unconfined wells that could be the source of consumptive use reduction in a substitute water supply plan, a change case, and/or an alternative transfer method to obtain augmentation water to be delivered through the using these wells and the unconfined augmentation pipeline. The Trinchera Subdistrict, using its allocation to reduce consumptive use and in cooperation with its members will obtain consumptive use reduction from the unconfined aquifer that will offset the pumping of augmentation wells. In addition to the "dry-up" of unconfined wells, the Subdistrict could purchase surface water stored in Smith Reservoir from the Trinchera Irrigation Company and either through a substitute water supply plan or a change case, change the water to recharge/augmentation. This surface water would then be

recharged to the unconfined aquifer, as an augmentation source to offset the pumping of the unconfined augmentation wells. Funding for and the purchase of these unconfined wells will allow the Subdistrict Members to continue operating their Subdistrict Wells.

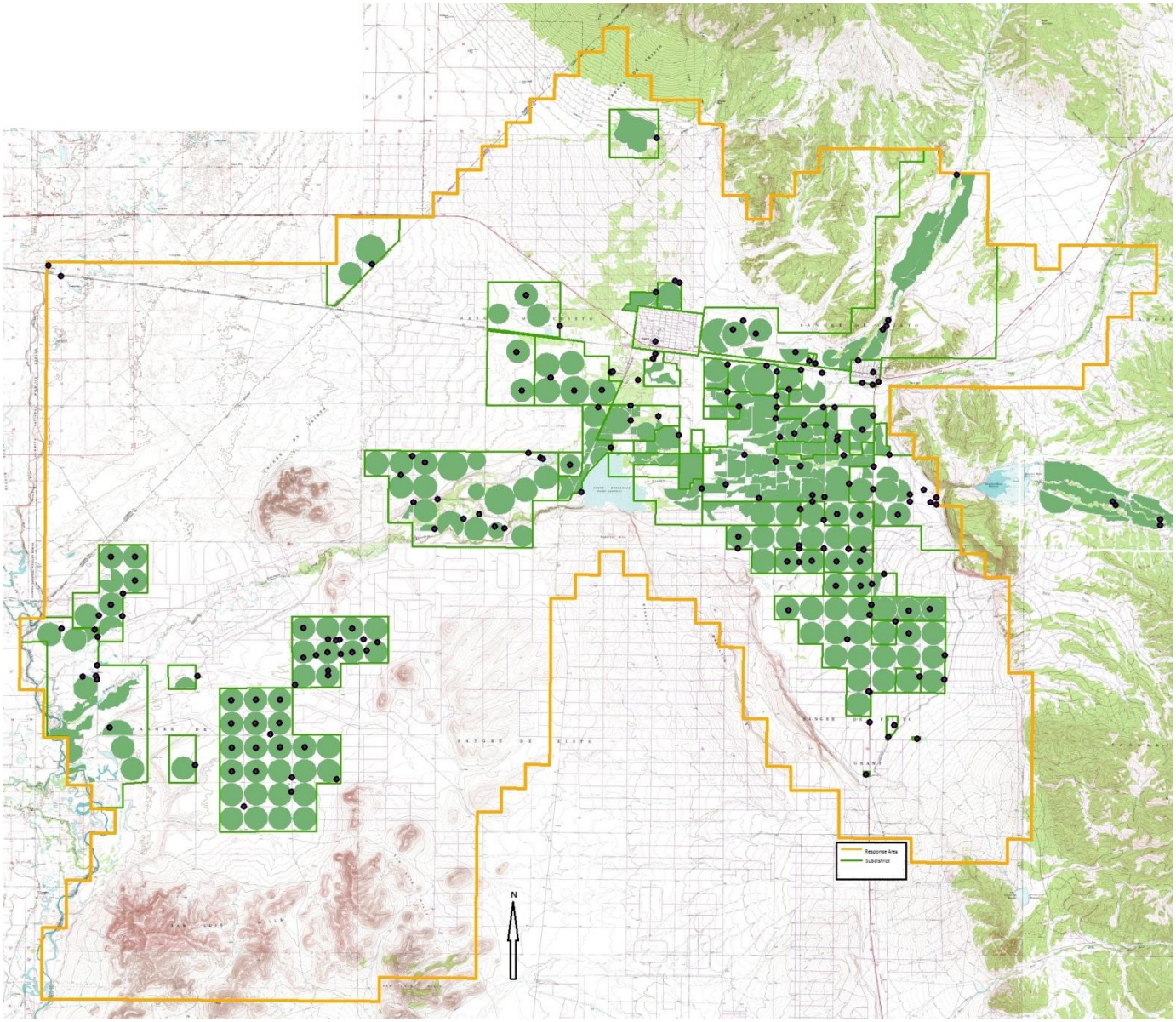

Figure 1 Subdistrict and Response Function Boundaries

1.2 Project Sponsor – Trinchera Groundwater Subdistrict of the Trinchera Water Concervancy District, acting by and through its Water Activity Enterprise

The Trinchera Subdistrict was decreed organized on September 3, 2008 by the District Court for Costilla County in Case No. 2007CV66. The District Court for Water Division No. 3 ("Water Court") has confirmed the ability of the Trinchera Subdistrict, as a subdistrict of a water conservancy district, to pursue a Ground Water Management Plan. The Water Court previously entered an order confirming the Subdistrict's ability, as a subdistrict of a water conservancy district, to submit a plan of water management. See ORDER GRANTING TRINCHERA SUBDISTRICT'S MOTION FOR DETERMINATION OF QUESTION OF LAW REGARDING AUTHORITY TO IMPLEMENT A GROUNDWATER MANAGEMENT PLAN dated October 7, 2016 in Case No. 2015CW3024.

The overall objective of the Subdistrict is to provide a water management alternative to individual plans for augmentation or state-imposed regulations that limit the use of wells within the Subdistrict; that is a system of self-regulation using economic-based incentives and other measures that promote responsible groundwater use and management and ensures protection of senior surface water rights. The Subdistrict currently consists of 179 wells that have consumed an average of 24,888 acre-ft. from 2011 through 2020. In an effort to maintain a sustainable aquifer and to meet the requirement for replacement of stream depletions the Subdistrict Board set the allocation in 2023 to 13,080 acre-ft, with 10,529 acre-ft for irrigation, 551 acre-f. for commercial and municipal uses and 2,000 acre-ft for augmentation as a replacement source for stream depletions.

To fund their operations, the Subdistrict assesses administrative and operational fees by special assessments placed on their members and contract holders' taxes. The fees assessed by the Subdistrict are a per well administrative fee, a per acre-ft. past pumping fee (based on average historical CU of the well), a per acre-ft. current pumping fee (based on the allocation of current year CU to the well), and a per acre-ft. over pumping fee (a penalty fee at 10X the normal fee in the event and for the amount the allocation is exceeded). The past pumping and current pumping fees will be used to fund the repayment of the Trinchera Unconfined Pipeline loan. For the 2023 season the fee is set at $30.36/acre-ft.

1.3 Project Area

The project area is in the northern portion of Costilla County in the San Luis Valley. The economy in this area is predominately agriculturally based. Crops grown in the Trinchera Subdistrict include alfalfa, potatoes, grass hay, barley, wheat, oats, canola, and quinoa. Other economic sectors include ranching, forestry, and tourism. Trinchera Subdistrict is bordered on the north and east by the Sangre de Cristo Mountains, on the west by the Rio Grande River and on the south by the San Luis Hills. The snowmelt from the Sangre de Cristos provides the primary streamflow into the subdistrict from Trinchera, Ute, and Sangre de Cristo Creeks. The aquifer beneath the Subdistrict is

primarily unconfined with only 19 confined wells located at the western edge of the Subdistrict along the Rio Grande River. Costilla County is the poorest county in Colorado.

1.4 Land Uses

Land use is predominately irrigated agriculture, with a small amount of commercial and municipal uses. In Costilla County agricultural land is primarily used for forage production followed by potatoes and small grains. From 2011 to 2020 the average consumptive use by wells was 24,888 acre-ft. with 96% of the use going to center pivot irrigation, 2% to flood irrigation, and 2% to commercial and municipal uses.

2.0 Water Demands and Water Rights Included in the Trinchera Unconfined Pipeline

2.1 Water Supply Demands

The water supply demands are determined by the Rio Grande Decision Support System (RGDSS) Groundwater Model and the Trinchera Response Are Response Functions. These tools are used to calculate the Subdistrict's depletions to the Rio Grande River, Conejos River, and Trinchera Creek monthly and are summed on to an annual basis. The largest portion of depletions owed by the Subdistrict is to the Rio Grande River from the Chicago Ditch to the State Line (Rio Grande Reach 3) with an average of 2,596 acre-ft from 2021 to 2023. The next largest stream depletion from Subdistrict pumping is on the Conejos River below Seldonia/Garcia Ditch (Conejos Reach 2) at 336 acre-ft. The remaining depletions occur on the Rio Grande between the Excelsior Ditch and Chicago Ditch (Rio Grande Reach 2) at 168 acre-ft and on the Trinchera Creek below Smith Reservoir (Trinchera Reach 2) at 9 acre-ft. The maximum depletions to the Rio Grande and Conejos Rivers during this period were 3,348 acre-ft.

Table 1 Net Stream Depletions of Trinchera Subdistrict

	Net Stream Depletions (May-Apr)				
Year	Trinchera Below Smith Reservoir	Rio Grande Excelsior-Chicago	Rio Grande Chicago-State Line	Conejos below Seledonia/Garcia	Total
2021	10	177	2,809	363	3,358
2022	9	168	2,470	323	2,970
2023	9	158	2,509	321	2,998
Average	9	168	2,596	336	3,109

2.2 Water Rights Included in the Trinchera Unconfined Augmentation Well Pipeline

The primary source of water for the unconfined well augmentation pipeline will be the ten unconfined wells included in this study that have historical consumptive use that

can be changed from irrigation to augmentation. The dry up of the lands associated with these wells will supply 985 acre-ft of historical consumptive use for this change. The physical augmentation water will be supplied by five of these wells. Additionally, these physical supply wells can be used to deliver dry up of additional unconfined wells in the basin.

The wells included are listed in Table 2 and locations are shown in Figure 2. The physical supply wells are listed in bold print.

Table 2 Wells Included

WDID	PermitNo	DecreeNo
3505016	**18647-F**	**W3272 WELL NO 20**
3505020	18649-F	W3272 WELL NO 24
3505022	**18652-F**	**W3272 WELL NO 26**
3505587	45647-F	10CW0008 WELL NO 27-S
3505588	18653-F-R	10CW0008 WELL NO 27-R
3505593	**18651-F-R**	**10CW0008 WELL NO 25-R**
3505604	46309-F	10CW0008 WELL NO 3-S
3505606	**46211-F**	**10CW0008 WELL NO 21-S**
3505621	**46210-F**	**10CW0008 WELL NO 21-R**
3505631	14262-R-R	10CW0008 WELL NO 3-R

Figure 2 Well Locations

3.0 Project Description

3.1 Purpose and Background of the Trinchera Unconfined Augmentation Well Purchase

The groundwater wells within the Trinchera Subdistrict are required to replace injurious depletions to the Rio Grande River, Conejos River, and Trinchera Creek. The depletions to Trinchera Creek have been addressed through the use of forbearance and no call agreements with the surface water right holders on Trinchera Creek. The Trinchera Subdistrict continues to look for reliable sources of replacement water to replace the 3,100 acre-ft average depletions occurring on the Rio Grande and Conejos Rivers. The following alternatives described below have been considered to remedy depletions on the Rio Grande and Conejos Rivers.

3.2 Analysis of Alternatives

3.2.1 Alternative 1 – Purchase Surface Water Rights and/or Forbearance Agreements

Surface water rights could be purchased, and the irrigated land could be dried up. The historical consumptive use would be changed to augmentation through water court. The Subdistrict has purchased surface water rights in the past and uses them as a source of augmentation. Currently there hasn't been enough historical consumptive use associated with the surface water rights for sale to fully replace the depletions to the Rio Grande and Conejos Rivers. Also surface water rights are dependent upon stream flows and as such the amount of water available fluctuates from year to year placing some uncertainty as to how much water will be available each year relative to the depletions that need to be replaced. Also, the timing of the water right coming into priority may not match the timing of depletions to the streams. To address the fluctuation of supply and timing storage must also be procured and even then exchange into storage may not be available when the water right is in priority. The Subdistrict will continue to evaluate surface water rights as they become available as to the suitability for replacement of Subdistrict depletions, but to date the amount of consumptive use available is not sufficient to fully replace depletions.

Forbearance Agreements are contracts to pay the surface water right holder for the injury occurred from depletions with something other than wet water. Forbearance can be an unreliable source as it also is controlled by streamflow and the resulting calling right. If the calling right is not a ditch forbearing with the Subdistrict, it is not available as a replacement source on that day and wet water is required. Also, forbearance agreements have risen in price as there is more demand for water. One forbearance agreement offered to the Subdistrict set the price at $500/acre-ft. As the price of forbearance increases it will become unaffordable for the Subdistrict to maintain. Many of the contracts for forbearance are on an annual basis which makes them difficult to count on in the long term.

3.2.2 Alternative 2 – Trinchera Unconfined Augmentation Pipeline

The second alternative considered is the use of unconfined augmentation wells which will pump water to the Rio Grande through a pipeline. The dry up of unconfined wells in the basin will be a source of historical consumptive use for the augmentation wells. A second source for the consumptive use for the unconfined augmentation wells would be the changing of Trinchera Irrigation Company surface water historical consumptive use of water stored in Smith Reservoir to recharge/augmentation. This surface water would then be recharged into the unconfined aquifer and pumped from the unconfined augmentation wells for replacement of depletions. The delivery pipeline has

been installed to deliver water across the 5.5 miles between the selected wells and the Rio Grande River.

Figure 3 Proposed Trinchera Unconfined Augmentation Pipeline

3.2.3 Alternative 3 – No Action

No action would result in an unreliable supply of replacement water that would result in eight commercial wells, three municipal wells and 163 irrigation wells will being forced to cease pumping, when sources of replacement water available are insufficient to replace depletions. The economic impact would be devastatiing to the area, so this is not the preferred alternative.

3.3 Preferred Alternative – Alternative 2

The Subdistrict has constructed a pipeline for delivery of augmentation water from these wells and has operated under a lease purchase agreement for the past two years. The purchase of these wells would supply the largest single source of augmentation water owned by the Subdistrict to date. These wells would be a reliable supply for the replacement of one third of the Subdistricts depletions. To date the Subdistrict has not been able to find sufficient surface water available for sale and as forbearance is not a reliable source based on streamflow and contracts available from year to year and also may become price prohibitive to make Alternative 1 work, Alternative 2 is the preferred alternative. Augmentation wells pumping water to the Rio Grande will provide a guaranteed source to the Rio Grande and Conejos to ensure the Sub-district can replace injurious depletions in time, place, and amount, as required by the Ground Water Rules. By using unconfined aquifer wells the source of dry up to offset the pumping can be borne by all the members of the Subdistrict and not just the owners of the few confined wells. By using unconfined wells to supply the augmentation water there is sufficient dry up available through the Subdistrict's allocation process to full supply all depletions on the Rio Grande and Conejos Rivers if needed. The use of unconfined aquifer wells also provides a conduit for the use of surface water through recharge as a source of augmentation water the streams.

4.0 Engineering Analysis for the Preferred Alternative

4.1 Source of Water for the Trinchera Unconfined Pipeline

The source of historical consumptive use for the Trinchera Unconfined Pipeline will come from ten irrigation wells. These wells pump ground water from the unconfined aquifer. The acreage for these wells will be dried up and along with the historical consumptive use of other unconfined wells in the basin and surface water recharged will be used to remedy depletions from the Subdistrict wells. The unconfined wells in the basin have historically irrigated alfalfa, grass hay, small grains, and potatoes in the basin.

The dry up from the parcels associated with these ten wells are expected to have 985 acre-ft of consumptive use available for replacement of depletions. These parcels along with other parcels supplied by the unconfined aquifer will be used along with other sources to supply the replacement of depletions on the Rio Grande River and through exchange on the Conejos River, which has been as much as 3,350 acre-ft. Five of these wells will be used as a physical supply of augmentation water.

4.2 Hydrologic Evaluation

The physical supply wells are drilled to depths between 156 feet and 305 feet and are in the unconfined aquifer. See Table 3 for well depths. The current cumulative flow rate of the physical supply wells is 6,300 gpm.

Table 3 Well Depths and Perforations

WDID	Top Perforation	Bottom Perforation	Well Depth
	ft	ft	ft
3505016	**116**	**170**	**170**
3505020	226	280	280
3505022	**251**	**305**	**305**
3505587	80	200	200
3505588	69	201	201
3505593	**20**	**156**	**156**
3505604	49	169	198
3505606	**60**	**200**	**200**
3505621	**121**	**200**	**200**
3505631	140	300	300

5.0 Project Cost

The purchase price for the Trinchera Unconfined Pipeline wells is $2,300,000.

6.0 Permitting, Change of Water Rights

The physical supply wells for this plan are permitted through the Division of Water Resources as described above.

The Subdistrict's plan is to temporarily change the water rights use from irrigation to augmentation through the SWSP process for up to 5 years. After this time, the Subdistrict will either pursue a change in water rights through a water court case.

7.0 Implementation Schedule

The Subdistrict began replacing depletions using these well during the 2022 ARP which began May 1st 2022. The subdistrict has a lease purchase agreement with the owner of these wells with a closing date of April 1st, 2025.

8.0 Institutional Considerations

The pipeline connecting these wells to the Rio Grande River has been completed and the agreement between the Subdistrict and the Owner has been finalized.

The Subdistrict on an annual basis will set its allocation to maintain a sustainable aquifer and to provide enough "dry up" to allow for the use of the augmentation wells to have adequate supply to replace depletions on the Rio Grande and Conejos Rivers. The subdistrict members (including the owner of the physical supply wells for the pipeline) in response to this allocation will designate their dry up on an annual basis to provide historical consumptive use for a change to augmentation.

9.0 Social and Environmental Impacts of the Project

The environmental impacts of drying up these parcels will be minimal as native vegetation has been planted on these parcels in 2022 and 2023. If the Subdistrict does not find a way to replace injurious depletions and the project does not move forward, then environmental impact might be very significant if wells are turned off. Significant portions of historically irrigated land will be dried up.

The social impact for the area including the Subdistrict members will be positive. It will allow irrigation wells to continue to withdraw groundwater while also replacing any injurious depletions owed to senior surface water rights from these continued groundwater withdrawals. All the surface water rights in the Trinchera Subdistrict are owned by well owners who are members of the Subdistrict.

10.0 Financial Feasibility

10.1 Financial Repayment

The Subdistrict is applying for a loan in the amount of $2,300,000 from the Colorado Water Conservation Board Water Project Loan Program with a 30-year repayment period and an interest rate of 1.1%. The estimated annual payment is $90,428.28. The Subdistrict assesses a current pumping fee and a past pumping fee at a variable fee rate. The current pumping fee is 83% of the irrigation allocation multiplied by the variable fee rate for the subdistrict. The past pumping fee is the historic consumptive use by the wells multiplied by 17% multiplied by the variable rate. For the 2023 irrigation season the irrigation allocation accepted was 11,229.10 acre-ft with the historic consumptive use at 21,687.81 acre-ft. To generate the loan payment of $90,428.28 the variable fee

rate required is $6.95/acre-ft. The variable rate for 2023 is set at $30.36/acre-ft with projected income for 2022 and will generate $350,537.96. This variable fee rate is set annually by the board of directors to meet the financial obligations of the Subdistrict. In addition to the irrigators in the basin the municipalities and commercial users contract with the subdistrict and their contracts will generate an additional $33,449.43 in 2023. A Schedule of Revenues and Expenditure is included as Attachment 3.

10.2 Credit Worthiness

To fund their operations, the Subdistrict assesses administrative and operational fees by special assessments placed on their members and contract holders' taxes. The fees assessed by the Subdistrict are a per well administrative fee, a per acre-ft. past pumping fee (based on average historical CU of the well), a per acre-ft. current pumping fee (based on the allocation of current year CU to the well), and a per acre-ft. over pumping fee (a penalty fee at 10X the normal fee in the event and for the amount the allocation is exceeded).

The fee rate will be evaluated annually, and if appropriate, will be adjusted by the Board of Managers as required by the Plan of Water Management and in response to the demands of the Annual Replacement Plan.

11.0 Conclusions and Recommendations

1. The purchase of these unconfined irrigation wells assists the Trinchera Subdistrict in remedying injurious depletions owed to senior surface water users on the Rio Grande River and Conejos Rivers from groundwater withdrawals in the Subdistrict. The change of water right for the augmentation wells will result in a total of 985 acre-ft based on the historical consumptive use of the irrigated areas.
2. The purchase of these wells and obtaining a change in water right is feasible from both a financial, engineering, and legal viewpoint.
3. The Trinchera Subdistrict has the legal ability to budget the annual payment for the loan into their annual past and current pumping fees.