FEASIBILITY STUDY APPROVAL
Pursuant to Colorado Revised Statutes 37-60-121 &122, and in accordance with policies adopted by the Board, the CWCB staff has determined this Feasibility Study meets all applicable requirements for approval.

Signed 5/4/2020 Date

Loan Feasibility Study

1.1 Background

The Arapahoe County Water and Wastewater Authority (ACWWA) is a water and wastewater provider that currently provides water to roughly 10,000 residents and numerous commercial and industrial customers in a 11.25 square mile area in the southeastern portion of the Denver Metropolitan area. Notable customers are Centennial Airport, the Denver Broncos training facility, and numerous data centers. ACWWA's existing water supply system consists of several raw water wells in the Cherry Creek alluvium and associated water rights, water from the ACWWA Flow project which delivers water from the South Platte River Basin to ACWWA through the East Cherry Creek Valley Water and Sanitation District's (ECCV) Reverse Osmosis Northern Water Treatment Plant, downstream of Barr Lake, and associated pipeline and pumping facilities. ACWWA also has various water rights and wells in the Denver Basin Aquifer.

In the late 2000's, ACWWA identified a need for both renewable water supplies and additional water supplies to supply and expand ACWWA's raw water irrigation system. In 2009, ACWWA entered into an agreement with United Water and Sanitation District (UWSD) to construct the ACWWA Flow project which included a 1,400-acre-foot reservoir for use by ACWWA near the current ACWWA service area. This reservoir, called "Chambers Reservoir", was to be constructed on a site located west of Chambers Road and south of E-470, shown in Figure 1 below.

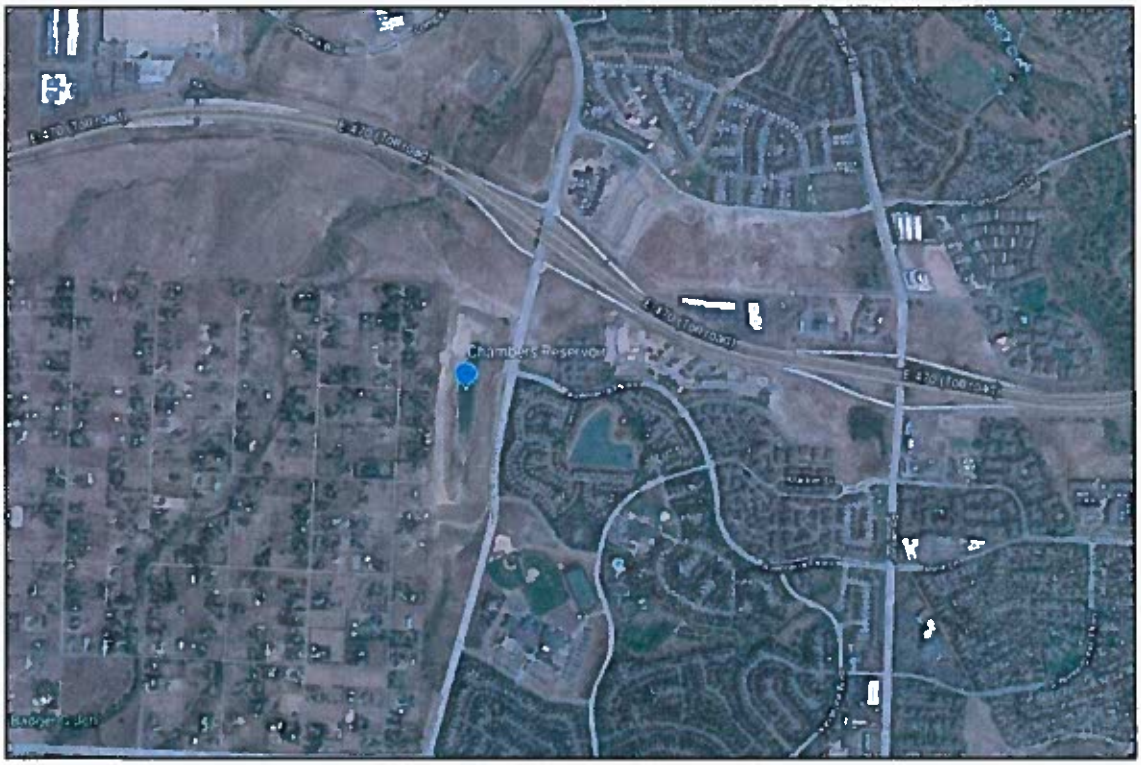

Figure 1 – Chambers Reservoir

The purpose of this reservoir is to provide a storage vessel to supply ACWWA's existing and future raw water irrigation customers and as supplemental raw water supplies for delivery to and

augmentation of ACWWA's existing wells in the Cherry Creek alluvium. In addition, ACWWA's existing raw water wells are high in iron and manganese which causes staining of sidewalks and driveways when applied from customer's sprinkler systems. Chambers Reservoir would allow water to be pumped from these alluvial wells directly into the reservoir where the iron and manganese would be oxidized and settled before being placed into the raw water irrigation system.

This reservoir was to be constructed by both excavation below the natural ground surface and by construction of a dam across an unnamed tributary to Happy Canyon Creek. The reservoir was proposed to be filled by pumping groundwater from the Cherry Creek alluvium through existing wells owned by ACWWA. The design of the reservoir was based upon using a partial clay liner to seal sand lenses encountered during excavation of the reservoir. This patchwork of clay lining was intended to meet the State Engineers' Reservoir Design Criteria for seepage into the reservoir. The reservoir was constructed in 2010/2011 and the pump station used to pump water out of Chambers Reservoir to meet ACWWA's raw water irrigation demands was constructed in 2011/2012. Upon partial filling of the reservoir, ACWWA observed that the reservoir was leaking water in excess of acceptable limits and, if not repaired, would result in a reservoir that could not economically be used for storage. Upon draining of the water stored in the reservoir, a portion of the clay liner and reservoir side-slope failed.

ACWWA submitted a warranty claim against the project and eventually settled with all parties including the reservoir designer and contractor. However, ACWWA still needed a solution to the excessive leakage. ACWWA contracted with AECOM to provide alternatives for repair of the reservoir such that water could be economically stored. Upon review of all alternatives, ACWWA selected AECOM's recommendation to regrade the reservoir and install a synthetic liner to prevent water leakage. The dam that created Chambers Reservoir is under the jurisdiction of the State Engineer and is being repaired in cooperation with the State Engineer.

1.1.1 Purpose

The purpose of this loan request is to partially fund the installation of the synthetic liner. ACWWA expended approximately $17,000,000 for the initial construction of Chambers Reservoir and associated Pump Station. ACWWA has also spent substantial amounts of money in the subsequent years addressing this issue, and while receiving some funds in settlements with the parties, these funds did not cover the anticipated cost for a complete repair of the reservoir. The cost of the proposed repair totals around $7,500,000 which exceeds ACWWA's current budget for this repair. Therefore, ACWWA is requesting a loan of $2,500,000 to assist in paying for the proposed repair including reservoir regrading and installation of the synthetic liner.

1.1.2 Study Area Description

ACWWA primarily serves property located in the southeastern Denver metropolitan area approximately 10 miles southeast of downtown Denver. The majority of ACWWA's service area is within southern Arapahoe County, but a portion is also within northern Douglas County. Together, this service area contains approximately 5,500 acres. In addition to providing direct service to the property described above, ACWWA is a party to numerous agreements with other local governments, pursuant to which it provides water

service to the Town of Foxfield, the Antelope subdivision and other areas. ACWWA also provides wastewater treatment for the Cottonwood Water and Sanitation District. These other areas total approximately 1,700 acres, resulting in an overall service area of approximately 7,200 acres, or approximately 11.25 square miles. Chambers Reservoir will provide non-potable water to the ACWWA service area, which is shown in Figure 2 below.

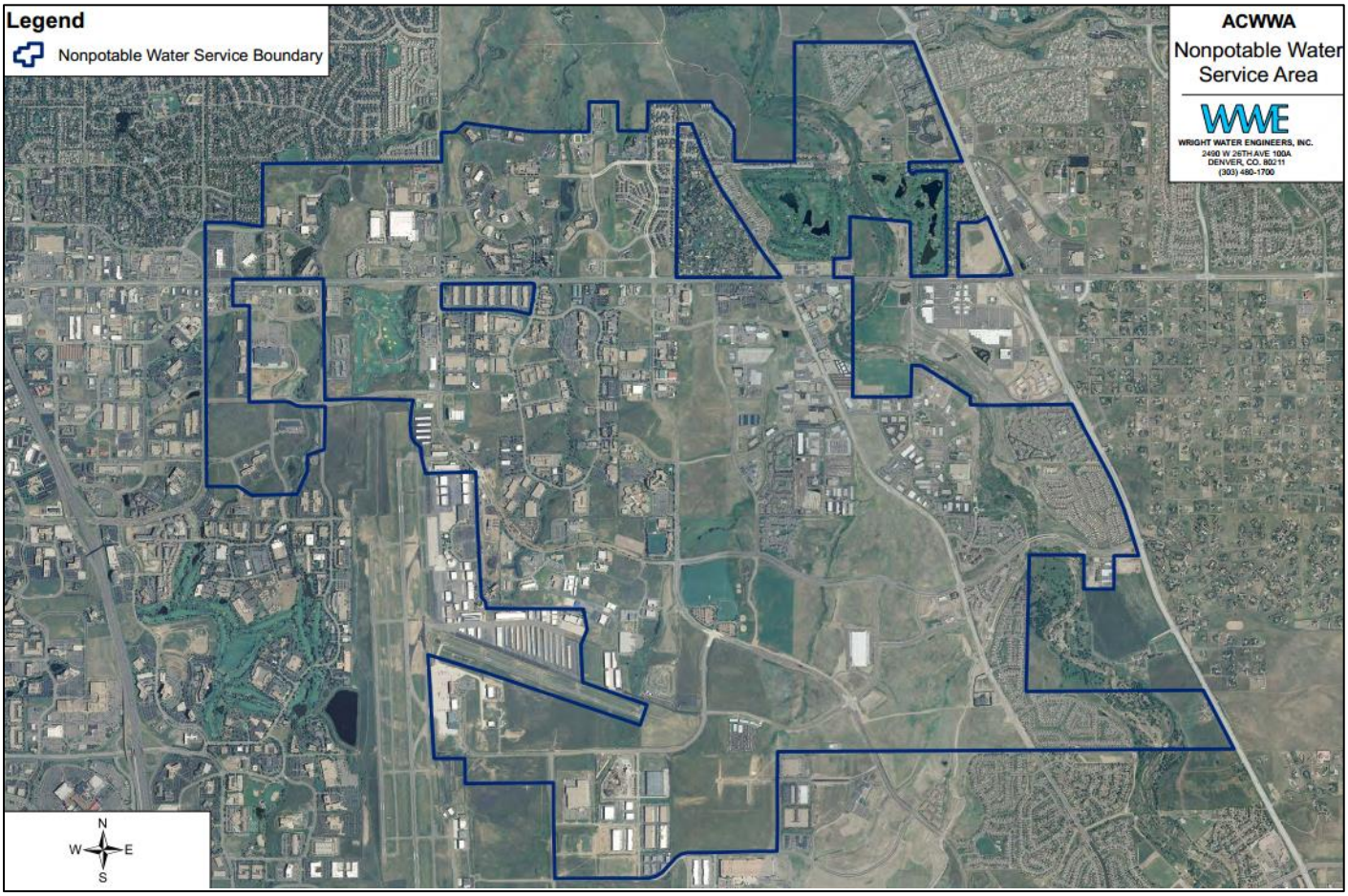

Figure 2 – ACWWA's Service Area

There are six areas located adjacent to the ACWWA service area boundary that may be potential future service areas for ACWWA. These areas have been included in the analysis of ACWWA's buildout conditions.

The potential future service areas and type of service are as follows:

- Arapahoe Heights – Potable Water
- Chenango – Potable Water
- East Valley – Potable Water
- Piney Creek Ranches – Potable Water
- Vermillion Creek – Potable Water, Nonpotable Water, Wastewater
- Compark 190 – Potable Water, Nonpotable Water, Wastewater

The topography of ACWWA's service area varies from the low-lying areas along the Cherry Creek drainage to relative high ground elevations to the southwest near Centennial Airport and the eastern portion of the potable water service area of Antelope. The lowest ground elevation of 5625 feet is located along Cherry Creek at the northern edge of the service area in the Prairie Creek development. The highest ground elevation of 6005 feet is located on the east side of Antelope.

Arapahoe County has over 56,000 residents and an abundance of commercial real-estate. The following table provides a history of the populations of Arapahoe County, the Denver-Aurora Core Based Statistical Area (the "Denver-Aurora CBSA") and the State. The Denver-Aurora CBSA is comprised of six metropolitan counties and four bordering counties. The counties are Adams, Arapahoe, Broomfield, Clear Creek, Denver, Douglas, Elbert, Gilpin, Jefferson and Park. Between 2000 and 2010, the population of Arapahoe County increased 17.2%, and the populations of the Denver-Aurora CBSA and the State increased 15.8% and 16.9%, respectively.

Population

Year	Arapahoe County	Percent Change	Denver-Aurora CBSA	Percent Change	Colorado	Percent Change
1970	162,142	--	1,116,226	--	2,207,259	--
1980	293,621	81.1%	1,450,768	30.0%	2,889,735	30.9%
1990	391,511	33.3	1,650,486	13.8	3,294,394	14.0
2000[(1)]	487,967	24.6	2,196,957	33.1	4,301,261	30.6
2010	572,003	17.2	2,543,482	15.8	5,029,196	16.9
2011	585,069	--	2,601,403	--	5,119,182	--
2012	595,264	1.7%	2,647,835	1.8%	5,189,861	1.4%
2013	606,938	2.0	2,698,037	1.9	5,266,317	1.5
2014	617,498	1.7	2,751,570	2.0	5,345,680	1.5
2015	628,951	1.9	2,809,029	2.1	5,444,871	1.9
2016	637,266	1.3	2,853,972	1.6	5,534,240	1.6
2017	643,257	0.9	2,890,391	1.3	5,609,445	1.4

(1) Population of the Denver-Aurora CBSA adjusted by Colorado State Demography Office to reflect the 2001 creation of the City and County of Broomfield.
Sources: United States Department of Commerce, Bureau of the Census (1970 to 2010) and Colorado State Demography Office (2011 to 2017 estimates, which are subject to periodic revision).

The following table sets forth the annual per capita personal income levels for the residents of Arapahoe County, the Denver-Aurora CBSA, the State and the nation.

Per Capita Personal Income

Year[1]	Arapahoe County	Denver-Aurora CBSA	Colorado	United States
2013	$49,731	$51,804	$45,120	$44,851
2014	53,297	55,673	46,869	47,060
2015	54,476	56,708	50,021	48,985
2016	55,116	56,712	51,956	49,883
2017	56,642	59,660	52,097	51,731
2018	n/a	n/a	53,504	53,712

(1) Figures for Arapahoe County and the Denver-Aurora CBSA updated March 6, 2019. State and national figures updated March 26, 2019. All figures are subject to periodic revisions.
Source: United States Department of Commerce, Bureau of Economic Analysis.

In 2018, the largest employment sector in the Denver-Aurora CBSA was health care and social assistance (comprising approximately 12.2% of the metro area's work force), followed in order by accommodation and food services, professional and technical services, retail trade, and educational services. For the twelve-month period ending December 31, 2018, total average employment in the Denver-Aurora CBSA increased by approximately 2.6% as compared to the same twelve month period ending December 31, 2017.

The following table sets forth the number of individuals employed within selected Arapahoe County industries which are covered by unemployment insurance. In 2018, the largest employment sector in Arapahoe County was health care and social assistance (comprising approximately 13.1% of the county's work force), followed, in order, by retail trade, professional and technical services, finance and insurance, and administrative and waste services. For the twelve-month period ending December 31, 2018, total average employment in Arapahoe County increased 1.1% as compared to the same period ending December 31, 2017, and total average weekly wages increased 3.2%.

Average Number of Employees within Selected Industries – Arapahoe County

Industry	2014	2015	2016	2017	2018
Accommodation and Food Services	24,151	25,461	26,161	26,942	26,939
Administrative and Waste Services	27,591	28,314	26,640	27,411	27,622
Agriculture, Forestry, Fishing, Hunting	89	94	94	119	124
Arts, Entertainment and Recreation	5,320	5,347	5,470	6,106	6,331
Construction	17,986	19,107	20,244	21,769	22,805
Educational Services	22,230	22,760	22,930	22,632	22,399
Finance and Insurance	25,921	27,531	28,516	29,159	28,891
Government	13,108	13,194	13,051	13,079	13,373
Health Care and Social Assistance	38,291	41,116	43,035	42,754	43,572
Information	18,305	17,710	17,675	18,136	18,203
Management of Companies/Enterprises	8,092	8,130	7,280	8,661	8,743
Manufacturing	7,827	8,041	8,148	7,891	8,209
Mining	942	925	714	675	683
Non-classifiable	33	22	28	13	30
Other Services	8,541	8,610	8,959	9,316	9,528
Professional and Technical Services	29,153	30,364	31,529	31,878	33,178
Real Estate, Rental and Leasing	5,884	6,234	6,312	6,381	6,681
Retail Trade	33,121	34,414	34,614	34,774	33,916
Transportation and Warehousing	4,817	4,796	5,069	5,138	5,554
Utilities	241	249	260	256	267
Wholesale Trade	13,922	14,180	14,836	15,032	14,741
Total All Industries[(1)]	305,562	316,597	321,566	328,120	331,789

(1) Figures may not equal totals when added due to the rounding of averages or the inclusion in the total figure of employees that were not disclosed in individual classifications.

Source: State of Colorado, Department of Labor and Employment, Labor Market Information, Quarterly Census of Employment and Wages (QCEW).

1.1.3 Previous Study

ACWWA had identified several possible sites for raw water storage in the ACWWA service area prior to signing the agreement with UWSD in 2009. All of these sites had insignificant potential storage capacity as compared to the Chambers Reservoir site. ACWWA's contract for Chambers Reservoir was a turn-key project. In other words, UWSD was to deliver a completed reservoir for ACWWA, ready for use. Thus, ACWWA doesn't have records or knowledge of any feasibility study prepared for UWSD for the constructed Chambers Reservoir. ACWWA's information on the original Chambers Reservoir construction is documented in the design report and construction report prepared for UWSD and submitted to the State Engineer for approval of the dam design and resulting constructed reservoir (See Appendix A - Original Chamber Reservoir Design).

ACWWA's investigation of the reservoir leakage and potential causes is documented in the Investigation Report prepared by AECOM for ACWWA (See Appendix B – AECOM Investigation Report). The conclusion of this investigation was that the originally constructed Chambers Reservoir would need to be rehabilitated for ACWWA to use the reservoir for its intended purposes. The alternatives investigated prior to selection of the final rehabilitation project is presented in Section 1.4 of this application.

1.2 Project Sponsors

ACWWA represents a cooperative effort among public entities to provide for water and wastewater service in portions of Arapahoe County, within the boundaries of the Arapahoe County Water and Wastewater Public Improvement District (the "District"), and within other areas as permitted by law.

ACWWA was formed in 1988 as a separate governmental entity to develop water resources, systems and facilities, and wastewater treatment and disposal systems and facilities in whole or in part for the benefit of the District and the County and their inhabitants, and others. Pursuant to intergovernmental agreements, ACWWA also provides water and/or wastewater service to areas within the boundaries of other local governments, including Cottonwood Water and Sanitation District ("CWSD"), East Valley Metropolitan District (formerly known as East Valley Water and Sanitation District ("EVWSD")), a portion of the City of Aurora, the Town of Foxfield, Inverness Water and Sanitation District ("IWSD") and Elkhorn Metropolitan District No. 1.

ACWWA is governed by a seven-member board of directors (the "Board"). Each director is appointed by the Board of County Commissioners (the "Commissioners"). The Board may include any or all of the Commissioners. Each director term shall be three years; however, upon the expiration of a term, a director shall continue to serve until a successor has been appointed by the Commissioners. The directors hold regular monthly meetings, and special meetings as needed. A majority of directors present at the meeting constitutes a quorum for the transaction of business.

ACWWA serves roughly 10,000 residents and numerous commercial and industrial customers. There are currently 4767 taps. Water usage from 2019 was approximately 1280 af from alluvial groundwater, 793 af for Denver Basin groundwater, 1358 af from ACWWA Flow water and 96 af from Reg 84 water. At buildout, ACWWA expects to serve between 6,340 af up to 10,000 af, depending on possible additional areas outside the current service area boundary that could be served.

ACWWA's main revenue sources include existing service charges and tap fees. For more information about ACWWA, see the official statements attached in Appendix C.

ACWWA owns and operates the following water supply facilities: Several Denver Basin Aquifer wells, several shallow alluvial wells, the Joint Water Purification Plant (joint ownership with CWSD), and the Northern Water Treatment Plant and associated facilities (joint ownership with ECCV).

1.3 Water Rights

1.3.1 Water Availability

ACWWA has a large portfolio of water sources available for storage in Chambers Reservoir. Specifically, ACWWA plans to use its existing alluvial wells drilled into the Cherry Creek alluvium to supply water to Chambers Reservoir. The locations of these wells and the non-potable distribution plan is presented in Figure 3.

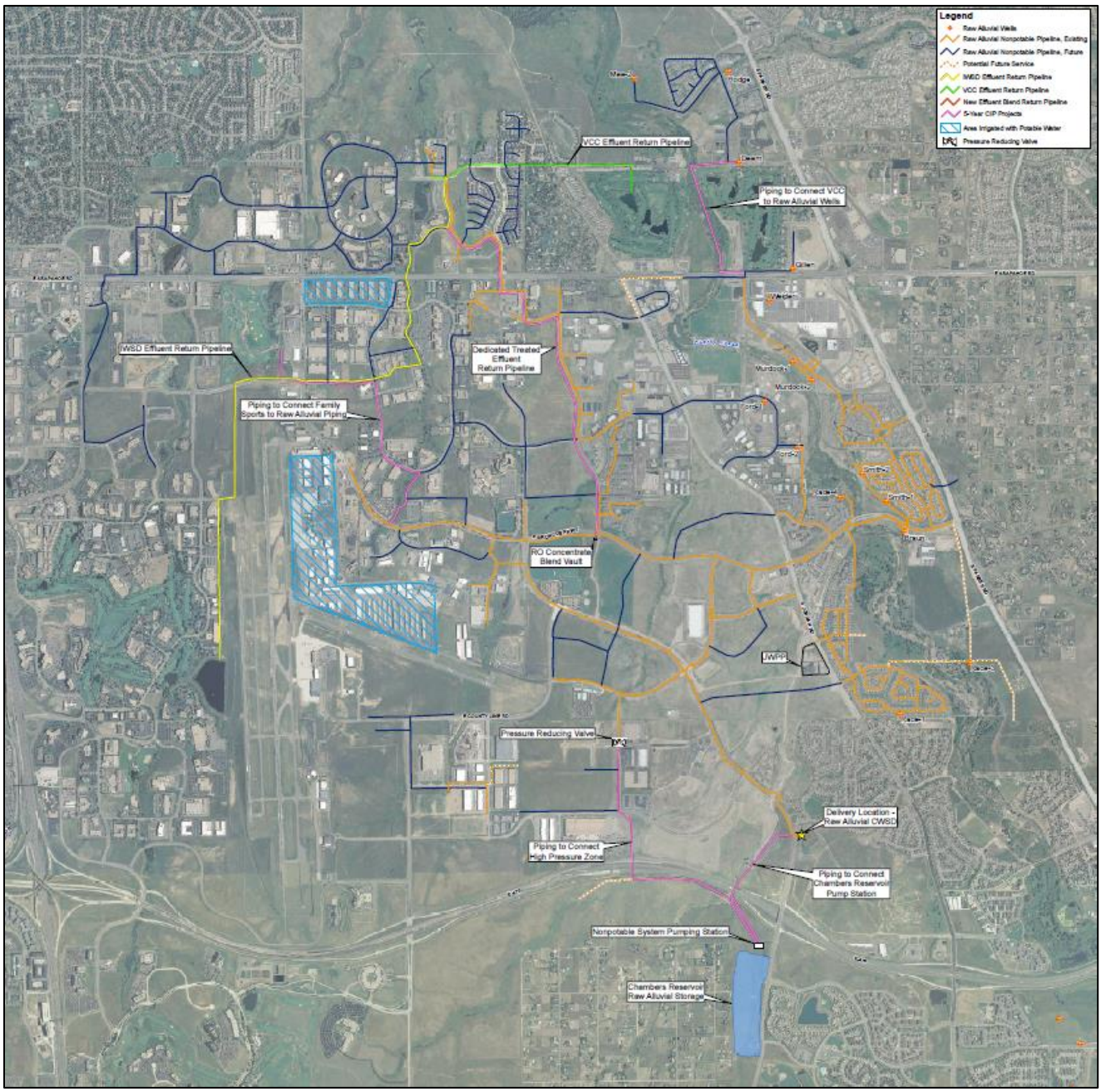

Figure 3 – Non-potable Water Distribution System

ACWWA currently plans to use the Braun, Smith 1, and Smith 2 Cherry Creek alluvial wells to provide the raw water for this project. ACWWA's water rights for these wells and the plan of augmentation which allows the use of these wells (and other wells) for storage and subsequent municipal uses was decreed in Case No. 96CW1144. In addition, this decree also includes a water storage right for Chambers Reservoir.

These three wells were historically used as a potable water supply for the ACWWA service area. As ACWWA's water demands grew, ACWWA obtained additional potable water supplies which allowed the wells to be converted for use to supply water to ACWWA's raw water irrigation system. The wells have a combined decreed pumping capacity of 3500 gpm and an actual pumping capacity of about 2600 gpm. Pumping at normal operating rate allows Chambers Reservoir to be completely filled from empty in 4 months. These wells were used to provide water for the initial filling of Chambers Reservoir until leaks were detected and pumping was stopped. ACWWA has several other existing wells that could be used to supply water to Chambers Reservoir if the three wells described above are unable to meet their desired pumping capacity. This provides redundancy in the supply of water to Chambers Reservoir.

ACWWA's plan is to fill Chambers Reservoir during the non-irrigation season and then release this water into ACWWA's raw water irrigation system during the irrigation season. Chambers Reservoir will supplement ACWWA's water supply during irrigation months and be especially critical during drought-stricken irrigation seasons. Water pumped to Chambers Reservoir during the non-irrigation season will be augmented, when required, with reusable return flows from ACWWA's wastewater treatment facility and with water stored in Cherry Creek Reservoir.

1.3.2 Water Supply Demands

ACWWA's current planned raw water irrigation system has an estimated buildout demand of 577 to 824 aft/yr., depending on the climate conditions in that year. Peak day demands are estimated to be around 1,400 gpm during a drought period. ACWWA anticipates that, in severe drought periods, ACWWA may be limited in the amount of water available to fill Chambers Reservoir during the non-irrigation season based upon reductions in available augmentation water. To understand this water supply limitation, ACWWA developed a model of its water rights portfolio as part of its 2019 Raw Water Master Plan (See Appendix D – 2019 Raw Water Supply Master Plan). The results of this analysis showed that in most years, Chambers Reservoir has enough capacity to meet irrigation demands. In significant drought years, releases from Chambers Reservoir will need to be supplemented with direct pumping from ACWWA's raw water alluvial wells to meet irrigation demands. In all years, ACWWA's raw water irrigation system demands can be met with ACWWA's current and proposed water supplies.

1.4 Project Description

1.4.1 Analysis of Alternatives

ACWWA contracted with AECOM to develop alternatives for the repair of Chambers Reservoir. These alternatives fell into three categories: Do nothing (no-action alternative),

repair of the failed clay liner, or reconstruction with a synthetic liner (with either relief wells or raising the reservoir bottom above the local groundwater table). A brief description of these alternatives is as follows:

A. Do nothing: For this alternative no repairs would be made to the reservoir. If no repairs are made, the reservoir becomes unsuitable for water storage due to the amount of expected seepage (over 500 af/yr.), the risk of additional bank failures, and expected storage level restrictions. Excess seepage, if allowed to occur over time with no actions to reduce the seepage (repairs), could put residents downstream of the reservoir at risk for surcharged high ground water tables affecting performance of septic systems and sump pumps. In addition, excess seepage may affect the design and integrity of the dam forming the upper portion of Chambers Reservoir. Since this is a jurisdictional dam and reservoir, the State Engineer would then likely limit the storage levels in the reservoir to below the existing dam toe to maintain safe dam conditions. At this level, Chambers Reservoir would only be able to store about 640 acre-feet of water. With yearly irrigation water demands of 577 to 824 af/yr. and estimated seepage of 500 af/yr., the reservoir would be of insufficient size to allow its use as a raw water storage reservoir.

   Without Chambers Reservoir, ACWWA would need to use its alluvial wells to supply water to the raw water irrigation system as it is currently. These wells meet the current raw water irrigation demands but the well water stains the sidewalks and concrete curbs and gutters. Therefore, ACWWA currently limits its use to a limited service area. For ACWWA to meet its buildout raw water system demands (which includes substantial expansion of the raw water irrigation system to reduce the use of potable water for irrigation), ACWWA would need to install a treatment system(s) to remove iron and manganese to eliminate the staining affect from the untreated well water. In addition, at full buildout, ACWWA has insufficient augmentation supplies to meet both its potable system demands from the Joint Water Purification Plant and to supply the raw water irrigation demands. Therefore, ACWWA would need to expand its potable water system treatment capacity and reduce its planned expansion of the raw water irrigation system.

B. Repair the Existing Compacted Clay Liner: Chambers Reservoir, due to design and construction defects of the Compacted Clay Liner (CCL), leaked a greater volume of water than the design of 119 ac-ft/year (2.29 ac-ft/week) at full reservoir height. Seepage was calculated up to 27 ac-ft per week when the reservoir was approximately ¾ full. AECOM evaluated an alternative for repairing the existing CCL. The alternative involved testing at various locations around the reservoir to confirm the hydraulic conductivity was less than 1.0 x 10-6 cm/s which was the design hydraulic conductivity to achieve the maximum leakage from the reservoir of 119 ac-ft/year.

   AECOM tested the CCL during the week of October 2015 and reported the results of the 11 hydraulic conductivity tests in a memorandum dated December 9, 2015. The permeabilities of the reservoir sides ranged from 1 x 10 -3 to 5 x 10-7. Permeability tests conducted by AECOM indicated only 6 out of the 11 tests resulted in permeabilities greater than 1 x 10-6 cm/s. Based on the number of tests that failed over half of the CCL would need to be replaced.

Approximately 1,000,000 cubic yds of clay was placed as CCL in the original construction. AECOM estimated that approximately 600,000 cubic yds of CCL would need to be imported to repair the liner which means 600,000 cubic yds of unsuitable material would need to be exported from the reservoir. AECOM estimated the cost of export to be approximately $20/yd and the cost of import and compaction would be $35/yd. The estimated cost for repairing the liner was approximately $3,300,000. Given the highly variable nature of the placed CCL, AECOM did not believe it could reasonably identify all locations where the CCL was deficient, and this alternative would still leak greater than the design requirements. Since continued reservoir leakage didn't resolve the concerns presented in the "do nothing" alternative, this alternative was eliminated.

C. Installation of a Synthetic Liner: This alternative includes rehabilitation of the existing reservoir to allow the installation of a synthetic liner. For this alternative, two options were evaluated: Relief Wells or Raising the Reservoir Bottom.

1. Relief Wells: In this alternative the reservoir bottom would be left as is and relief wells would be installed to prevent floatation of the synthetic liner from existing local groundwater levels which are currently above the reservoir bottom. In addition to the high seepage rate out of the reservoir, there is also a high native groundwater that intersects the excavated slopes of the reservoir. The excessive seepage exasperated the high groundwater. The slope failure in March 2017 demonstrated that not only did the seepage out of the reservoir need to be reduced but the high groundwater would also need to be mitigated in order to fully operate the reservoir without side slope failure.

   AECOM evaluated relief wells to pump the aquifer to lower the groundwater levels when the reservoir levels were below the elevation within the aquifer. In the 30% Design Report, AECOM estimated the cost of the relief wells to be approximately $3,600,000 versus the cost of an underliner drain system and raising of the reservoir bottom of approximately $1,000,000. In addition to the capital cost of $3,600,000, there would be significant operation and maintenance costs estimated at $300,000/year. This cost would be in addition to the O&M cost for the synthetic liner itself. ACWWA eliminated this alternative because of the anticipated significant O&M costs for operating, maintaining and replacing the well pumps in the relief wells.

2. Raising the Reservoir Bottom: In this alternative the existing reservoir would be regraded to raise the reservoir bottom above the local groundwater table. This allows for the installation of the synthetic liner without the capital installation and operation and maintenance costs of relief wells. This alternative is expected to have a 50-year design life. A drain system is proposed under the liner to collect water from groundwater as an additional protection of the synthetic liner. Water collected in this drain system will remain but can be pumped out whenever the water in the drain system is above the water level in the reservoir. The current proposed reservoir operation is expected to maintain the reservoir water levels above this level. The synthetic liner is exposed and therefore the liner may be damaged and need to be repaired. AECOM has estimated 5% of the capital costs for operation

and maintenance (O&M). The estimated O&M is approximately $275,000 per year inclusive of liner maintenance. See summary of alternatives below.

Option 1: Do Nothing	Option 2: Repair Clay Liner	Option 3: Install Synthetic Liner	
Chambers Reservoir would only be able to store about 640 acre-feet of water, with 500 af/yr being loss to seepage. Chambers wouldn't meet ACWWA's yearly irrigation water demands. Chambers would also become a risk to ground water supplies.	After extensive testing, it was concluded that even after a repair Chambers Reservoir would still see significant seepage. Creating a similar scenario to option 1: do nothing.	Relief Well: Capital Cost of $3,600,000 with O&M of $300,000/year plus the O&M cost of the synthetic liner of $275,000/year.	Raising Reservoir Bottom: No Capital Cost with O&M of $275,000/year.
Eliminated	Eliminated	Eliminated	Selected

1.4.2 Selected Alternative

ACWWA selected the synthetic liner option using a raised reservoir bottom. This alternative consists of reshaping of the reservoir and lining the reservoir with a 45 mil Reinforced Linear Low Density Polyethylene (LLDPE-R) or Reinforced Flexible Polypropylene (fPP-R) synthetic liner. The reshaping of the reservoir is currently being completed based upon the design presented on the Construction Drawings and the current 30% level design construction drawings for the liner installation are included in Appendix E – Construction Drawings.

The re-construction plan was split into two phases. Phase 1 consists of removing to clay liner from the original design and reshaping the reservoir. Phase 2 will be the installation of the synthetic liner. Phase 1 of the Chambers Reservoir reconstruction began in August of 2019 and is estimated to finish by June of 2020 and Phase 2 will begin. Phase 2 is estimated to complete is December of 2020.

Impacts of the proposed selected alternative were identified for the Location and Extent (L&E) process through Douglas County. As addressed in the L&E approval, the expected project impacts are being addressed as follows:

A. Noise: The impact of noise on the surrounding community (primarily the residents of the Grandview Estates Sub-division) was addressed through limiting the hours of operation of heavy equipment to the normal working hours of 7:00 am to 5:00 pm. In addition, most of the construction noise occurred at the bottom of the reservoir thus minimizing construction sounds primarily to truck traffic hauling materials in and out of the site.
B. Air Quality: The construction contractor applied for and obtained the CDPHE Air Pollutant Emission Notice (APEN) based on APCD-223 for the land development activities associated with the rehabilitation project (Appendix F – Construction Permits).
C. Vibration: AECOM conducted a vibration analysis and found that adjacent properties are not at risk from vibration from the proposed construction (Appendix F – Construction Permits)

D. Access: An access plan was prepared and submitted to Douglas County for approval. Douglas County issued the required access permit for the project (Appendix F – Construction Permits)
E. Water Quality: Water Quality impacts are addressed through the Grading, Erosion, and Sedimentation Control (GESC) Plan prepared for the project. An approved GESC Permit for the project was obtained from Douglas County.
F. Sanitation: Port-a-potties are provided on-site for use by the construction workers.

Most of the requirements for construction of these repairs were addressed during the proceedings and permits required for the original reservoir construction. The requirements needed for construction of the selected alternative are as follows:

A. Location and Extent Permit: The original reservoir construction was processed through Douglas County through their Location and Extent (L&E) process. This process is a public process that requires a hearing and project approval from the Douglas County Planning Commission. The Location and Extent for the original construction was approved in 2009. Douglas County required that the proposed repair be processed through an amended Location and Extent process to again allow the general public to comment on the selected alternative. As part of this process, ACWWA reached out to the Grandview Estates Homeowners Association (GEHOA) and the Grandview Estates Rural Water Conservation District (GERWCD) to solicit their input on the rehabilitation project. The main concern expressed by the GERWCD was the impact of rehabilitation on their constituents' water wells.

   As part of the original L&E approval, in July 2010 Wright Water Engineers, Inc (WWE) prepared a Groundwater Sampling and Analysis Plan (SAP) for the Chambers Reservoir Project. The SAP was approved by the Tri-County Health Department (TCHD). As proposed in the SAP, five monitoring wells were installed on the Project site in December 2010 to provide information to assess potential impacts from the Project. In addition to the five constructed monitoring wells, two nearby private water supply wells on properties within the Grandview Estates Subdivision were identified and included (after obtaining homeowner approval) in the monitoring plan.

   The stated goals and objectives of the SAP were to:

   1. Obtain water level and water quality data from Dawson Aquifer monitoring wells to assess potential impacts to nearby water supply wells (completed in the same formation) resulting from the construction and operation of Chambers Reservoir.

   2. Obtain water level and water quality data from shallow groundwater monitoring wells to assess potential impacts from nearby septic system discharge and/or potential leakage from the reservoir to the surrounding unconsolidated deposits.

   Monitoring and sampling of the subject wells began before construction of the original reservoir commenced and continued through 2018 at which time ACWWA discussed with GERWCD about modifying the sampling program since no new water was being pumped into Chambers Reservoir. ACWWA and GERWCD agreed upon a revised monitoring and

sampling plan which is currently being followed. Upon completion of the reservoir lining, no further monitoring and sampling will be required.

The GEHOA concerns over dust, vibrations, and noise were addressed to their satisfaction. The Location and Extent for the selected alternative was approved on May 6, 2019.

B. Access: Permission to access the site for the reconstruction efforts was required from Douglas County. ACWWA obtained an access permit from Douglas County for access to the reservoir site during construction (Appendix F – Construction Permits). ACWWA has an existing easement on the north side of the reservoir which allows access to the reservoir for construction and future maintenance. This easement is over private property and was not fenced (Appendix G – Easement). As part of this project ACWWA coordinated with this property owner and installed a three-wire barbed wire fence to maintain access control separate from the private property owners' agricultural activities.

C. Douglas County Grading, Erosion, and Sediment Control (GESC) permit: ACWWA obtained a GESC permit to cover the reconstruction project (Appendix F – Construction Permits).

D. Colorado Department of Public Health and Environment Stormwater Permit (Stormwater Management Plan – SWMP): A SWMP was produced for compliance with General Permit COR-86000 (Appendix F – Construction Permits).

E. SEO Dam Safety Section and SEO Water Commissioner. The original Chambers Reservoir Dam was approved for construction and then storage after its completion (Appendix A – Construction Original Chamber Reservoir Design). As part of the rehabilitation effort, AECOM conducted a Comprehensive Dam Safety Evaluation (CDSE) through a Semi Quantitative Risk Analysis (SQRA) of the reservoir site and dam in cooperation with the State Engineers Dam Safety Section. The final results of this analysis are pending but no fatal flaws were found based on the results of the draft analysis. The final design plans will be submitted to the State Engineer Dam Safety Section for review and approval once completed.

Water rights accounting for storage in Chambers Reservoir was completed and approved by the District 8 Water Commissioner prior to the initial reservoir filing in 2013. This same accounting will be used for the rehabilitated reservoir.

1.4 Financial Feasibility Analysis

The estimated cost of the repair of Chambers Reservoir totals $7,500,000, which exceeds ACWWA's current budget for the repair. Therefore, ACWWA is requesting a loan of $2,500,000 to assist in paying for the proposed repair including reservoir regrading and installation of the synthetic liner. ACWWA is seeking a loan with a 20-year term at a 2.5% interest rate.

Financing for the repair will be a combination of settlement payments, ACWWA savings from previous years paid water rates, and the CWCB loan. Repayment for the loan will be funded by future water rates and fees (Appendix H – Rates and Fees). ACWWA's rates and fees will also

act as collateral for funding of the loan. A detailed schedule of ACWWA's 20 year projected annual revenue and expenditures is attached in Appendix I and a detail loan repayment schedule is shown in Appendix J.

The annual estimated loan repayment amount of $160,000 for this $2,500,000 CWCB Loan is less than 1% of the over $19 million in total annual expense ACWWA has paid and recorded in the last 4 years. Additionally, with the anticipation of even modest growth in our service areas, ACWWA can say with confidence that rates will not be impacted by this additional loan.

ACWWA's management and legal counsel have concluded that a significant portion of ACWWA's operations, including its revenue and spending, is conducted as an exempt enterprise under TABOR. Likewise, ACWWA does not have or exercise any taxing authority and is therefore not subject to TABOR's provisions regarding the imposition of taxes. To the extent any portion of ACWWA's operations are governed by TABOR, ACWWA believes it is in full compliance.

ACWWA creditworthiness can be proven with ACWWA's S&P Credit Ratting AA (Appendix K), and 3 most recent credit audit reports (Appendix L).

1.5 Conclusion

The repair of Chambers Reservoir is essential to ACWWA and to the rapidly growing water supply of Arapahoe County. Chambers Reservoir was originally built in 2011/2012 but had a slope failure and was shut down. In order to repair the reservoir ACWWA is redesigning the slope and installing a synthetic liner. The CWCB loan will fund the synthetic liner, which will be a key element that shall keep the reservoir from failing again. The total cost of the repair is estimated at $7,500,000, which exceeds ACWWA's current budget. ACWWA is requesting a loan to assist in paying for the proposed repair including reservoir regrading and installation of the synthetic liner. ACWWA is seeking a loan of $2,500,000 with a 20-year term at a 2.5% interest rate.

List of Appendices