Summary Report

Update of Preliminary Investigations of New Mexico Unit CAP Projects

Stantec

July 5, 2018 (Updated Per CAP Entity Board Actions on July 3, 2018)

This report documents the additional development of conceptual alternatives to deliver and store water from the Gila Basin and San Francisco River Basin for the New Mexico Central Arizona Project Entity (NM CAP Entity).

The 2004 Arizona Water Settlements Act (AWSA), which was a modification of the 1968 Colorado River Basin Project Act, authorized the Secretary of Interior (Secretary) to enter into contract with water users in New Mexico for consumptive use of up to 14,000 acre-feet of water from the Gila River in exchange for delivery of CAP water to users in Arizona. Additionally, the AWSA ratified the Consumptive Use and Forbearance Agreement (CUFA), which details the conditions that must be met for New Mexico to be able to divert water from the Gila River and tributaries. In 2014, New Mexico notified the Secretary that they intended to pursue a New Mexico Unit of the CAP. The NM CAP Entity was granted the authorization to design, build, operate and maintain the New Mexico Unit.

A Proposed Action has been identified and is described in this report. On June 12, 2018, the Notice of Intent was published in the Federal Register beginning the scoping period for the NEPA process and opening a 30-day public comment period.

The components described in this report will allow partial development of the 14,000 acre-feet. On a long-term basis, the NM CAP Entity intends to develop the 14,000 acre-feet of water to the maximum viable extent. Based on demand, other alternatives for development of the water will be investigated in the future. Supplemental NEPA compliance analysis would be required.

Under direction from the NM CAP Entity, Stantec has continued preliminary investigations of various elements of a potential New Mexico Unit. This report summarizes findings regarding potential New Mexico Unit project areas, specifically: the Upper Gila (along the Gila River near the Cliff-Gila and Riverside areas), the Virden Valley (along the Gila River near the Arizona state line) and the San Francisco River (the Spurgeon and WS Ditch diversions near Alma and the east and west diversions at Pleasanton). For each of these project areas, project components are described below and shown in figures 1-6, attached.

Figures 1-6 also show properties that could potentially use Arizona Water Settlement Act (AWSA) water. Stantec reviewed Crop Reports that are updated annually by the New Mexico Office of the State Engineer (NMOSE), to identify irrigated and fallow land. Properties with fallow land that had adjudicated water rights and properties which had been destroyed by flooding events were eliminated as potential AWSA water users. Properties that were owned or co-owned by the Nature Conservancy were also differentiated. Lands available for irrigation could also change once the biological survey is completed as part of the NEPA process and critical habitat areas are identified.

The total land available for potential use of AWSA water may exceed the amount of water that can be delivered with the components included in the proposed action. However, delivery of AWSA water cannot be restricted to a certain group of properties. Changes in ownership, use of land, local economic conditions, market forces and other factors will influence which lands may use AWSA water in any given time period. The proposed action components will be able to deliver water to any or all of the properties identified as potential users of AWSA water.

Upper Gila Area

The Upper Gila area is depicted in Figures 1 and 2

Diversion and Storage:

Project components are a surface water diversion structure (nine alternatives were presented in the October 12, 2017 AECOM Final Report (AECOM Report) – three diversion sites with three types of structures evaluated at each site); conveyance through the existing Upper Gila and Fort West ditches with improvements as identified in the AECOM Report; surface storage ponds with associated pump facilities (for the Winn Canyon ponds only), gated inlets, gated outlets, outfalls to deliver water from the ponds back into the ditch system and eight conventional production wells. Storage ponds 2P and 3P upstream and downstream of the Winn Canyon Dam were the only sites identified as suitable for aquifer storage and recovery (ASR) and three conventional production wells are used to recover water stored in the aquifer.

The proposed diversion structure is described in the AECOM Report (Sections 2.1.1, 2.1.2 and 2.1.3). The structure is low profile, generally raising the river level by three to four feet. Section 3 of the AECOM Report includes schematics of the proposed structure alternatives. Although the conveyance capacity limits the diversion to a maximum of 100 cubic feet per second (CFS) with 50 CFS in each canal, the diversion structure will be designed for a maximum total diversion of 150 CFS to allow for future expansion of the irrigation delivery system if needed without reconstruction of the diversion structure.

Potential storage ponds were evaluated for storage volume potential as well as cost of excavation, lining, pumping (if necessary), gated inlets and gated outlets with outfall lines. Figure 1 is a map of the Cliff-Gila area which depicts the potential pond locations and approximate outfall alignments. The identified pond locations were categorized as preferred sites if there was a preliminary indication by the landowner of a willingness to allow pond construction on that site. Preferred sites are designated with a number followed by a "P" (e.g., 1P) and are depicted as either solid blue polygons. Other sites were categorized as alternate sites, are designated with a number followed by an "A" and are depicted on the map as crosshatched polygons.

The preferred sites are numbered 2P to 8P moving from north to south in Figure 1 with surface-storage sites shown in solid blue. The five alternate sites are numbered 1A to 5A from north to south in Figure 1 with surface-storage sites shown as cross-hatched.

Except for the two reservoirs in Winn Canyon designated 2P and 3P, all ponds can receive water directly from one of the ditches via gravity flow. Ponds 2P and 3P are proposed for construction directly upstream and directly downstream of an earthen flood control dam in Winn Canyon, respectively. Pond 2P would entail excavation to remove sediment upstream of the dam. Care will be exercised (including consultation with the New Mexico Office of the State Engineer Dam Safety Bureau) to assure that any excavation would be far enough from the dam so as not to compromise the integrity of the dam itself. Pond 3P would entail excavation downstream of the dam and similarly, would be spaced far enough from the toe of the dam to assure that the integrity of the dam is not comprised. Since both Ponds 2P and 3P are above the ditch elevation, water will have to be pumped from the Upper Gila Ditch into the ponds.

Preliminary evaluations based on the NRCS Web Soil Survey indicate that all surface-storage ponds except Pond 5P will need to be lined. Lining material is assumed to be locally sourced clay potentially from excavation of Pond 5P (the NRCS Web Soil Survey indicates that the Pond 5P site is a clay rich area). ASR Ponds will not be lined to allow infiltration of the water into the underlying aquifer.

All surface-storage ponds have gated inlets for filling and gated outlets with outfall lines to release water from storage back into a ditch or a lateral. As indicated earlier, Ponds 2P and 3P will be filled by water pumped from a short lateral off the Upper Gila Ditch. Water stored in the aquifer below Ponds 2P and 3P will be recovered through three conventional wells and pumped back into the ditch network for use.

It is recognized that not all of the water stored in the aquifer will be recovered with the limited number of conventional wells proposed; however, the water that migrates back into the River will have utility for environmental flow, for delayed diversion downstream in the Virden area, or for return flow credits. AECOM is currently updating the diversion and yield models for the Cliff-Gila area with the proposed infrastructure. Modified Blaney Criddle consumptive use methodology is being used to estimate the amount of return flow as part of the diversion and yield modeling. A groundwater model would need to be developed to track the migration and timing of the movement of the water through the aquifer to the River. Further, if the water is to be diverted downstream, the timing of its movement through the system and any evaporation or conveyance losses would have to be tracked and accounted for.

Surface-storage potential in the preferred sites ranged from 165 acre-feet in Pond 3P to 979 acre-feet in Pond 8P. Combined surface-storage potential for all seven preferred sites in the Gila Cliff area totals 3,735 acre-feet. Surface-storage potential in the alternate sites ranges from 499 acre-feet in Pond 4A to 1,349 acre-feet in Pond 1A. Combined storage potential for all five alternate sites in the Gila Cliff area totals 4,645 acre-feet. The aquifer-storage recovery (ASR) potential of Ponds 2P, 3P has been quantified at approximately 1050 acre-feet. Further hydrologic investigation and analysis is needed for verification of this quantification. The estimated storage volumes of the preferred pond sites and the proposed ASR storage are summarized below:

Pond #	**Storage Volume (Acre Feet)**	**Depth (Feet)**	**Depth to Groundwater (Feet)**
2P	564	35	
3P	165	20	
4P	310	15	18
5P	598	15	24
6P	877	15	19.5
7P	242	15	47
8P	979	15	26
2P, 3P ASR (est.)	1,050		
Total	**4,785**		

Based on groundwater depth data obtained from well logs and groundwater information provided in *Analyses of Surface Water – Groundwater Interactions along the Gila River, Gila-Cliff Basin,* S.S. *Papadopulos & Associates, Inc.* to the New Mexico Interstate Streams Commission (ISC) in June of 2010. Groundwater depths are below the proposed pond bottom elevations. Further field investigation is needed to confirm ground water depths.

Finally, nine conventional production wells depicted as yellow dots and designated as AWSA production wells in Figure 1 are distributed in the Upper Gila area. These wells could potentially be used as alternate points of diversion for AWSA water when CUFA conditions are met. Two of these wells will be located south of the Old Iron Bridge and pump into the Riverside Ditch (See Figure 2). The wells are expected to

pump approximately 500 GPM each. Further hydrologic investigation and analysis is needed to confirm the actual capability and capacity of the potential well sites.

Proposed Diversion and Storage Components are shown on Figures 1 and 2 and summarized as follows:

1) *Diversion Structure:* Gate controlled surface water diversion structure with a 150 CFS capacity to be located in close proximity to the existing Upper Gila push-up diversion structure. Also includes an 8x8 concrete box structure adjacent and immediately behind the diversion structure to convey water across the river to the Ft West ditch. The extension of the Ft West Ditch to the diversion structure and the connection of the Gila Farms Ditch to the Ft West Ditch are included in this component because they are necessitated by the construction of a single diversion structure rather than three structures. Because of limited conveyance capacity the initial diversion will be limited to 100 CFS.
2) *Gravity-Fed Storage Reservoirs:* Five lined gravity fed storage reservoirs (4P, 5P, 6P, 7P and 8P) with a total storage capacity of 3,006 acre-feet will be excavated. Outfall pipe and gates to allow drainage of water back into the canals are also provided.
3) *Aquifer Storage and Recovery:* Two unlined, pump fed storage reservoirs upstream and downstream of the existing Winn Canyon Dam with a storage capacity of 629 acre-feet. These reservoirs will be used to feed an aquifer storage and recovery basin having a capacity of approximately 1,050 acre-feet with three conventional production wells being used to recover the water. A pumping station is required to feed these reservoirs out of the Upper Gila Ditch.
4) *Nine Conventional Water Production Wells:* Nine conventional production wells, with an assumed depth of 120 feet and a capacity of 500 GPM, that could be used to deliver water, are strategically located along the valley.

Estimated Cost of Construction:

Conceptual level cost estimates have been completed for construction of the components described above and are summarized in the tables below. Each of the estimates include 30% contingencies covering the additional costs of gross receipts tax, engineering and miscellaneous construction items.

Table 1-1: Diversion Structure

Sub-Component	Estimated Construction Cost	Comments
Diversion Structure	$ 3,396,250	Assuming that a Fixed Crest Diversion Structure is used near the Jordan-Shelly Property. This estimate was completed by AECOM and is included in the October 20, 2017 Final Report
Concrete Box Structure	$ 812,500	8 Feet by 8 feet concrete box structure to convey water from west side of structure to the east side Ft West Ditch. Estimate by AECOM. Included in October 20, 2017 Report.
Conveyance Connections	$ 845,000	Extension of the Ft West Ditch to the Diversion Structure. This includes crossing Garcia Canyon. Also includes reconstruction of the Gila Farms to the Ft West Ditch.
Total Component	**$ 5,187,000**	

Table 1-2: Gravity-Fed Storage Reservoirs:

Sub-Component	Estimated Construction Cost	Comments
Pond 4P	$ 2,080,120	Provides 310 acre-feet of storage. Depth is 15 feet. Clay lined
Pond 5P	$ 692,427	Provides 598 acre-feet of storage. Depth is 15 feet.
Pond 6P	$ 5,181,163	Provides 877 acre-feet of storage. Depth is 15 feet. Clay lined
Pond 7P	$ 1,274,064	Provides 242 acre-feet of storage. Depth is 15 feet. Clay lined
Pond 8P	$ 4,507,004	Provides 979 acre-feet of storage. Depth is 15 feet. Clay lined
Total Component	**$13,734,778**	Total storage volume is 3,006 acre-feet

Table 1-3: Aquifer Storage and Recovery

Sub-Component	Estimated Construction Cost	Comments
Pond 2P	$ 5,492,320	Provides 564 acre-feet of storage. Depth is 35 feet.
Pond 3P	$ 333,731	Provides 165 acre-feet of storage. Depth is 20 feet.
Pumping Station	$ 2,032,659	Sump, sand trap, pumps, pipelines and electrical service to pump water from Upper Gila Canal into ponds.
Conventional Production Wells	$ 2,177,101	Includes 3 conventional water production wells. Includes power supply. Approximately 1050 acre-feet of additional groundwater storage is provided.
Total Component	**$ 10,035,811**	Total storage volume is 1,779 acre-feet

Table 1-4: Conventional Water Production Wells

Sub-Component	Estimated Construction Cost	Comments
Water Production Wells	$ 6,530,595	9 water production wells, 500 GPM at 120 Depth. Cost is estimated at $726,783 per well and includes electric power supply.
Total Component	**$6,530,595**	

Conveyance:

The new diversion dam, to be located in close proximity to the existing Upper Gila push up diversion, will channel river water toward the head of the Upper Gila Ditch on the west side of the river through a gated control structure. From that point, diverted water will be split between the Upper Gila Ditch and across the river to the Ft West Ditch via a concrete box structure located adjacent to the diversion structure. The existing Ft West Ditch push up diversion, located approximately 2,300 feet downstream of the existing Upper Gila Ditch diversion, will be extended upstream to the new diversion dam. The Gila Farms Ditch will be fed via a new connecting pipe or open channel to the Ft West Ditch.

There is a large amount of fallow land south of NM 211 which could potentially use AWSA water. Irrigation water was once delivered to this land with the McMillan Ditch. The McMillan Ditch will be reconstructed along its original alignment from its intersection with the Upper Gila Ditch south. The McMillan Ditch will be fed from the Upper Gila Ditch.

Much of the fallow land, on the west side of the river and lying above NM 211 that could potentially use AWSA water, was once served from laterals coming off of the Upper Gila Ditch. These laterals will need to be repaired.

The table below shows the amount of irrigated land with adjudicated rights versus fallow land without adjudicated rights that could potentially use AWSA water in the area.

	Upper Gila			
Cliff Gila Area	Adjudicated (Ac)	Potential AWSA (Ac)	Nature Conservancy (Ac)	Total (Ac)
Upper Gila	534.0	280.8	13.8	828.6
Reconstructed McMillan	28.9	243.8	0.0	272.7
Ft West	409.7	197.6	45.7	653.0
Gila Farms	440.6	137.8	0.0	578.4
Total Cliff-Gila Area	1,413.2	860.0	59.5	2332.7

Riverside Area	Adjudicated (Ac)	Potential AWSA (Ac)	Nature Conservancy (Ac)	Total (Ac)
Reconstructed McMillan	0.0	60.6	0.0	60.6
Carlson	0.0	40.8	0.0	40.8
Riverside	3.5	111.1	39.2	150.3
Total Riverside Area	3.5	212.5	39.2	251.7

	Total Upper Gila			
	Adjudicated (Ac)	**Potential AWSA (Ac)**	**Nature Conservancy (Ac)**	**Total (Ac)**
Total Upper Gila	**1,416.7**	**1,072.5**	**98.7**	**2,587.9**

The proposed action plan is for AWSA water to be available for irrigation of approximately one thousand additional acres in the Upper Gila area.

Using a total estimated gross irrigation requirement of 4.4 acre-feet per acre per year, with 25% of the total requirement being in June, the total potential acreage that could be irrigated from each ditch and the peak daily water demand is summarized below.

West Side of Gila River:

Ditch	Total Acreage	Cumulative Acreage	Cubic Feet/Second (CFS)	Cumulative CFS
Carlson	40.8	40.8	1.5	0.8
McMillan	333.3	374.1	13.7	6.9
Upper Gila	828.6	1,202.7	22.1	22.2

Peak water demand currently needed to irrigate land with adjudicated rights (562.9 acres) on the west side of Upper Gila River is approximately 10.4 CFS. The capacity of the Upper Gila Ditch was estimated to be 42 CFS in the October 2017 Report by AECOM.

The existing capacity of the Upper Gila Ditch is more than adequate to convey future potential peak water demands. The capacity of the canal will be increased however to 50 CFS in order to allow for conveyance of greater amounts of AWSA water to storage ponds when it is available for diversion.

East Side of River:

Ditch	Total Acreage	Cumulative Acreage	Cubic Feet/Second (CFS)	Cumulative CFS
Riverside*	150.3*	150.3	2.8	2.8
Gila Farms	578.4	728.7	10.7	13.5
Ft West	653.0	1,381.7	12.1	25.6

*Alternative reconnection to Ft West – Gila Farms Ditch if 2 wells included in proposed action are not adequate to supply water delivery needs

Capacity needed to meet current peak water use demands for irrigable land with adjudicated water rights is 8.1 CFS for the Gila Farms Ditch which has a capacity of 59 CFS (October 2017 AECOM Report) and 15.7 CFS for the Ft West Ditch (plus Gila Farm) which has a capacity of 29 CFS according to the aforementioned report. The existing capacity of the Ft West Ditch is therefore adequate to meet future potential peak water demands. The capacity of the canal will be increased however to 50 CFS in order to allow for conveyance of greater amounts of AWSA water to storage ponds when it is available for diversion.

The proposed action also includes lining approximately one third of the ditches to decrease the amount of seepage losses. Habitat/riparian areas have grown up around segments of each of the ditches. The biological survey to be conducted during the NEPA process will identify the locations of these areas. Segments will be identified for lining that are not within significant habitat/riparian areas.

Conveyance improvements are summarized as follows:

Conveyance Capacity Improvements:

1) Increase capacity of Upper Gila Ditch to 50 CFS
2) Increase capacity of Ft West Ditch to 50 CFS
3) Reconstruct/repair McMillan Ditch to a capacity of 10 CFS
4) Repair lateral ditches to deliver water from Upper Gila Ditch to potential AWSA sites

Connections Associated with Single Diversion Structure:

5) Extend Ft West Ditch to Diversion structure (Capacity 50 CFS)
6) Connect Gila Farms Ditch to Ft West Ditch (Capacity of 50 CFS)

Lining:

7) Lining approximately one third of the ditch length (Upper Gila, Ft West and Gila Farms)

Alternative:

8) Alternative: Repair connection from Riverside Ditch to Ft-West – Gila Farms Ditch (5 CFS Capacity) in lieu of 2 production wells planned for Riverside area.

In addition, access for construction and maintenance of the facilities will need to be identified and included with the proposed improvements.

Estimated Costs

Conceptual level cost estimates have been completed for construction of the components described above and are summarized in the tables below. Each of the estimates include 30% contingencies covering the additional costs of gross receipts tax, engineering and miscellaneous construction items. The costs of the Ft West Ditch Extension and the Gila Farms Ditch – Ft West Ditch Connection is included in the costs for diversion and storage components and is therefore not included here.

Table 2-1: Conveyance Capacity Improvements

Sub-Component	Estimated Construction Cost	Comments
Upper Gila Ditch	$ 818,249	Construction to increase capacity from approximately 42 CFS to 50 CFS for a length of. Includes 48-inch pipe from diversion 2,500 feet downstream.
Ft West Ditch	$ 162,281	Construction to increase capacity from approximately 29 CFS to 50 CFS
McMillan Ditch	$ 173,800	Repair and reconstruction (below Chuck's Service Station) the old McMillan Ditch. Will also include a new siphon under Duck Creek
Lateral Ditches	$ 200,000	Repair of laterals, previously used for irrigation
Total Component	**$ 1,354,330**	

Table 2-2: Ditch Lining

Sub-Component	Estimated Construction Cost	Comments
Upper Gila Ditch	$ 2,480,400	Concrete lining for approximately 10,600 feet of 31,700 feet of total length
Ft West Ditch	$ 2,971,800	Concrete lining for approximately 12,700 feet of 37,440 feet of total length
Gila Farms Ditch	$ 1,544,400	Concrete lining for approximately 6,600 feet of 19,800 feet of total length
Total Component	**$ 6,996,600**	

Table 2-3: Alternative Repair of Riverside to Gila Farms-Ft West Ditch

Sub-Component	Estimated Construction Cost	Comments
Riverside Ditch Repair	$ 150,000	Repair ditch from Ft-West – Gila Farms connection to termini
Total Component	**$ 150,000**	

Virden Valley Area

In the Virden Valley area, water will be diverted through existing diversion structures and conveyed through existing ditches. Therefore, project components in the Virden area are surface-storage ponds with gated inlets from the canals and pump facilities for delivering water from the ponds back into the canals.

Potential storage ponds were evaluated for storage volume potential as well as cost of excavation, lining, gated inlets and pump facilities. Figure 3 is a map of the Virden area which depicts two storage pond locations categorized as 2P and 3P. Seven potential pond sites were originally identified but five were determined to be unviable. The two preferred sites are depicted as solid blue polygons on Figure 3.

Preliminary evaluations based on the NRCS Web Soil Survey indicate that all surface-storage ponds will need to be lined. Lining material is assumed to be locally sourced clay.

Both surface-storage ponds can receive water directly from one of the canals via gravity flow and will have gated inlets for filling. Given the relatively flat topography of the area, both sites will need low-head pumps to deliver water from storage back into the canal.

The table below summarizes the storage volumes available from the two storage ponds,

Pond #	**Storage Volume (Acre Feet)**	**Depth (Feet)**	**Depth to Groundwater (Feet)***
2P	261	21	
3P	290	31	
Total	**551**		

- The exact depths to groundwater have not been confirmed at the time of this writing. Initial investigation indicates that it is below the proposed pond bottom elevations.

The table below shows the amount of irrigated land versus fallow land in the area as of 2017 according to the Crop Reports from the Office of the State Engineer.

Virden Valley Area	Adjudicated (Ac)	Potential AWSA (Ac)	Total (Ac)
Sunset Canal	1833.4	453.1	2,286.5
New Model Canal	417.8	101.8	519.6
Total Virden Valley Area	2251.2	554.9	2,806.1

Improvements are also planned for the canals including measuring gauges for individual farm diversions and other improvements to improve the efficiency of delivery.

Proposed improvement components for Virden Valley are summarized as follows:

1) *Gravity-Fed Storage Reservoir 2P:* A lined storage reservoir 21 feet deep with approximately 261 acre-feet of storage volume available. Also includes pump station to lift water back into the Sunset Canal for use together with the electrical power supply.
2) *Gravity-Fed Storage Reservoir 3P:* A lined storage reservoir 31 feet deep with approximately 290 acre-feet of storage volume available. Also includes pump station to lift water back into the New Model Canal for use together with the electrical power supply.
3) *Measuring Gauges for Individual Farm Deliveries*

Estimated Costs

Conceptual level cost estimates have been completed for construction of the components described above and are summarized in the tables below. Each of the estimates include 30% contingencies covering the additional costs of gross receipts tax, engineering and miscellaneous construction items.

Table 3-1: Gravity-Fed Storage Reservoir 2P

Sub-Component	Estimated Construction Cost	Comments
Pond 2P	$ 1,241,831	Provides 261 acre-feet of storage. Depth is 21 feet. Clay lined
Pumping Station	$ 264,857	
Electric Power	$ 27,083	
Total Component	**$ 1,533,771**	

Table 3-2: Gravity-Fed Storage Reservoir 3P

Sub-Component	Estimated Construction Cost	Comments
Pond 2P	$ 1,505,288	Provides 290 acre-feet of storage. Depth is 31 feet. Clay lined
Pumping Station	$ 283,986	
Electric Power	$ 703,950	About 13,000 lineal feet of overhead power line required to power pump
Total Component	**$ 2,493,224**	

Table 3-3: Measuring Gauges for Individual Farm Deliveries

Sub-Component	Estimated Construction Cost	Comments
Measurement Gauges	$ 200,0000	
Total Component	**$ 200,000**	

San Francisco River:

The San Francisco River area includes three primary areas, 1) Spurgeon Diversion, 2) WS Diversion and Pleasanton Diversion. These three areas are depicted respectively in Figures 4, 5 and 6.

The proposed action for the Spurgeon Diversion area, as depicted in Figure 5, includes the following:

1) Construction of a new diversion structure at the existing Spurgeon push-up dam diversion site located near the old US 180 bridge structure. The diversion would raise the river level by four to five feet.
2) Replacement of the existing open channel conveyance on the west side of the river with a 48-inch pipe starting from the Spurgeon Diversion structure and continuing across the confluence with Pueblo Creek.
3) Enlargement of the existing canal from the terminus of the 48-inch pipe continuing to the Weedy Canyon storage site from an existing capacity of approximately 20 CFS (estimated) to a capacity of 50 CFS.
4) Repair Spurgeon Ditch #2
5) Siphon from Pleasanton Eastside Ditch and repair of Pleasanton Westside Ditch.
6) Construction of the Weedy Canyon Reservoir with a storage capacity of 1,874 Acre-Feet with gated pipe outlets to the canal and the river.
7) Construction of pumping facilities to pump water from the canal into the Weedy Canyon Reservoir site.

The WS Ditch and Pleasanton Eastside diversion structures do not require improvements. Conveyance facilities in both areas are also in good operating condition and will not require improvement with the exception of the Pleasanton Westside Ditch. This ditch will be reconstructed to provide for irrigation of approximately 87.3 acres with potential AWSA water. Water to the diversion would be provided with a siphon from the East-Side Pleasanton Ditch to the West Side Ditch.

The table below shows the amount of irrigated land versus fallow land in the area as of 2017 according to the Crop Reports from the Office of the State Engineer.

San Francisco River Area			
	Adjudicated (Ac)	Potential AWSA (Ac)	Total (Ac)
Spurgeon #2	44.2	0.7	44.9
Thomason Flat	37.0	9.1	46.1
WS Ditch	150.6	14.1	164.7
Pleasanton Eastside	214.0	58.2	272.2
Pleasanton Westside	0.0	38.6	38.6
Total San Francisco River Area	445.8	120.7	666.5

In addition to the 120.7 acres of fallow land mentioned above that could potentially use AWSA water, there is more than 7,000 acres of private property between the Spurgeon Diversion Structure and Pleasanton that is adjacent to the river without water rights. This land, shown in a lighter shade of brown on Figures 3, 4 and 5, could potentially be developed by releasing stored water from the Weedy Canyon Reservoir back into the river and pumping an equivalent storage right amount from private groundwater wells to be developed on those private lands. A groundwater model would need to be developed to confirm the feasibility.

Proposed improvement components for the San Francisco River Area are summarized as follows:

Spurgeon Diversion Structure:

1) *Spurgeon Diversion Structure:* Gate controlled surface water diversion structure with a 75 CFS capacity to be located in close proximity to the existing Spurgeon push-up diversion structure.

Thomason Flat Ditch and Spurgeon Ditch #2 Conveyance Improvements:

2) *48-inch pipe conveyance:* 2,700 lineal feet of 48-inch pipe conveyance from Spurgeon Diversion Structure to a termination point on the west side of the Pueblo Creek confluence.
3) *Increase capacity of Thomason Flat Ditch;* Increase capacity 4,500 feet of existing ditch to 50 CFS from termini of 48-inch pipe to the Weedy Canyon Reservoir.
4) *Repair Spurgeon Ditch #2*

Pleasanton Westside Siphon and Ditch Repair:

5) 24-inch siphon from Pleasanton Eastside Ditch to Pleasanton Westside Ditch
6) Repair Pleasanton Westside Ditch

Weedy Canyon Storage Reservoir:

7) *Weedy Canyon Storage Reservoir:* A lined earth embankment dam with storage capacity for 1,874 acre-feet of storage. Includes emergency spillway excavation and principal spillway works.
8) *Pump Station:* Pumping station to lift water from the Thomason Flat Canal into the Weedy Canyon Reservoir. Includes sump, pumps, electrical, inlet structures and gates, fill and drain lines, valves assemblies, excavation and electrical power service supply line.

Estimated Costs

Conceptual level cost estimates have been completed for construction of the components described above and are summarized in the tables below. Each of the estimates include 30% contingencies covering the additional costs of gross receipts tax, engineering and miscellaneous construction items.

Table 4-1: Spurgeon Diversion Structure

Sub-Component	Estimated Construction Cost	Comments
Diversion Structure	$ 1,257,750	Based on estimate by AECOM included in October 20, 2017 Final Report for fixed crest diversion structure.
Total Component	**$ 1,257,750**	

Table 4-2: Thomason Flats and Spurgeon Ditch #2 Conveyance Improvements

Sub-Component	Estimated Construction Cost	Comments
48-inch Pipe Conveyance	$ 756,250	48-inch pipe including excavation, backfill, compaction and pipeline appurtenances from Spurgeon Diversion Structure across Pueblo Creek confluence
Increase Capacity of Open Channel	$ 93,350	Increase capacity of Thomason Flats Ditch from approximately 20 CFS to 50 CFS from termini of 48-inch pipe structure to Weedy Canyon Pump Station.
Spurgeon Ditch #2 Repairs	$100,000	
Total Component	**$ 919,600**	

Table 4-3: Pleasanton Westside Siphon and Ditch Repair

Sub-Component	Estimated Construction Cost	Comments
24-inch Siphon	$ 70,600	
Pleasanton Westside Ditch Repair	$ 120,000	
Total Component	**$ 190,600**	

Table 4-4: Weedy Canyon Storage Reservoir

Sub-Component	Estimated Construction Cost	Comments
Weedy Canyon Storage Reservoir	$ 49,700,000	Based on estimate by AECOM included in October 20, 2017 Final Report.
Weedy Canyon Reservoir Lining	$ 13,500,000	Based on estimate by AECOM included in October 20, 2017 Final Report.
Pump Station	$ 2,230,000	Sump, sand trap, pumps, pipelines to pump water from Upper Gila Canal into ponds.
Electric Power Service to Booster Pump	$ 140,000	Electrical service line to power booster pump
Total Component	**$ 65,570,000**	*At the February 6, 2018 CAP Entity Board Meeting, the Board agreed to include construction of the Weedy Canyon Reservoir in the proposed action with the understanding that construction would be completed with additional funds outside of AWSA funding.*

Summary of Costs:

Components to be completed using AWSA Funds:

Upper Gila Area:

Component	Table	Estimated Cost
Diversion Structure	Table 1-1	$ 5,187,000
Gravity Fed Storage Reservoirs	Table 1-2	$ 13,734,778
Aquifer Storage and Recovery	Table 1-3	$ 10,035,811
Conventional Water Production Wells	Table 1-4	$ 6,530,595
Conveyance Capacity Improvements	Table 2-1	$ 1,354,330
Ditch Lining	Table 2-2	$ 6,996,600
Total Upper Gila (Cliff-Gila)		$ 43,839,114

Virden Valley Area:

Component	Table	Estimated Cost
Gravity –Fed Storage Reservoir 2P (Sunset Canal)	Table 3-1	$ 1,533,771
Gravity-Fed Storage Reservoir 3P (New Model Canal)	Table 3-2	$ 2,493,224
Individual Measuring Gauges	Table 3-3	$ 200,000
Total Virden Valley Area		$ 4,226,995

San Francisco River Area:

Component	Table	Estimated Cost
Spurgeon Diversion Structure	Table 4-1	$ 1,257,750
Thomason Flats and Spurgeon Ditch #2 Conveyance Improvements	Table 4-2	$ 819,600
Pleasanton Westside Siphon and Ditch Repair	Table 4-3	$ 190,600
Total San Francisco River Area		$ 2,267,950

Total Estimated Cost to be paid with AWSA Funds:

Component		Estimated Cost
Upper Gila Area (Cliff – Gila)		$ 43,839,114
Virden Valley Area		$ 4,226,995
San Francisco River Area		$ 2,267,950
Total		$ 50,334,059

Potential Changes to Estimated Costs;

At the time of this report there remains a number of investigations and analyses that will be completed at some point in the upcoming months and also issues that are being resolved that could affect the components that will finally be recommended. Estimated costs will likely change as the project evolves through further investigation and analysis and concepts are vetted and refined. Some of the factors that could affect final recommended components and costs include:

1) Diversion and yield modeling will be completed on each of the three sites. These analyses will reveal how much water is actually available for consumptive use with proposed components in place. The feasibility of certain proposed individual components will become more apparent and modification or elimination of certain components may occur.
2) The best information available has been used to determine groundwater levels. Pond bottom elevations have been determined to avoid penetration into the groundwater. Further investigation to be performed in the future could show a need for modification.
3) Further interaction with property owners could affect the shape and extent of the proposed storage ponds
4) The conceptual design of nine conventional water production wells and three conventional wells to be used for aquifer storage and recovery is based on the assumption that 500 gallons per minute can be produced from each well. Additional groundwater investigation and analysis is needed to confirm this assumption. Further investigation and analysis could indicate that some

of the recommended wells should be modified or eliminated. The aquifer storage and recovery component could similarly be affected.

5) Assumptions have been made, based on available information, concerning soil characteristics The results of geotechnical investigations yet to be performed could affect changes with respect to lining locations and assumptions.
6) The Gila Basin Irrigation Commission (GBIC) is planning for construction of three cross vane rock diversion structures at the current Upper Gila, Ft West and Gila Farms diversion sites. We are aware of a proposal to be submitted as part of the NEPA scoping process for elimination of the diversion component for the Upper Gila with a single diversion structure and substitution with acceptance of the three GBIC diversion structures. If this proposal is in fact submitted then we would recommend review, evaluation and recommendation.
7) During the NEPA scoping process, other proposals could be submitted for alternatives to the proposed action. In each case, we would recommend a process of review, evaluation and recommendation.
8) Issues affecting the legality of certain components of the proposed action with respect to state water law and the CUFA are yet to be resolved.

FIGURE 1: CLIFF - GILA AREA

CLIFF-GILA PONDS SURFACE-STORAGE							
POND #	ELEV OF POND BOTTOM	ELEV OF TOP OF BERM	STAGE STORAGE AC-FT	EXCAVATION CU-YD	POND LINER SQ-FT	OUTFALL PIPE LF	PIPE SIZE IN
PREFERRED SITES							
2P	4,615	4,650	564	1,079,704	957,600	485	18
3P	4,600	4,620	165	22,311	486,308	1,128	18
4P	4,565	4,580	310	46,979	1,149,381	420	18
5P	4,530	4,545	598	91,720	2,191,213	240	18
6P	4,503	4,518	877	307,642	3,131,361	420	24
7P	4,555	4,570	242	40,888	935,430	350	18
8P	4,540	4,555	979	148,074	3,483,841	600	24
		TOTAL =	**3,735**	**1,737,318**	**12,335,134**	**3,643**	
ALTERNATE SITES							
1A	4,555	4,570	1,349	199,944	4,812,338	4,380	30
2A	4,525	4,540	583	90,862	2,115,509	400	18
3A	4,510	4,525	976	148,116	3,511,594	220	24
4A	4,510	4,525	499	80,909	1,913,311	130	18
5A	4,500	4,515	1,238	194,962	4,518,466	450	30
		TOTAL =	**4,645**	**714,793**	**16,871,218**	**5,580**	

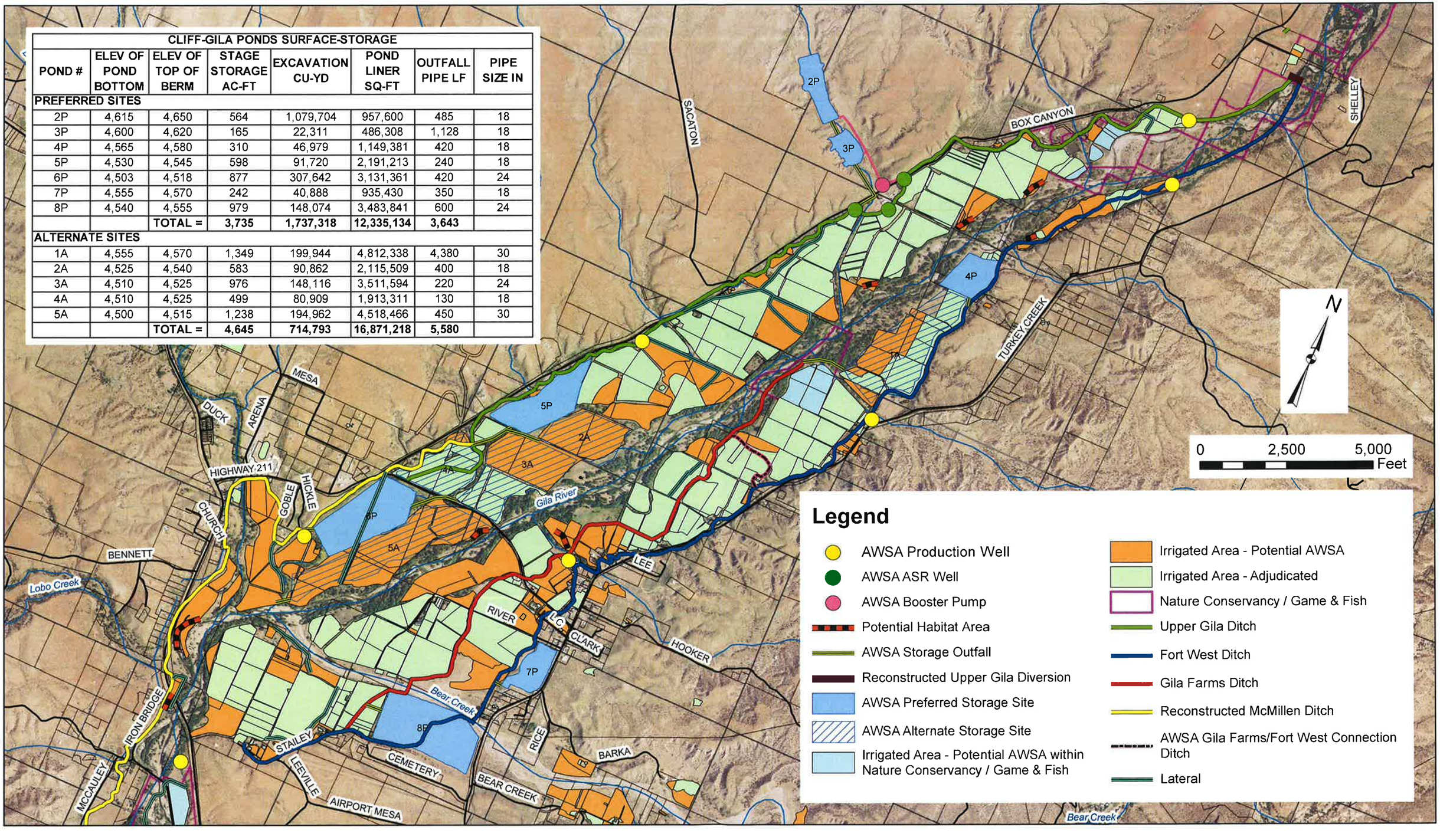


FIGURE 2: RIVERSIDE AREA

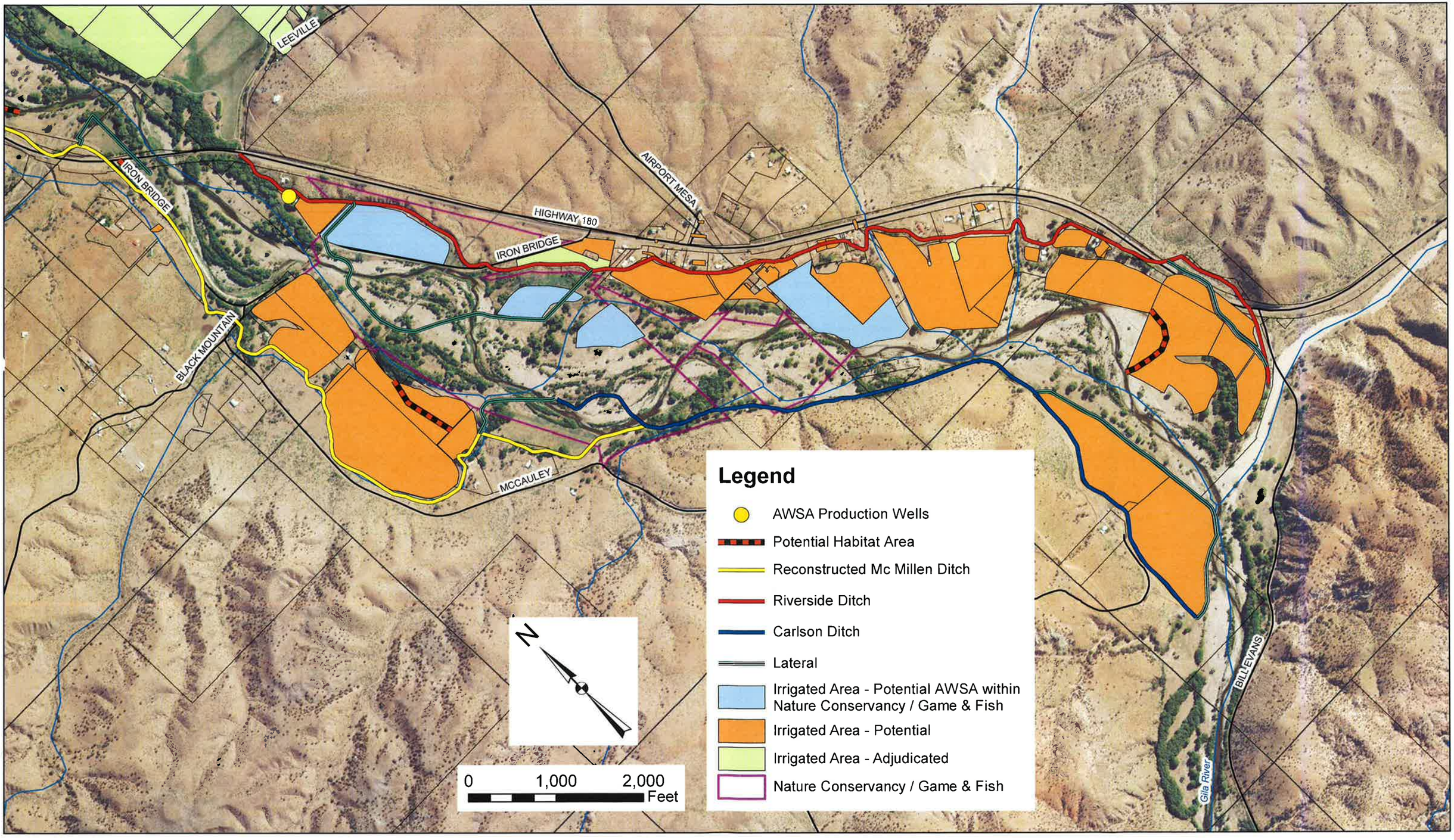
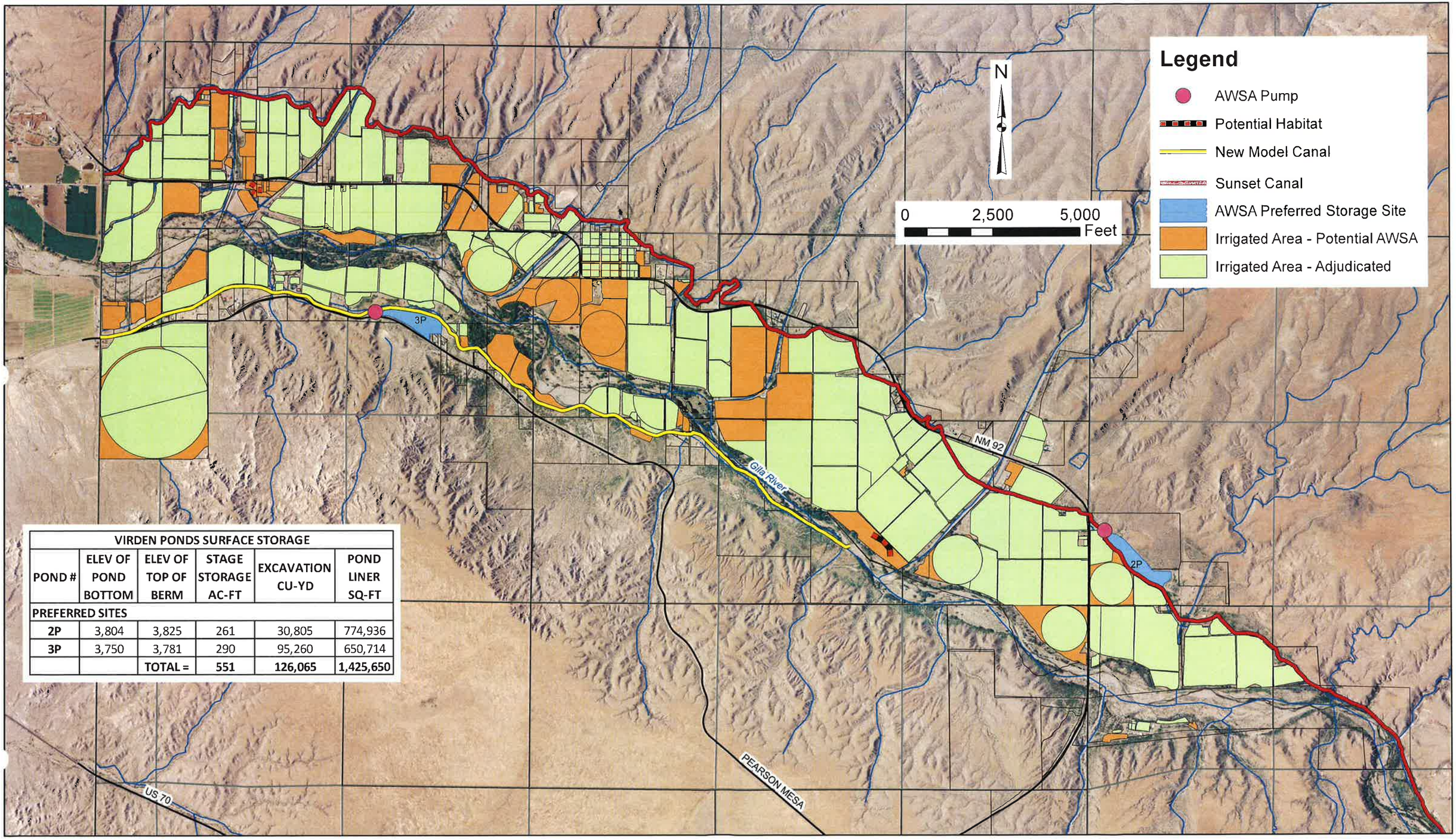


FIGURE 3: VIRDEN AREA



VIRDEN PONDS SURFACE STORAGE					
POND #	ELEV OF POND BOTTOM	ELEV OF TOP OF BERM	STAGE STORAGE AC-FT	EXCAVATION CU-YD	POND LINER SQ-FT
PREFERRED SITES					
2P	3,804	3,825	261	30,805	774,936
3P	3,750	3,781	290	95,260	650,714
		TOTAL =	**551**	**126,065**	**1,425,650**

FIGURE 4: SPURGEON DIVERSION AREA

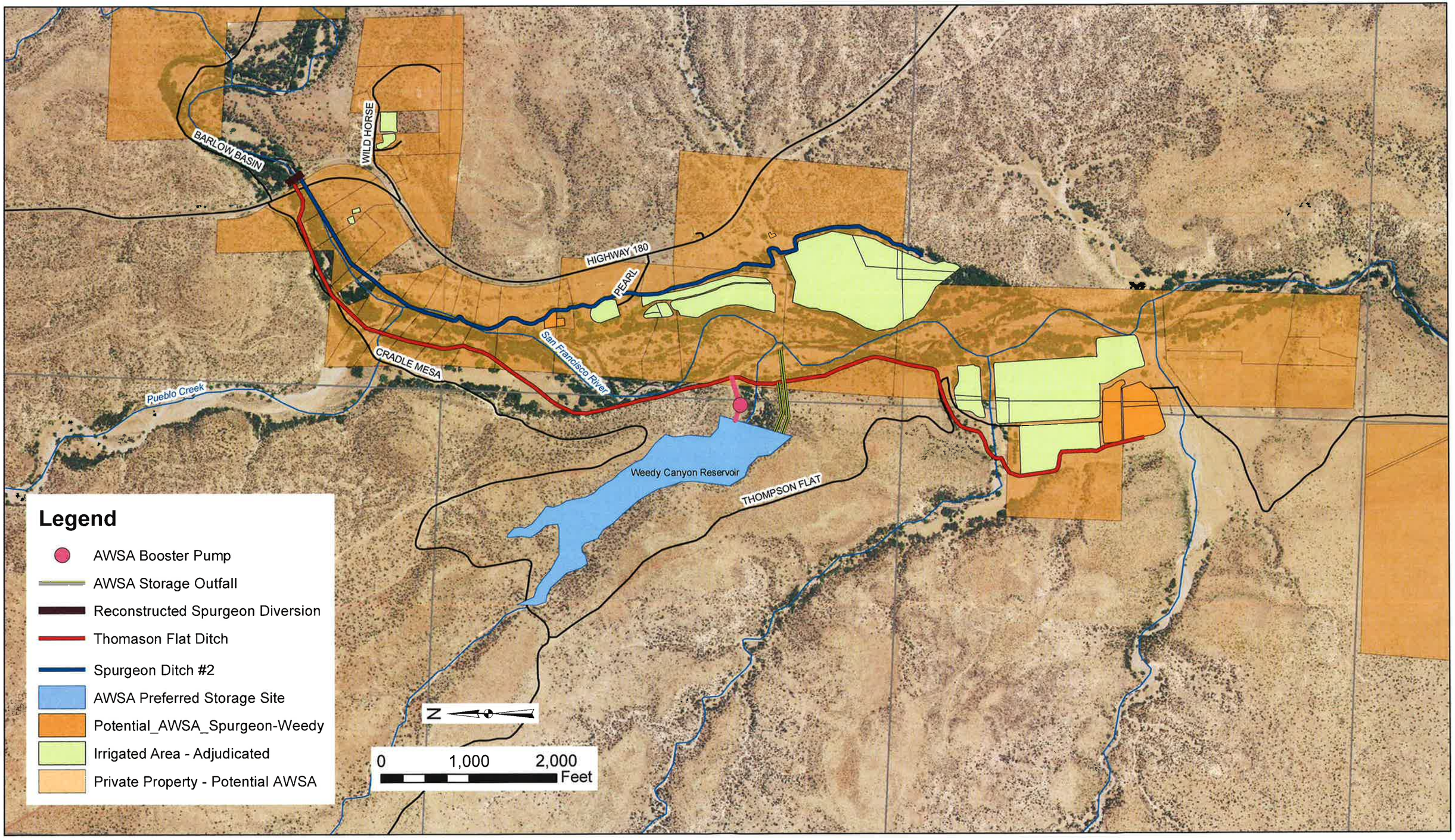


FIGURE 5: W-S DITCH DIVERSION AREA

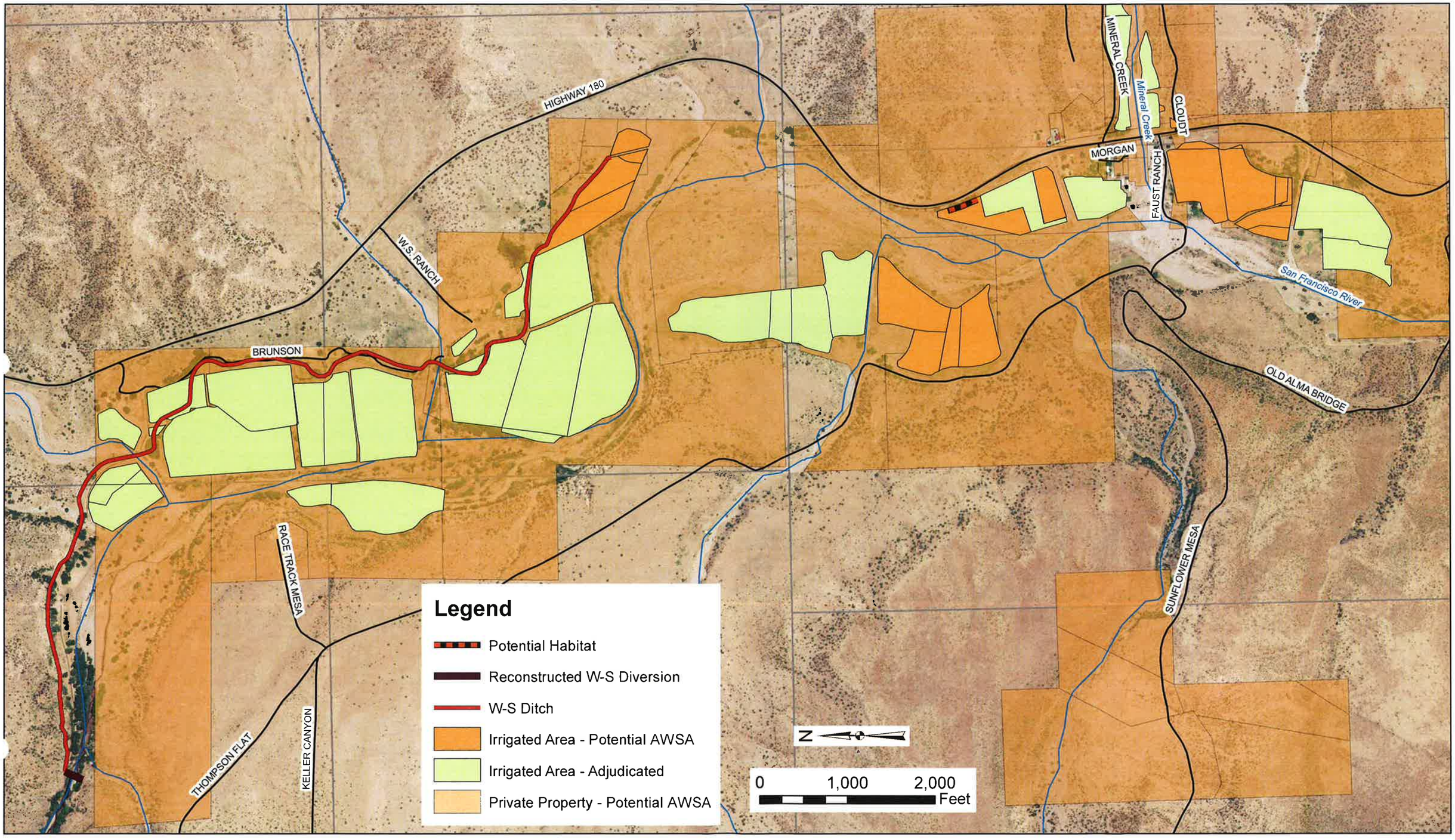


FIGURE 6: PLEASANTON AREA