

Memo

To:	Flood Control District of Maricopa County 2801 West Durango Street Phoenix, Arizona	From:	Stantec Consulting Inc. Stephanie Gerlach, PE 8211 South 48 th street Phoenix, AZ
File:	Stantec # 181300034	Date:	April 17, 2009

Reference: Gila River Bank Stabilization - Data Collection Memorandum

The Data Collection task for the Gila River Bank Stabilization project consists of collecting information that pertains to engineering evaluations and land use within the project area. This information is used to define resources and constraints in the study area, and influences design elements. The type of information collected and reviewed includes historical photographs, current land use plans, previous hydraulic reports existing topographic mapping, engineering plans for existing bank protection structures, transportation and utility plans, flood control facilities design guidelines and drainage manuals.

Project Description

The Gila River Bank Stabilization Pre-design project is located in the Town of Buckeye and City of Goodyear planning areas, unincorporated Maricopa County and within the Buckeye Water Conservation and Drainage District (BWCCD) (see Figure 1). The need for the stabilization project is based on the results of the Lateral Migration Analysis conducted as part of the El Rio Watercourse Master Plan (JE Fuller, 2006) and historic flooding and erosion problems. At locations, the north bank has been armored with angular and river-run (rounded) rock. The bank stabilization project is proposed to mitigate the public safety hazard due to flooding as a result of potential bank failure and lateral migration. The BWCCD and the Town of Buckeye submitted a Capital Improvement Program (CIP) priority request (Stantec, 2003). A copy of the request is included in Attachment A.

The Flood Control District of Maricopa County (FCDMC) provided the existing bank protection within the project reach in 1983, three years after the maximum recorded discharge of 178,000 cfs had occurred. Bank protection was provided in response to erosion and bank lateral migration. Additional rock was added to the bank protection during a 1993 event, however there are no specific records indicating if there was active bank failure occurring during the runoff event.

Reference: Gila River Bank Stabilization - Data Collection Memorandum

Data Collection

Mapping

Three topographic mapping sources are available for the project, 1) *Topographic mapping developed for floodplain delineation depicted on Federal Emergency Management Agency (FEMA) effective FIRM Panels*, 2) *Topographic Mapping developed for the Norte Vista/King Ranch LOMR*, 3) *Topographic mapping developed for the FCDMC's Gila River Floodplain Redelineation Study*.

The Effective Federal Emergency Management Agency (FEMA) topographic mapping was completed by Michael Baker, Jr. and McLain Harbers Co., Inc. (Michael Baker, Jr., 1999). The study area was first flown on 14 November 1991. During the end of 1992 and early 1993 a flood with a peak discharge of 130,000 cfs occurred with the largest runoff volume recorded on the Gila River. The channel and part of the adjacent overbanks were reflowed on 6 February 1993. The contour interval was four feet. The horizontal datum is North American Datum (NAD) 83 State Plane Coordinate System (AZ Central Zone, International Feet) and the vertical datum is National Geodetic Vertical Datum (NGVD) 29. In 2005 a topographic bust was found in the mapping within the Gila River Bank Stabilization project reach, therefore this data set will not be utilized.

The remaining two sources of detailed topographic mapping will be utilized for this study. Topographic data from the two data sources were compiled into one data set for the Gila River Floodplain Redelineation Study (Stantec Consulting Inc., 2008). The final topographic data is on the NGVD of 1929 and NAD 83 State Plane Coordinate System. The extents of the two data sets are depicted on Figure 2. Details of the two sources that were used to develop the topography for this project are:

Norte Vista / King Ranch, April 2007

The topography was flown by Kenney Aerial Mapping, Inc. during 2003 and 2004. Coe & Van Loo Consultants, Inc. provided ground control survey. The contour interval varied between one foot in the overbanks and two feet in the channel. The horizontal datum was based on the Norte Vista / King Ranch project and the vertical datum was NGVD 29. The project was projected to the same horizontal coordinate system as the Effective study using ArcView v3.2.

Gila River Floodplain Redelineation Study, March 2008

The mapping provided by the FCDMC was developed for the Gila River Floodplain Redelineation Study. Vertical Mapping Resources Inc. flew the area during 13 March 2006. Ground control survey was provided by RBF Consulting Inc. The contour interval is two feet. The mapping is on the NGVD of 1988 and NAD 83 State Plane Coordinate System (AZ Central Zone, International Feet).

Reference: Gila River Bank Stabilization - Data Collection Memorandum

Aerial photography was provided by the FCDMC on 12 December 2008 for the project. Flight dates for the aerial photography were 25 November 2007 and 12 December 2007. The photography is on the NAD 83 (Arizona Central, foot) datum.

Existing Facilities

As part of the project major utilities are identified and inventoried. Location and type of facilities were determined from aerial photographs, utility plans, field investigation and information provided by the FCDMC or BWCDD. Utilities identified consist of electrical lines, high-pressure gas main lines, telephone, well sites and BWCDD irrigation facilities (see Figure 3). BWCDD irrigation facilities include the South Extension Canal, laterals, turnout structures and check structures. Table 1 lists the utility companies contacted and Attachment A includes a copy of the utility map, if provided, by the utility company. Private utilities will have to be field verified to see if there are impacts from the proposed bank stabilization.

Table 1
Utilities Contacted

Utility Company	Utility	Utilities Impacted by Project	Utility Maps Provided
APS	Electric, Water, Petroleum	No	Yes
BWCDD	Irrigation	Yes	No
City of Goodyear	Water, Sewer & Transp.	No	Yes
Clearwater Utilities	Water	No	No
Cox	Cable	No	Yes
Kinder Morgan	Petroleum	No	Yes
Level 3	Fiber Optics	No	Yes
MDOT	Transportation	No	No
MCI	Fiber Optics	No	No
Qwest National	Fiber Optics and telephone	No	No
Qwest Local	Fiber Optics and telephone	No	No
Southwest Gas	Natural Gas	No	Yes
Town of Buckeye	Water and Sewer	No	No
Verizon	Telephone	No	Yes

Table 2 lists the well site, owner and if the Arizona Department of Water Resources (ADWR) well records included information regarding the well log and water levels. A copy of the well information is included in Attachment A. Well locations shown on Figure 3 that are close to the project area will need to be field verified to see if the proposed alignment will impact the wells. In general, the well logs near the project area indicate the material from ground surface to five to ten feet below ground surface

Reference: Gila River Bank Stabilization - Data Collection Memorandum

consists of silts and clays with some fine sands. From five to ten feet below ground surface the material is coarser and consists of sand with some gravels and few cobbles.

Table 2

Well Site Information

ADWR Registration Number	Owner	Records include well log	Record Depth to water (ft)
638273	Luce, G P	No	96
528916	SW Gas Corp,	Yes	Not given
608352	Tumbleweed Dairy LLC	No	Not given
581625	Wolfe	No	Not given
602770	Ratliff, Steven	No	19
602771	Ratliff, Steven	No	19
623372	Schulz, F	No	Not given
610418	Wagner, Robert, M	No	125'?
610419	Wagner, Robert, M	No	150'?
619812	BWCDD	No	26
634138	Ladra, P H	No	Not given
634137	Ladra, P H	No	Not given
516768	BWCDD	Yes	19.78
640738	Brown, J C	No	72
516769	Holly, D,	Yes	16.46
613058	Oxford, James	No	105
567483	Mendoza	No	Not given
806834	Dos Rios Materials, LLC	No	31
516771	Calhoun, Frank	Yes	10.20

An existing and active sand and gravel operation is shown on Figure 3 and is owned by Dos Rios Materials. A copy of the sand and gravel operation is included in Attachment A. Based on information from the sand and gravel plan the distance between the top of the pit and floodway is approximately 550-feet.

Other existing facilities include the Perryville Bank Stabilization project constructed during 1983 at a cost of \$270,010 (Camp Dresser & McKee, Inc. 1983). The purpose of the project was to prevent further erosion of the riverbank and resultant loss of land and improvements. The limits of the existing bank stabilization are approximately 0.5-miles long and are shown on Figure 3. Copies of the as-built plans are included in Attachment A. The plans indicate that rock was in place before the bank protection was added. The slope of the rock was listed as 1 horizontal to 1 vertical. According to the plans gabions were added to the toe of the rock. Riprap was added upstream and downstream of the existing rock at a slope of 2.5 horizontal to 1 vertical. Originally, the riprap was to extend 10-feet below ground surface. According to FCDMC records the

Reference: Gila River Bank Stabilization - Data Collection Memorandum

toe-down trench could not be excavated because the groundwater was higher than expected and there was fine-grained soil. The toe-down was replaced with gabions.

The FCDMC Records indicate the bank protection was damaged during the 1993 flood event. An aerial photograph from the 1993 flooding event is shown on Figure 4. The records indicated that 1,600 cubic yards (cy) of riprap and 1,100 cy of fill was placed, but did not indicate where the damage occurred.

As part of the geotechnical investigation for the project, four test pits were excavated in the bank stabilization area (AMEC, 2009). The report indicated the bank stabilization material consisted of cobble approximately 1.5-feet thick underlain by a woven geotextile. The average size of the cobbles is 9 inches. Based on a preliminary bank slope stability analysis, AMEC concluded the bank protection has an adequate factor of safety in regards to slope stability. As part of the El Rio project the total scour was estimated to be approximately 9-feet deep at the thalweg of the channel (Stantec, 2005).

The design plans for the existing bank protection show that at locations the toe of bank stabilization consists of a gabion mattress apron that is 6- to 8-inches thick instead of providing armor to the total scour depth, however inspection notes provided by the FCDMC indicate that because of high ground water that the gabion mattress application was used along the entire project. Bank protection plans for the gabion mattress indicate that the mattress extends 20- to 40-feet into the channel. Application of a gabion mattress apron instead of providing scour protection to the total scour depth or a launchable riprap application has been attempted on the Salt River, and has failed. Due to this failure It is recommended that the gabion mattress apron be replaced.

The Design Report for this project will include scour analysis and riprap sizing and will further discuss the adequacy and/or deficiency of the existing bank protection.

Future Transportation Plans

Future transportation corridors include State Route 303 Loop (SR 3030L) extension into Rainbow Valley. Preliminary plans indicate that it is likely that it will cross the Gila River somewhere between Jackrabbit and Citrus Road (Parsons, 2003). Further study is being conducted by Arizona Department of Transportation. The project is currently unfunded and the projected construction date is approximately 20 years out (Pokorski, Jennifer email communication, 9 February 2009).

Land Ownership

Currently, the majority of the land in the project area is owned by private entities. The largest landowner is Dos Rios Materials (see Figure 3). Other landowners include BWCDD and FCDMC.

Reference: Gila River Bank Stabilization - Data Collection Memorandum

Land Use Plans

The project area is located within Unincorporated Maricopa County except for the Citrus Road alignment (see Figure 5). Citrus Road alignment is owned by the City of Goodyear (COG). The project area is also included in two general plans, Town of Buckeye (TOB) and City of Goodyear (TOB and COG, 2007). According to the plans the study area was assigned the classifications of rural residential, open space, business park and very low density. Attachment B includes copies of the land use plans from the Town of Buckeye and City of Goodyear. The preliminary bank stabilization alignment lies between the rural residential and open space land uses and these designations should not impact the project.

Cultural Resource Sites

As part of the El Rio project, James Rodgers prepared a cultural resources report (Rodgers, 2002). The report includes an archival map of the major Hohokam canals and adjacent villages of the eastern Buckeye Valley. A copy of the map is included in Attachment C. The report documents three sites near the project, AZ T:11:22 ASM, Midvale 4 and ASM 87-222, 98-4 (MC 85 Study). These sites are shown on Figure 6. An additional site was discovered during the project, AZ T:11:189 ASM, and is located near the start of the proposed alignment. Protection of two cultural sites, AZ T:11:22 ASM and AZ T:11:189 will affect the alignment. The other cultural sites are located outside the preliminary alignment of the bank protection.

Hydraulic, Sediment and Erosion Hazard Analysis

The Gila River within the project area was the subject of several large scale hydrologic and hydraulic studies. The studies were collected and reviewed as part of the data collection effort and are included in the reference database printout (see Attachment D). Figure 7 shows the effective FEMA floodplain and floodway and the line work from the redelineation by Stantec.

Salt – Gila River Floodplain Delineation Restudy; May 1999

The floodplain delineation study was initiated by the FCDMC and performed by Michael Baker, Jr., Inc (Michael Baker Jr., 1999). The purpose of the study was to receive a Letter of Map Revision or a Physical Map Revision to revise the 100-year floodplain and floodway along the Gila River from 1.4 miles downstream of SR85 to the confluence with the Salt River. The study also included the area along the Salt River from the Gila River confluence to just downstream of the Granite Reef Diversion Dam. Project specific topographic four-foot contour mapping was used. A HEC-RAS model was used to delineate the floodplain and floodway.

El Rio Watercourse Master Plan; 2005

Prepared by Stantec Consulting Inc. for the FCDMC (Stantec Consulting Inc., 2005). The purpose of the study was to define the existing river and the desired form and

Reference: Gila River Bank Stabilization - Data Collection Memorandum

function of the river in the future. The focus of the plan is to maintain and enhance the natural functions of the Gila River through flood control management strategies. The limits of the study were from SR 85 to the confluence with the Agua Fria River. JE Fuller developed an erosion hazard zone as part of the Lateral Migration Analysis. A HEC-6T model was developed as part of the sedimentation analysis. In 2004, detailed mapping for approximately 5.5 miles of the Gila River was prepared as part of the King Ranch development and Cotton Lane Bridge. This new mapping was incorporated into the HEC-RAS base model. When the new mapping was compared to the mapping from the 1999 study it was discovered that there were areas where the channel invert was as much as eight feet lower.

Norte Vista / King Ranch Floodplain Redelineation, April 2007

Prepared by River Research & Design Inc. for Spenser Management, Inc. and SD Construction, L.L.C. (River Research & Design, Inc., 2007). The purpose of the project was to support the design of the Cotton Lane Bridge, determine the amount of encroachment possible from the King Ranch and Lakin property developments and provide documentation for a Conditional Letter of Map Revision (CLOMR) submittal package. The limits of the study were from the Estrella Parkway Bridge to Airport Road. A HEC-RAS model was developed based mapping from the FCDMC and mapping flown for the project. It was discovered during the study that because of the new mapping an area north of the Gila River known as the "Buckeye Breakout" could be removed from the floodplain.

Cotton Lane Bridge Floodplain Redelineation, February 2008

Prepared by River Research & Design Inc. for Maricopa County Department of Transportation (River Research & Design, Inc. 2008). The purpose of the report was for a CLOMR submittal package for a new bridge at Cotton Lane and associated roadway across the floodplain. The study area is approximately three-miles long and extends from Estrella Bridge to approximately one mile downstream of Cotton Lane Bridge. The bridge and associated abutments were incorporated into the HEC-RAS model developed as part of the Norte Vista / King Ranch project. A sediment model was developed as part of the project.

Gila River Floodplain Redelineation Study, March 2008

Prepared by Stantec for redelineation of the floodplain and floodway limits between Airport Road and Bullard Avenue (Stantec, 2008). The study incorporated topographic mapping flown by the FCDMC for the project and mapping from the Norte Vista / King Ranch Floodplain Redelineation Project. A HEC-RAS model was developed from the new mapping but does not incorporate the Cotton Lane Bridge.

Reference Database

References, which were collected by Stantec for use in the project, are compiled in an Excel spreadsheet. Attachment D includes a printout of the database, organized by date. Spatial information such as structures, land ownership and floodplains are stored

Reference: Gila River Bank Stabilization - Data Collection Memorandum

in GIS shape files. A listing of each shapefile along with the date it was received, the source of the information and a description of the information are included in Attachment E.

Design Constraints and Considerations

Based on the data collected the following is a list of the design constraints and considerations:

- A potential conflict between the bank protection alignment and a water well located on the Robert P., and Esther G. Mendoza property was identified. Additional data regarding private utilities, such as well sites, will need to be gathered from private landowners.
- The available two foot contour mapping is not sufficient for design. Additional survey and mapping will be required for 30% design to define project specific elements.
- Through site visits and geotechnical investigations it is was determine that fill material of questionable content (type and quality (potential oil stained) has been placed along the bank alignment. The FCDMC is preparing a Phase I Environmental Assessment report concerning possible environmental impacts. Conclusions and recommendations provided in the Phase 1 report will be provided in the Design Report developed for this report.
- The geotechnical investigation conducted by AMEC (AMEC, 2009) recommended:
 - Install a minimum of (3) piezometers to monitor groundwater levels.
 - Drill borings in large areas of fill to characterize the depth and condition of the fill. Excavate several test pits in areas of significant fill to evaluate the types and extent of debris.
 - Excavate additional test pits along the toe of the cobble armoring to verify the presence of gabion baskets along the entire reach of rip rap
- Dos Rios operates an active sand and gravel operation next to the proposed bank protection. Due to the required pit setback the bank protection alignment will not impact sand and gravel operations.
- Jurisdictional boundaries should not affect the project. Majority of the bank protection is located within unincorporated Maricopa County except for the Citrus Road alignment. The Citrus Road alignment is owned by the City of Goodyear.

Reference: Gila River Bank Stabilization - Data Collection Memorandum

- The project lies within the City of Goodyear planning area. The alignment lies between rural residential and open space land uses. The bank protection alignment will not impact proposed land use.
- Two cultural sites are located in the proposed alignment of the bank protection. The design report will consider options for minimizing impacts to the sites.
- Construction and maintenance of the bank stabilization will require acquisition of right-of-way from BWCDD and private property owners.
- Based on the information from the as-builts and total scour depth from the El Rio study the toe-down of the existing bank protection may not be adequate. Further evaluation of the riprap size and total scour depth will be completed as part of the design report.
- Adequate all-weather access to the proposed bank protection will be considered in the design report.

References

AMEC, 2009, Initial Preliminary Geotechnical Investigation Report, Gila River Bank Protection Pre-Design Project, Perryville Road to Citrus Road, Maricopa County, Arizona, Prepared for the Flood Control District of Maricopa County, dated February 20, 2009.

Camp Dresser & McKee, Inc., 1983, Construction Plans for Bank Stabilization, Perryville Area, prepared for the Flood Control District of Maricopa County.

City of Goodyear, 2007, City of Goodyear General Plan 2003-2013.

JE Fuller, 2005, El Rio Watercourse Master Plan Lateral Migration Analysis Report, prepared for the Flood Control District of Maricopa County, dated December 2005.

Michael Baker Jr., 1999, Salt-Gila Floodplain Delineation Restudy Submitted to the Flood Control District of Maricopa County, dated May 1999.

Parsons, 2003, Corridor Improvement Study Loop 303 Between Riggs Road and MC 85 (Draft), Prepared by Parsons, Prepared for Maricopa County Department of Transportation, dated 11 June 2003.

River Research & Design, Inc., 2007, Norte Vista / King Ranch Floodplain Redelineation, Gila River, Goodyear Arizona Letter of Map Revision, dated June 2007.

River Research & Design, Inc., 2008, Cotton Lane Bridge Floodplain Redelineation Gila River, Goodyear, Arizona Conditional Letter of Map Revision, dated February 2008.

Stantec

April 24, 2009
Flood Control District of Maricopa County
Page 10 of 10

Reference: Gila River Bank Stabilization - Data Collection Memorandum

Rogers, James B., 2002, A Cultural Resources Assessment of the El Rio Archeological Research Locale in West-Central Maricopa County, Arizona, Prepared for the Flood Control District of Maricopa County, dated December 17, 2002.

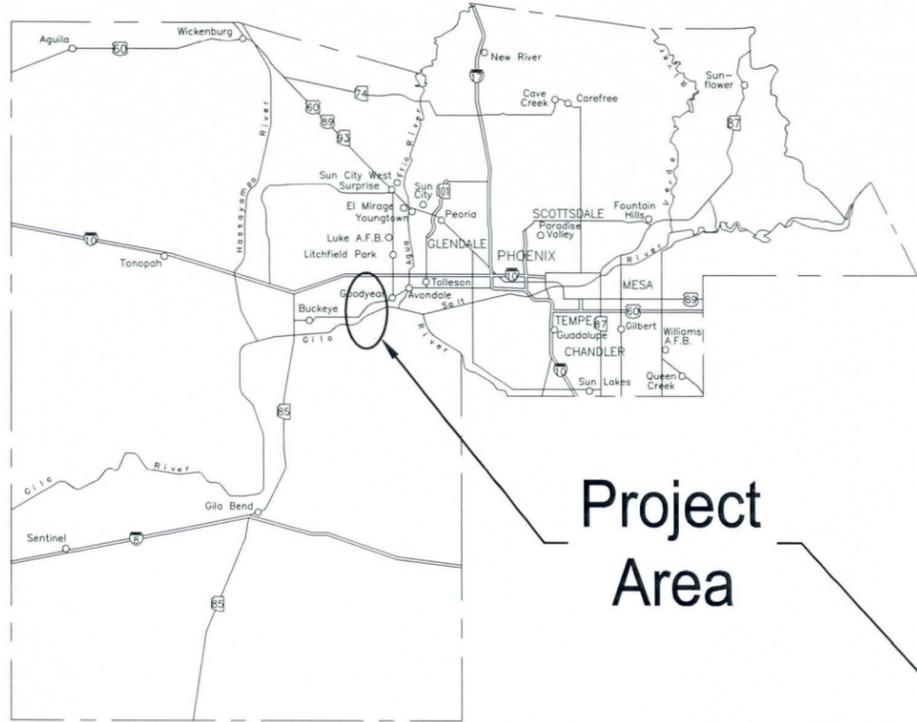
Stantec Consulting Inc., 2003, CIP Project Priority Request for North Bank of the Gila River Bank Stabilization/Levee Project, 175 th Avenue to Jackrabbit Trail, Submitted to Flood Control District of Maricopa County, Requested by Buckeye Water Conservation and Drainage District, In Association with the Town of Buckeye, Dated July 2003.

Stantec Consulting Inc., 2005, El Rio Watercourse Master Plan, Prepared for the Flood Control District of Maricopa County, dated December 2005.

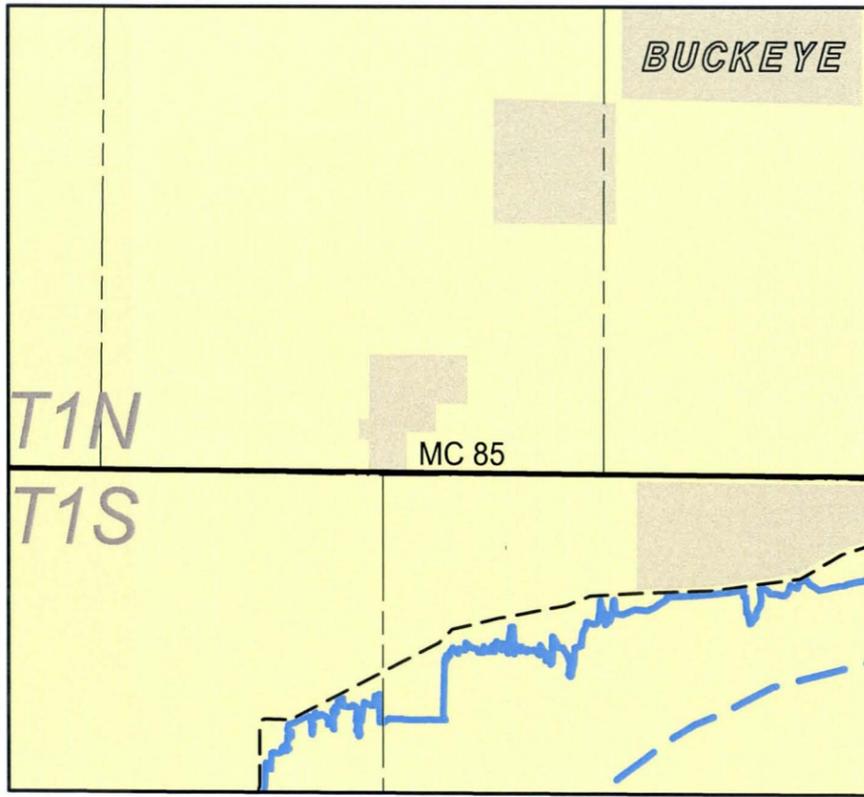
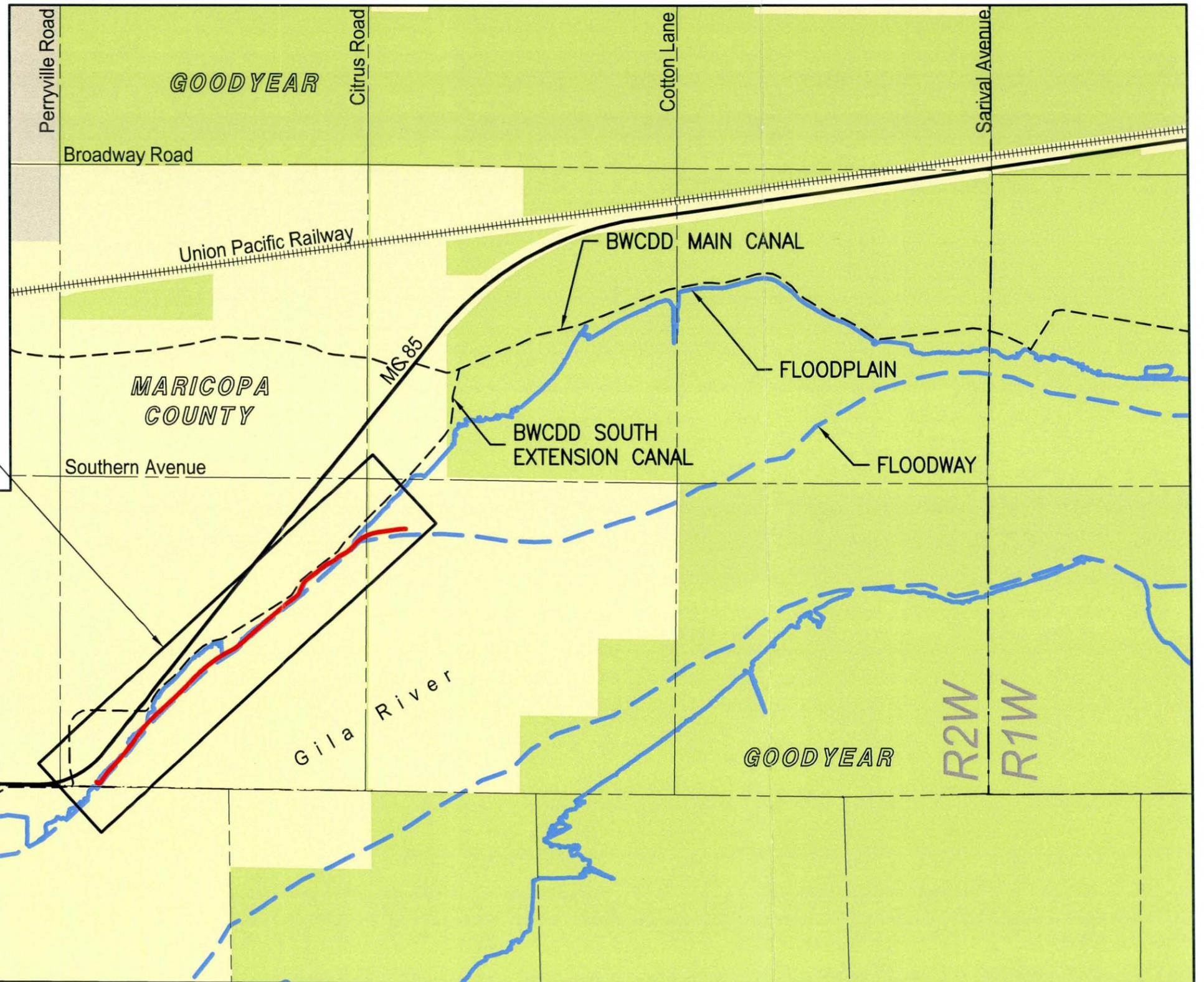
Stantec Consulting Inc., 2008, Gila River Floodplain Redelineation Study, Maricopa County, Technical Data Notebook, for the Flood Control District of Maricopa County (FCDMC), dated March 2008.

Town of Buckeye, 2007, Town of Buckeye 2007 General Plan Update, Adopted January 18, 2008 and Ratified May 20, 2008.

Figures



Project Area



01.2009
1813000034

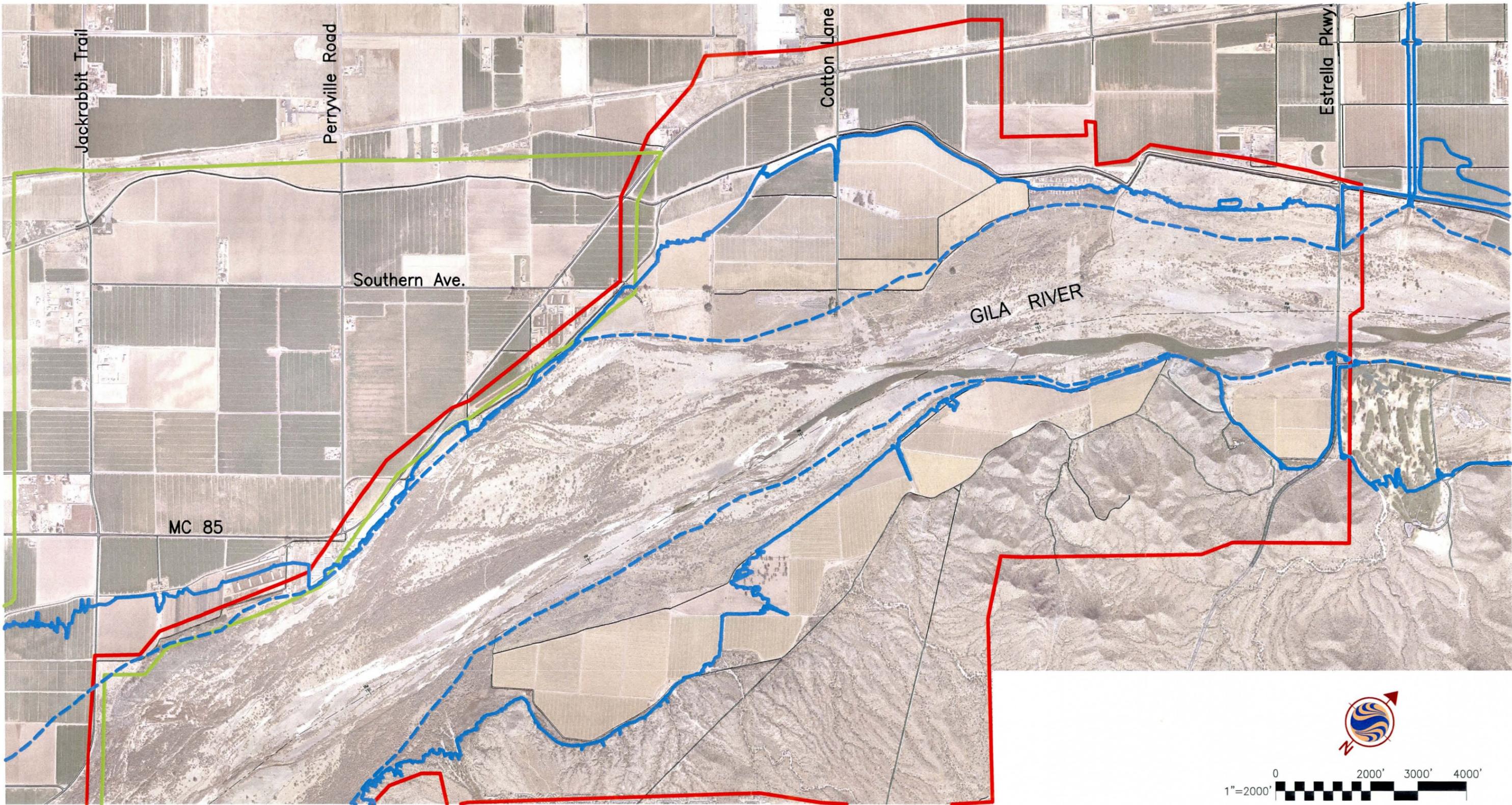


- Maricopa County
- Goodyear
- Buckeye

Client/Project
Flood Control District of Maricopa County
Gila River Bank Protection Pre-Design Project
Perryville Road to Citrus Road - FCD No. 2007-C017

Figure No.
1

Title
Vicinity Map



01.2009
1813000034

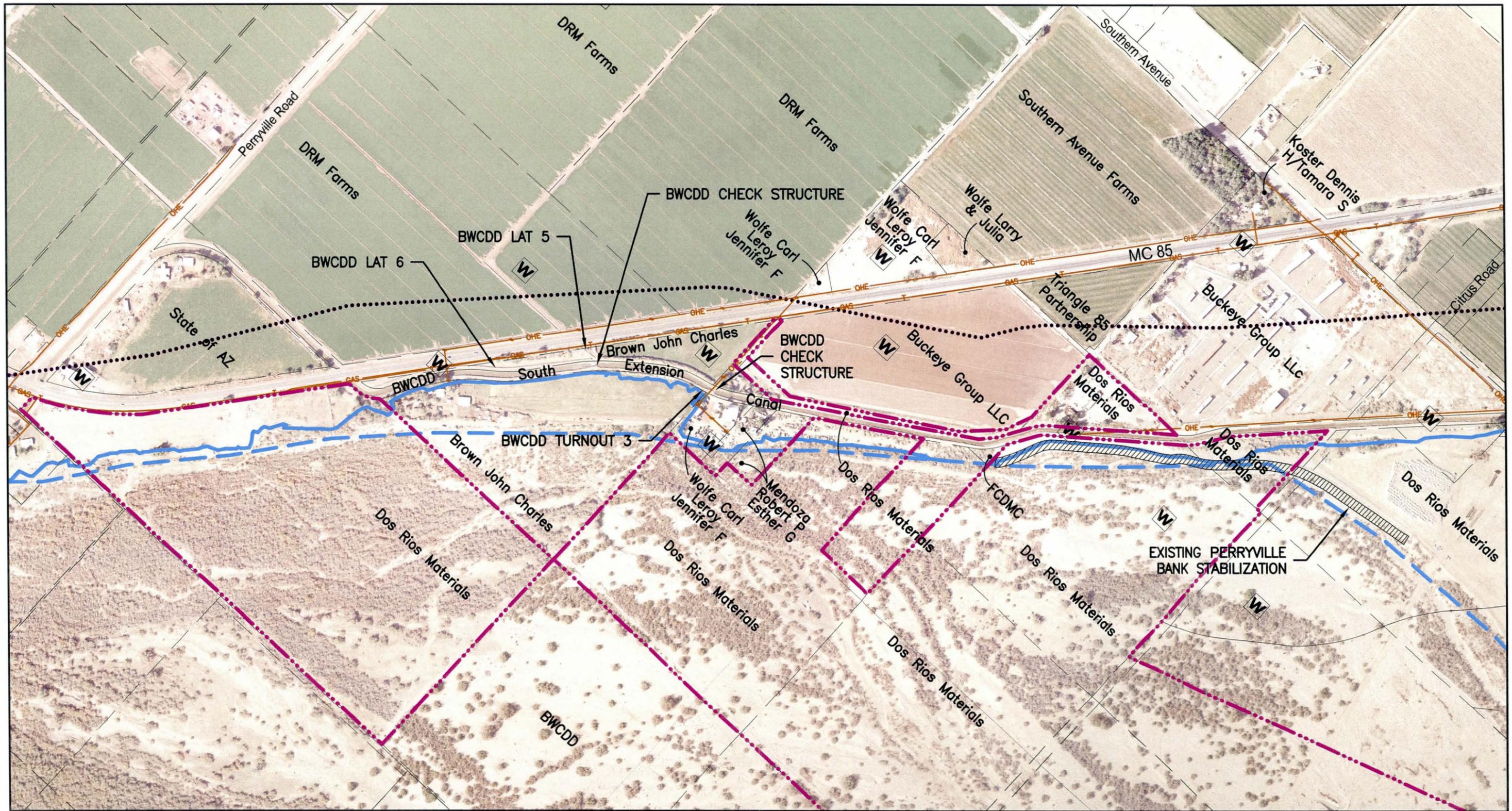


- Legend**
- Baseline
 - - - Project 100-year Floodway
 - Project 100-year Floodplain
 - ▭ King Ranch Topography Boundary
 - ▭ FCDMC Topography Boundary

Client/Project
 Flood Control District of Maricopa County
 Gila River Bank Protection Pre-Design Project
 Perryville Road to Citrus Road - FCD No. 2007-C017

Figure No.
Figure 2

Title
Topographic Mapping Sources



03.2009
181300034



- Legend**
- - - - - Active Sand and Gravel Operations
 - Project 100-year Floodplain
 - - - - - Project 100-year Floodway
 - - - - - Erosion Hazard Zone
 - OHE Overhead Electric
 - GAS High Pressure Gas
 - T Telephone

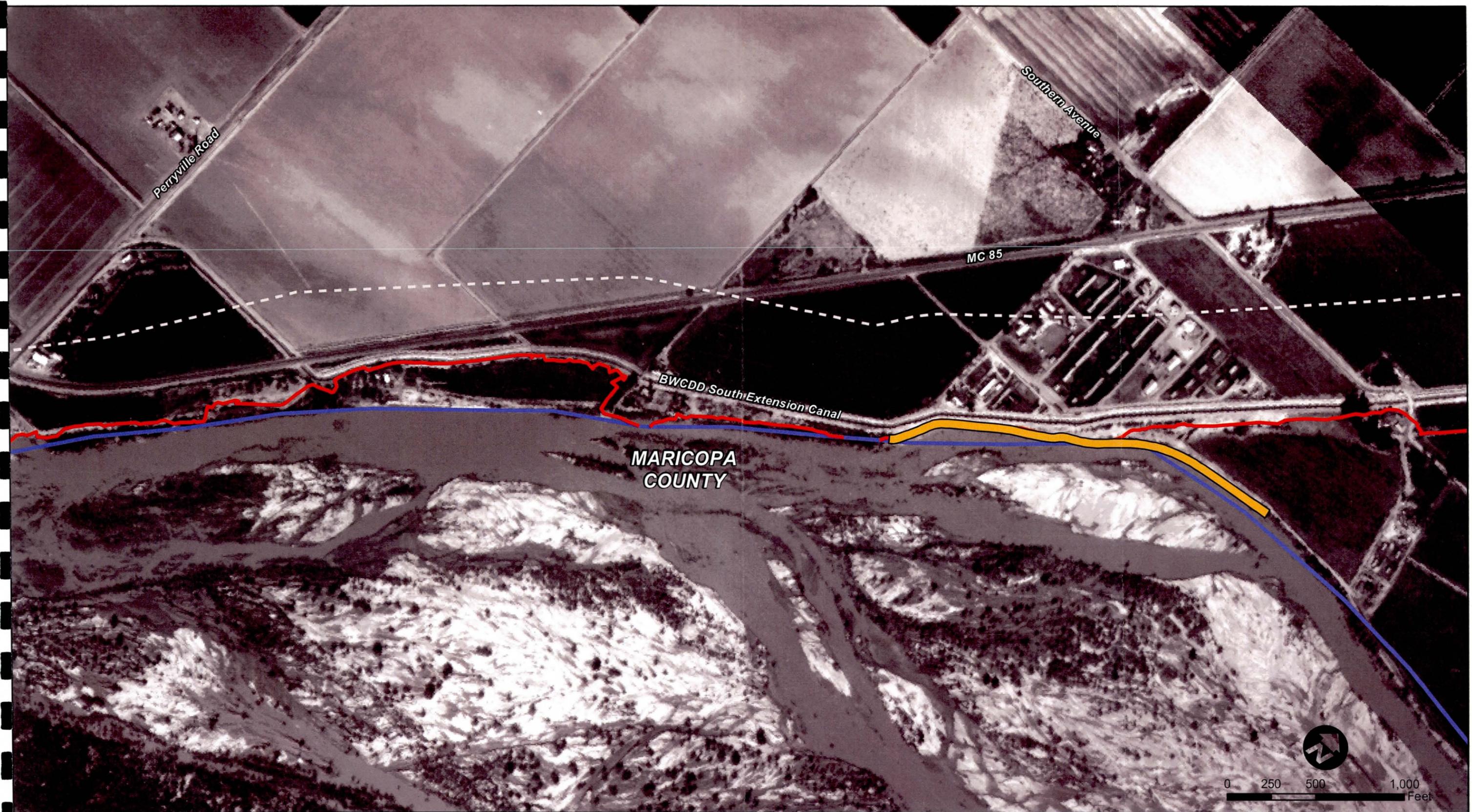
W ADWR Well Location



Client/Project
Flood Control District of Maricopa County
Gila River Bank Protection Pre-Design Project
Perryville Road to Citrus Road - FCD No. 2007-C017

Figure No.
Figure 3

Title
Existing Conditions



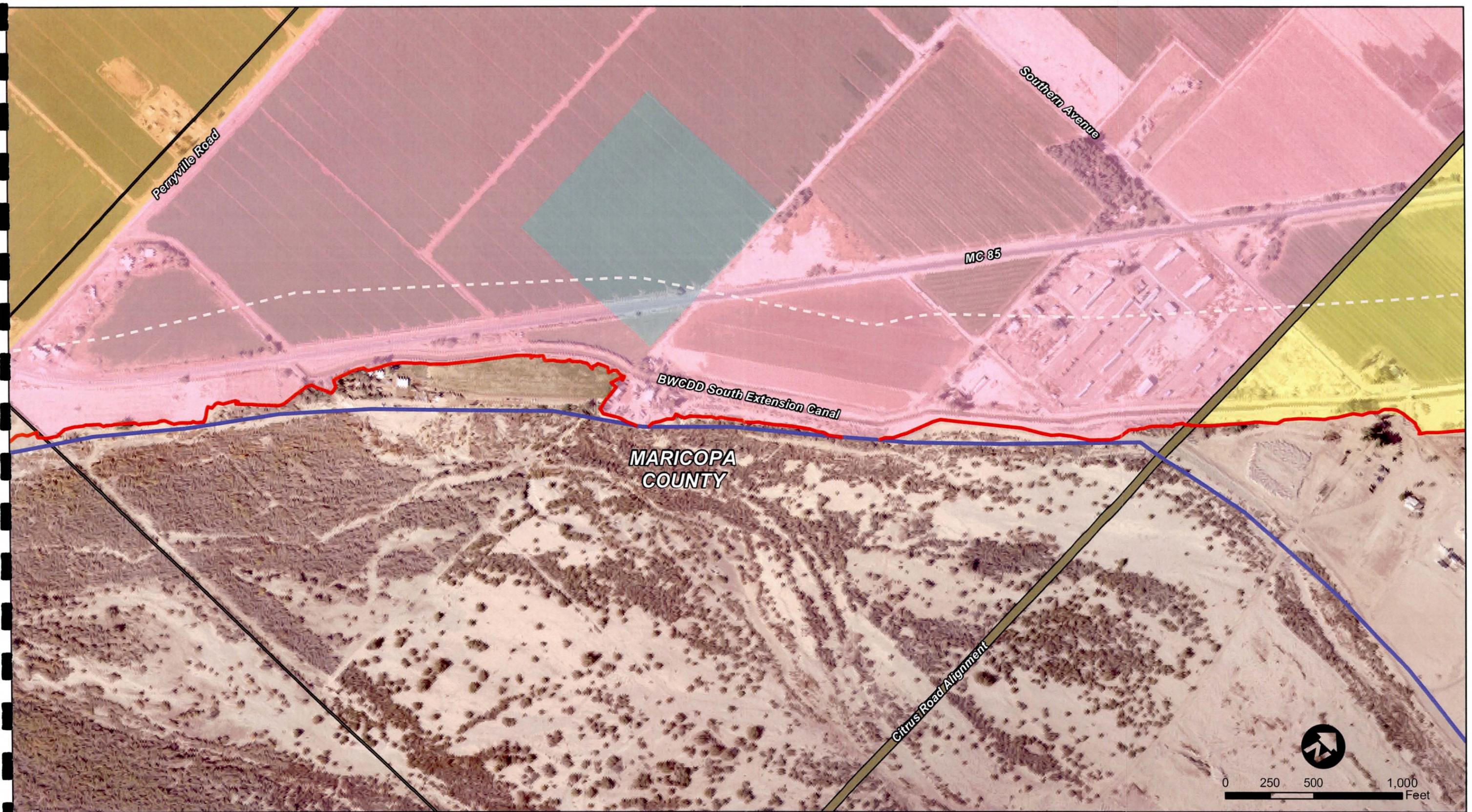
- Legend
- Project 100-year Floodway
 - Project 100-year Floodplain
 - Existing Bank Protection
 - Erosion Hazard Zone

Aerial Photos taken 2 February 1993 by FCDMC

Client/Project
Flood Control District of Maricopa County
 Gila River Bank Protection Pre-Design Project
 Perryville Road to Citrus Road - FCD No. 2007-C017

Figure No.
Figure 4

Title
Limits of 1993 Flood Event



- Legend**
- Project 100-year Floodway
 - Project 100-year Floodplain
 - Erosion Hazard Zone

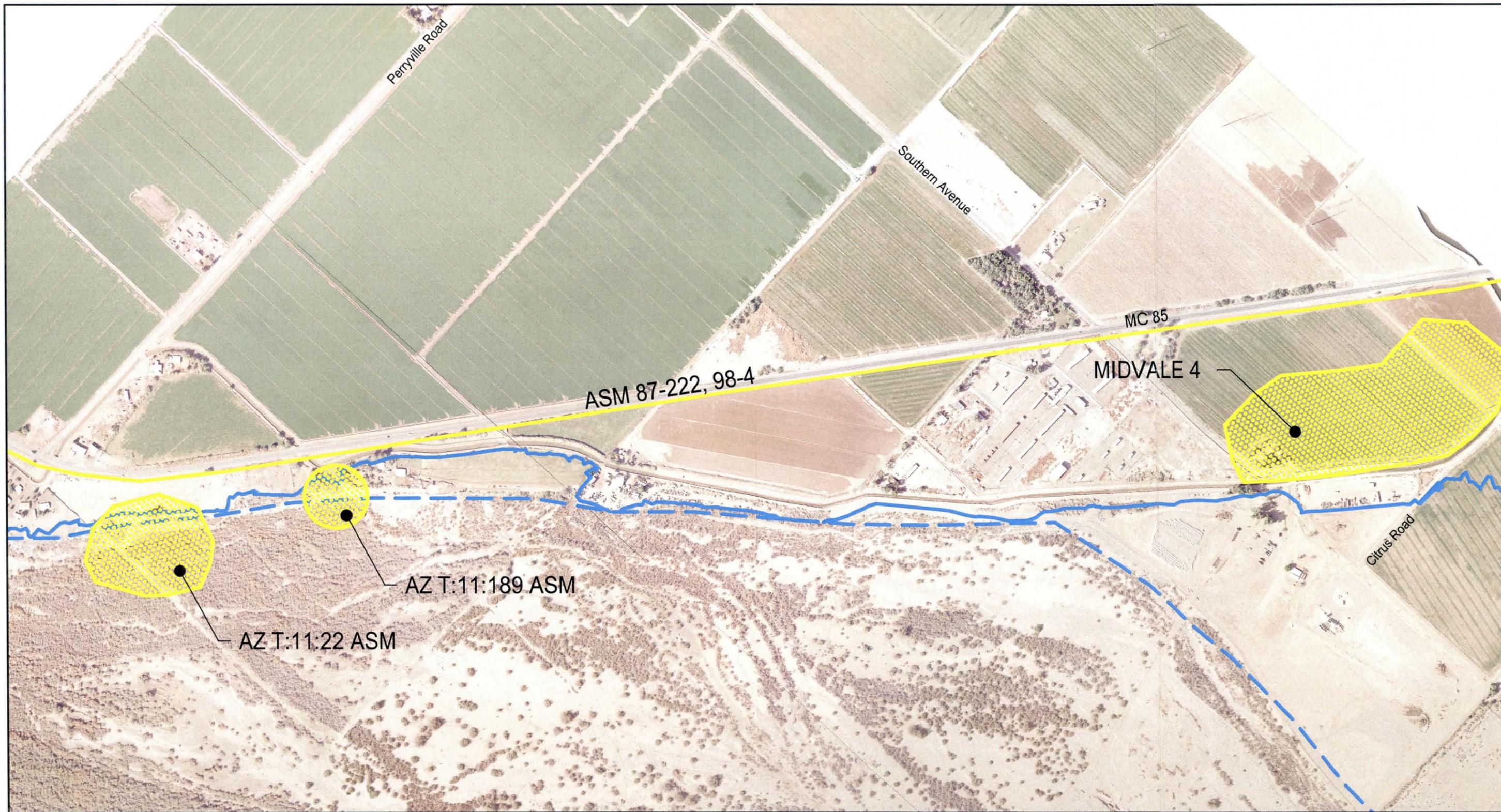
- Land Use Legend**
- Buckeye - Business Park
 - Goodyear - Community Commercial
 - Goodyear - Low Density Residential
 - Goodyear - Rural Residential
 - Buckeye - Very Low Density
 - Goodyear - Open Space

- Jurisdictional Boundaries**
- Goodyear
 - Maricopa County

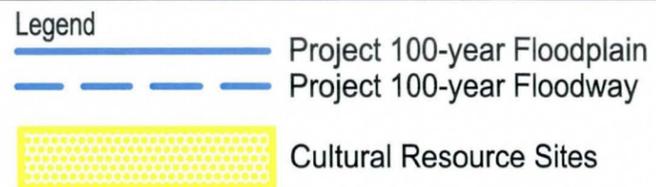
Client/Project
Flood Control District of Maricopa County
 Gila River Bank Protection Pre-Design Project
 Perryville Road to Citrus Road - FCD No. 2007-C017

Figure No.
Figure 5

Title
Jurisdictional Boundaries and Land Use



03.2009
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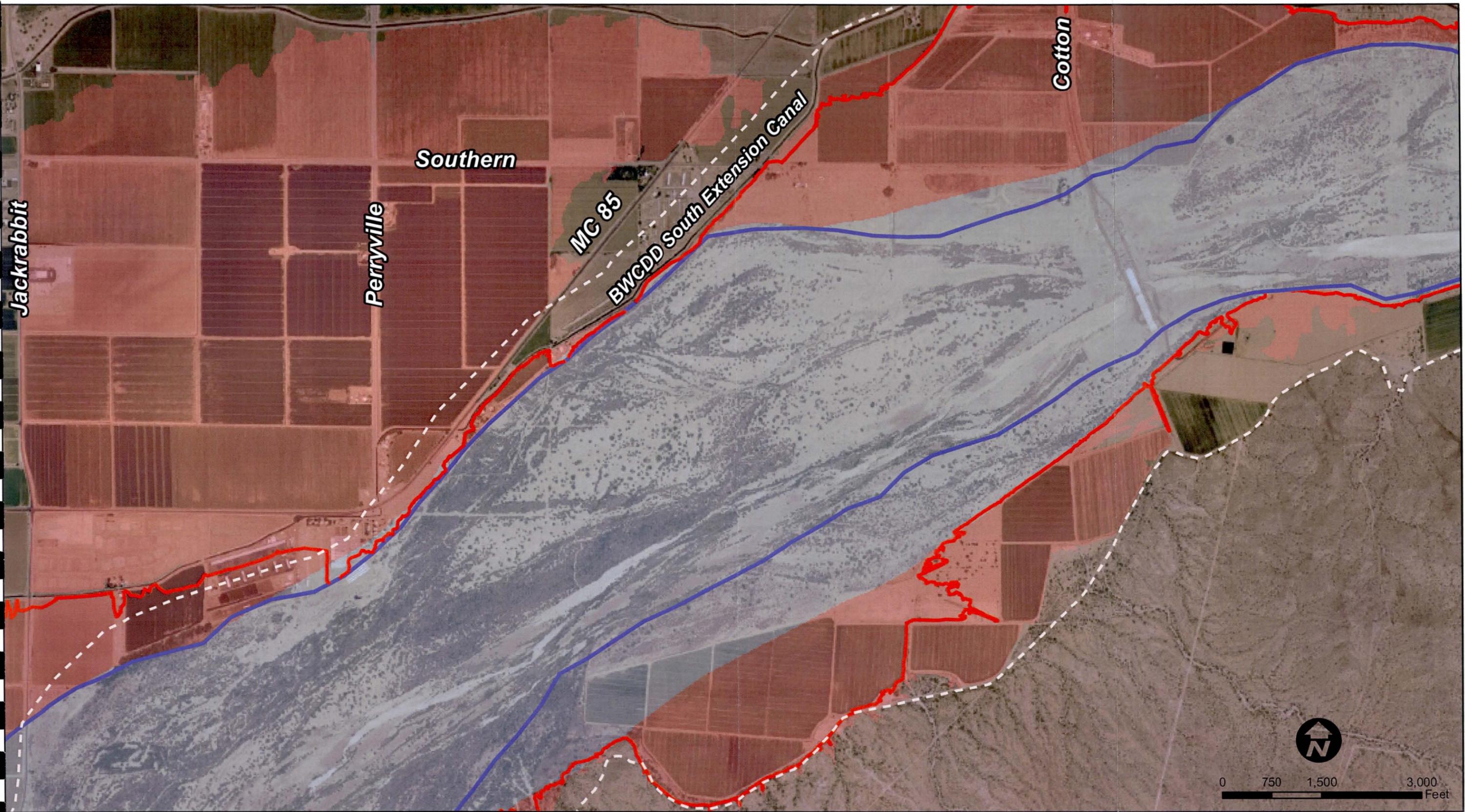


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Client/Project
Flood Control District of Maricopa County
Gila River Bank Protection Pre-Design Project
Perryville Road to Citrus Road - FCD No. 2007-C017

Figure No.
Figure 6

Title
Cultural Resource Sites



- Legend
- Project 100-year Floodway
 - Project 100-year Floodplain
 - Effective Floodway
 - Effective Floodplain
 - Erosion Hazard Zone

Client/Project
Flood Control District of Maricopa County
 Gila River Bank Protection Pre-Design Project
 Perryville Road to Citrus Road - FCD No. 2007-C017

Figure No.
Figure 7

Title
Floodplain and Floodway Comparison

Attachment A

CD

CIP Project Priority Request for North Bank of the Gila River Bank Stabilization/Levee
Project, 175th Avenue to Jackrabbit Trail

Utility Maps

Well Information

Dos Rios Sand and Gravel Exhibit

Perryville Bank Protection As-builts

Attachment B

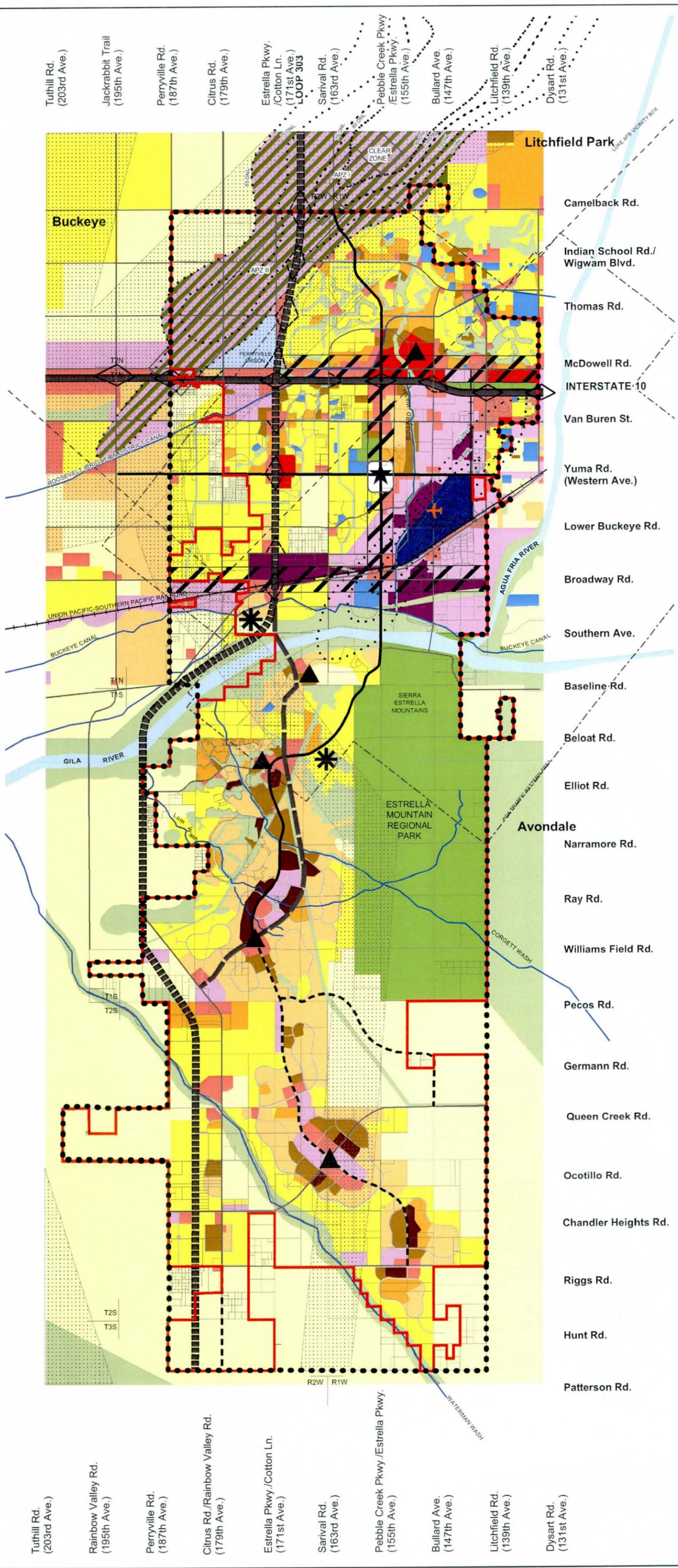
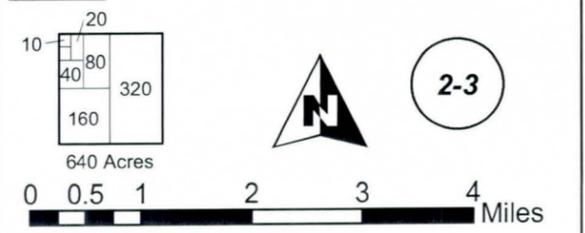
Land Use Plans

*Proud past.
Vibrant future!*

GOODYEAR
General Plan 2003 - 2013

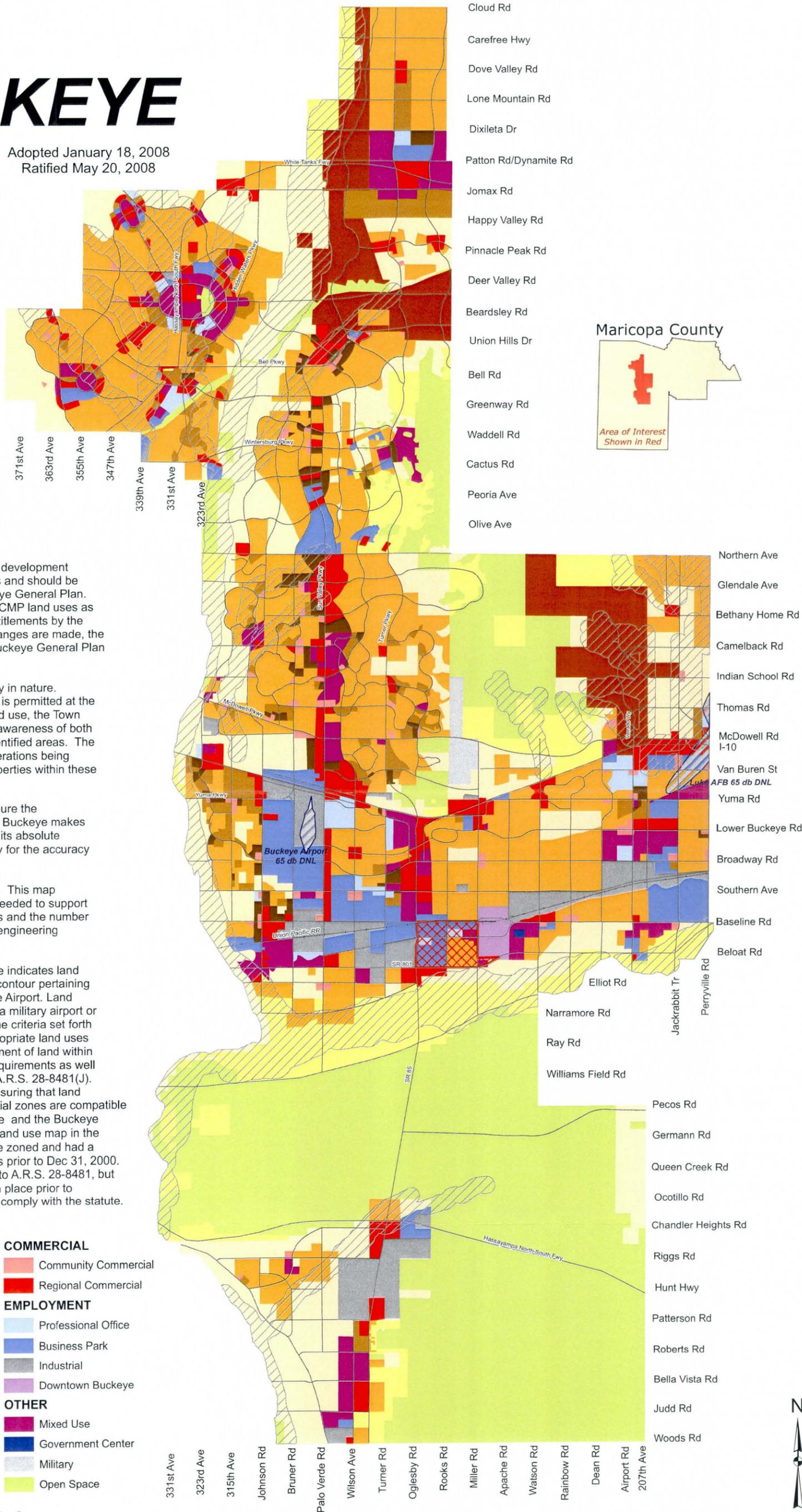
LAND USE PLAN

- Agricultural Preserve (AP)**
(1.0 DU/AC)
- Rural Residential (RR)**
(0 - 2.0 DU/AC)
- Low Density Residential (LDR)**
(2.0 - 4.0 DU/AC)
- Low-Medium Density Residential (L-MDR)**
(4.0 - 6.0 DU/AC)
- Medium Density Residential (MDR)**
(6.0 - 10.0 DU/AC)
- Medium-High Density Residential (M-HDR)**
(10.0 - 20.0 DU/AC)
- High Density Residential (HDR)**
(20.0 + DU/AC)
- Community Commercial (CC)**
- Regional Commercial (RC)**
- City Center (CCTR)**
- Light Industrial (LI)**
- General Industrial (GI)**
- Luke Compatible Land Use Area (LCLUA)**
- Public/Quasi-Public (PQP)**
- Prison (PR)**
- Airport (A)**
- Parks (P)**
- Open Space (OS)**
(1.0 DU/AC)
- High Intensity Mixed Use Corridor Overlay**
- Village Center Overlay**
- Resort Development Overlay**
- Freeway (Existing)**
- Freeway (Proposed)**
- Parkway (Existing)**
- Parkway (Proposed)**
- Scenic Arterial (Existing)**
- Scenic Arterial (Proposed)**
- Arterial Roads**
- City Incorporated Area**
- Planning Area**
- Canals/Washes**
- Regional Park**
- Luke AFB Range Access Routes**
- Aviation Noise Contours (DNL)**
- Parcel Boundary**



Town of **BUCKEYE**

Adopted January 18, 2008
Ratified May 20, 2008



Notes:
All Community Master Plans (CMP) and development agreements remain as valid entitlements and should be referred to in conjunction with the Buckeye General Plan. The Land Use Map strives to reflect the CMP land uses as accurately as possible. The adopted entitlements by the Town of Buckeye are valid and if any changes are made, the policies and guidelines outlined in the Buckeye General Plan will be followed.

Floodway Transitional Areas are advisory in nature. Though development within these areas is permitted at the level of the designated General Plan land use, the Town wishes to emphasize the importance of awareness of both the hazards and sensitivities in these identified areas. The Town strongly encourages these considerations being addressed in development plans for properties within these areas.

While every effort has been made to ensure the accuracy of this information, the Town of Buckeye makes no warranty, expressed or implied, as to its absolute accuracy and expressly disclaims liability for the accuracy thereof.

Arterial / River crossings are conceptual. This map demonstrates the numbers of crossings needed to support development at build-out. Final locations and the number of crossings will be determined through engineering and water studies.

Town of Buckeye General Plan Land Use indicates land within the 65 day-night noise level (dnl) contour pertaining to Luke Air Force Base and the Buckeye Airport. Land within the designated 65 dnl adjacent to a military airport or ancillary military facility is restricted by the criteria set forth in A.R.S. 28-8481(J) which outlines appropriate land uses for such land. Any General Plan Amendment of land within these areas must also comply with all requirements as well as the compatible land uses outlined in A.R.S. 28-8481(J). The Town of Buckeye is committed to ensuring that land uses in the high noise or accident potential zones are compatible with the operation of Luke Air Force Base and the Buckeye Airport. Residential uses shown on the land use map in the 65 dnl area for Luke Air Force Base were zoned and had a development plan in place for those uses prior to Dec 31, 2000. These properties continue to be subject to A.R.S. 28-8481, but the development plans that have been in place prior to December 31, 2000 for these properties comply with the statute.

FIGURE 3-4



Attachment C

Archival map of the major Hohokam canals and adjacent villages

Source:

Rogers, James B., 2002, A Cultural Resources Assessment of the El Rio Archeological Research Locale in West-Central Maricopa County, Arizona, Prepared for the Flood Control District of Maricopa County, dated December 17, 2002.

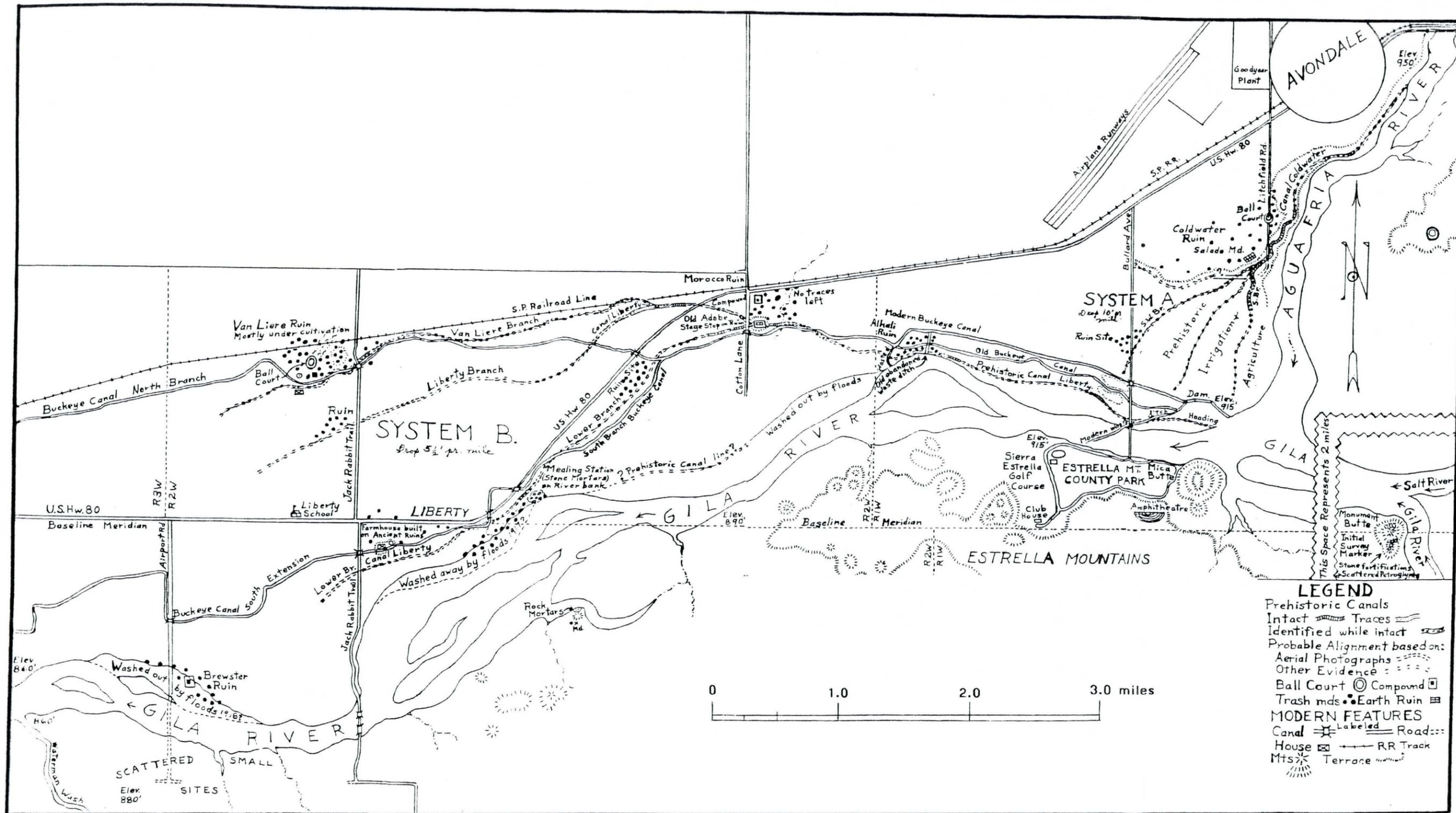


Figure 8. Archival map of the major Hohokam canals and adjacent villages of the eastern Buckeye Valley. (from Midvale 1971)

Attachment D

References

**Gila River Bank Stabilization Project
References**

Reference	Reference Type	Reference Date	Author	Owner	Location	Description
Construction Plans for Bank Stabilization, Perryville Area	As-builts	February 4, 1983	Camp Dresser & McKee Inc.	FCDMC	Stantec	
Salt - Gila River Floodplain Delineation Restudy	Report	May 1999	Michael Baker, Jr., Inc.	FCDMC	Stantec	
A Cultural Resource Assessment of the El Rio Archeological Research Locale in West-Central Maricopa county, Arizona	Report	December 17, 2002	James B. Rodgers	FCDMC	Stantec	
Corridor Improvement Study Loop 303 Between Riggs Road and MC 85 (Draft)	Report	June 11, 2003	Parsons	Maricopa Department of Transportation	Stantec	
FCDMC CADD Guidelines	Manual	2004	FCDMC	FCDMC	Stantec	
SCP Parcel IC Main Plan	Figure	July 26, 2004		FCDMC	Stantec	
El Rio Watercourse Master Plan	Report	2005	Stantec Consulting Inc.	FCDMC	Stantec	
Dos Rios Materials Parcel 1B	Figure	February 17, 2007	CNC	FCDMC	Stantec	
Norte Vista / King Ranch Floodplain Redelineation Gila River Goodyear Arizona Letter of Map Revision	Report	April 2007	River Research & Design, Inc.	Spencer Management, Inc. & SD Construction L.L.C.	Stantec	
Norte Vista / King Ranch Floodplain Redelineation Gila River Goodyear Arizona Letter of Map Revision	Report	June 2007	River Research & Design, Inc.	Spencer Management, Inc. & SD Construction L.L.C.	Stantec	
Goodyear General Plan 2003-2013	Figure	2008	COG	COG	Stantec	
Cotton Lane Bridge Floodplain Redelineation Gila River Goodyear, Arizona Conditional Letter of Map Revision	Report	February 2008	River Research & Design, Inc.	Maricopa Department of Transportation	Stantec	
Berm Alignment Verde Pit - Sand & Gravel Mine	As-builts	February 19, 2008	Davey-Cairo Engineering, Inc.	FCDMC	Stantec	
Response to FCDMC Comments by River Research & Design	Letter	May 1, 2008	River Research & Design, Inc.	FCDMC	Stantec	
Town of Buckeye General Plan Land Use	Figure	May 20, 2008	TOB	TOB	Stantec	
Carlos Rivera Maintenance Files	Project Files	2009	Carlos Rivera	FCDMC	Stantec	Includes as-builts and project coordination.
GIS data for the Gila River Bank Stabilization Project in Various Formats	GIS file	December 2, 2008	FCDMC	FCDMC	Stantec	DVD - Shape files include land ownership, existing FP/FW, structures and MAG information. Majority of the information is on NAD 83 HARN State Plane AZ Central, International Feet.
Southwest Gas Corporation Gas Distribution System	Map	December 10, 2008	Southwest Gas	Southwest Gas	Stantec	
GIS data for the Gila River Bank Stabilization Project in Various Formats	GIS file	January 15, 2009	FCDMC	FCDMC	Stantec	Shape files include land ownership, city boundaries and structures. The files are on the NAD 83 State Plan Coordinate System (AZ Central Zone, International Feet).
GIS data on ADWR wells	GIS file	February 12, 2009	FCDMC	FCDMC	Stantec	Shape file includes ADWR wells within the project area.
Arizona Public Service OH & UG Electric maps	Map	February 13, 2009	Arizona Public Service	Arizona Public Service	Stantec	

Attachment E

Shapefiles

**Gila River Bank Stabilization Project
Shapefiles**

File Name	Date Received	Source	Description
cartopt-1003	12/2/2008	FCDMC	Power poles, utilities
ctrl-1030	12/2/2008	FCDMC	Horizontal/Vertical Photogrammetric Control
ctrl-1260	12/2/2008	FCDMC	Horizontal/Vertical Photogrammetric Control
drnphpt-1221	12/2/2008	FCDMC	Hydraulic Control Pts from Waterman Wash FDS
elvpt-1003	12/2/2008	FCDMC	Spot elevations from White Tanks - Agua Fria ADMS
elvpt-1030	12/2/2008	FCDMC	Spot elevation from Salt/Gila River Master Plan
elvpt-1208	12/2/2008	FCDMC	Spot elevations from Countywide 10ft Contour Mapping
elvpt-1226	12/2/2008	FCDMC	Spot elevations from Rainbow Valley Mapping
elvpt-1260	12/2/2008	FCDMC	Spot elevations from El Rio Mapping
fpctlfcd-1003	12/2/2008	FCDMC	Control Points
fpctlfcd-1030	12/2/2008	FCDMC	Control Points
alris_streams	12/2/2008	FCDMC	Arizona Land Resource Information System (ALRIS) stream information
bridge-1003	12/2/2008	FCDMC	Bridges as part of the White Tanks - Agua Fria ADMS
bridge-1030	12/2/2008	FCDMC	Bridges as part of the Salt/Gila River Master Plan
bridge-1260	12/2/2008	FCDMC	Bridges as part of the El Rio Mapping
cartoln-1003	12/2/2008	FCDMC	Cartography as part of the White Tanks - Agua Fria ADMS
cartoln-1030	12/2/2008	FCDMC	Cartography as part of the Salt/Gila River Master Plan
cartoln-1115	12/2/2008	FCDMC	Cartography as part of the White Tanks FRS#4 Spillway Flows
cartoln-1226	12/2/2008	FCDMC	Cartography as part of the Rainbow Valley Mapping
cnl-1003	12/2/2008	FCDMC	Canal as part of the White Tanks - Agua Fria ADMS
cnl-1030	12/2/2008	FCDMC	Canals as part of the Salt/Gila Master Plan
cnl-1226	12/2/2008	FCDMC	Canals as part of the Rainbow Valley Mapping
culvert-1003	12/2/2008	FCDMC	Culverts as part of the White Tanks - Agua Fria ADMS
culvert-1226	12/2/2008	FCDMC	Culverts as part of the Rainbow Valley Mapping
drnphln-1221	12/2/2008	FCDMC	Hydraulic information from Waterman Wash FDS
elvln-1003	12/2/2008	FCDMC	Contours from the White Tanks - Agua Fria ADMS
elvln-1030	12/2/2008	FCDMC	Contours from the Salt/Gila River Master Plan
elvln-1208	12/2/2008	FCDMC	Contours from the Countywide 10 foot Contour Mapping
elvln-1226	12/2/2008	FCDMC	Contours from the Rainbow Valley Mapping
elvln-1260	12/2/2008	FCDMC	Contours from El Rio Mapping
fcproj	12/2/2008	FCDMC	FCDMC projects
fpsrfelv	12/2/2008	FCDMC	From the Salt/Gila River Master Plan
fpxfema	12/2/2008	FCDMC	FEMA cross sections
river-1030	12/2/2008	FCDMC	From the Salt/Gila River Master Plan
river-1208	12/2/2008	FCDMC	From Countywide 10 foot Contour Mapping
river-1226	12/2/2008	FCDMC	From Rainbow Valley Mapping
river-1260	12/2/2008	FCDMC	From El Rio Mapping
rr-1003	12/2/2008	FCDMC	Railroad alignment as part of the White Tank - Agua Fria ADMS
rr-1030	12/2/2008	FCDMC	Railroad alignment as part of the Salt/Gila River Master Plan
stnetres	12/2/2008	FCDMC	Street alignments
strct-1003	12/2/2008	FCDMC	Structures mapped as part of the White Tanks - Agua Fria ADMS
strct-1030	12/2/2008	FCDMC	Structures mapped as part of the Salt/Gila River Master Plan
strct-1226	12/2/2008	FCDMC	Structures mapped as part of the Rainbow Valley Mapping
strct-1260	12/2/2008	FCDMC	Structures mapped as part of the El Rio Mapping
strtdtl-1003	12/2/2008	FCDMC	Street detail mapped as part of the White Tanks - Agua Fria ADMS
strtdtl-1030	12/2/2008	FCDMC	Street detail mapped as part of the Salt/Gila River Master Plan
strtdtl-1226	12/2/2008	FCDMC	Street detail mapped as part of the Rainbow Valley Mapping
strtdtl-1260	12/2/2008	FCDMC	Street detail mapped as part of the El Rio Mapping
swtrln	12/2/2008	FCDMC	Polyline of the Gila River
alris_gapveg	12/2/2008	FCDMC	ALRIS vegetation
alris_gfveg	12/2/2008	FCDMC	ALRIS vegetation
alris_natveg	12/2/2008	FCDMC	ALRIS vegetation
alris_own	12/2/2008	FCDMC	ALRIS land ownership
alris_riparia	12/2/2008	FCDMC	ALRIS riparian vegetation
ctrplss	12/2/2008	FCDMC	Township, range and section
drnbsn-1003	12/2/2008	FCDMC	Hydrologic subbasins part of the White Tanks/Agua Fria Project
drnbsn-1221	12/2/2008	FCDMC	Hydrologic subbasins part of the Waterman Wash Project
fpznfcd	12/2/2008	FCDMC	FP as part of the Waterman Wash Project
fpznfema	12/2/2008	FCDMC	FEMA floodplains
mag_future_landuse	12/2/2008	FCDMC	MAG Future Landuse

**Gila River Bank Stabilization Project
Shapefiles**

File Name	Date Received	Source	Description
mag_genplan	12/2/2008	FCDMC	MAG General Plan
mag_landuse	12/2/2008	FCDMC	MAG existing land use
Parcels	12/2/2008	FCDMC	Parcels and ownership
scs_soil	12/2/2008	FCDMC	SCS soil types
Existing Floodplain - Feb08	12/2/2008	FCDMC	Existing corrected effective floodplain without Cotton Lane Bridge
Existing FW - Feb08	12/2/2008	FCDMC	Existing corrected effective floodway without Cotton Lane Bridge
ProposedFP-Feb08-Final	12/2/2008	FCDMC	Corrected effective floodplain with Cotton Lane Bridge
ProposedFW-Feb08-Final	12/2/2008	FCDMC	Corrected effective floodway with Cotton Lane Bridge
city	1/15/2009	FCDMC	City and County Boundaries
ADWR_Wells	2/12/2009	FCDMC	Wells sites within the project area
GeneralSandGravel	4/2/2008	FCDMC	Sand and Gravels sites within the project area
erosion_hazard_zone	4/24/2006	Stantec	Erosion hazard zone developed as part of the El Rio project
ae_point	4/24/2006	Stantec	Cultural resource points mapped as part of the El Rio project
ae_polygon	4/24/2006	Stantec	Cultural resource polygons mapped as part of the El Rio project
ae_line	4/24/2006	Stantec	Cultural resource lines mapped as part of the El Rio project

Attachment E

Shapefiles

DRAFT

Attachment F

Response to Comments

**Gila River Bank Stabilization Pre-Design Study
Data Collection Report**

COMMENT FORM

Comments Due: March 26, 2009

Comment No.	Page No.	Reviewer	Comment	Comment Response (this column is completed by FCD PM & Consultant)
1		M. Duncan	Add details regarding the failure locations and flooding-extents of the Perryville Bank Stabilization features during the 1993 flood events.	Information provided by the District indicates that the 1993 event impacted the bank stabilization but details were not provided.
2		M. Duncan	The as-built plans (or plans) of the 1983 Perryville Bank Stabilization should likely be included in the Data Collection.	The as-builts will be added.
3		M. Jones	The Data Collection Memo did not present the results of the Geotechnical Report, does not include an opinion of the existing bank protection or discuss the design constraints that have been identified through the collection of existing data. This information should be added and updated as necessary.	This was added.
4		R. Waskowsky	A summary narrative, which discusses the design constraints and design considerations that were identified through the review of available data, should be provided at the end of the memorandum. Design considerations are defined in the scope as "an opinion concerning the adequacy and/or deficiency of existing bank protection that can be derived from review of geotechnical reports, construction drawings and site visits."	This was added.
5	1, Mapping	K. Rakestraw	Change wording to : "The mapping is on North American Vertical Datum of 1988 (NAVD 88) ...".	This will be changed.
6		B. Lokey	What about the history of bank failure and repair? Are there documented records of who did what and when?	Information provided by the District indicates that the 1993 event impacted the bank stabilization but details

**Gila River Bank Stabilization Pre-Design Study
Data Collection Report**

COMMENT FORM

Comments Due: March 26, 2009

				were not provided.
7		B. Lokey	Add narrative which describes how the data is relevant or germane to this study. For instance, the cultural survey seems to show arch sites bracketing the area of concern. Will they impact or constrain the outcome of this project? Likewise, the jurisdictional land use plans are included with no comment as to whether they impact the project in any way.	Additional discussion will be provided in the report.
8		B. Lokey	With respect to Fig 3, it looks like the entire area - except for Citrus Rd ROW, is in unincorporated Maricopa County, but that Buckeye and Goodyear have some planning interests. The hatching on this figure is confusing and difficult to read.	The figure will be fixed to make it easier to read.
9		B. Lokey	There are several wells shown in the proximity on Figure 2. Were the ADWR records for these wells accessed? This would be a pretty simple way to get additional detail with respect to the riverbed sediments and water levels.	The ADWR records will be included in the attachments and information summarized in the report.
10		B. Lokey	Re: description of mapping, where some of the pertinent mapping details are listed, it's not clear whether both sets of mapping are on the same datum and could be merged or not. Also should note whether one or the other (or both) is used in this study. Also, seems like there ought to be a mention of the mapping used for the current effective FEMA maps, even if it's in the process of being obviated.	This information will be added.
11		J. Pokorski	Please make sure that the FCD logo is on the maps and the report. The maps should reflect the District's public information guidelines (delete the file pathname, etc.) The maps which aren't created by Stantec should list the original source (i.e., arch map)	These changes will be made.
12		J. Pokorski	Spell out acronyms for their first use (i.e., FCDMC)	These changes will be made.
13	1, Mapping	J. Pokorski	Include the full reference for the Gila River Floodplain Redelineation Study.	This change will be made.
14	2, Existing Facilities	J. Pokorski	How was the inventory performed? Any possible missing data?	Additional discussion will be added to the report.

**Gila River Bank Stabilization Pre-Design Study
Data Collection Report
COMMENT FORM**

Comments Due: March 26, 2009

15	Fig. 2	J. Pokorski	On Figure 2, are all of the S&G operations shown actually permitted? If the land is just owned by Dos Rios, don't show it as permitted.	Based on the attribute table provided with the sand and gravel shapefile the operations near the project area are listed as active. This information will be added to the figure and report.
16	2, Land Use Plans	J. Pokorski	Land use is two words. The Goodyear and Buckeye plans should be referred to as "general plans" instead of planning studies.	This change will be made.
17	Fig. 4	J. Pokorski	I'm confused as to how ASM 87-222, 98-4 is depicted. It doesn't appear to be shaded.	The shapefiles for the cultural resource sites include polygons, lines and points. ASM 87-222, 98-4 was provided as part of the line shapefile.
18		J. Pokorski	Should we include a map showing the difference in the floodplains (original v. revised) to illustrate the redelineation?	A figure will be included in the report.
19		J. Pokorski	I agree with comments 3 and 4 above that per the SOW we need to expand the constraints discussion and the analysis of the condition of the existing bank protection.	This was added.