



Planning Assistance to States

**US Army Corps
of Engineers
Los Angeles District**

Sols Wash Watershed & Vicinity Analysis

PLANNING ASSISTANCE TO STATES

**Final Report
April 2002**

**WICKENBURG, ARIZONA
Water Resources Development Act of 1974**

EXECUTIVE SUMMARY

This report presents the findings of a planning assistance to states study under public law 94-251, eighty-first Congress known, as Section 22 of the Water Resources Development Act 1974. The name of this report is The Town of Wickenburg, Arizona For Sols Wash Watershed & Vicinity Analysis. Total study costs were \$79,000 over a span of 12 months. The study area is located in Maricopa County, Arizona 58 miles northwest of Phoenix. The Hassayampa River originates in the Bradshaw Mountains, south of Prescott, and flows south through the town of Wickenburg into the Gila River, about 40 miles west of Phoenix. Sols Wash flows east through Wickenburg until it confluences with the Hassayampa River.

Wickenburg is located about 50 miles northwest of Phoenix in the northeast section of Maricopa County. The Hassayampa River originates in the Bradshaw Mountains, south of Prescott, and flows south through the town of Wickenburg to its confluence with the Hassayampa River. The drainage area for Sols Wash at the Hassayampa River is 145 square miles. The drainage area for the Hassayampa River above Sols Wash is 565 square miles.

The delineated study area extends 1 mile up Sols Wash from the confluence with the Hassayampa River, ½ mile up the Hassayampa River from the confluence with Sols Wash, and downstream on the Hassayampa River from the confluence of Sols Wash to a point just below the Hassayampa River Preserve (figures 1.3 and 1.4). The Town of Wickenburg owns the majority of the land within the study area with the exception of two privately owned properties located a mile up the Sols Wash/Hassayampa River confluence.

Damaging floods in the area have been recorded for over 100 years, little quantitative data is available for associated rainfall, runoff, and dollar damages. Interviews with local residents and a review of newspaper files, however, indicate at least a dozen damaging floods in the area since 1945. A major event on the Hassayampa River in September of 1970 swept away homes, motor vehicles, and livestock along several miles of the river near Wickenburg. The Wickenburg sewage treatment plant was severely damaged, and a quarter of a mile of sewage line was washed away. Raw sewage flowed into the river for three weeks. No lives were lost, but property damages were estimated at \$3 million (1970 dollars) by local authorities. Localized events, associated with intense summer thunderstorms, are frequently common on all area washes and flooding can occur annually.

At the upstream end of the study area, the Sols Wash splits into the north and south branches and confluences back together approximately 200 yards

upstream of the Hwy 93 Bridge. The island and ranch areas in between the north and south branches of Sols Wash were flooded. Water broke out of the north branch of Sols Wash and flooded part of the mobile home park causing minimal damage. Hospital Wash, a small tributary of the north branch of Sols Wash, overtopped as well.

In cooperation with the non-federal sponsor, a Hydraulic detailed model was developed using a 2 dimensional hydraulic model including accurate cross sections and sedimentation analysis of Sols Wash. The model includes Sols Wash from its confluence with the Hassayampa River upstream to where the Sols Wash branches into the north and south branches (approximately 1 mile). The model also includes the Hassayampa River ½ mile upstream of its confluence with Sols Wash to approximately 1½ mile downstream of its confluence with Sols Wash. The model also defines the 500-year flood plain.

The analyses conducted for the Sols Wash Watershed and Vicinity Analysis have been developed based upon criteria specific to the U.S. Army Corps of Engineers and are not to be construed as meeting the separate criteria required by the Federal Emergency Management Agency (FEMA) to effect or develop a Flood Insurance Rate Map or revision. The preliminary plans are conceptual in nature at a level of detail sufficient for development and are not intended as plans of sufficient detail for actual construction.

Sols Wash Watershed & Vicinity Analysis

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CHAPTER 1.0 STUDY AUTHORITY

1.0 STUDY AUTHORITY

This report provides a response under Public Law 94-251, 81st Congress, known as the Section 22 Water Resources Development Act of 1974. The name of the study authority is Planning Assistance To States. This program authorizes the Corps to use its technical expertise in management of water and land resources to help States, their political subdivisions, and Indian Tribes deal with their water resource problems. An annual request for assistance in addressing these resource problems is used to develop the Corps study program each year. The program does not include construction.



TOWN OF WICKENBURG

155 N. Tegner, Ste. A • Wickenburg, Arizona 85390 • (520) 684-5451
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November 27, 2000

District Engineer
U.S. Army Corps of Engineers
P.O. Box 532711
Los Angeles, CA 90053-2352

Dear Sir,

In accordance with the provisions of Section 22 of the Water Resources Development Act of 1974, as amended, which provides authority for the Corps of Engineers to assist in the preparation of comprehensive plans for the development, utilization and conservation of water and related land resources, the Town of Wickenburg hereby makes formal inquiry for assistance for the Sols Wash Watershed and Vicinity Analysis located in the Town of Wickenburg, in Maricopa County, Arizona.

A proposed Plan of Study/Scope of Work is included as an attachment. Upon your review of this initial inquiry, we would like to execute the Letter of Agreement to initiate a Section 22 study. Please contact me at 520-6845451 to arrange a further discussion of this inquiry. Thank you for your consideration.

Sincerely,



Fred Carpenter
Town Manager

Figure 1.1
Sponsors Request for Assistance

CHAPTER 2.0 STUDY PURPOSE, STUDY SCOPE AND STUDY AREA

2.1 PURPOSE

The Town of Wickenburg for Sols Wash Watershed & Vicinity Analysis study was conducted by the U.S. Army Corps of Engineers, Los Angeles District and the Town of Wickenburg, Arizona (Maricopa Flood Control District is their technical point of contact). This report provides a response to the study authority cited.

This report describes the without-project conditions Hydraulic and Sedimentation Analysis of Sols Wash and the Hassayampa River, Corps involvement with The Town of Wickenburg, The parcels of Real Estate that lie within Sols Wash/Hassayampa River confluence, environmental characterization of Sols Wash and the Hassayampa River, and the requirements for obtaining planning permits.

2.2 STUDY SCOPE

The study scope includes development of accurate cross sections, sedimentation analysis at a generalized level of detail, and hydraulic modeling of Sols Wash and Hassayampa River. The hydraulic modeling effort extends 1 mile up Sols Wash from the confluence, ½ mile up the Hassayampa River from the confluence, and downstream from the confluence approximately 1-1/2 miles to a point just downstream of the Nature Conservancy property. Along with a hydraulic analysis of Sols Wash Watershed, an environmental characterization was conducted along with a real estate appraisal of two privately owned parcels within the 100-year flood plain of Sols Wash. The environmental characterization characterizes the vegetation and habitat on a qualitative basis, develops generalized vegetation mapping, and identifies any species issues that may be of concern. Impacts of removal of vegetation for flood control purposes are quantitatively characterized. The real estate appraisal includes the financial value of the two privately owned parcels of land along with the legal process to acquire the two privately owned parcels of land located within the 100-year floodplain of Sols Wash/Hassayampa River confluence.

2.3 STUDY AND REPORT PROCESS

The Los Angeles District of the Corps of Engineers completed the study report in April of 2002. The results of the study give a detailed cross sections, sedimentation analysis, hydraulic modeling of Sols Wash and Hassayampa River, a real estate appraisal and legal process to acquire two privately owned parcels of land, and an environmental characterization of vegetation and habitat on a qualitative basis.

2.4 STUDY AREA

Wickenburg is located about 50 miles northwest of Phoenix in the northeast section of Maricopa County. The Hassayampa River originates in the Bradshaw Mountains, south of Prescott, and flows south through the town of Wickenburg to its confluence with the Hassayampa River. The drainage area for Sols Wash at the Hassayampa River is 145 square miles. The drainage area for the Hassayampa River above Sols Wash is 565 square miles.

2.4.1 Population

The population within the corporate limits of the Town of Wickenburg has increased from about 4,400 residents in 1990 to approximately 7,130 in 2000. The 200 population of the urbanized local region, including both town and unincorporated adjacent area, is estimated at approximately 15,000 residents. Rapid growth has increased the potential for more serious flood damage than has historically occurred.

2.4.2 Meteorology and Climate

Wickenburg is in an arid climatic zone characterized by hot summers, mild winters, and infrequent rainfall. The area receives abundant sunshine and experiences high evaporation rates. July and January average maximum/minimum temperatures are 104°/70° and 63°/30°, respectively. Recorded temperature extremes in Wickenburg are 117° and 10°.

Rainfall averages 11 inches per year, about equally split between the July-September monsoon season and the November-April winter storm season. Occasional heavy rains are experienced from flooding commonly occurs during the monsoon season, while most major historical floods involving the Hassayampa River have occurred during the tropical storm period.

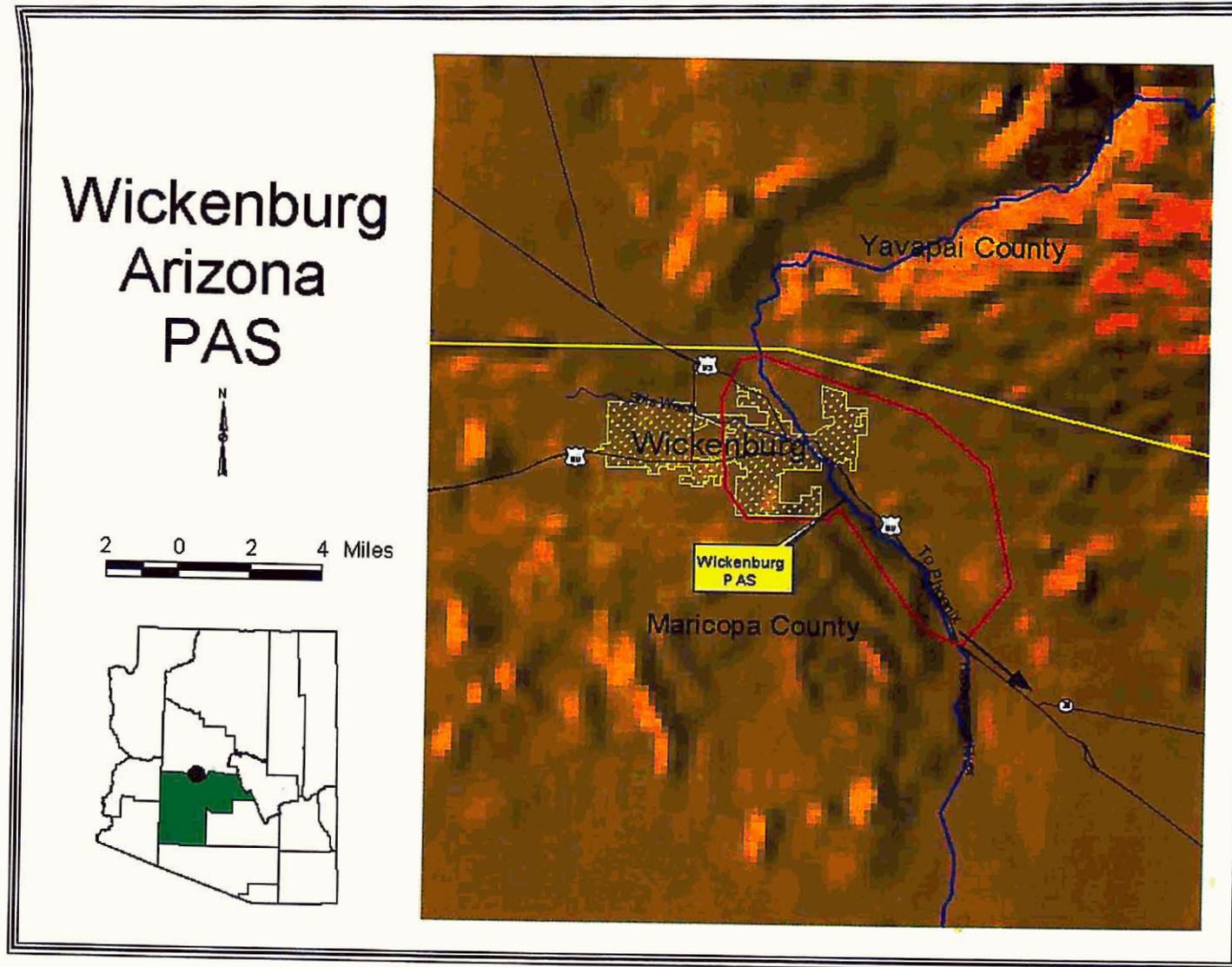
2.4.3 Existing Land Use

Most of Sols Wash/Hassayampa River floodplain, as a whole, has been altered from its natural state. Some of the development has been limited to agricultural uses; but increasingly, the area is being converted to urban development.

Combined Highway 60 and 89 parallels the river on the east bank, south of Wickenburg, then crosses the flood plain in Wickenburg. The Santa Fe Railroad crosses the river near the downstream study limit, then parallels the flood plain on the west bank up to Wickenburg.

A few commercial and public structures in Wickenburg as well as portions of several residential areas are in the 100-year floodplain. As population and

tourism increase in the study area, much of the floodplain currently utilized for agricultural purposes will come under increasing pressure to be developed.



**Figure 2.1
Location Map**

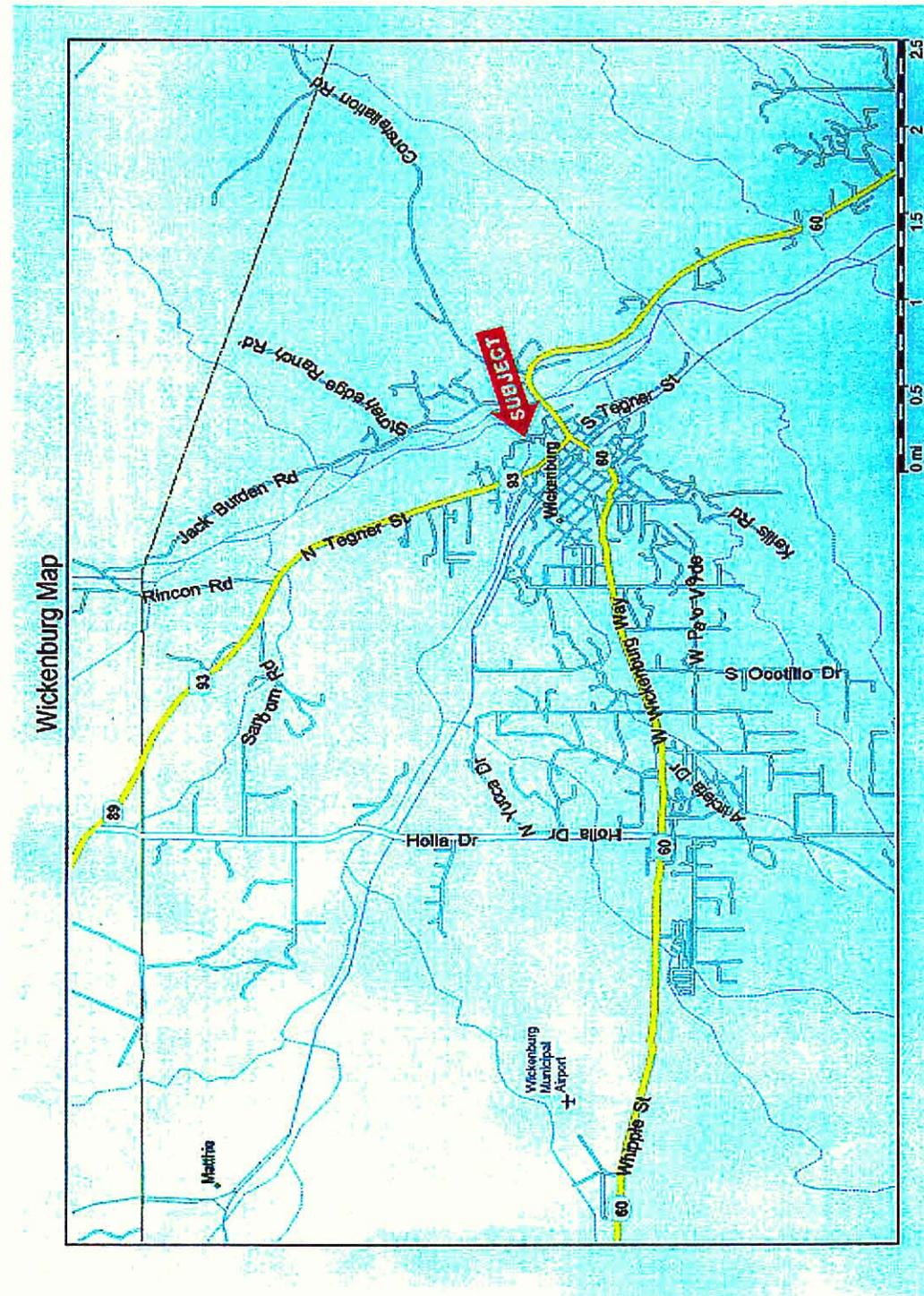


Figure 2.2
Study Vicinity Map

CHAPTER 3.0 PRIOR STUDIES & REPORTS

Several prior studies and reports provided valuable reference information and were utilized for this study.

USACE, Flood Plain Information, Hassayampa, Vicinity of Wickenburg, Arizona Prepared for Flood Control, District of Maricopa County, April 1972

USACE, Hassayampa River near Wickenburg, Arizona, Reconnaissance Report Final, January 1993.

Hassayampa Project Arizona. Project Planning Report No. 3-8b, 1-2, U.S. Bureau of Reclamation, February 1948

Master Plan for Flood Control, Flood Control District Maricopa County, 1963.

Flood-Plain Information Study for Maricopa County, Arizona, Volume IV – Wickenburg Report, U.S. Army Corps of Engineers, Los Angeles District, December 1965.

Flood Plain Information, Hassayampa River, vicinity of Wickenburg, Arizona, U.S. Army Corps of Engineers, Los Angeles District, April 1972.

Watershed Work Plan, Wickenburg Watershed, Maricopa and Yavapai Counties, Arizona, U.S.D.A., Soil Conservation Service, 1974.

Flood Insurance Study, Town of Wickenburg, AZ, Federal Emergency Management Agency, July, 1977.

Hydrology Report, Sols Wash, Town of Wickenburg. PRC Toups, January 1981.

CHAPTER 4.0 PROBLEMS AND OPPORTUNITIES

4.1 HISTORICAL FLOOD DAMAGES

The Hassayampa River originates in the Bradshaw Mountains southwest of Prescott and flows south for approximately 70 miles until it empties into the Gila River 50 miles west of Phoenix. Total area drained is about 1,000 square miles, of which 700 square miles lie upstream of Wickenburg. Ten-year discharge in the vicinity of Wickenburg is estimated at 14,000 cfs, and 100-year at 70,000 cfs.

There are no dams on the river, nor are there any flood control levees, dikes or channels. There are, however, several locations near Wickenburg where localized revetment work and/or dumps of stone or riprap have occurred. Sand and gravel mining has taken place at several upstream locations. This mining has locally impacted the natural flood channel.

Wickenburg is located about 50 miles northwest of Phoenix in the northeast section of Maricopa County. The Hassayampa River originates in the Bradshaw Mountains, south of Prescott, and flows south through the town of Wickenburg to its confluence with the Hassayampa River. The drainage area for Sols Wash at the Hassayampa River is 145 square miles. The drainage area for the Hassayampa River above Sols Wash is 565 square miles.

Damaging floods in the area have been recorded for over 100 years, little quantitative data is available for associated rainfall, runoff, and dollar damages. Interviews with local residents and a review of newspaper files, however, indicate at least a dozen damaging floods in the area since 1945. A major event on the Hassayampa River in September of 1970 swept away homes, motor vehicles, and livestock along several miles of the river near Wickenburg. The Wickenburg sewage treatment plant was severely damaged, and a quarter of a mile of sewage line was washed away. Raw sewage flowed into the river for three weeks. No lives were lost, but property damages were estimated at \$3 million (1970 dollars) by local authorities. Localized events, associated with intense summer thunderstorms, are frequently common on all area washes and flooding can occur annually.

At the upstream end of the study area, the Sols Wash splits into the north and south branches and confluences back together approximately 200 yards upstream of the Hwy 93 Bridge. The island and ranch areas in between the north and south branches of Sols Wash were flooded. Water broke out of the localized events, frequently associated with intense summer thunderstorms, are common on all area washes and flooding can occur annually.

4.2 DAMAGE AREAS

A 10-year flood event occurred in Wickenburg in October 2000. The island and ranch areas in between the north and south branches of Sols Wash were flooded. Water broke out of the north branch of Sols Wash and flooded part of the mobile home park causing minor damage. Hospital Wash, a small tributary of the north branch of Sols Wash, overtopped as well.

Floodwaters crossed Highway 89/93 north of the bridge and caused flooding east of the highway. Flooding occurred at Coffinger Park due in part to flood waters breaking out just downstream of the Hwy 89/93 Bridge by splashing over a brick wall on the left overbank (looking downstream) and flowing through an area where the top of the wall was not tied into the abutment; water may have broken out downstream of the brick wall as well.

The south branch of Sols Wash was observed to be significantly wider and had a lower invert than the north branch. It was reported that there was three feet of deposition from the last two floods in the north branch of Sols Wash. The north branch is constricted to almost 25 ft downstream of the ranch. If the north branch of Sols Wash overtops the left bank (looking downstream), there is potential flooding of the nearby hospital.

The Hwy 89/93 Bridge has five bridge piers. It was reported that the north two openings were flowing full while the south opening was flowing approximately half full. Downstream of the bridge, it was reported that water splashed over the brick wall along the left bank (looking downstream) and flowed through an opening because the top of the wall does not tie into the bridge abutment. The brick wall does not extend very far downstream and ends near thick trees/vegetation. The toe of the brick wall was starting to erode.

4.3 PROBLEM IDENTIFICATION

Problem areas within Sols Wash and the Hassayampa River are within the previously mentioned parameters of the study area 1 mile up Sols Wash from the confluence, ½ mile up the Hassayampa River from the confluence, and downstream from the confluence approximately 1-1/2 miles to a point just downstream of the Nature Conservancy property.

Sols Wash rises in the Date Creek Mountains of Yavapai County, and flows south out of Gibson Tank and east for approximately 18 miles to its confluence with the Hassayampa River in the Town of Wickenburg. Total area drained is approximately 145 square miles. Ten-year discharge is estimated at 4,700 cfs, and 100-year at 22,000 cfs.

The main problem area of significance is the 1 mile stretch up Sols Wash from the confluence with the Hassayampa River. In the last flood event in October 2000, the owner of the two previously mentioned private parcels of land were flooded along with the mobile home park located in the north branch of Sols Wash. Specific problems include:

- Repair Costs
- Fences, home damaged
- Natural watercourse has been graded out
- Home is in Sols Wash
- Resident(s) unaware of flooding problem when home was built
- Lack of vegetation contributes to erosion
- No Planning, lack of plan
- Cleanup
- Drainage Control
- Sediment in roads, yards

Initial screening for Corps analysis included three basic criteria: (1) meeting Corps regulatory requirement of at least 800 cfs discharge for a 10-year event; (2) having displayed historically significant damages, or the potential for significant damages; and (3) identified by local interest for Corps analysis.



**Figure 4.1 Downstream on Sols Wash at upstream
Face of Hwy 93 Bridge**



Figure 4.2 Upstream on the Hassayampa River

5.0 CHAPTER STUDY SUMMARY

This report is for information purposes and should be used with the intent to guide the local sponsor, Town of Wickenburg, in addressing flood control issues for the Sols Wash Watershed/Hassayampa River. This report illustrates hydraulic FLO-2D modeling of the study area, an environmental site characterization of the study area, and a detailed real estate report illustrating the measures used to determine the value of two private parcels of land located within the Sols Wash/Hassayampa River confluence.

5.1 SUMMARY OF HYDRAULIC ANALYSIS

A hydraulic analysis for the city of Wickenburg on part of the Sols Wash and part of Hassayampa River for existing (without-project) conditions was conducted. The analysis included the development of a 2-dimensional hydraulic model utilizing FLO-2D and a 1-dimensional hydraulic model utilizing HEC-RAS for the study area. The purpose of these analyses is that models can be used to model future conditions alternatives, depending on the modeling purpose. Results from both models were compared and evaluated.

5.2 SUMMARY OF ENVIRONMENTAL CHARACTERIZATION

The study area contains a mixture of natural and developed areas adjacent to the Town. Future land-use planning for this area will involve consideration of the historic patterns of flood inundation of lands adjacent to both Sols Wash and the Hassayampa River, i.e., the base flood elevation. The development of a floodplain ordinance by the Town in compliance with the Federal Emergency Management Agency (FEMA) floodplain boundaries, State of Arizona Standards for floodplain management, and the Maricopa County Flood Control District (FCDMC) floodplain regulations would also allow for the consideration of utilizing any designated setback zones as opportunities for natural resource conservation and recreation through conservation easements.

The review of the AZGFD HDMS information on special status species for this study does not substitute for an official agency review of project proposals, and will not decrease requirements by resource agencies to review and evaluate new project proposals and sites. The AZGFD has also indicated a concern about other resource values, such as other wildlife, including game species, and wildlife-related recreation. The AZGFD and other agencies will need to be consulted and provided the opportunity to provide an evaluation of impacts to wildlife or wildlife habitats associated with project activities occurring in the study area, when specific details regarding a proposed activity become available (AZGFD 2001).

5.3 SUMMARY OF REAL ESTATE APPRAISAL

The current value of the two privately owned parcels of land located in Sols Wash/Hassayampa River is \$20,000. The property consists of 7.6 acres of flood prone land between U.S. Highway 93 and the main channel of the Hassayampa Riverbed directly north of Downtown Wickenburg. The estimation of a real property's market value involves a systematic process in which the problem is defined; the work necessary to solve the problem is planned; and the data required is acquired, classified, analyzed and interpreted into an estimate of value. In this process, the appraisers use three basic approaches, when applicable: the Cost, Sales Comparison and Income Approaches. When one or more of these approaches is not applicable in the appraisal process, justification is presented. A brief explanation of each approach follows.

- 1.) Cost Approach: the appraiser estimates the value of the subject site by comparing it to recent sales or offerings of similar sites.
- 2.) Sales Comparison Approach: Involves the comparison of similar properties that have recently sold or similar properties that are currently offered for sale, with the subject property.
- 3.) Income Approach: The process in which the anticipated flow of future benefits (actual dollar income or amenities) is discounted to a present value figure through the capitalization process.

The valuation analysis used for the privately owned parcels of land was the Sales Comparison Approach.

5.4 PLANNING PERMIT REQUIREMENTS

Depending upon the anticipated development or proposed activity within and/or immediately adjacent to the delineated study area, there are varying regulatory requirements that may need to be addressed. Such requirements may be present at the federal, state and/or local level, depending upon the nature of the proposed activity.

There are several federal, state and/or local laws, regulations and policies guiding land-use decisions, particularly those that could potentially affect riverine areas. A project proponent should consult with the responsible regulatory agencies early in the project planning process in order to identify which regulations and/or permit processes might impinge upon successful completion of the desired activity.

Depending on the type of future activity proposed within the study area, there may or may not be a requirement to apply for a federal permit to be issued under Section 404 of the Clean Water Act (33 U.S.C. 1344). For activities that

would potentially impact the bed and/or bank of either Sols Wash or the Hassayampa River, which have previously been delineated as "waters of the United States," the project proponent would be wise to request a permit application packet from the USACE Regulatory Branch early in the project planning phase in order to determine whether the proposed activity would require a specified type of permit. If the USACE Planning Division should determine that some future project meets the definition of a "federal interest" for a Civil Works project, then the permit process would in most cases follow a formal Environmental Assessment by the USACE Environmental Resources Branch.

The decision by the USACE whether to issue such a federal permit will be based on an evaluation of the probable impact, including cumulative impacts, of the proposed activity on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefit that reasonably may be expected to accrue from the proposal must be balanced against its reasonably foreseeable detriments. All factors that may be relevant to the proposal will be considered including the cumulative effects thereof. Factors that will be considered include conservation, economics, aesthetics, general environmental concerns, wetlands, cultural values, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shoreline erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food production and, in general, the needs and welfare of the people. In addition, if the proposal would discharge, dredged or fill material, the evaluation of the activity will include application of the EPA Guidelines (40 CFR 230) as required by Section 404 (b)(1) of the Clean Water Act. The applicant may also be required to obtain water quality certification, under Section 401 of the Clean Water Act, from the Arizona Department of Environmental Quality and/or the EPA. In addition, the applicant may be required to address the occurrence of any cultural resources within the project area, and indicate whether the proposed activity would affect federally-listed endangered or threatened species, or their delineated critical habitat.

The Director of the Arizona Department of Water Resources under authority outlined in ARS 48-3605(a) established several State Standards for Floodplain Management. Of particular interest to this delineated study area are State Standard SS1-97, "Requirement for Flood Study Technical Documentation," State Standard 2-96, "Requirement for Floodplain and Floodway Delineation in Riverine Environments," and State Standard 6-96, "Development of Individual Residential Lots Within Floodprone Areas" (Appendix B). Depending upon the nature and scope of any future activity within or immediately adjacent to the delineated study area, additional regulatory concerns at the state level may include compliance with the State of Arizona regulations dealing with listed "species of special concern" and their requisite habitats, and potentially with the collection and/or removal requirements of the Arizona Native Plant Law.

Other regulatory issues related to the delineated study area of Sols Wash and the Hassayampa River involve the continued compliance under the existing NPDES permit for the discharge of treated effluent from the Town of Wickenburg's wastewater treatment facility to the Hassayampa River. There is also the continued compliance with planning guidelines and zoning ordinances for properties and operations located within or immediately adjacent to Sols Wash and the Hassayampa River.

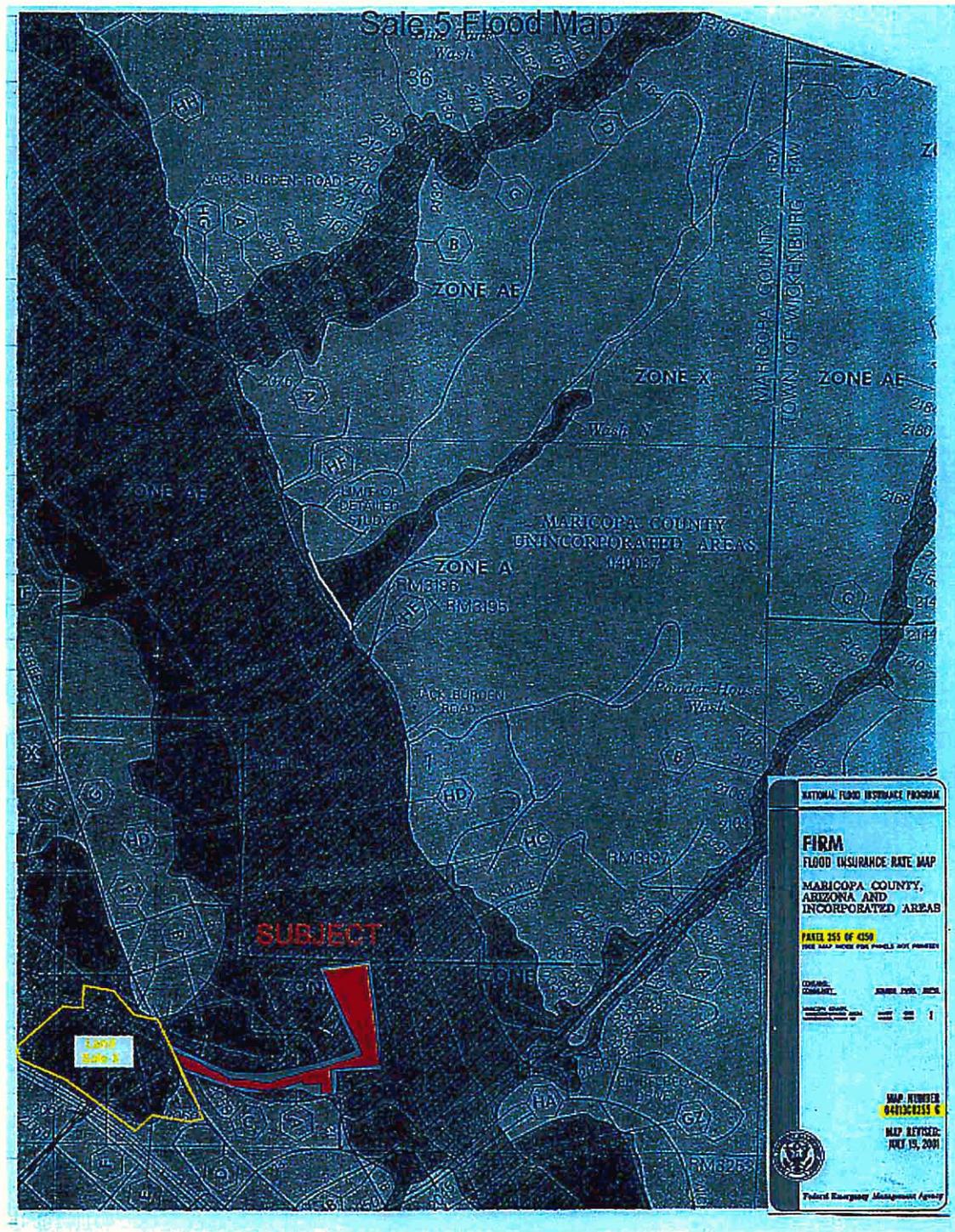


Figure 5.1
Flood Insurance Rate Map
For Sols Wash and The Hassayampa River

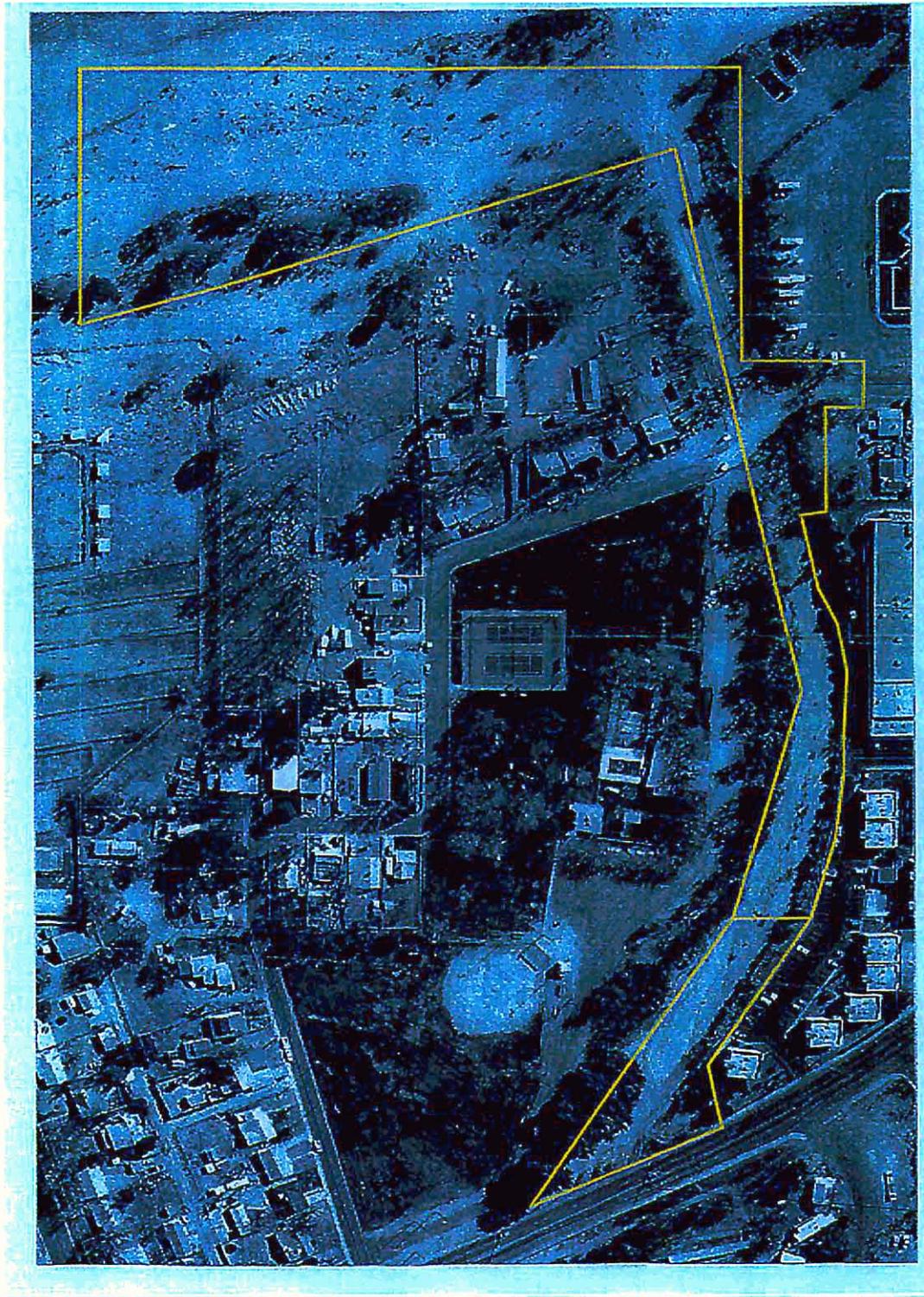


Figure 5.2
Private Parcels of Land located in
Sols Wash/Hassayampa Floodplain



Los Angeles District

**Hydraulic Analysis
Of
A Delineated Reach of Sols Wash and The Hassayampa
River
HYDRAULIC APPENDIX A**

Hydrology and Hydraulics Section

**U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT
SOUTH PACIFIC DIVISION
APRIL 2002**

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WICKENBURG HYDRAULIC EVALUATION

Sols Wash and Hassayampa River

PURPOSE AND SCOPE

The Hassayampa River and Sols Wash are typical desert washes that run through the city of Wickenburg, AZ. Most years, the Hassayampa River and Sols Wash are dry. The Hassayampa River and Sols Wash are ephemeral streams that flow after heavy rainfall. Sols Wash has historically been the cause of serious flooding in the city of Wickenburg. The most recent flood event was in October of 2000 in which several homes and businesses were damaged.

The purpose of this study is to develop flood plain information for the city of Wickenburg. The analyses will involve the use of one- and two-dimensional hydraulic models which cover the area of Sols Wash just upstream of the Hassayampa River as well as the Hassayampa River just upstream and downstream of the Sols Wash confluence. The models will reflect existing conditions (survey date Dec 2000) and can be used by the local flood control agencies or the Town of Wickenburg to evaluate flood control alternatives and determine flood damage reduction. The models are not intended for design purposes.

PROJECT DESCRIPTION

A hydraulic analysis for the city of Wickenburg on part of Sols Wash and part of the Hassayampa River for existing conditions was conducted. The designated study area consists of approximately one (1) mile along Sols Wash upstream from the Hassayampa River confluence, approximately one-half ($\frac{1}{2}$) mile along the Hassayampa River upstream from the Sols Wash confluence, and approximately one and one-half ($1\frac{1}{2}$) miles along the Hassayampa River downstream from the Sols Wash confluence to the Nature Conservancy. Figure 1 shows the study area. The analysis included the development of a one-dimensional hydraulic model utilizing HEC-RAS and a two-dimensional hydraulic model utilizing FLO-2D for the study area. HEC-RAS was used to determine water surface profiles, flow velocities, and other detailed hydraulic information at user-defined cross-sections. Because of the geomorphology of the area, it was determined that flows in excess of channel capacity would flow in a direction different than channel flows, and a two-dimensional model such as FLO-2D may be more appropriate for determining overflow boundaries and other pertinent hydraulic data. The purpose of these analyses is to develop models that can be used to model potential alternatives, depending on the modeling purpose. Results from both models were compared and evaluated and are included in this report. A qualitative assessment describing the circumstances where one- and two-dimensional modeling are appropriate is also included.

BACKGROUND INFORMATION

General

Wickenburg is located about 50 miles northwest of Phoenix in the northeast section of Maricopa County. The Hassayampa River originates in the Bradshaw Mountains, south of Prescott, and flows south through the town of Wickenburg into the Gila River, about 40 miles west of

Phoenix. Sols Wash flows east through Wickenburg to its confluence with the Hassayampa River. The study area for this hydraulic evaluation is presented on Figure 1. The drainage area for Sols Wash at the Hassayampa River is 145 square miles. The drainage area for the Hassayampa River above Sols Wash is 565 square miles.

Runoff Characteristics

“Little stream flow occurs in the study area except during and immediately following heavy precipitation. Climatic and drainage area characteristics are not conducive to continuous runoff. Stream flow increases rapidly in response to effective rainfall. Base flow is negligible in the Wickenburg area. Snowmelt does not add significant runoff in winter floods.”¹

“The climate of this locale is primarily semi-desert with the annual precipitation averaging 11 inches and occurring predominantly in the summer or winter. The summer rains are associated with moist air that enters the state from the Gulf of Mexico producing moderate to intense afternoon and evening thundershowers (Sellers and Hill, 1973). Winter precipitation, however, originates from the Pacific Ocean and is much less severe.”²

Water Resources

Natural surface drainage in the study area is generally eastward toward the Hassayampa River, and then to the south where the Hassayampa flows into the Gila River about 70 miles south of Wickenburg. Flows in the Hassayampa are from many named washes, such as Casandro and Flying E, as well as from numerous unnamed, smaller washes and drainages. Natural channels range from shallow, poorly – defined watercourses to broad, well – defined washes. Flows in all watercourses, including the Hassayampa River are ephemeral and seasonally related to precipitation and associated runoff.

Water is pumped from wells throughout the region for agricultural, residential, industrial, and commercial uses. Overdraft of groundwater resources does not appear to be an issue in the area.

Historical Flood Damages

While damaging floods in the area have been recorded for over 100 years, little quantitative data is available for associated rainfall, runoff, and dollar damages. Interviews with local residents and a review of newspaper files, however, indicate at least a dozen damaging floods in the area since 1945. A major event on the Hassayampa River in September of 1970 swept away homes, motor vehicles, and livestock along several miles of the river near Wickenburg. The Wickenburg sewage treatment plant was severely damaged, and a quarter of a mile of sewage line was washed away. Raw sewage flowed into the river for three weeks. No lives were lost, but property damages were estimated at \$3 million (1970 dollars) by local

¹ PRC Toups, Hydrology Report, Sols Wash, Town of Wickenburg, January 6, 1981.

² Cella Barr Associates, *Hydrologic Analysis of Sols Wash, Incorporated Town of Wickenburg, AZ, for Federal Emergency Management Agency*, November 1985.

authorities. Localized events, associated with intense summer thunderstorms, are frequently common on all area washes and flooding can occur annually.

At the upstream end of the study area, the Sols Wash splits into the north and south branches and confluences back together approximately 200 yards upstream of the Hwy 93 Bridge. The island and ranch areas in between the north and south branches of Sols Wash were flooded. Water broke out of the north branch of Sols Wash and flooded part of the mobile home park causing minimal damage. Hospital Wash, a small tributary of the north branch of Sols Wash, overtopped as well. Flood waters crossed Highway 93 north of the bridge and caused flooding east of the highway. Flooding occurred at Coffinger Park due in part to flood waters breaking out just downstream of the Hwy 93 Bridge by splashing over a brick wall on the left overbank (looking downstream) and flowing through an area where the top of the wall was not tied into the abutment; water may have broken out downstream of the brick wall as well. The north branch constricts to as narrow as approximately 25 ft downstream of the ranch. If the north branch of Sols Wash overtops the left bank, there is potential flooding of a hospital. The Hwy 93 Bridge has five bridge piers. It was reported that the north two openings were flowing full while the south opening was flowing approximately half full. Downstream of the bridge, it was reported that water splashed over the brick wall along the left bank (looking downstream) and flowed through an opening because the top of the wall does not tie into the bridge abutment. The brick wall does not extend very far downstream and ends near thick trees/vegetation. The toe of the brick wall was starting to erode.

SOURCE OF TOPOGRAPHIC DATA

Topographic mapping data was provided by Maricopa County. Table 1 shows the pertinent data for the survey and mapping files.

Table 1: Pertinent Data for Survey and Mapping Information

Data Type	DTM (Breaklines for streams & ridges and Mass Points)
Horizontal Datum	State Plane NAD83, Arizona Central
Vertical Datum	NAVD 88
Survey Date	Dec 2000
Mapping Scale	1"=500'
Contour Interval	10'

HYDROLOGY

The hydrology for the model simulations is for without-project conditions because an existing conditions model is the only scenario that will be analyzed. In future studies, further hydrology information collection and analyses may be required, depending on the results desired. As cited below, the 100-yr discharge for Sols Wash is 24,000 cfs³; the 100-yr discharge for the Hassayampa River at Sols Wash is 70,000 cfs.⁴

³ Hydrology Appendix of the Hassayampa River near Wickenburg, AZ, Reconnaissance Report, Final, January 1993.

⁴ Flood Plain Information, Hassayampa River, Vicinity of Wickenburg, AZ, April 1972.

Hydrographs

The 100-yr hydrograph for Sols Wash was developed based on information provided in "Pinal County, Arizona, Special Study McClellan Wash and Tributaries, Hydrologic Summary Report, April 1994." Figure 5 of the cited report was considered representative of the shape of the 100-yr hydrograph. The hydrograph was prorated based on the 100-yr discharge of 24,000 cfs. The 100-yr hydrograph for the Hassayampa River was developed based on the stage hydrograph presented in the "Flood Plain Information, Hassayampa River, Vicinity of Wickenburg, AZ, April 1972." The peak stage corresponded to the 100-yr discharge of 70,000 cfs based on Table 3 of the Flood Plain Information Study. The hydrograph was prorated accordingly. Figures 2, 3, and 4 show hydrographs for the Hassayampa River and Sols Wash. The developed hydrographs were used as inflow hydrographs in the FLO-2D model. The peak discharges were used as inflow for the HEC-RAS model.

HYDRAULIC ANALYSES

Reach by Reach Description

The Hassayampa River flows from north to south through the town of Wickenburg. Sols Wash flows from west to east and splits into a north branch and a south branch approximately one mile upstream of the Hwy 93 Bridge and joins again approximately two hundred yards upstream of the Hwy 93 Bridge. Sols Wash continues to flow east to its confluence with the Hassayampa River.

Preprocessor/Postprocessor – GIS and SelectCAD

The CADD digital terrain model (DTM) was created from four topographic drawing files (AutoCAD format) provided by Maricopa County. A triangular irregular network (TIN) was then created from the digital terrain model utilizing SelectCAD and ArcView.

FLO-2D Analysis

FLO-2D is a quasi-two-dimensional (eight directions) flood routing program written by Dr. Jim O'Brien. The model incorporates unsteady flow, channel and bridge components (utilized during this analysis), along with other features such as sediment transport, street, infiltration and abstraction, and area and width reduction factors components (not utilized during this analysis). Components refer to the optional modeling features available in the FLO-2D software. The user has the option to select either the diffusive wave or dynamic wave routing equations to be used during the analysis. Because of the variation of terrain elevations and the inclusion of channels and bridges, the dynamic wave equation was chosen.

Flood Plain Grid Network – The grid developer system (GDS) included with the FLO-2D software was used to create a grid system at 250-foot increments from the triangular irregular network (reference Figure 5). The size of the grid system (3478 floodplain nodes) adequately models the flood plain and allows for a reasonable model computation time. Elevations were assigned to the grid elements using the GDS based on interpolation of the digital terrain model

created using SelectCAD. The FLO-2D software allows depth and velocity results to be re-imported into the original computer-aided design and drafting (CADD) program for visual display of results.

Channels – FLO-2D has an option available which allows the user to define the cross-section geometry of the channel. Cross-sections were developed using HEC-RAS.

Manning's Roughness Coefficients – An initial Manning's n-value of the overland flow was estimated to be 0.065 based on the Cowan method (Chow 1959). The channel inverts of both the Sols Wash and the Hassayampa River are predominantly coarse sand. An initial Manning's n-value of 0.035 was selected based on the Cowan method.

Bridges – Bridge information was provided by Maricopa County. Highway 60 crosses the Hassayampa River just downstream of the confluence and Highway 93 crosses Sols Wash just upstream of the confluence. Both bridges are skewed relative to the direction of flow. The bridge input component is a discharge/upstream stage/flow area rating curve based on HEC-RAS bridge hydraulic results.

HEC-RAS Analysis

The HEC-GeoRAS ArcView extension was used to assist with the development of the HEC-RAS model. HEC-GeoRAS is an ArcView GIS extension used to create the geometric attribute data input file containing station identifiers, cross section data, and reach lengths from a triangular irregular network. Figure 6 shows the HEC-RAS cross sections and centerline generated using HEC-GeoRAS. Figures 7 and 8 show typical HEC-RAS cross sections for the Hassayampa River and Sols Wash, respectively. HEC-GeoRAS was also used for 100-yr flood plain delineation of the HEC-RAS results (reference Figure 12).

HEC-RAS is a one-dimensional flow model that was used to calculate water surface elevations, flow depths, velocities, and other pertinent hydraulic values assuming steady gradually varied flow. HEC-RAS is based on the energy equation and uses friction (Manning's equation) to determine energy losses. Contraction and expansion losses are determined based on the change in a coefficient multiplied by the velocity head. At locations where rapidly varied flow exists (such as at bridges and confluences), the momentum equation is applied.

Manning's Roughness Coefficients – An initial Manning's n-value of the overland flow was estimated to be 0.065 based on the Cowan method (Chow 1959). The channel inverts of both the Sols Wash and the Hassayampa River are predominantly coarse sand. An initial Manning's n-value of 0.035 was selected based on the Cowan method.

Bridges – Bridge information was provided by Maricopa County and described above. Figures 9 and 10 show HEC-RAS cross sections of the Highway 60 Bridge and the Highway 93 Bridge, respectively. The skew of both bridges were accounted for based on equation 5-20 of the HEC-RAS Hydraulic Reference Model. Fifteen degrees was the skew angle used for the Hwy 60 along the Hassayampa River and five degrees was the angle used for Hwy 93 along Sols Wash.

$$W_p = \sin \theta * L + \cos \theta * w_p$$

where W_p = the projected width of the pier, perpendicular to the flow lines
 θ = the bridge skew angle in degrees
 L = the actual length of the pier
 w_p = the actual width of the pier

Calibration – There was no detailed hydraulic data available at this time for calibration purposes. However, the HEC-RAS model was adjusted to correspond with Maricopa County FEMA maps by adjusting the Manning's n-values where appropriate.

SEDIMENT ASSESSMENT

Due to the scope of this evaluation, no sediment transport modeling was conducted. A qualitative assessment of sediment impacts is provided below.

Geology and Soil Characteristics

“The soils within the watershed can generally be divided into two types; those found on the gently sloping plains and alluvial fans, and those in the mountains and low hills. The soils of the plains and alluvial fans are mostly gravelly, sandy loams that range from shallow to very deep depending on the slope of the topography. In the mountains and hilly areas, the soils are shallow to very shallow, consisting of very gravelly, sandy loams. Rock outcrops of granites and volcanics are common throughout the area. Bedrock can often be found just below the surface and is covered with only a few cobbles and stones in the process of disintegration.”⁵

The most populated areas of Wickenburg are built on deposits of silt, sand, and gravel deposited in recent geological time by the Hassayampa River and tributary washes in the area.

Recent Flood Events

After the October 2000 flood event, sediment impacts resulted in the south branch of Sols Wash to be significantly wider and have a lower invert than the north branch. It was reported that there was three feet of deposition from the last two floods on the north branch of Sols Wash.

Potential Hazard Areas (Qualitative)

Degradation could cause catastrophic failure at the bridges piers and/or abutments due to scour. Depositional patterns raising the invert could raise the water surface elevation causing flooding especially of the houses and park north of Sols Wash in between the Sols Wash Bridge and the confluence with the Hassayampa, the mobile home park north of Sols Wash, property damage of agricultural land developed along the north and south branch of Sols Wash.

⁵ PRC Toups, Hydrology Report, Sols Wash, Town of Wickenburg, January 6, 1981.

RESULTS

The FLO-2D 100-yr flood plain delineation relative to the FEMA flood insurance rate map for Maricopa County is shown on Figure 11. The HEC-RAS 100-yr flood plain delineation relative to the FEMA flood insurance rate map for Maricopa County is shown on Figure 12. The Hassayampa River and Sols Wash HEC-RAS water surface profiles are shown on Figures 13 and 14, respectively.

Comparison of Hydraulic Results between One and Two Dimensional Models

FLO-2D uses a power function approximation based on full dynamic wave equations for unsteady flow to calculate water surface elevations. HEC-RAS uses the energy equation for backwater calculations and the momentum equation at bridges to calculate water surface elevations. Twenty-three HEC-RAS cross-sections were assigned to FLO-2D channel nodes along the Hassayampa River and fifteen HEC-RAS cross-sections were assigned to FLO-2D channel nodes along Sols Wash. The FLO-2D cross-section shapes and slopes were interpolated using the FLO-2D PROFILES preprocessor so that cross-sections were assigned to nodes contiguously along both the Hassayampa River and Sols Wash. After the interpolations, a total of 85 contiguous nodes had cross-section information assigned. Once the FLO-2D and HEC-RAS simulations were complete, the water surface depths were compared and deemed reasonable. Cross-section variation, modeling equations, hydrograph attenuation, n-values, geometry and slope interpolations, and steady/unsteady modeling approaches are causes of flow depth/water surface profile variations between the two models.

Future Recommended Sediment Transport Modeling

If a more quantitative sediment assessment is desired in the future, FLO-2D does allow the user to model degradation/aggradation. The current model could be used and development of the sediment module could be incorporated. If the desire is to determine general trends of aggradation/degradation of overland (non-channel) areas, FLO-2D would be valuable. If the concern is confined within the channel and at the bridges, a one-dimensional program such as HEC-6 would be adequate. The user can perform sediment transport calculations using a multiple regression equation in FLO-2D for alluvial flood plains or sand bed channels. Since the major concerns are within the channel, development of an HEC-6 model may be more ideal. HEC-6 can be used to compute sediment transport rates at each cross section over moderate time periods. HEC-RAS has the ability to allow the user to calculate local scour at bridge abutments and piers as well as contraction scour based on methods outlined in Hydraulic Engineering Circular No. 18 (HEC No. 18, FHWA, 1995). To quantify abutment and pier scour, some combination of HEC-6, HEC-RAS, and hand calculations may be required.

Depending on the results of the existing conditions model, alternatives to be modeled may include but are not limited to: levees or floodwalls, channel widening, and/or flow reductions due to upstream detention basins. The roughness coefficients may need to be modified in the model to take into account potential vegetation removal.

QUALITATIVE ANALYSIS OF FLOOD CONTROL ALTERNATIVES

Based on the results of this study, there appears to be several short and long-term alternatives that may reduce flood damages from future flood events. The alternatives presented would need further hydraulic analysis to determine feasibility and impacts.

Short-term flood control solutions include:

- raising the brick fence just downstream of the Hwy 93 Bridge and tying the top of the fence into the bridge abutment (the fence could also be extended along the bank further downstream to further protect the left overbank – Coffinger Park).

Potential long-term alternatives to be evaluated should include:

- the effects of bridge modifications such as widening, bridge pier realignments (so that piers would be parallel with the direction of flow), and pier extensions (placed on the upstream side of the bridge piers to increase conveyance and reduce concentration of flow through the left openings, looking downstream).
- levees or floodwalls.
- channel widening.
- flow reductions due to upstream detention basins.
- evaluation of the current operations and maintenance plans.

The one- and two-dimensional models are for planning and alternative formulation purposes only. Several steps would need to be taken in order to achieve design level accuracy. Hydrology, more specifically hydrographs, for a range of n-year events would need to be determined on the Hassayampa River and Sols Wash for the study area. Topographical data with greater detail should be incorporated at the bridges and at key areas of interest. (Topographical data of greater detail would not be needed to better define the channel or flood plain areas). Stationing should be adjusted to allow for consistency with previous studies and/or county standards. Bridge locations need to be modified to more accurately define bridge alignment and station positioning. Finally, the model would need to be calibrated. FLO-2D and/or HEC-RAS could be used to model the study area at design level of detail, depending on the objectives of the alternative(s).

Further development of the FLO-2D is recommended if further modeling would be beneficial for determining hydraulic effects on the flood plain, residential, commercial, and agricultural areas. In this case, FLO-2D components would include incorporation of street, infiltration and abstraction, and area and width reduction factors components. On the other hand, further development of the HEC-RAS model is recommended if the main channel, bridges, and key areas of interest (i.e. scour at the bridges) are of importance. An HEC-6 sediment transport model would be beneficial to determine aggradation and degradation patterns within the channel reaches.

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9. USACE, *GIS for Hydrologic Engineering*, PROSPECT, FY2001.
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Figure 1: Town of Wickenburg Study Area

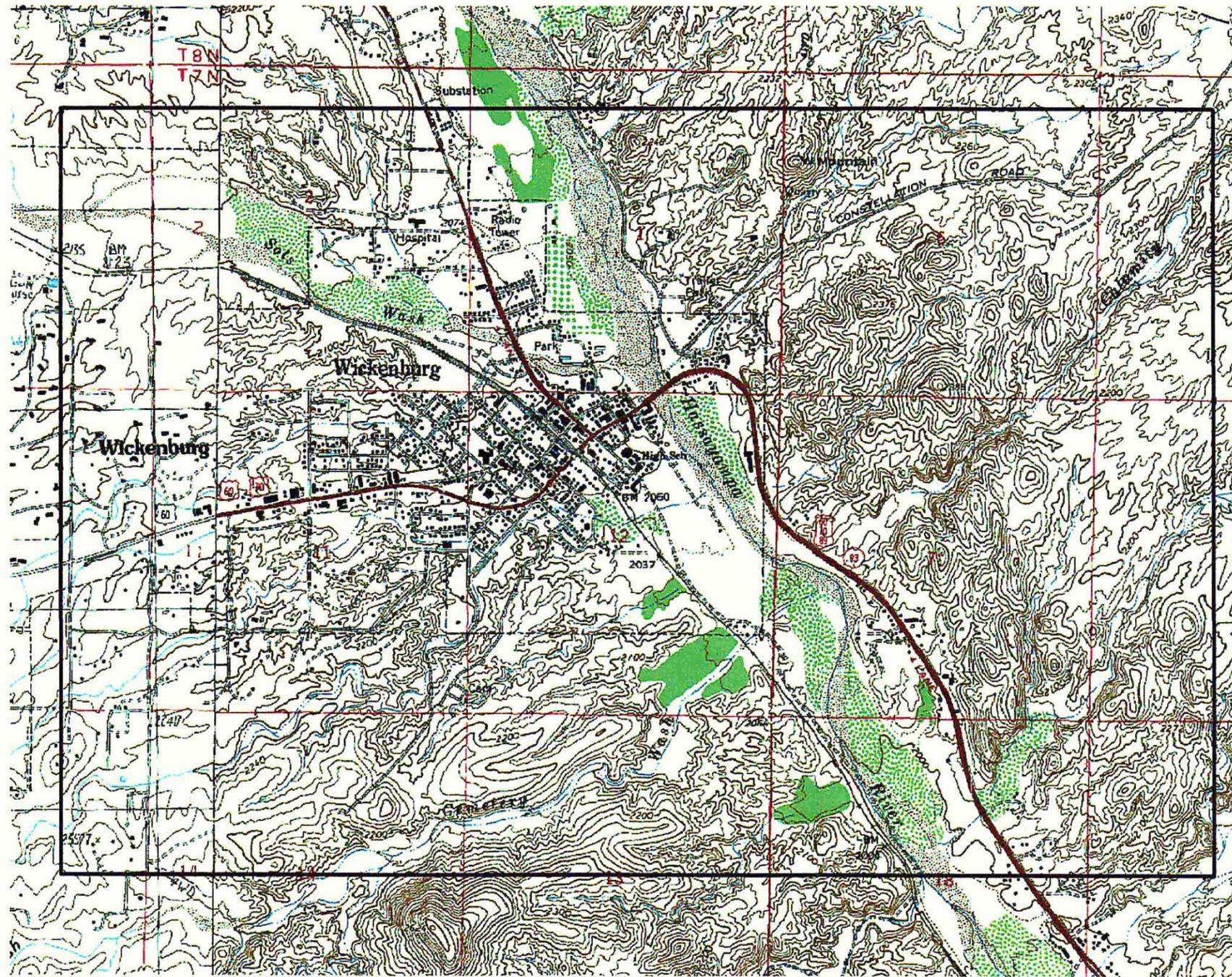


Figure 2: Hassayampa River Inflow Hydrograph

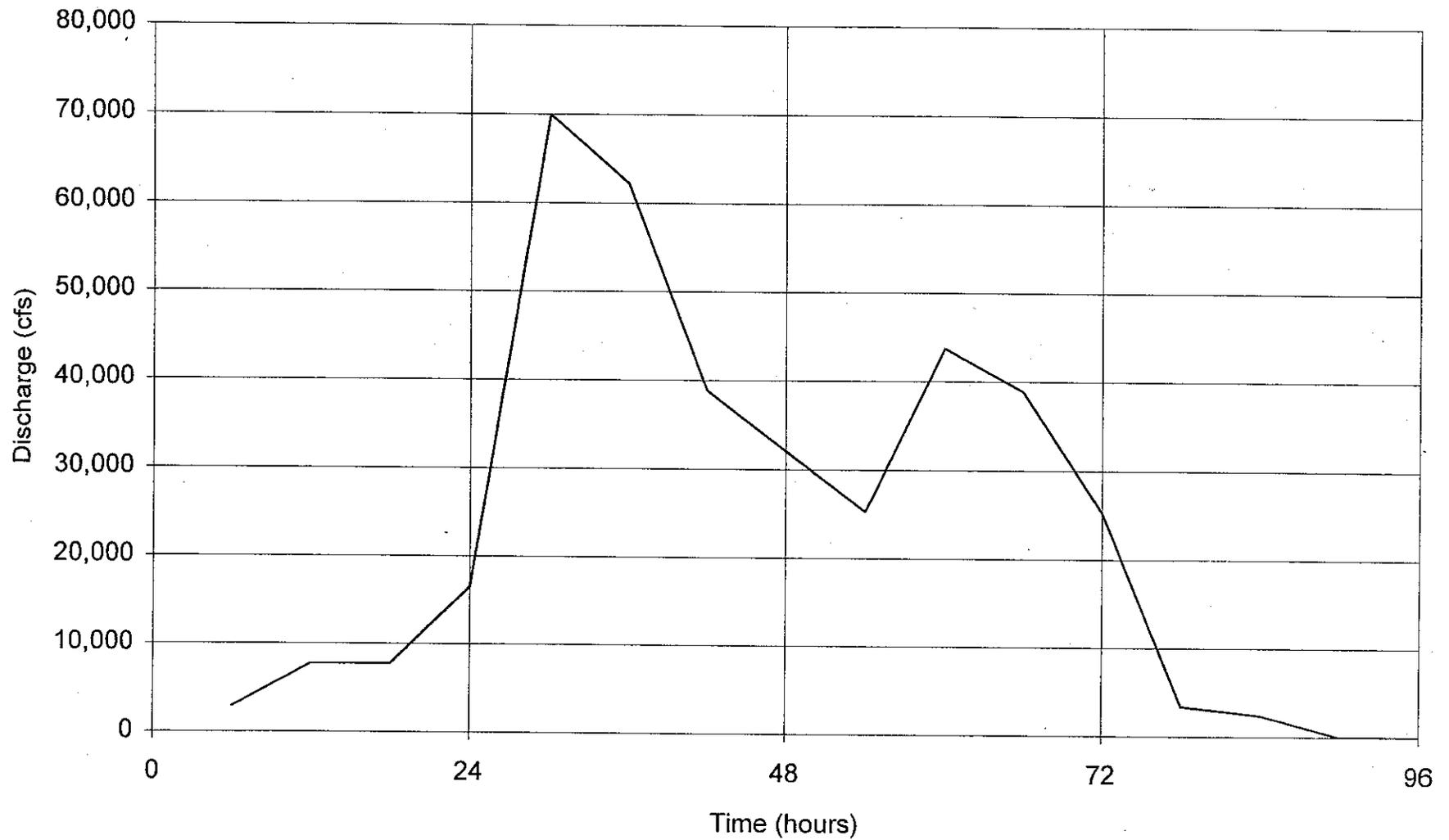


Figure 3: Sols Wash Inflow Hydrograph

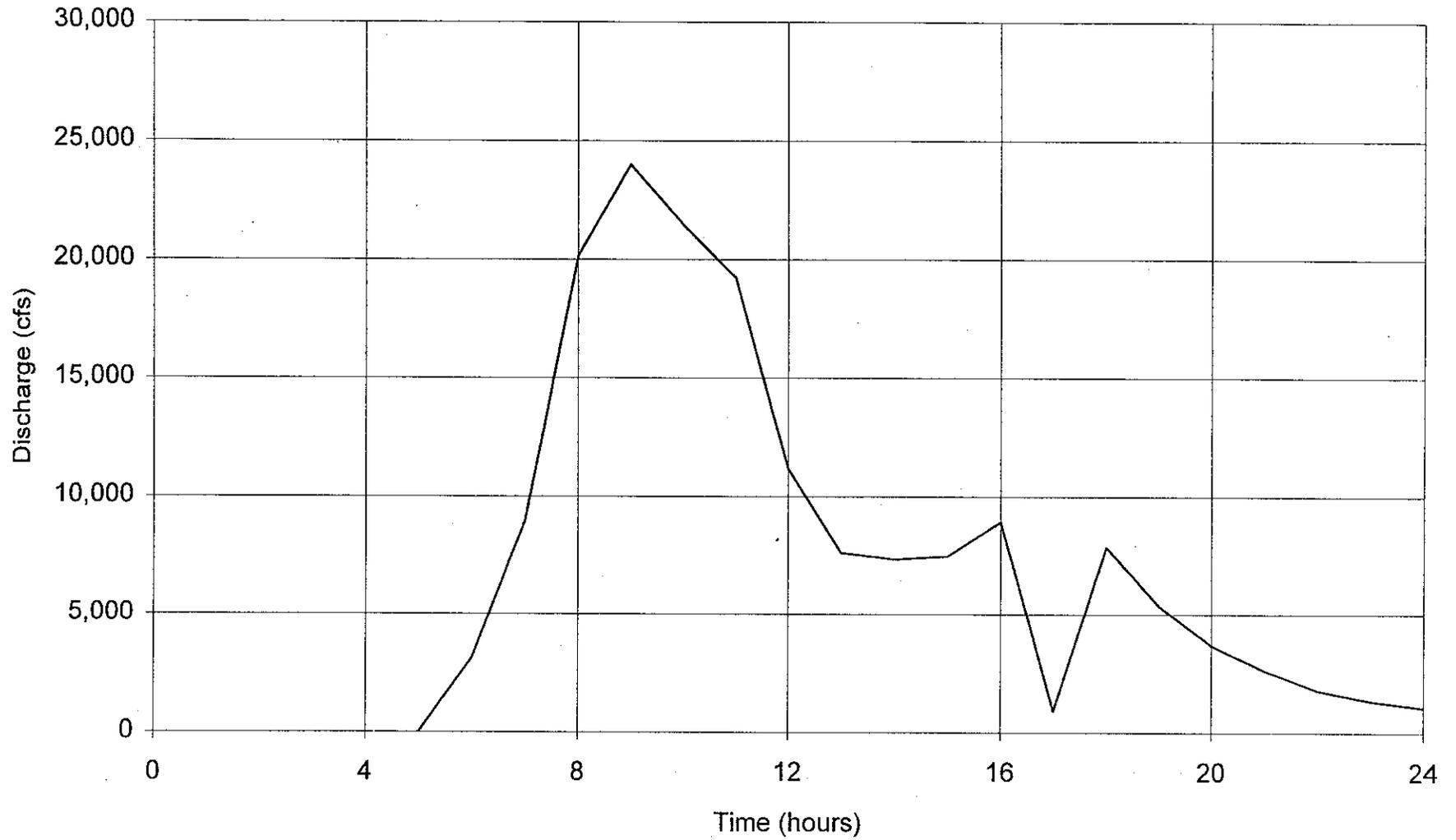


Figure 4: Hassayampa River and Sols Wash Inflow Hydrographs

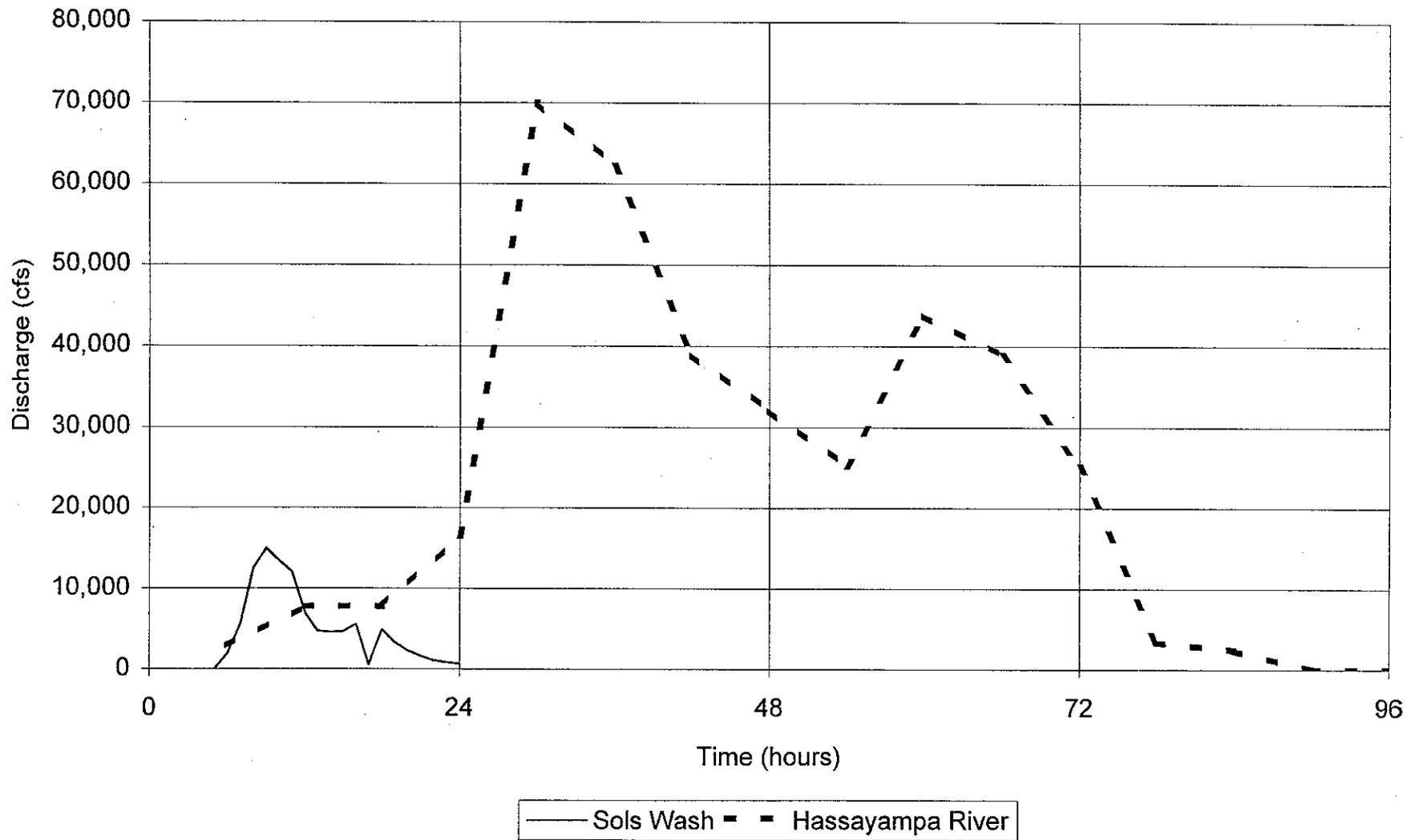


Figure 5: FLO-2D Study Area Grid System

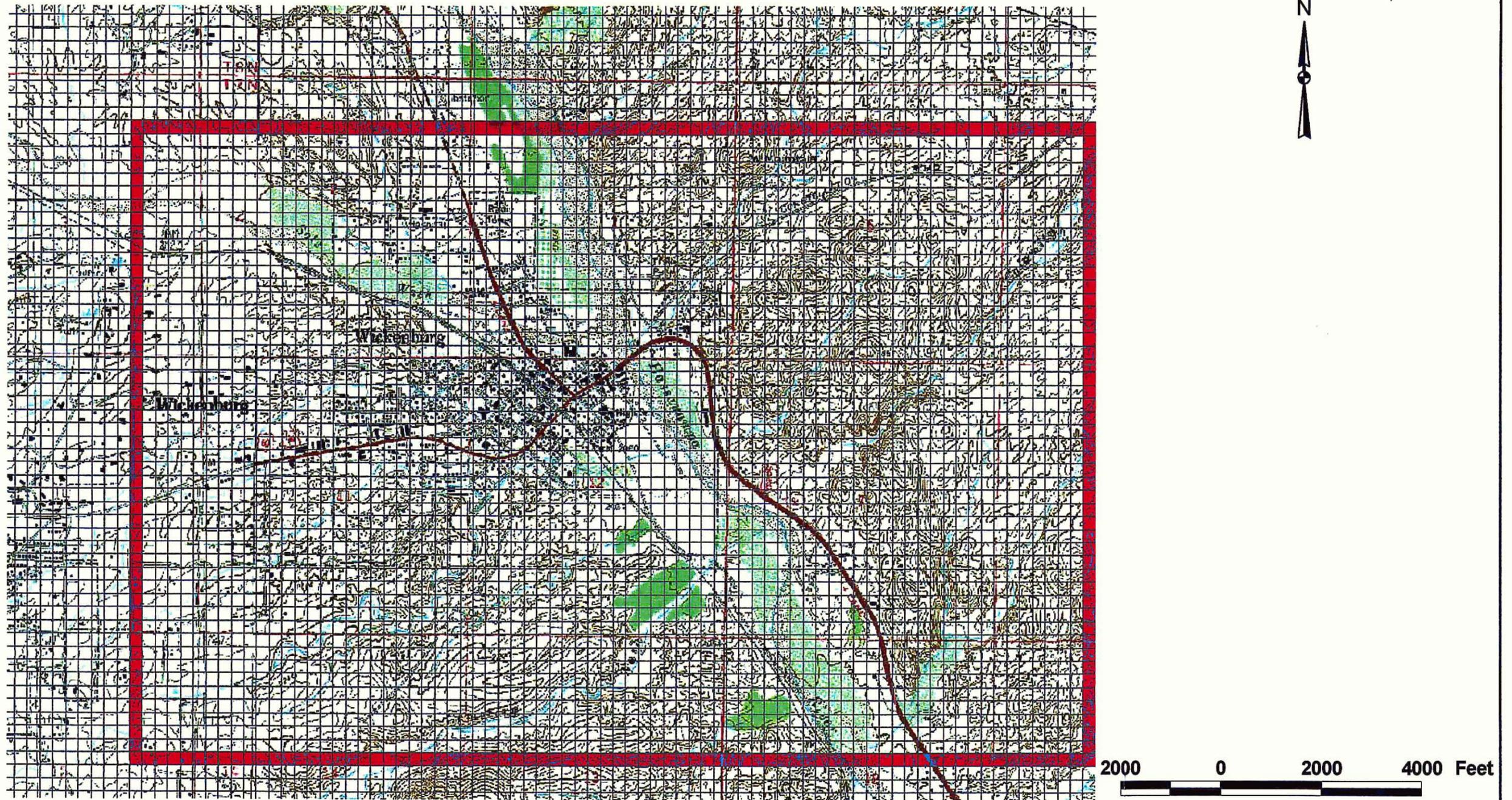


Figure 6: HEC Geo-RAS Cross Sections and Channel Centerlines

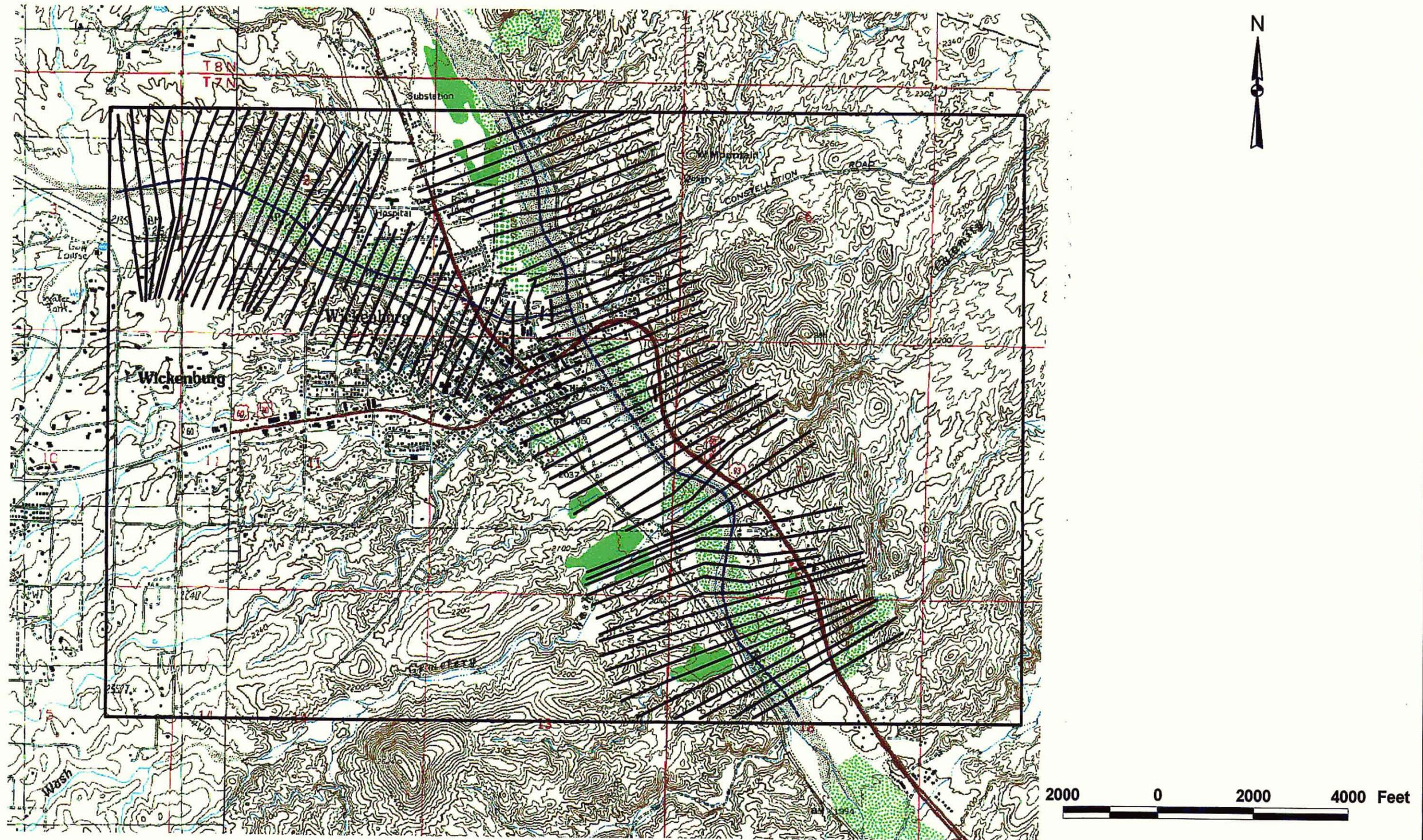


Figure 7: Typical HEC-RAS Cross Section, Hassayampa River

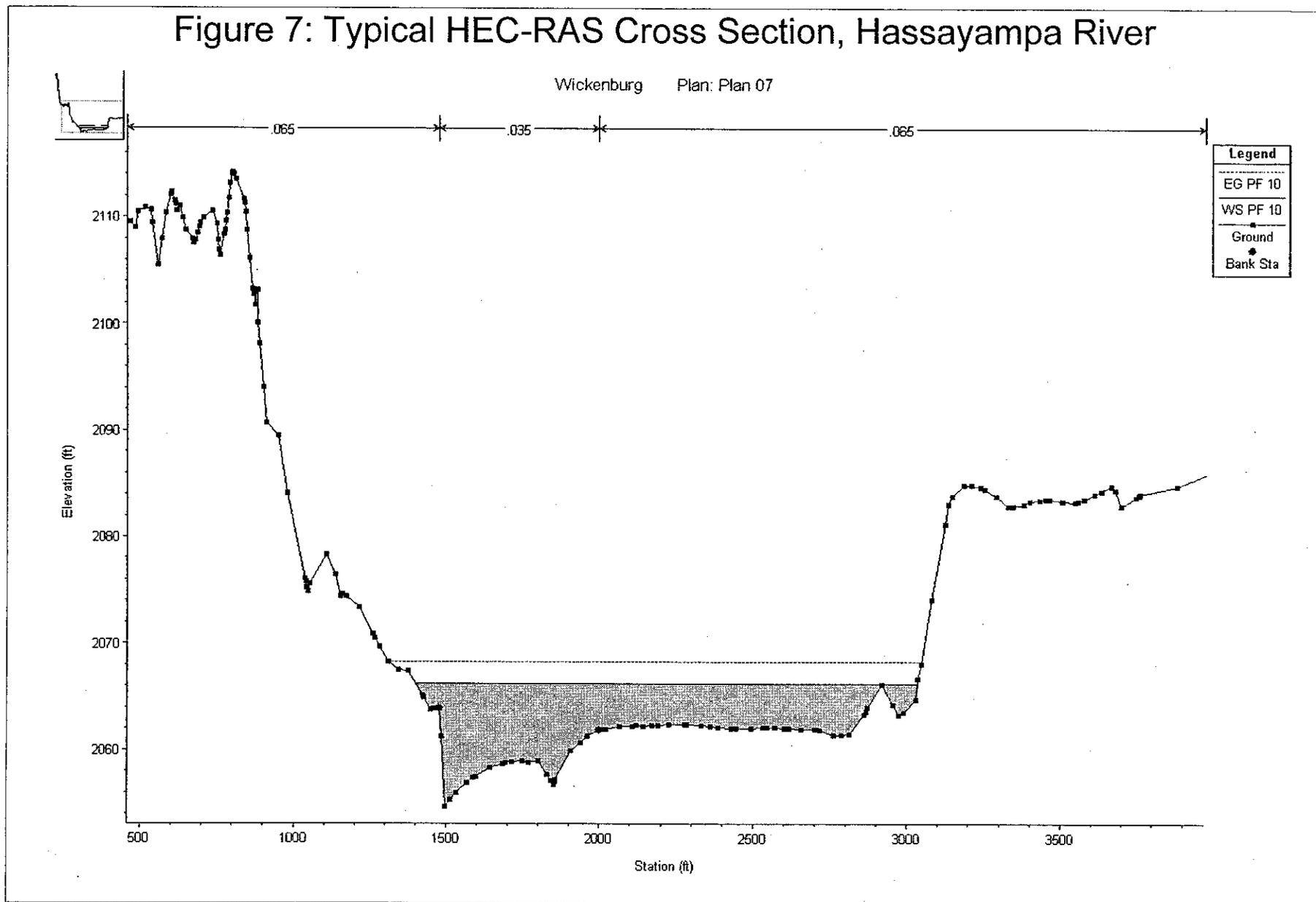


Figure 8: Typical HEC-RAS Cross Section, Sols Wash

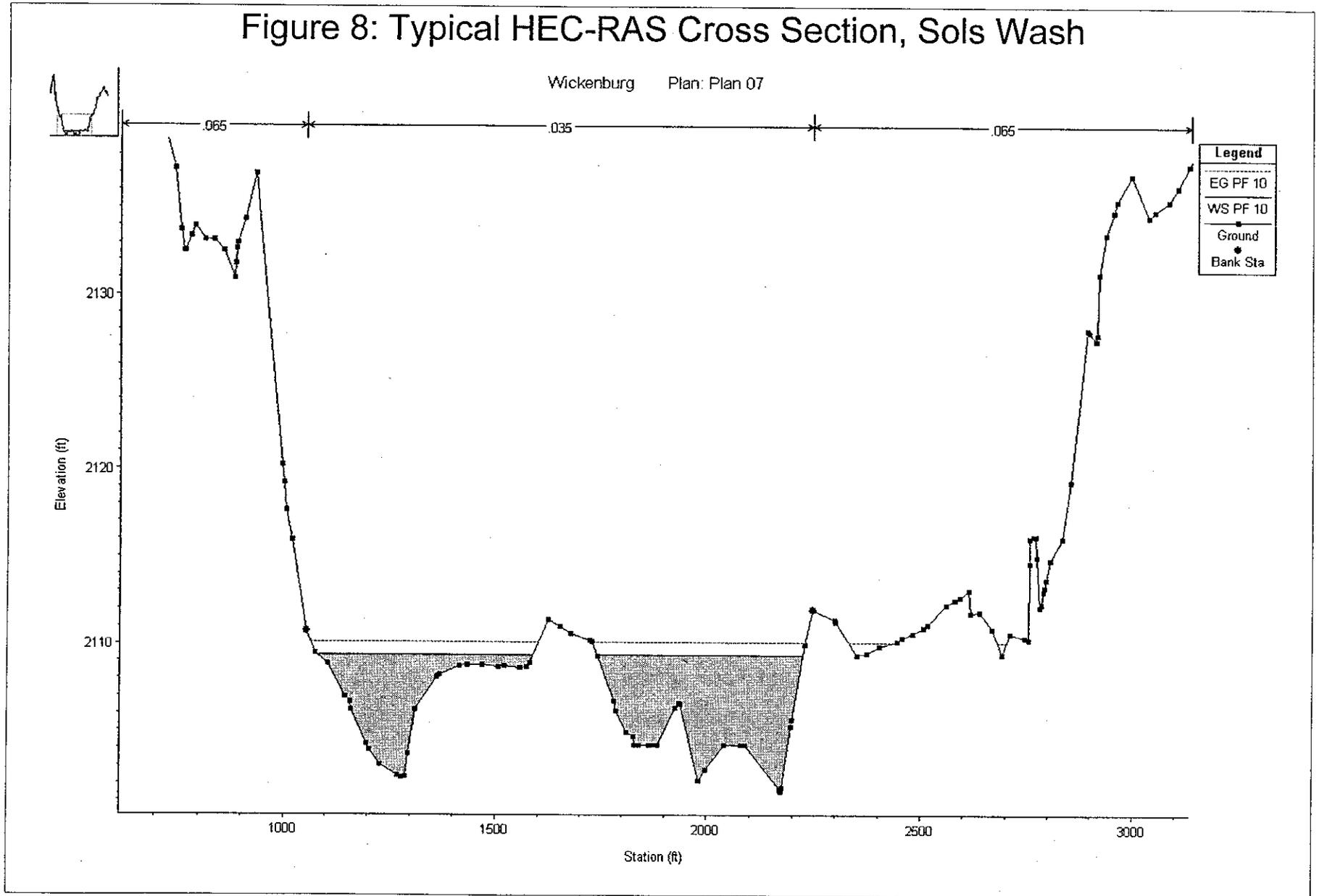


Figure 9: Hwy 60 Bridge Modeled in HEC-RAS

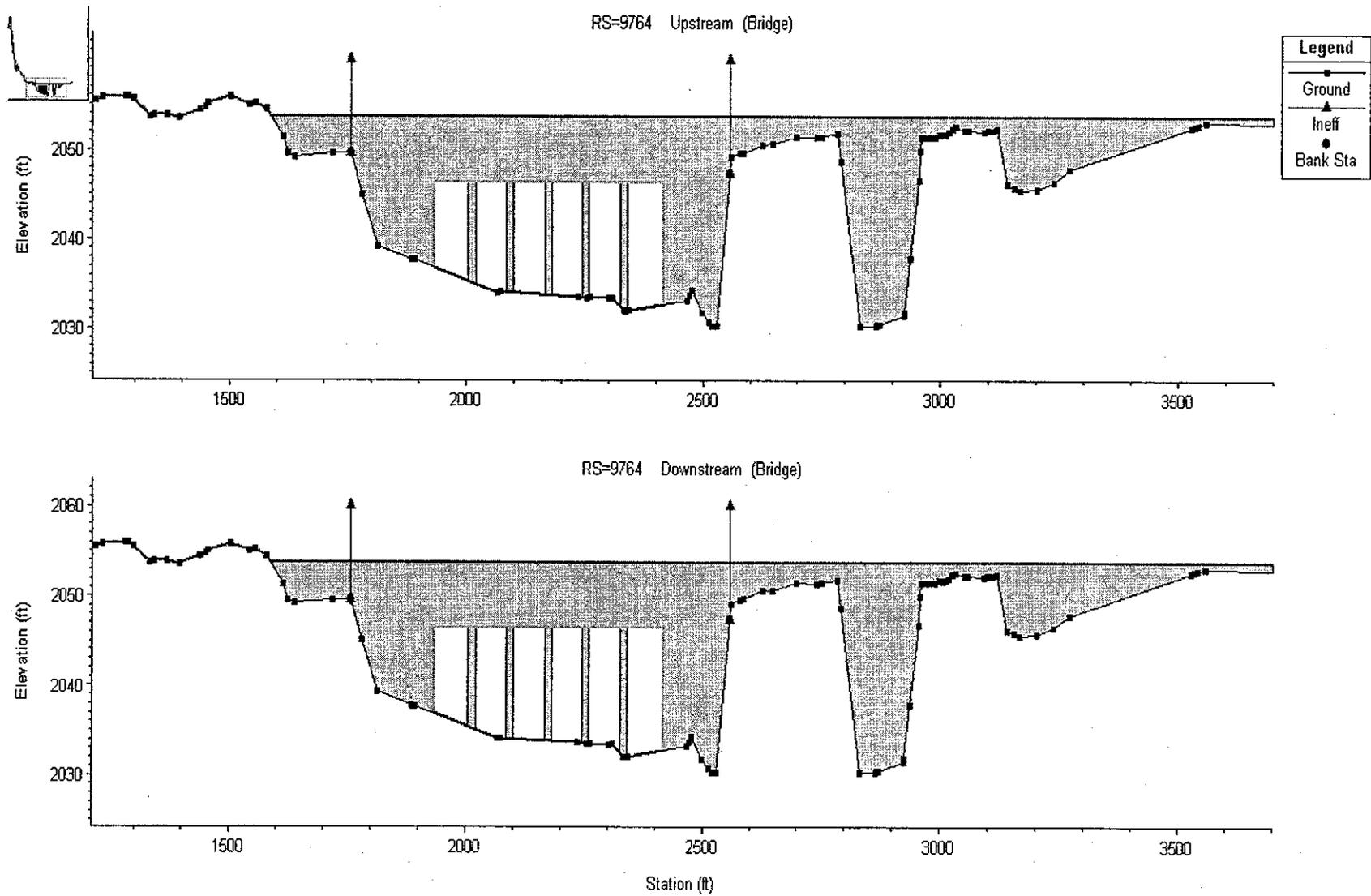


Figure 10: Hwy 93 Bridge Modeled in HEC-RAS

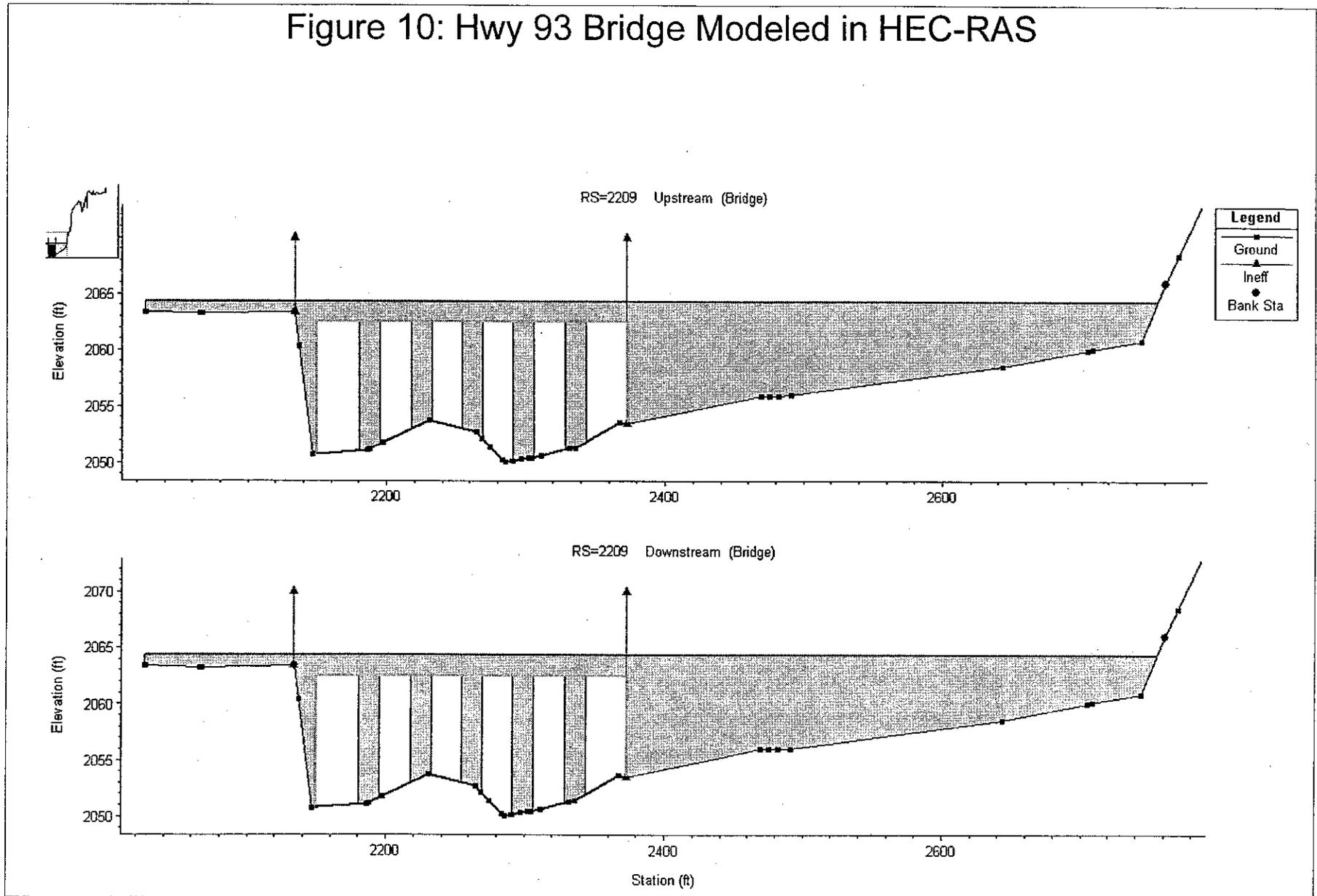


Figure 11: Flood Plain Delineation of FLO-2D Results

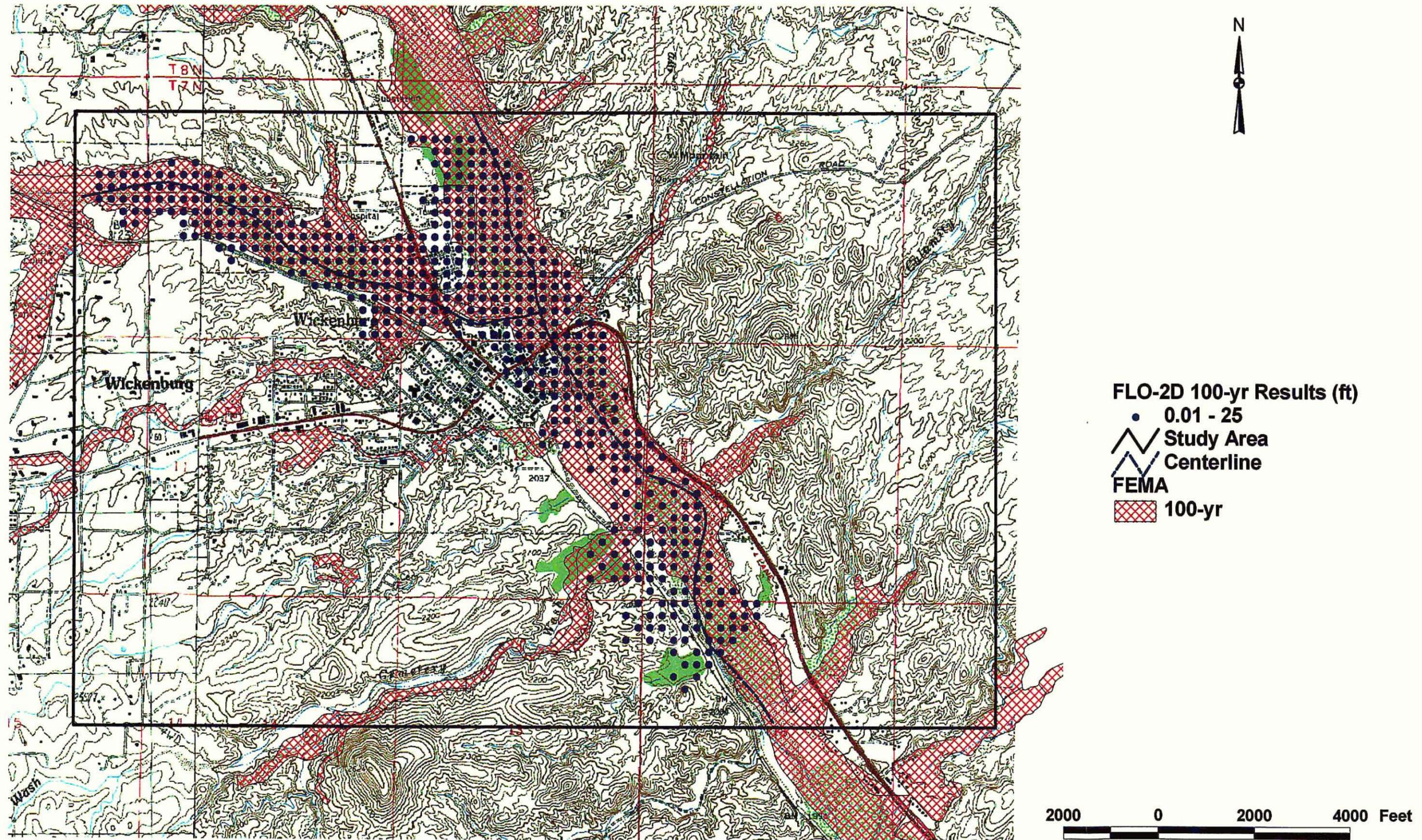


Figure 12: Flood Plain Delineation of HEC-RAS Results

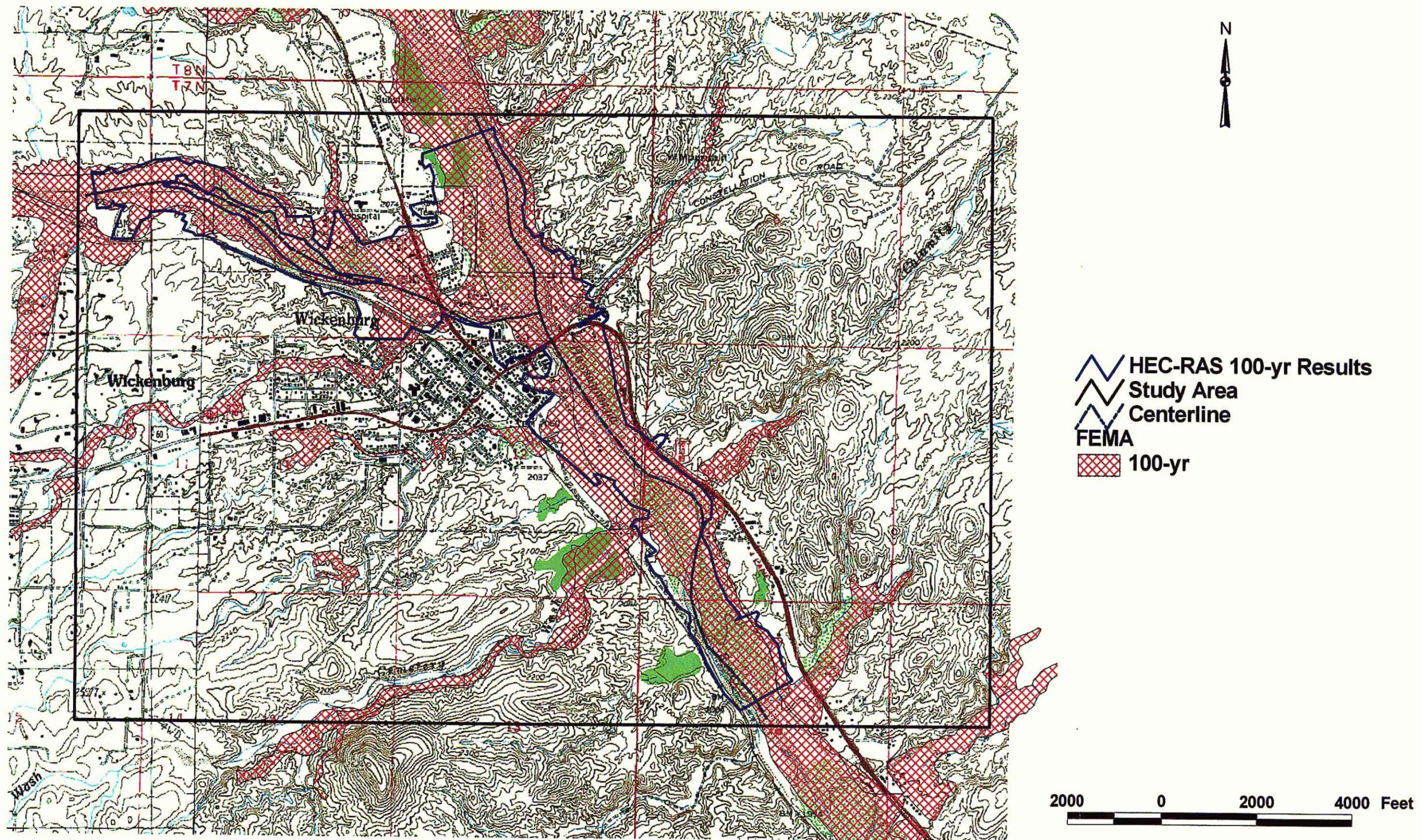


Figure 13: Hassyampa River HEC-RAS Water Surface Profile

Wickenburg Plan: Plan 07

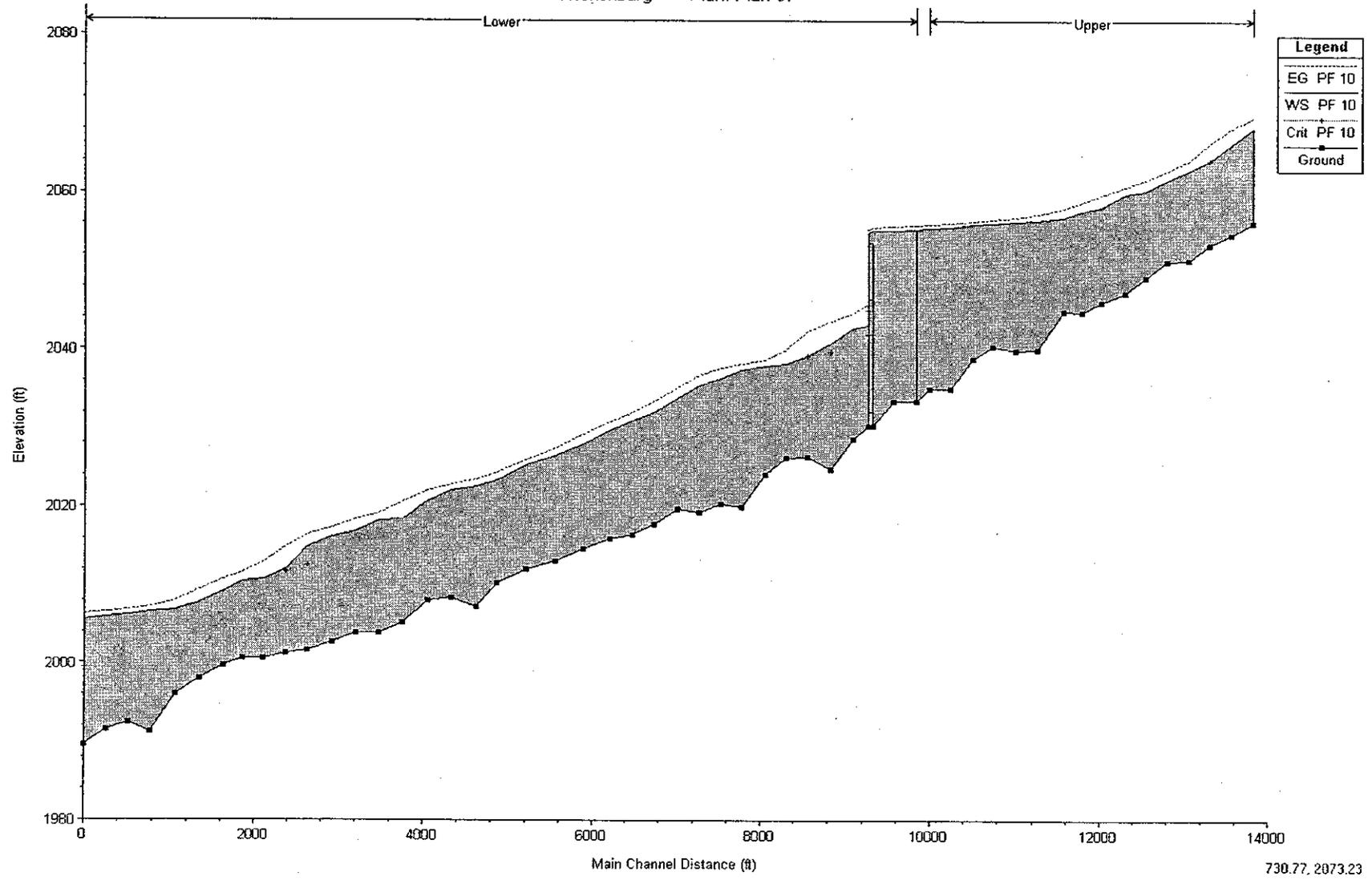
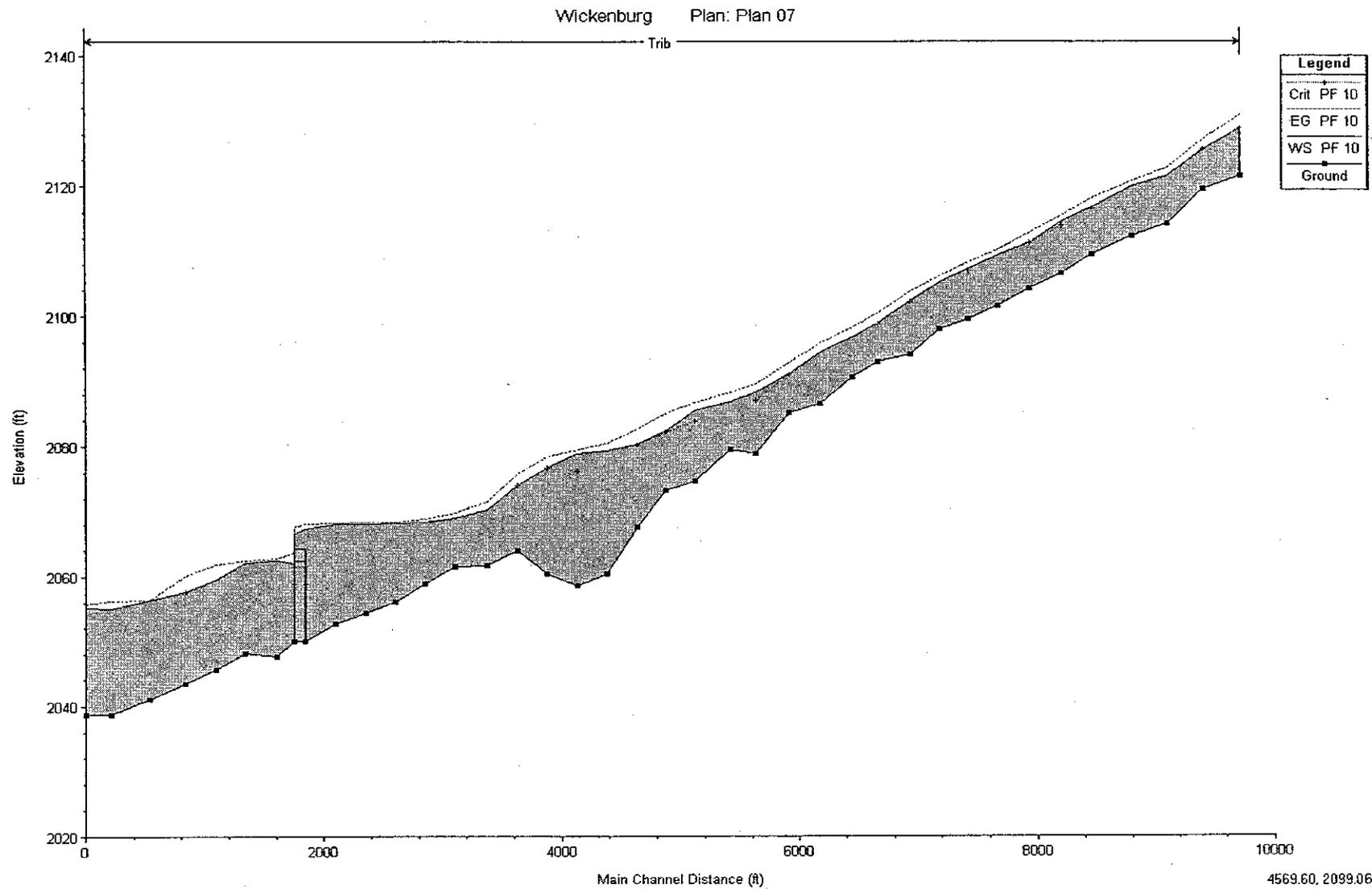


Figure 14: Sols Wash HEC-RAS Water Surface Profile





Los Angeles District

Environmental Site Characterization
Of
A Delineated Reach of Sols Wash and The Hassayampa
River

ENVIRONMENTAL APPENDIX B

Planning Section C

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT
SOUTH PACIFIC DIVISION
APRIL 2002

Town of Wickenburg
Environmental Site Characterization

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Town of Wickenburg
For Sols Wash Watershed & Vicinity Analysis

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Overview

This environmental site characterization report was prepared for the Town of Wickenburg, AZ (hereinafter, the Town) by the Water Resources Planning Division, Section C (Phoenix, AZ) of the Los Angeles District of the U.S. Army Corps of Engineers (USACE), under authority granted by the Planning Assistance to States (and Tribes) Program (PAS), Section 22 of the 1974 Water Resources Development Act (WRDA), as amended.

The sole purpose for preparing this report is to characterize existing environmental conditions within and immediately adjacent to a defined study area delineated by agreement between the Town and the USACE. This report was prepared for informational purposes as an initial step towards any future formal environmental evaluation or assessment that may be conducted for compliance with any federal, state and/or local requirements.

1.0 Study Location

Wickenburg is located about 50 miles northwest of Phoenix in the northeast section of Maricopa County. The Hassayampa River originates in the Bradshaw Mountains, south of Prescott, and flows south through the town of Wickenburg to its confluence with the Hassayampa River. The drainage area for Sols Wash at the Hassayampa River is 145 square miles. The drainage area for the Hassayampa River above Sols Wash is 565 square miles.

Wickenburg Arizona PAS



2 0 2 4 Miles

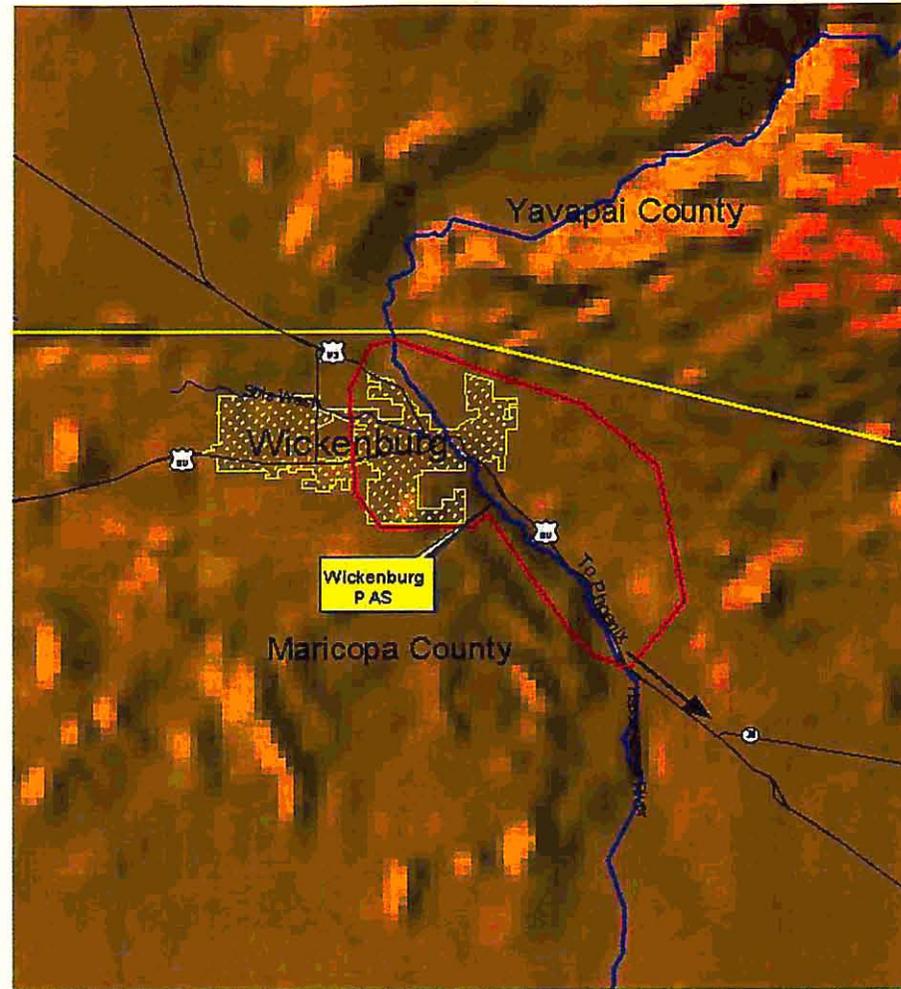


Figure 1.1
Location Map

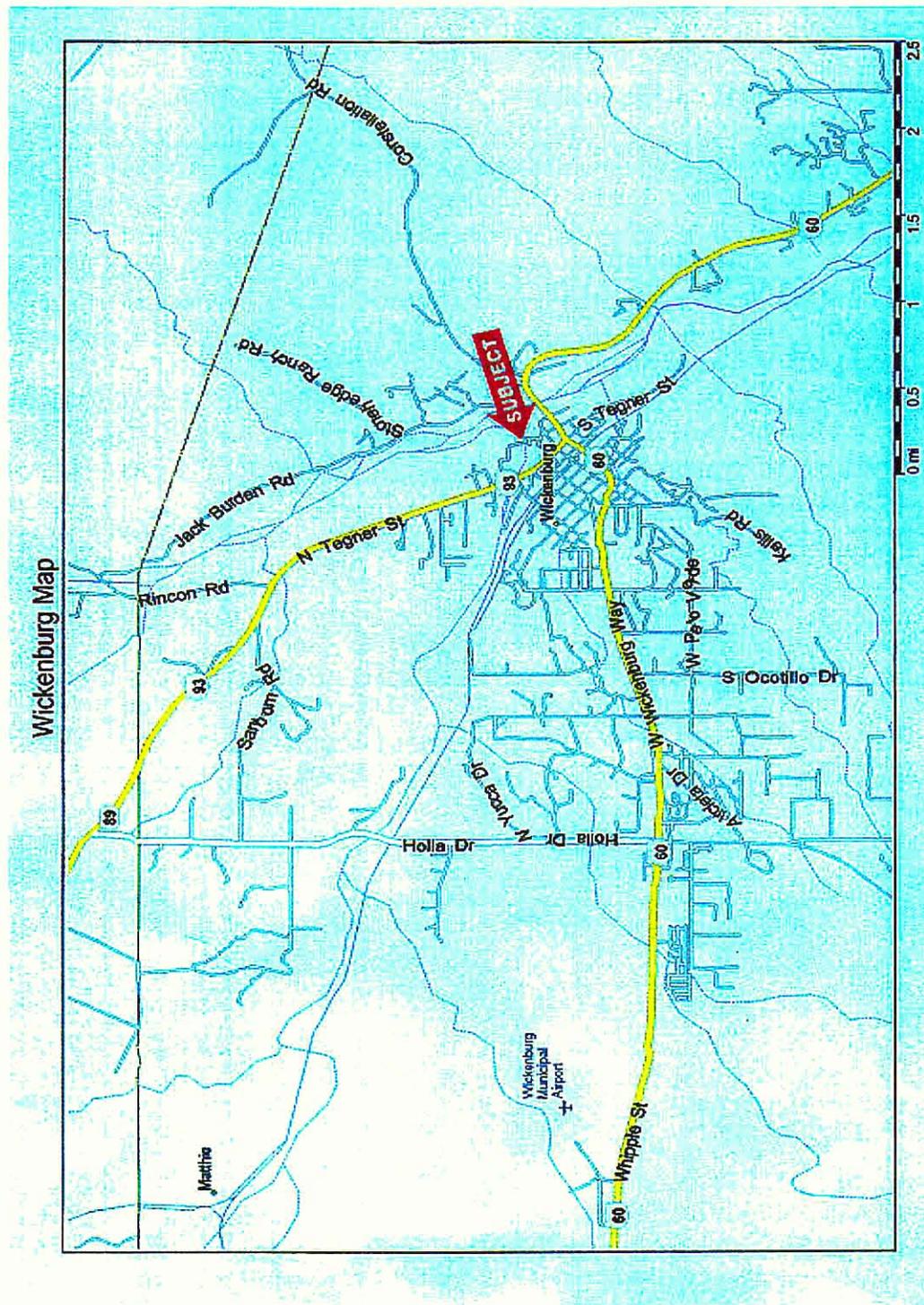


Figure 1.2
Study Vicinity Map

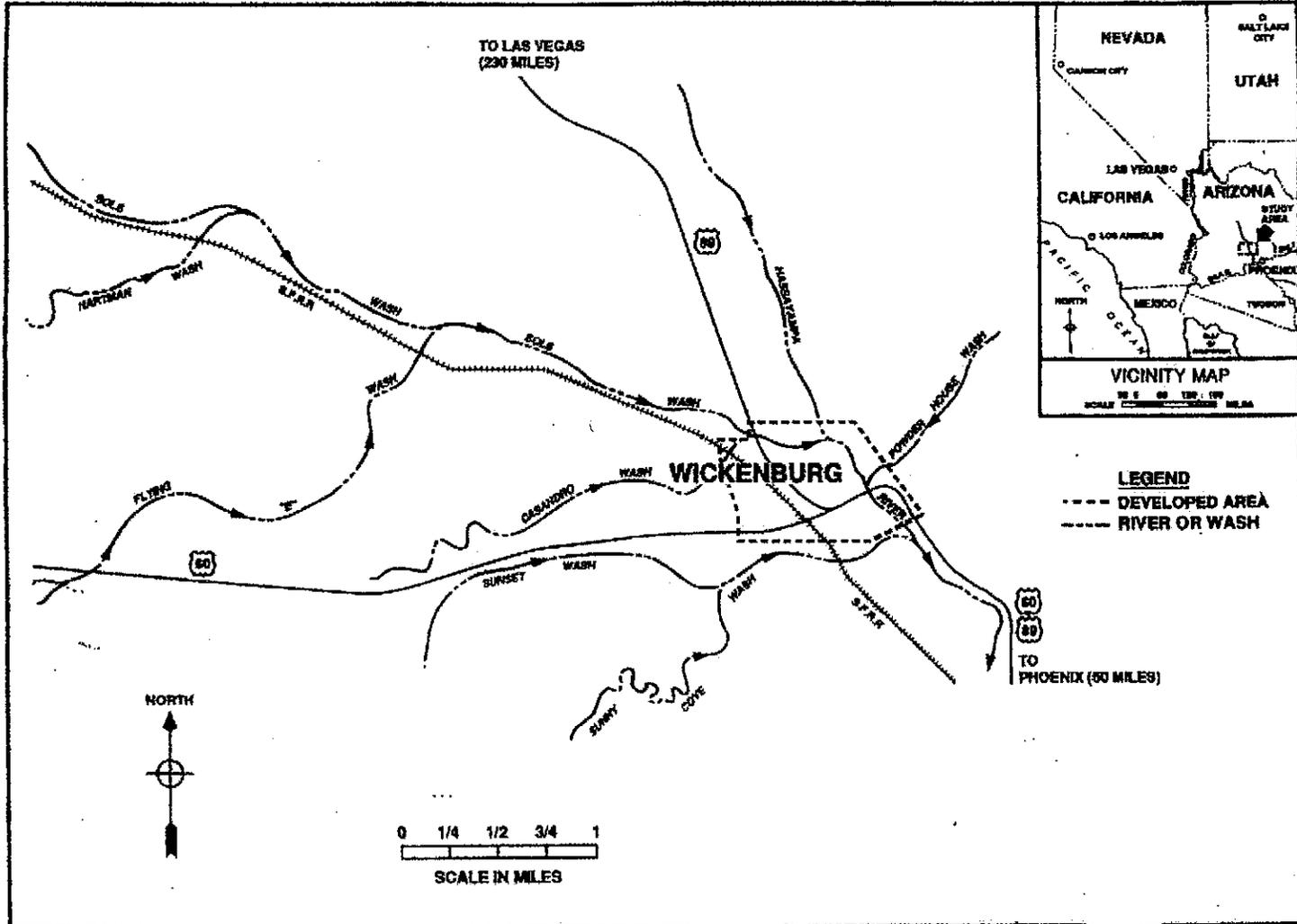
1.1 Physiographic Province

The Hassayampa River watershed drains an area of approximately 1,470 square miles in central Arizona. The headwaters originate in the northern Bradshaw Mountains and flow southward through the Upper Hassayampa groundwater basin to the Gila River within the Phoenix Active Management Area (AMA). The watershed boundaries are the Bradshaw Mountains to the north and east, the White Tanks to the southeast, and the Weaver, Date Creek, Vulture and Big Horn Mountains to the west. For planning purposes, this watershed is divided into two parts: the Central Highlands Planning Area, which lies outside of an active groundwater management area (AMA), the Phoenix AMA. The Upper Hassayampa River basin includes about 740 square miles of the Central Highlands physiographic province of central Arizona, and contains relatively small hydrographic basins filled with alluvial deposits. The upper hydrographic basin of the Hassayampa River is bounded on the north by the Weaver Mountains, on the northwest by the Date Creek Mountains, on the south by the Vulture Mountains, and on the east by the Bradshaw Mountains. Elevations in this area range from 2,000 feet to over 7,000 feet above mean sea level (ADWR 2001).

There is a substantial network of smaller tributary washes, such as Sols Wash, that drain the lower portion of this hydrographic basin. These washes are ephemeral and flow mainly in response to summer rainstorms. Most of the runoff in these washes infiltrates into the ground before reaching the lower reaches of the intermittent Hassayampa River.

U.S. ARMY ENGINEER DISTRICT

CORPS OF ENGINEERS



6340-19

ACOE-M81

Figure 1.3
Town of Wickenburg/ Hassayampa River
And Tributaries

1.2 Community Profile

The town was founded in 1863 and is the oldest town in Arizona north of Tucson. The Town was incorporated in 1909. Traditionally, tourism, cattle ranching and agriculture have been the main economic activities in Wickenburg. In 1964, Wickenburg began to diversify its economic base by developing an industrial airpark to attract manufacturing firms. Nine light industrial users occupy parts of the park. The median income for 1989 was \$19,572, and the population was 7,130 people in 2000. 2000 median income figures have not been released upon writing this report (U.S. Census Bureau 2001).

The Wickenburg area features a wide range of attractions, including several famous guest ("dude") ranches, and the Vulture Mine, discovered by Henry Wickenburg, which in time became the most productive gold producing mine in Arizona's history, producing nearly \$30 million in gold. The Desert Caballeros Western Museum showcases an acclaimed collection of Western art and artifacts, and offers downtown visitors a landscaped park and rest area with statuary. A walking tour of historic buildings is also a highlight of the downtown area of Wickenburg. The Hassayampa River Preserve is located on Highway 60, approximately 3 miles southwest of Wickenburg, and provides a self-guided nature trail along the spring-fed Palm Lake and the banks of the Hassayampa River. The preserve is home to over 220 species of birds. Another popular area for outdoor recreation is the 11,840-acre Hassayampa River Canyon Wilderness, which was established in November of 1990, and is located approximately 8 miles northeast of Wickenburg. The Bureau of Land Management (BLM), Department of the Interior (DOI), manages this wilderness area. In this upper portion of the watershed, the Hassayampa River has three perennial stream reaches for a total distance of nearly 14 miles.

1.3 Land Use Planning and Zoning

The Planning and Building Department of the Town (hereinafter the Department), is responsible for current and long range planning, zoning enforcement, building inspection, and floodway management. The staff provides assistance to the Planning and Zoning Advisory Commission, Board of Adjustment, Economic Development Advisory Commission, The Downtown Revitalization Advisory Commission, and through the Town Manager's Office, the Mayor's Transportation Oversight Committee, and the Town Council. The Department develops plans with input from the public through various Boards, Commissions and the Town Council. If a particular plan is approved, then implementing ordinances are prepared and upon adoption by the Council, these approved plans help shape the growth and maintain the character of the community. The Department is also responsible for preparing the Town's application for federal Community Development Block Grants (CDBG).

2.0 SETTING

The Town lies at an elevation of 2,095 feet in the foothills of the Bradshaw Mountains, along the banks of the Hassayampa River and Sols Wash in the northern part of Maricopa County. U.S. Highways 60 and 93, State Route 74, and the Burlington Northern/Santa Fe Railroad, transect the town.

2.1 Study Area Boundaries

The delineated study area extends 1 mile up Sols Wash from the confluence with the Hassayampa River, ½ mile up the Hassayampa River from the confluence with Sols Wash, and downstream on the Hassayampa River from the confluence of Sols Wash to a point just below the Hassayampa River Preserve. The study area will include the floodplain, and the adjacent riparian corridors and upland areas that are in close proximity to the ephemeral, intermittent and perennial reaches of these stream channels.

2.2 Climate

Wickenburg is in an arid climatic zone characterized by hot summers, mild winters, and infrequent rainfall. The area receives abundant sunshine and experiences high evaporation rates. July and January average maximum/minimum temperatures are 104°/70° and 63°/30°, respectively. Recorded temperature extremes in Wickenburg are 117° and 10°. Rainfall averages 11 inches per year, about equally split between the July-September monsoon season and the November-April winter storm season. Occasional heavy rains are experienced from flooding commonly occurs during the monsoon season, while most major historical floods involving the Hassayampa River have occurred during the tropical storm period.

2.2.1 Insolation

There are no specific records identified for the Town or the study area regarding hours of sunshine, but for the Phoenix metropolitan area that is located 50 miles to the southeast, there is an 85 percent chance that there will be sunshine on any given day throughout the year during the months of December and January. The period of record monthly climate summary from March 1, 1908 through December 31, 2000 for the Town indicates an average annual maximum temperature of 83.5 degrees Fahrenheit, and an average annual minimum temperature of 47.4 degrees Fahrenheit. The warmest months are June – August with an average temperature of 101.4 degrees Fahrenheit, and the coolest months are December - February (DRI 2001).

2.2.2 Precipitation

The period of record monthly climate summary listed above indicates an annual average total precipitation of 11.27 inches for weather station #029287 in Wickenburg, AZ. Average total snowfall for this period was 0.2 inches. The average total precipitation for the summer (June – August) is 3.37 inches, and the average total precipitation for the winter (December – February) for this period of record is 3.59 inches. The maximum monthly precipitation of 5.56 inches occurred during August 1951, and the minimum monthly precipitation of 0.00 inches occurred during May 1983 (DRI 2001).

2.2.3 Air Quality

The federal Clean Air Act of 1970 required the Environmental Protection Agency (EPA) to assist states and localities in establishing ambient air quality monitoring networks to characterize human health exposure and public welfare effects of criteria pollutants. The 1977 and 1990 Clean Air Act Amendments established National Ambient Air Quality Standards (NAAQS) for criteria pollutants, and required each state to implement a visibility-monitoring network to cover specified national parks and wilderness areas. The Phoenix metropolitan area has a year-round visibility-monitoring network to assess urban hazes. All of these networks are composed of individual monitoring sites, which are operated to collect ambient air quality data. These networks help the Arizona Department of Environmental Quality (ADEQ) Air Quality Division identify causes of air pollution and to provide Arizona citizens with local air quality conditions. The Maricopa County networks are operated primarily to monitor urban-related air pollution. For the purposes of characterizing the existing environmental conditions within and surrounding the study area, the two monitoring objectives for air quality monitoring sites that are of interest include the determination of the extent of regional pollutant transport among populated areas, and the determination of the welfare-related impacts in more rural and remote areas, such as visibility impairment and vegetation effects (ADEQ 2000).

The Maricopa County Environmental Services Department (MCESD), Air Quality Division's "2000 Network Review" has been submitted to the EPA Region 9 office for their review. The network review evaluates the adequacy of the air quality monitoring network with respect to the monitoring objectives and spatial scales of representation as required by 40 CFR Part 58, Appendix D. The National Air Monitoring Stations (NAMS) and State and Local Monitoring Stations (SLAMS) are evaluated for their location and density. Data summaries, procedural changes, special projects, and new air monitoring sites are also included in the network review (MCESD 2000).

MCESD Air Monitoring maintains twenty-six sites in the ambient air-monitoring network throughout Maricopa County. The history of these sites range from 1961 (Central Phoenix) to November 2000 (Surprise). Land use patterns around these

sites vary from heavy populated urban areas to sparsely populated rural settings. MCESD monitors for the following "criteria pollutants": Carbon Monoxide (CO), Ozone (O₃), Particulates (PM₁₀), Nitrogen Dioxide (NO₂), and Sulfur Dioxide (SO₂). MCESD no longer monitors for lead (Pb). Pollutants are monitored with federal reference or equivalent methods, certified by EPA. EPA redefined PM monitoring in 1987 to measure particles less than or equal to 10 microns in aerodynamic diameter (PM₁₀), and again in 1997 to measure both PM₁₀ and particles less than or equal to 2.5 microns in aerodynamic diameter (PM_{2.5}). For each criteria pollutant, EPA specifies monitoring objectives that define the parameters over which the health exposure and public welfare are assessed, and measurement scale classifications that describe the influence of atmospheric movement at that location.

For the purposes of this report characterizes the ADEQ/MCESD ambient air monitoring site reported as operational to the EPA Aerometric Information and Retrieval System (AIRS) that is closest to the delineated study area (25 miles southeast) is located in the city of Surprise (SU; 04-013-4007). This air quality-monitoring site is at the edge of a growing population area in the northwest portion of the Phoenix metropolitan area. Since climate data indicates that the prevailing wind speed and direction average 13 degrees east of true north, and 43 miles per hour, respectively, for the Phoenix metropolitan area, this monitoring site may provide valuable downwind transport data. To date, sampling data from this monitoring site indicate that concentrations were below the NAAQS (DRI 2001).

Visibility monitoring networks track impairment in specified national parks and wilderness areas. These parks and wilderness areas are called Class I areas and were designated based on an evaluation required by Congress in the 1977 federal Clean Air Act Amendments. The evaluation, which the U.S. Forest Service (USFS) and National Park Service (NPS) performed, reviewed the wilderness areas of national parks and forests that were designated as wilderness before 1977, were more than 6,000 acres in size, and have visual air quality as an important resource for visitors. Of the 156 Class I areas designated across the nation, 12 are located in Arizona (ADEQ 2000).

Following the Class I Area designation, EPA initiated a nationally operated monitoring network in 1987 called the "Interagency Monitoring of Protected Visual Environments Program" (IMPROVE). The original purpose of IMPROVE was to establish a visibility monitoring network to characterize broad regional trends for existing visibility conditions using monitoring data collected in or near Class I Areas across the United States. The IMPROVE network was originally made up of approximately 30 sites in Class I Areas; during the past couple of years the number of sites has increased to almost 110 nationwide. The State of Arizona is a member of the IMPROVE Steering Committee and the Arizona Class I visibility network consists of a combination of visibility monitoring sites established by ADEQ and those established by the IMPROVE committee. The State of Arizona is considering additional network sites as funding becomes available (ADEQ 2000).

3.0 Geology

The Town is located within the Basin and Range Province of southern and western Arizona which is characterized by alternating mountain ranges and broad valleys, most of which were formed by block faulting during the last part of the Cenozoic Era (15-5 million years ago). The mountain ranges are largely composed of granite, basalt, andesite, or schist and related bedrocks of various ages that have been extensively folded and faulted during the Mesozoic and Cenozoic Eras (100-15 million years ago). Broad, gentle sloping dissected fans of old alluvium, extend from relatively narrow recent alluvial flood plains to the bases of foothills or abruptly rising mountains. The intervening valleys form floodplains that are narrow, ranging from $\frac{1}{4}$ to 1 mile in width and are generally underlain by thick sequences of consolidated sediments (mostly, gravel, sand, and silt) that are the main aquifers for the region (ADWR 2001). The delineated study area is located in such a floodplain. It is noted that seven miles downstream from Wickenburg, a major fault crosses the Hassayampa River at a place called "The Narrows." The fault is downthrown to the south and virtually the entire runoff of the Hassayampa River permeates into the bed of the river and recharges the aquifer system (Halpenny and Halpenny, 1988). The Narrows is where the Hassayampa River enters the broad Hassayampa Plain and the Phoenix AMA (ADWR 2001).



Figure 3.1
Downstream on the Hassayampa River

3.1 Soils

The soils in the Wickenburg area contained in the Upper Sonoran Desertscrub biome are predominantly Haplargids (Mohave, Tres Hermanos, Pinaleno, and Vekol series) and make up about 50 percent of this area. Torrfluvents (Glendale, Gila, Anthony and Vinton series) comprise about 15 percent of the area. Lithic Haplargids (Lehmans series), Lithic Torriorthents (Cellar and House Mountain series) and rock outcrop make up about 25 percent of the area. Calciorthids (Latena, Rillino and Nickel series) make up the remaining 10 percent of this area. The majority of these soil series are neutral to moderately alkaline (NRCS 2001).

In the lower elevations of the Sonoran Mohave Desertscrub Mix biome of the Wickenburg area, the soils are thermic. Lithic Haplargids (Lehmans series), Lithic Torriorthents (Cellar, and House Mountain series) and rock outcrop make up about 60 percent of the area. Haplargids (Mojave, Tres Hermanos and Vekol series), and Calciorthids (Latene and Rillino series) comprise about 30 percent of the area. Torrfluvents (Glendale, Gila, Anthony and Vinton series) make up the remaining 10 percent. The majority of these soil series are moderately alkaline (NRCS 2001).



Figure 3.2
Upstream on Hassayampa River and
Sols Wash confluence

3.2 Natural Hazards

Active natural process such as earthquakes, floods, slope failure, and problem soils can cause deaths, injuries and property damage in the Wickenburg area. Unlike its neighbors to the north, west and south, Arizona is seldom thought of as earthquake prone. However, the National Earthquake Hazard Reduction Program has recently categorized Arizona as "high risk" (the second most serious category) in recognition of the State's vulnerability to earthquakes that occur both within and outside its borders (AZGS 2001).

Flooding is the most common, widespread and damaging of all the natural hazards in Arizona. One of the background conditions that actually enable flooding to occur in desert regions is the fact that it does not rain very often. Dry conditions characteristic of desert regions produce thin soils and sparse vegetation. Flash flooding can be particularly dangerous because rain may be falling only in a very small area, with blue sky elsewhere. Highly localized, intense flooding may occur on short stretches of a few washes and nowhere else. The outside banks of bends in stream channels are particularly vulnerable to erosion. In valley regions, stream banks consist of loose silt, sand, and gravel deposits that offer little resistance to erosion. To protect the safety of occupants, and reduce the potential for damage, it is wise to build houses as far away from the banks of a stream as possible (AZGS 2001).

Landslides, rock falls, mudflows, and debris flows are types of mass movements of earth material due to gravity. Such mass movements are one of the most common means by which the earth's surface is shaped over time. Landslides and debris flows are most common in mountainous or hilly terrain. The type of material involved, the proportion of solid versus water, and the speed of the movement classify types of mass movements. Flows consist of material saturated with water that moves as a liquid mass. Slides are masses that travel along the surface, usually as a single, coherent mass. Falls are rocks or material that move in the air as a free-fall, intermittently losing contact with the ground. Material ranges in grain size from clay to boulders. Water content ranges from dry to saturated. Movement can be almost imperceptibly slow to as fast as a car. Debris flows are the most common form of mass wasting in the desert regions of Arizona. Without extensive plant roots to help hold weathered rocks and soil in place, even small rainfalls can cause debris flows. Debris flows, because of their high water content, behave as a slurry and follow drainages (AZGS 2001).

Problem soils in Arizona present a number of hazards to land owners. Expansive (shrink-swell) soils and collapsing soils cause the most problems. Engineering properties of soils are generally related to the type and amount of clay minerals in the soil, conditions under which the clay originated, and original density of the soil. Clay minerals can form in-place by weathering of rocks or they can be transported and deposited by water or wind. Soils that expand or swell typically have a high

content of clay minerals of the smectite family, which includes bentonite and montmorillonite. Expansive clay acts like a sponge, absorbing large amounts of water and subsequently increasing in volume. Expansion of clay minerals can cause building walls and foundations to crack, and road and sidewalks to warp, in a manner similar to frost heaving. Expansive soils are common and widespread in Arizona (AZGS 2001).

The other types of problem soils potentially occurring in Arizona are collapsing soils that are characterized by low moisture content (less than 15%), high porosity (>40%) and low bulk density. In these soils, the particles are loosely packed and have never been subjected to loading. Infrequent rain in the desert southwest seldom penetrates more than a foot or two, and then quickly evaporates, so soils in Arizona usually have very low moisture content even at depth. The clay in these soils acts as sort of glue, holding in place a three-dimensional framework of more or less randomly oriented soil grains. Upon wetting, the clay loses its cohesive strength, resulting in the displacement of the soil particles to a more densely packed configuration. This process, commonly referred to as hydro compaction, is especially troublesome in soils with large amounts of silt (AZGS 2001).

4.0 Biological Resources

The study area consist primarily of native flora and non-native landscaped vegetation dominating the macro biological community, with natural microbiological areas being present along the margins of both Sols Wash and the Hassayampa River. The riparian vegetation immediately adjacent to these stream channels is dominated by galleries of willow and cottonwood, mesquite bosques, and the invasive exotic, Salt Cedar (*Tamarix chinensis*). These native riparian forests are extremely valuable habitat sites for a diverse avifaunal community of resident and neotropical migrant species, and are frequently used for forage and cover by resident and migrant mammals of the region. The perennial reaches of the Hassayampa River, and the spring-fed Palm Lake, are host to a variety of amphibian and fish species. The adjacent upland areas are also the domain of several species of desert birds, mammals and reptiles.

4.1 Ecoregion

The bimodal rainfall pattern of the Sonoran Desert allows for a greater structural diversity than in the Great Basin and Mojave Deserts. The Sonoran Desert differs markedly from the other North American desert biomes, which are dominated by low shrubs, in its arboreal elements and its truly large cacti and succulent constituents. Even in its most arid parts, the Sonoran Desert exhibits tree, tall shrub and succulent life forms along drainages and in other favored habitats. This is particularly true within the study area where the Arizona Upland, Sonoran Desertscrub and Mojave Desertscrub biome subdivisions blend together along the Sonoran Riparian Deciduous Forest and Woodland margins of Sols Wash, the Hassayampa River and the hilly uplands nearby.

4.2 Natural Communities

Upper Sonoran Desertscrub

The most extensive biome of the Arizona Upland subdivision, also referred to as Upper Sonoran Desertscrub, is dominated by a leguminous tree, Littleleaf or Foothill Paloverde (*Cercidium microphyllum*), with the columnar Saguaro cactus (*Carnegiea gigantea*), commonly reaching through the upper strata. This community surrounds the study area and is best developed away from valley floors on bajadas (alluvial fans) and mountainsides. Ironwood (*Olneya testosa*), another tree legume, often plays a secondary role to Paloverde. The two species occupy closely similar ranges within the Sonoran Desert, with Littleleaf Paloverde occurring in this community with greater fidelity. Ironwood is more frost sensitive than Littleleaf Paloverde and is excluded from lower slopes adjacent to cold valley floors and from north slopes that support Littleleaf Paloverde (Brown 1994).

The ecotone between this and the Creosote bush-White Bursage series is a common feature along the margins of the many valleys of the region. As the gently sloping valley floor makes contact with the base of the adjacent bajada or hillside, Triangle-leaf Bursage (*Ambrosia deltoidea*) is commonly found growing along minor watercourses where moisture conditions are more favorable. As greater elevation is attained, the ecologically complementary White Bursage (*Ambrosia dumosa*) wanes and Triangle-leaf Bursage is found on all aspects of the terrain. Littleleaf Paloverde, Ironwood and Saguaro become increasingly prominent and are largely responsible for the arborescent physiognomy of the vegetation. Creosote bush (*Larrea tridentata*) remains but is mostly relegated to an under story role (Brown 1994).

Many additional species are encountered that contribute to the diverse and complex nature of this community. These may include Whitethorn Acacia (*Acacia constricta*), Limber Bush (*Jatropha cardiophylla*), Ocotillo (*Fouquieria splendens*), Jojoba (*Simmondsia chinensis*), Little-leaved Ratany (*Krameria parvifolia*), Desert Hackberry (*Celtis pallida*), Fairy Feather Duster (*Calliandra eriophylla*), Bush Buckwheat (*Eriogonum fasciculatum*), Desert Zinnia (*Zinnia acerosa*), Cilindrillo (*Lycium berlandieri*), and various cacti such as Desert Christmas Cactus (*Opuntia leptocaulis*), Engelmann Prickly Pear (*Opuntia phaeacantha* var. *major* and *discata*), Fish-hook Pincushion (*Mammillaria microcarpa*), Fendler Hedgehog (*Echinocereus fendleri*), and a variety of Cholla (*Opuntia cholla*, spp.). Locally, any or several of these can assume numerical superiority (Brown 1994).

The understories to these Paloverde-cacti mixed scrub canopies consist of perennial and annual grasses and forbs. Bush Muhly (*Muhlenbergia porteri*) is the dominant perennial grass. Rothrock Grama (*Bouteloua rothrockii*) acts as a summer annual grass. Other grasses include Slender Grama (*Bouteloua filiformis*), Purple Three-awn (*Aristida purpurea*), Mesa and Spidergrass Three-awns (*Aristida*, spp.), Arizona Cottontop (*Trichachne californica*), Red Brome (*Bromus rubens*), Slim Tridens

(*Tridens mulicus*), and Curley Mesquite Grass (*Hilaria belangeri*). Major forbs include Spiny Goldenhead (*Acamptopappus*, spp.), Desert Globe Mallow (*Sphaeralcea ambigua*), and Coulter Globe Mallow (*Sphaeralcea coulteri*). Annual grasses and forbs of both winter and summer seasons are well represented in years with favorable moisture. Other shrubs include Flattop Buckwheat (*Eriogonum fasciculatum*), and Desert Buckwheat (*Eriogonum deserticola*). It should be noted that club moss is a very important plant on the hills, and can make up as much as half of the plant composition on the cooler, north facing slopes (Brown 1994).

Because the structural density and adequate winter precipitation, some habitats in the Arizona Upland subdivision adjacent to the study area support moderate densities of Desert Mule Deer (*Odocoileus hemionus crooki*) and Javelina (*Dicotyles tajacu*). Numerous smaller mammals are also at home there, including the California Leaf-nosed Bat (*Macrotus californicus*), California Myotis (*Myotis californicus*), Black-tailed Jackrabbit (*Lepus californicus*), Desert Cottontail (*Sylvilagus auduboni*), Arizona Pocket Mouse (*Perognathus amplus*), Bailey's Pocket Mouse (*Peromyscus baileyi*), Cactus Mouse (*Peromyscus eremicus*), White-throated Wood Rat (*Neotoma albigula*), Gray Fox (*Urocyon cinereoargenteus*), and the endemic Harris Antelope Squirrel (*Ammospermophilus harrisi*) (Brown 1994).

The Paloverde-cacti-mixed scrub series is particularly noted for its rich bird life. Many of its best known inhabitants – the Harris' Hawk (*Parabuteo unicinctus*), White-winged Dove (*Zenaida macroura*), Inca Dove (*Scardafella inca*), Elf Owl (*Micrathene whitneyi*), Wied's Crested Flycatcher (*Myiarchus tyrannulus*), and Pyrrhuloxia (*Cardinalis sinuatus*) – are in fact Desert Thornscrub species extending northward in suitable habitats. Even the "cactus" woodpeckers – the Gila Woodpecker (*Melanerpes uropygialis*), Gilded Flicker (*Colaptes chrysoides*), and Ladder-backed Woodpecker (*Picoides scalaris*) – are in fact quite widespread and not nearly as dependent on the Saguaro as is popularly thought (Brown, 1995). Other "desert" birds, e.g., Curve-billed Thrasher (*Toxostoma curvirostre*), and Cactus Wren (*Campylorhynchus brunneicapillus*) also find these communities acceptable, further enriching the avifaunal community (Brown 1994).

In addition to having a generous compliment of Sonoran and other desert reptiles, this biome is also the distribution center for a number of lizard species and snakes more limited in range. These include the Regal Horned Lizard (*Phrynosoma solare*), Western Whiptail (*Cnemidophorus tigris*), Gila monster (*Heloderma suspectum* – especially the reticulated form), Arizona Glossy Snake (*Arizona elegans noctivaga*), Arizona Coral Snake (*Micruroides euryxanthus*), and Tiger Rattlesnake (*Crotalus tigris*) (Brown 1994).

Sonoran Mojave Desertscrub Mix

Canopies of nearly identical species of large shrubs dominate the potential plant communities in this biome and low trees, with understories of nearly identical species of perennial grasses and forbs as the Arizona Upland listed above. Upland

sites are dominated by large shrubs like Creosote bush (*Larrea tridentata*), Whitethorn Acacia (*Acacia constricta*), Littleleaf Paloverde (*Cercidium microphyllum*), Crucifixion Thorn (*Canotia holacantha*), and Joshua Tree (*Yucca brevifolia*), with understories of Bush Muhly, Big Galleta, Three-awns, Desert Globe Mallow, and Spiny Goldenhead. Large areas of heavily textured uplands and bottoms are open grasslands dominated by Tobosa (*Pleuraphis mutica*). Important shrubs are a mixture of Mojave and Sonoran Desert varieties and include: White, Triangle, and Woolly Fruited Bursages (*Ambrosia*, spp.); Mexican Bladder Sage (*Salazaria mexicana*); Flattop Buckwheat (*Eriogonum*, spp.); and Mormon Tea (*Ephedra antisyphilitica*) (Brown 1994).

Generally, however, the Mojave species are best represented on the level (colder) plains; the Sonoran species favor the bajadas and hills. To the south and west from the Hualapai Mountains, where Mojave Desertscrub contacts the Arizona Upland subdivision of the Sonoran Desertscrub biome near Wickenburg, boundaries separating the two biomes are increasingly difficult to discern. Along this entire interface, definition of the boundary separating these two desert scrub biomes is largely arbitrary regardless of whether one relies on physiographic, climatic, or biotic criteria (Brown 1994).

The Joshua Tree (*Yucca brevifolia*) is the best-known Mojave Desert endemic; yet in few places can it be used to characterize this biome because of the plant's rather limited occurrence there. It is found along the entire eastern periphery of the Mojave Desert where this biome grades upslope into the cooler, moister vegetation of the Arizona Upland. Joshua Trees make contact with the Sonoran Desert in west-central Arizona in the area of Wickenburg because of the area's higher elevation and more generous precipitation. They normally grow on sandy, loamy, or fine gravelly soils where runoff is probably minimal, suggesting the species has relatively high moisture requirements. Published data suggests that after Joshua Trees have reached a certain age, the plant requires an annual cool-season exposure to low temperatures for optimal growth later during the warm season (Brown 1994).

It should be noted that the avifauna and the herpetofauna are similar to the mammal fauna present in the Sonoran Desertscrub biome, in that there is a relatively low level of taxonomic differentiation exhibited within the Mojave Desertscrub biome. The conclusion that the Mojave is a transitional desert differentiated at the subspecific level was derived from analysis of distributional data for amphibians, reptiles, birds and mammals (Brown 1994).

Sonoran Riparian Deciduous Forest and Woodlands

This is the biome of specific interest within the delineated study area. Several of the plant and animal species listed in the previous section describing the Sonoran Desertscrub biome occur in these riparian corridors, but their community structure and function are differentiated in the ephemeral, intermittent and perennial reaches of these riparian ecosystems.

The Hassayampa River watershed drains 1,470 square miles of land stretching from the Bradshaw Mountains to the Gila River. Of thirty (30) Sonoran Desert river systems in Arizona, the Hassayampa is one of only four (4) remaining diversion rivers. The river is perennial for several miles in the Hassayampa River Wilderness Area and in the Box Canyon above the study area. The Hassayampa River becomes intermittent and/or ephemeral across most of the study area, and then once again becomes a perennial stream at the lower end of the study area near the Hassayampa River Preserve.

The riparian corridor adjacent to the delineated study area is comprised of associations of Fremont Cottonwood (*Populus fremontii* var. *variabilis*, or *P. dimorpha*), Goodding's Willow (*Salix gooddingii* var. *macdougalii*), Desert Willow (*Chiopsis linearis*), and/or Velvet Mesquite (*Prosopis velutina*) "bosques" (woodlands), interspersed with areas of the invasive exotic Saltcedar (*Tamarix ramosissima* var. *chinensis*). These cottonwood-willow forests remain largely restricted to the immediate floodplains of perennial, or at least intermittent flowing streams, where periodic winter-spring flooding, and/or the occasional summer rainstorm maintain them. Mesquite bosques attain their maximum development on alluvium of old dissected floodplains, especially those laid down at the confluence of major watercourses and their larger tributaries. Consequently, these higher "secondary" floodplains are commonly 5 to 20 feet (1.5 to 6 meters) above the river channel (Brown 1994).

Historically, annual and perennial grasses (e.g., Vine-mesquite Grass, *Panicum obtusum*), forbs (e.g., Careless Weed, *Amaranthus palmeri*), and in more saline areas, Saltbushes (*Atriplex polycarpa*, *A. lentiformis*, *Suaeda torreyana*) constituted the understory in mature bosques. The interior of mesquite bosques was typically open and park-like. Old, fire-scarred trees predominated. Today, because of grazing and other disturbances, a number of introduced forbs and grasses such as Filaree (*Eriodinium cicutarium*), mustards (*Cruciferae*, spp.), Yellow Rocket (*Sisymbrium irio*), and in more open spaces, Red Brome (*Bromus rubens*), are frequently encountered understory species. Blue Paloverde (*Cercidium floridum*), Catclaw Acacia (*Acacia greggii*) and Ironwood (*Olneya tesota*) can be common in more arid locations. Graythorn (*Zizyphus obtusifolia*) or one or more of the Allthorns (*Lycium fremontii*, *L. andersonii*, *L. berlandieri*) frequently occupy an occasional opening or sunny place along with young mesquites (Brown 1994).

Nesting use of such Sonoran Riparian Deciduous Forests by colonies of White-winged Dove (*Zenaida asiatica*) and Mourning Dove (*Zenaida macroura*) has been well documented. Their importance to other avian species such as the Northern Goshawk (*Accipiter gentiles*), American Peregrine Falcon (*Falco peregrinus anatum*), Lucy's Warbler (*Vermivora luciae*), Vermillion Flycatcher (*Pyrocephalus rubinus*), Abert's Towhee (*Pipilo aberti*), Cardinal (*Cardinalis cardinalis*), Pyrrhuloxia (*Cardinalus sinuatus*), Phainopepla (*Phainopepla nitens*), Varied Bunting (*Passerina versicolor*), Southwestern Willow Flycatcher (*Empidonax traillii extimus*), Yuma

Clapper Rail (*Rallus longirostra yumaensis*), and others have also been well documented (Brown 1994).

Riparian cottonwood-willow forests determine the northern nesting distribution of a number of Neotropical raptors, such as the Gray Hawk (*Buteo nitidus*), in addition to a number of other tropical-subtropical species, e.g., Rose-throated Becard (*Platysaris aglaiae*) and Thick-billed Kingbird (*Tyrannus crassirostris*). These riparian gallery forests also provide nesting sites for the southernmost Bald Eagle (*Haliaeetus leucocephalus*). Other localized nesting species are the Western Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*), Great Blue Heron (*Ardea herodias*), Mississippi Kite (*Ictinia mississippiensis*), Gambel's Quail (*Lophortyx gambelii*), Black-tailed Gnatcatcher (*Polioptila melanura*), Brown Towhee (*Pipilo fuscus*), Say's Phoebe (*Sayornis saya*) and Crissal Thrasher (*Toxostoma dorsale*) (Brown 1994).

The faunal constituents of this biome are both residents and migrants. The Desert Pocket Mouse (*Perognathus penicillatus*) often occupies mesquite bosques as a result of its preference for deep, sandy, rock-free soils. The Silver-haired Bat (*Lasionycteris noctivagans*), Big Brown Bat (*Eptesicus fuscus*), and Lesser Long-nosed Bat (*Leptonycteris curasoae yerbabuenae*) often roost in trees such as cottonwood. Because the Hassayampa River is a perennial stream for several miles adjacent to the Hassayampa River Preserve, many faunal species have been recorded in this vicinity, and unfortunately some of these observations consisted primarily of "road-kills" along the adjacent highway. Species sighted and/or recorded include Desert Mule Deer (*Odocoileus hemionus crooki*), Mountain Lion (*Felis concolor*), Javelina (*Dicotyles tajacu*), Raccoon (*Procyon lotor*), Gray Fox (*Urocyon cinereoargenteus*), Bobcat (*Felis rufus*), and Coyote (*Canis latrans*). Historical records indicate that Sonoran Pronghorn Antelope (*Antilocarpa americana sonoriensis*) have ranged throughout the study area in the past, and that Sonoran Desert Tortoise (*Gopherous agassizii*) Class II habitat is located to the southwest of the study area (Brown 1994).

4.2.1 Sensitive Species

The U.S. Fish and Wildlife Service's (USFWS) list of endangered, threatened, candidate, and proposed species of native plants and wildlife for Maricopa County which have either been recorded within the study area, or could potentially occur in proximity to the study area, according to historical sources, include the following native plants and wildlife species (USFWS 2001). In addition, the Arizona Game and Fish Department (AZGFD) protects certain native plant species through specific designations under the Arizona Native Plant Law (NPL), and wildlife species of special concern in Arizona (WC). The AZGFD's Heritage Data Management System (HDMS) was also accessed and current records show that certain special status species (NPL, WC) listed below (noted by an asterisk), have been documented as occurring within three miles of the study area. The study area does not contain any proposed or designated Critical Habitats (AZGFD 2001). For this report, it was not

assessed whether any special status species actually are known to occur in the specific study area.

Table 4.1 Plants

<u>Common Name</u> <u>Status</u>	<u>Scientific Name</u>	<u>Listing</u>
Arizona Cliffrose	<i>Purshia subintegra</i>	LE; NPL (SR)
Hohokam Agave	<i>Agave murpheyi</i>	SC; NPL (HS)*
Ripley Wild Buckwheat	<i>Eriogonum ripleyi</i>	SC; NPL (SR)
Varied Fish-hook Cactus	<i>Mammillaria viridiflora</i>	NPL (SR)

Table 4.2 Wildlife

Bald Eagle	<i>Haliaeetus leucocephalus</i>	LT; WC
Southwestern Willow Flycatcher	<i>Empidonax traillii extimus</i>	LE; WC*
Desert Pupfish	<i>Cyprinodon macularius</i>	LE; WC*
Bonytail	<i>Gila elegans</i>	LE; WC*
Gila Topminnow	<i>Poeciliopsis occidentalis occidentalis</i>	LE; WC*
Razorback Sucker	<i>Xyrauchen texanus</i>	LE; WC
Lesser Long-nosed Bat	<i>Leptonycteris curasoae yerbabuenae</i>	LE; WC
Arizona Skink	<i>Eumeces gilberti arizonensis</i>	SC; WC*
Lowland Leopard Frog	<i>Rana yavapaiensis</i>	SC; WC*
American Peregrine Falcon	<i>Falco peregrinus anatum</i>	SC; WC
Western Least Bittern	<i>Ixobrychus exilis hesperis</i>	SC; WC
Sonoran Desert Tortoise	<i>Gopherous agassizii</i>	SC; WC
Longfin Dace	<i>Agosia chrysogaster</i>	SC*
Arizona Toad	<i>Bufo microscaphus microscaphus</i>	SC*
Speckled Dace	<i>Rhinichthys osculus</i>	SC
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	C*
Western Red Bat	<i>Lasiurus blossevillii</i>	WC*
Snowy Egret	<i>Egretta thula</i>	WC*

Note: LT – Listed Threatened; LE – Listed Endangered; SC – Species of Concern; C – Candidate Species (USFWS); HS – Highly Safeguarded: no collection allowed; SR – Salvage Restricted: collection only with permit (NPL); WC – Wildlife of Special Concern in Arizona (AZGFD). Critical habitat (designated July 22, 1997; 62 FR 39129) for the Southwestern Willow Flycatcher was set aside by the 10th Circuit Court of Appeals on May 11, 2001(AZGFD 2001).

4.3 Water Resources

The Hassayampa River watershed drains an area of approximately 1,470 square miles in central Arizona. This hydrographic basin has been assigned a "hydrologic unit code" (HUC) of #15070103 by the U.S. Geological Survey (USGS). The headwaters for this hydrographic basin originate in the northern Bradshaw Mountains and flow southward through the Upper Hassayampa groundwater basin to the Gila River within the Phoenix active groundwater management area (AMA). The watershed boundaries are the Bradshaw Mountains to the north and east, the White Tanks to the southeast, and the Weaver, Date Creek, Vulture and Big Horn Mountains to the west.

4.3.1 Surface Water

There have been several stream gages on the Hassayampa River at various locations since 1910. The USGS has established and abandoned at least eight gages upstream from the Hassayampa Plain. Currently, the USGS only maintains two gages: #09516500 is near Morristown, seven miles south of Wickenburg, and #9517000 is near Arlington, 1.8 miles upstream from the Gila River. Both gages only record flood runoff events and do not record flows that average less than 500 cubic feet per second (cfs) in a 24-hour period. The average annual runoff for the upper Hassayampa watershed has been estimated from a compilation of gauging records from 1939 through 1982. A 44-year rounded average of 16,800 acre-feet per year flows into the Hassayampa Plain and infiltrates into the groundwater aquifer. Flow rarely reaches the Gila River confluence during storm runoff. Most years there is zero flow across the Hassayampa Plain (ADWR 2001).

There are several miles of perennial stream flow in the Hassayampa River Canyon Wilderness area about eight miles northeast of Wickenburg. There are also a few miles of perennial flow in the Hassayampa River downstream of the Sols Wash confluence and adjacent to the Hassayampa River Preserve. In other reaches of the river, the water flows underground until it either reaches a cross section of shallow bedrock which causes the water to flow intermittently on the surface, or when a rainfall event is large enough to bring the entire flow to the surface of the river corridor.

There has been several record flooding events recorded for both Sols Wash and the Hassayampa River near Wickenburg during the late 1990's. On February 15, 1995, a peak discharge of 8,109 cfs was recorded (approximately the 5-year event for this site) at the Maricopa County Flood Control District (FCDMC) gage #5228 which is located in the Town of Wickenburg on the right, downstream side of the U.S. Highway 60 bridge over the Hassayampa River. The gage is located on the left side of the first pier from the right bank. This location is immediately downstream of the confluence with Sols Wash.

amount of water for a stated beneficial use each year, subject only to the rights of prior appropriators (ADWR 2001).

Most of the surface water rights established before or after the enactment of the Public Water Code of 1919 have ever been litigated/adjudicated. Also, the water reserved for Indian reservations and federal government purposes is under ongoing review at this time. The general adjudication of water rights in the Gila River and Little Colorado River watersheds will affect the status of all rights to use surface water in these watersheds (ADWR 2001). It should be noted that the Hassayampa River is a tributary to the Gila River, which in turn is tributary to the Colorado River, and therefore is considered as a part of the Lower Colorado River watershed.

4.3.2 Groundwater

The mountains of the Hassayampa River hydrographic basin are composed of crystalline and sedimentary rocks. Elevations in the area range from 2,000 feet to over 7,000 feet (610 to over 2,134 meters). The main water-bearing unit is the basin-fill deposits, which are found in the valleys between the mountains. These deposits consist of gravel, sand, silt, and clay and may yield several hundred gallons per minute (gpm) to wells. Where fractured, the crystalline and consolidated sedimentary rocks that make up the mountains may yield less than 10 gpm. In the alluvial basin north of the Vulture Mountains, the main water-bearing unit ranges from a few tens of feet thick near the margins to over 1,000 feet (305 meters) thick toward the middle of this basin. In a few areas along the Hassayampa River, only a thin cover of stream deposits overlies the crystalline rock. Near the town of Wagner, these deposits are up to 135 feet (41 meters) thick (ADWR 2001).

Depth to groundwater varies across the basin. Water levels range from a few feet below land surface along the Hassayampa River to over 1,000 feet (305 meters) below land surface toward the middle of this basin. Approximately 1.1 million acre-feet of groundwater are in storage up to 1,200 feet (366 meters) below land surface. An estimated 1,450 acre-feet of groundwater were pumped from the basin in 1985. Most of the pumpage was for irrigation, livestock, and domestic and public water supply purposes. Despite groundwater pumpage there has been little regional decline in water levels in the basin, which suggests that the area is still in a steady-state condition. Large short-term changes in water level do occur, however, where water levels are directly influenced by precipitation and stream flow rates (ADWR 2001).

The Hassayampa River hydrographic basin is outside the boundaries of the Phoenix active groundwater management area (AMA). The separate administration of surface water and groundwater is one of the legal factors affecting water management in Arizona. The legal separation of these two types of waters requires a water manager to determine what type of water is at issue before it can be determined what law is applicable. Determining when hydrologically connected

waters separate into surface water and "percolating groundwater" is currently an issue in the current water rights adjudications (ADWR 2001).

Groundwater quality in the study area is generally good. In most wells dissolved solids concentrations are below the maximum contaminant level set at 500 milligrams per liter (mg/L) for public water supplies. Groundwater is the primary source of drinking water in the Town, and the inorganic chemical analysis reports for the Barnett, Sols Wash and Remuda public water supply wells dated November 13, 2001 did not exceed any of the maximum contaminant levels (MCL) for the parameters tested (Appendix A).

The monitoring and assessment of primary and secondary water quality standards for potable water is performed under the statutory authority of the ADEQ Drinking Water Section's Monitoring and Assessment Unit. The Monitoring and Assessment Unit administers the Monitoring Assistance Program (MAP), the Source Water Assessment Program (SWAP) and Wellhead Protection Program (WHP). MAP provides for the collection, transportation, and analysis of baseline volatile organic chemicals (VOCs), synthetic organic chemicals (SOCs), and inorganic chemicals (IOCs) samples except for asbestos, lead, copper, nitrates, and nitrites. SWAP consists of evaluating the degree to which public water systems are protected or at risk from potential contamination. WHP is a voluntary program, which assists local communities in implementing measures to protect their drinking water supplies (ADEQ 2001).

5.0 Land Use

Most of Sols Wash/Hassayampa River floodplain, as a whole, has been altered from its natural state. Some of the development has been limited to agricultural uses; but increasingly, the area is being converted to urban development.

Combined Highway 60 and 89 parallels the river on the east bank, south of Wickenburg, then crosses the flood plain in Wickenburg. The Santa Fe Railroad crosses the river near the downstream study limit, then parallels the flood plain on the west bank up to Wickenburg.

A few commercial and public structures in Wickenburg as well as portions of several residential areas are in the 100-year floodplain. As population and tourism increase in the study area, much of the floodplain currently utilized for agricultural purposes will come under increasing pressure to be developed.

5.1 Historic Settlement

The history of Wickenburg began with Spanish explorers who came to the area during the late 1600s and again in the early 1700s, bringing with them horses that were eventually acquired by the local Apache Indians. They were followed by Mexican immigrants and Anglo-American prospectors who found valuable ore

deposits in the local hills and mountains. In 1863, Henry Wickenburg discovered a rich ore body and named it the Vulture Mine. The local community was named after him, and the Vulture Mine eventually produced nearly \$30M of gold. Cattle ranching and crop production became profitable enterprises in the area, providing food to the local miners and other residents. Other gold finds had been made north of Wickenburg, near Congress Junction, and by 1895, a spur railway came into Wickenburg and Congress from Prescott. Hotels and saloons were constructed on Railroad Street in Wickenburg, and a Wells Fargo freight office was soon opened.

Aside from the more substantial buildings on Railroad Street, most of the other structures, e.g., the ice company, a pool hall, barber and bath shops, and the livery stable, were very basic wooden buildings, constructed without much artistic design or serious thought of permanence. However, several pioneer families built more long-lasting homes out of cement blocks or wood and stucco. The original bank and school were built more sturdy with red brick. As Congress and other nearby mining towns exhausted their ore bodies and began to depopulate, Wickenburg managed to survive by continuing the cattle ranching industry. During the early 1900s, the large cattle ranches developed into guest ("dude") ranches for urbanized Americans who wanted to experience a taste of the Old West.

5.2 Visual and Aesthetic Resources

The rural and historic ranching character of the Town and the surrounding area support a healthy tourism industry. The Desert Caballeros Western Museum, the Del E. Webb Center for the Performing Arts, a rodeo arena, three municipal parks and two golf courses offer exciting activities inside the town. The surrounding Upper Sonoran Desert and numerous mountain ranges offer various opportunities for both active and passive forms of outdoor recreation. The nearby perennial reaches of the Hassayampa River offer a unique recreational experience in a desert environment located away from a major populated area.

6.0 Cultural Resources

Cultural resources include archaeological sites and artifacts, historical districts, buildings and artifacts, and the location of parks and preserves.

6.1 Archaeological Resources

A review of available literature does not indicate the presence of any known locations of archaeological sites within or immediately adjacent to the study area.

6.2 Historical Properties

Many of the buildings in the Town can be considered historical simply by their age. The Santa Fe Railroad Depot on Railroad Street is one of 23 buildings on the National Register of Historic Places. The railroad depot has been adaptively reused

as the Town's Visitor Information Center and also serves as the office for the Chamber of Commerce (NPS 2001).

Within the delineated study area, one site was found that is listed as historic. The Hassayampa River Preserve's headquarters were once a part of the Frederick Brill Ranch, and is now listed on Arizona's State Register of Historic Places. The four-room adobe core of the preserve's Arthur L. Johnson Visitor Center was built in the 1860s. Brill, a Russian immigrant, assumed ownership of the property around 1871 and raised cattle, operated a stagecoach way station, raised fruit from extensive orchards, and operated the first carp farm in Arizona near the spring-fed Palm Lake. In 1913 the Brill Ranch became one of Arizona's first guest ranches when new owners transformed it into the "Garden of Allah." Later it was called the Lazy RC Ranch. The Nature Conservancy purchased the Hassayampa River Preserve in December 1986.

6.3 Parks and Preserves

The 11,840-acre Hassayampa River Canyon Wilderness area was established in 1990, and is located approximately 8 miles northeast of Wickenburg. The wilderness includes several miles of perennial, free-flowing Hassayampa River and its associated riparian habitat. The side canyons and the adjacent uplands support chaparral, Paloverde and Saguaro plant communities. Recreation opportunities such as extended horseback riding and backpacking trips; sightseeing and photography are enhanced by the diverse topography, scenic character, and size, as well as the botanical, wildlife, and cultural values of the area.

The Hassayampa River Preserve is located approximately 3 miles southwest of Wickenburg. The preserve is adjacent to the only other perennial reach of the Hassayampa River outside of the Hassayampa River Canyon Wilderness. Over 230 species of birds have been recorded living, nesting and migrating in this unique riparian corridor of mature willow-cottonwood gallery forests. The spring-fed Palm Lake is a unique four-acre pond and marsh habitat located within the preserve. This open body of water attracts a diverse population of avian species, and the mature willows around the lake provide vital nesting habitat for the endangered Southwestern Willow Flycatcher (*Empidonax traillii extimus*).

7.0 Findings

The study area adjacent to the Town contains two significant stream channels, the lower reach of Sols Wash near its confluence with the Hassayampa River, and the Hassayampa River itself which flows underground for most of the year, except where it encounters shallow bedrock in the reach adjacent to the Hassayampa River Preserve, which has a perennial flow. These stream channels are bordered by both emergent and mature native riparian vegetation, which provide habitat for a number of wildlife species. Both of these stream channels have a history of major flood

events that have caused damage to adjacent structures and property in the recent and historical past (FCDMC 2001).

The study area was visited on November 15, 2001, in order to visually observe existing conditions within the study area and adjacent upland areas, and to meet with officials of the Town, and the manager of the Hassayampa River Preserve. Both Sols Wash and the Hassayampa River were dry on the date of the site visit, with the exception of the reach of the Hassayampa River adjacent to the Hassayampa River Preserve.

The Wickenburg area retains a high degree of air quality, and along with good visibility, continues to be a major tourist attraction due with these two environmental qualities remaining high as historically experienced. As the population of the Phoenix metropolitan area continues to expand toward the northwest, both the air quality and visibility in the vicinity of the study site may eventually become more directly affected.

The Natural Resource Conservation Service (NRCS) has recently completed an Emergency Watershed Protection project in Sols Wash just above the confluence with the Hassayampa River inside the Town limits. This restoration of bank protection included the excavation of 3,750 cubic yards of sediment and the discharge of 6,000 cubic yards of rock riprap for the stabilization of 3,062 feet of stream bank. This project was completed under Nationwide Permit 37 (Emergency Watershed Protection and Rehabilitation), pursuant to Section 401 and 404 of the federal Clean Water Act (NRCS 2001).

The location of the Sols Wash, Remuda Ranch and Barnett public water supply wells were noted, and the depth to groundwater in these three wells has historically ranged between 15-39 feet below ground surface (Appendix A). The more shallow groundwater levels could possibly explain the continued presence of the willow-cottonwood gallery forests and Mesquite bosques along the margin of Sols Wash and the Hassayampa River, even though the majority of the reaches of these two stream channels within the study area only flow above surface intermittently over the course of a year.

Following the site visit, additional information was gathered on the viability of wildlife species in the area. As mentioned in previous sections, there is a great variety of resident and migratory wildlife species present in and adjacent to the study area, including large mammals. The AZGFD HDMS data are not intended to include potential distribution of special status species in the study area. Arizona is large and diverse with plants, animals, and environmental conditions that are ever changing. Many areas may contain species that biologists do not know occur there. Not all of Arizona has been surveyed for special status species, and surveys that have been conducted have varied greatly in their scope and intensity (AZGFD 2001). However, the Hassayampa River drainage definitely serves as a migratory corridor for various species of birds and mammals between the perennial reach of the stream adjacent

to the Hassayampa River Preserve and the perennial reach of the stream in the Hassayampa River Canyon Wilderness area, located approximately 11 miles upslope.

8.0 Summary

The study area contains a mixture of natural and developed areas adjacent to the Town. Future land-use planning for this area will involve consideration of the historic patterns of flood inundation of lands adjacent to both Sols Wash and the Hassayampa River, i.e., the base flood elevation. The development of a floodplain ordinance by the Town in compliance with the Federal Emergency Management Agency (FEMA) floodplain boundaries, State of Arizona Standards for floodplain management, and the Maricopa County Flood Control District (FCDMC) floodplain regulations would also allow for the consideration of utilizing any designated setback zones as opportunities for natural resource conservation and recreation through conservation easements.

The review of the AZGFD HDMS information on special status species for this study does not substitute for an official agency review of project proposals, and will not decrease requirements by resource agencies to review and evaluate new project proposals and sites. The AZGFD has also indicated a concern about other resource values, such as other wildlife, including game species, and wildlife-related recreation. The AZGFD and other agencies will need to be consulted and provided the opportunity to provide an evaluation of impacts to wildlife or wildlife habitats associated with project activities occurring in the study area, when specific details regarding a proposed activity become available (AZGFD 2001).

9.0 Regulatory Requirements

Depending upon the anticipated development or proposed activity within and/or immediately adjacent to the delineated study area, there are varying regulatory requirements that may need to be addressed. Such requirements may be present at the federal, state and/or local level, depending upon the nature of the proposed activity.

9.1 Compliance Framework

There are several federal, state and/or local laws, regulations and policies guiding land-use decisions, particularly those that could potentially affect riverine areas. A project proponent should consult with the responsible regulatory agencies early in the project planning process in order to identify which regulations and/or permit processes might impinge upon successful completion of the desired activity.

Depending on the type of future activity proposed within the study area, there may or may not be a requirement to apply for a federal permit to be issued under Section

404 of the Clean Water Act (33 U.S.C. 1344). For activities that would potentially impact the bed and/or bank of either Sols Wash or the Hassayampa River, which have previously been delineated as "waters of the United States," the project proponent would be wise to request a permit application packet from the USACE Regulatory Branch early in the project planning phase in order to determine whether the proposed activity would require a specified type of permit. If the USACE Planning Division should determine that some future project meets the definition of a "federal interest" for a Civil Works project, then the permit process would in most cases follow a formal Environmental Assessment by the USACE Environmental Resources Branch.

The decision by the USACE whether to issue such a federal permit will be based on an evaluation of the probable impact, including cumulative impacts, of the proposed activity on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefit that reasonably may be expected to accrue from the proposal must be balanced against its reasonably foreseeable detriments. All factors that may be relevant to the proposal will be considered including the cumulative effects thereof. Factors that will be considered include conservation, economics, aesthetics, general environmental concerns, wetlands, cultural values, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shoreline erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food production and, in general, the needs and welfare of the people. In addition, if the proposal would discharge, dredged or fill material, the evaluation of the activity will include application of the EPA Guidelines (40 CFR 230) as required by Section 404 (b)(1) of the Clean Water Act. The applicant may also be required to obtain water quality certification, under Section 401 of the Clean Water Act, from the Arizona Department of Environmental Quality and/or the EPA. In addition, the applicant may be required to address the occurrence of any cultural resources within the project area, and indicate whether the proposed activity would affect federally-listed endangered or threatened species, or their delineated critical habitat.

The Director of the Arizona Department of Water Resources under authority outlined in ARS 48-3605(a) established several State Standards for Floodplain Management. Of particular interest to this delineated study area are State Standard SS1-97, "Requirement for Flood Study Technical Documentation," State Standard 2-96, "Requirement for Floodplain and Floodway Delineation in Riverine Environments," and State Standard 6-96, "Development of Individual Residential Lots Within Floodprone Areas" (Appendix B). Depending upon the nature and scope of any future activity within or immediately adjacent to the delineated study area, additional regulatory concerns at the state level may include compliance with the State of Arizona regulations dealing with listed "species of special concern" and their requisite habitats, and potentially with the collection and/or removal requirements of the Arizona Native Plant Law.

Other regulatory issues related to the delineated study area of Sols Wash and the Hassayampa River involve the continued compliance under the existing NPDES permit for the discharge of treated effluent from the Town of Wickenburg's wastewater treatment facility to the Hassayampa River. There is also the continued compliance with planning guidelines and zoning ordinances for properties and operations located within or immediately adjacent to Sols Wash and the Hassayampa River.

10.0 Consultation and Coordination

For the purposes of this environmental site characterization, consultation included the review of information available from the U.S. Geological Survey (USGS), the Natural Resources Conservation Service (NRCS), the Environmental Protection Agency (EPA), the Arizona Department of Environmental Quality (ADEQ), Maricopa County Flood Control District (MCFCD), National Park Service, Desert Research Institute, the U.S. Fish and Wildlife Service, the Arizona Game and Fish Department (AZGFD), and academic research sources.

The information gathered from these agencies in support of establishing this environmental site characterization included personal conversations with agency officials, agency publications and project reports, and information available through sources of online research and publication. Depending upon the nature and extent of any future activity, these agencies must again be contacted for more site-specific information as the project or activity warrants, and additional site reconnaissance may also be required.



Los Angeles District

**MARKET VALUE APPRAISAL
OF THE WASH AND RIVER BED
PROPERTY LOCATED AT
THE CONFLUENCE OF SOLS WASH
AND THE HASSAYAMPA RIVER
WICKENBURG, ARIZONA**

REAL ESTATE APPENDIX C

**100% Submittal
April 2002**

**U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT
SOUTH PACIFIC DIVISION**

Prepared By

**MONTANDON FARLEY RE-AD GROUP INC.
1480 East Bethany Home Road, Suite 220
Phoenix, Arizona 85014**



MONTANDON FARLEY
RE-AD GROUP INC.
REAL ESTATE ADVISORS & APPRAISERS

March 22, 2002

U.S. Army Corps of Engineers
Water Resources Planning Set C
3636 N Central Avenue, Suite 740
Phoenix, AZ 85012-1936

Attn: Mr. Joseph Dixon

RE: The property at the confluence of Sols Wash and the Hassayampa River,
Wickenburg, Arizona; Contract No. DACW09-02-P-0020

At your request and for the purpose of estimating its market value, we have made relevant investigations and have inspected the above-referenced property.

The property is legally and otherwise described in the attached report containing data and discussions from which, together with our experience as appraisers, the value estimate was formed. This report has been prepared in accordance with the appraisal reporting guidelines of the Uniform Standards of Professional Appraisal Practice (USPAP) as established by the Appraisal Foundation, and the Standards of Professional Practice as defined by the Appraisal Institute. It is also intended to comply with the appraisal guidelines of U.S. Army Corps of Engineers.

After considering all of the facts available to us, subject to the underlying assumptions and limiting conditions contained herein, it is our opinion that the fee simple interest in the subject property had a market value, as of March 14, 2002, of

\$20,000

Sincerely,

Wendell L. Montandon, MAI
Certified General Real Estate Appraiser
Certificate Number 30159, State of Arizona

:mb

EXECUTIVE SUMMARY

Location: At the confluence of Sols Wash and the Hassayampa River, Wickenburg, Arizona

Owned By: George David Underdown and Gloria Underdown

Assessor's Parcel Nos.: 505-16-014A, 505-15-036J

Effective Date: March 14, 2002

Interest Valued: The fee simple interest

Land Area: Total Net Area - 331,056 square feet, or 7.6 acres

Configuration: Very Irregular

Zoning: R1-12, Single Family Residential, by the city of Wickenburg; however the entire site is in the floodway portion of Flood Zone AE and is essentially unbuildable.

Improvements: There are no improvements on the subject property.

Valuation Approaches:
Sales Comparison Approach \$20,000

"As Is" Value Conclusion: \$20,000

Exposure Time: Estimated at 12 months

Marketing Time: Estimated at 12 months

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PURPOSE OF THE APPRAISAL

The purpose of this summary appraisal report is to provide the appraiser's best estimate of the market value in a complete appraisal assignment, as of March 14, 2002, of the fee simple interest in the property at the confluence of Sols Wash and the Hassayampa River, in Wickenburg, Arizona.

We have not been provided with a legal description of the property. We have been provided with a "Map of Underdown Property" prepared by Yost & Gardner Engineers. The property is also identified as Maricopa County Assessor's parcel numbers 505-16-014A, 505-15-036J. A copy of the Assessor's plat with the subject outlined in red is included on the following page.

The property consists of 7.6 acres of flood prone land between U.S. Highway 93 and the main channel of the Hassayampa Riverbed, directly north of Downtown Wickenburg.

This is a Summary Appraisal Report, which is intended to comply with the reporting requirements set forth under Standards Rule 2-2(b) of the Uniform Standards of Professional Appraisal Practice for a Summary Appraisal Report. As such, it presents only summary discussions of the data, reasoning, and analyses that were used in the appraisal process to develop the appraiser's opinion of value. Supporting documentation concerning the data, reasoning and analyses is retained in the appraiser's file. The depth of discussion contained in this report is specific to the needs of the client and for the intended use stated within this report. The appraiser is not responsible for unauthorized use of this report.

Materials provided to us for preparation of this report include:

1. Parcel Numbers
2. Map of the subject property
3. Aerial photo with subject overlay

Function of the Appraisal

This report is intended for use only by the U.S. Army Corps of Engineers and the Town of Wickenburg as a guideline as to a price to offer the owner in an attempt to acquire the site. Use of this report by others, or for any other use, is not intended by the appraisers.

DEFINITIONS

Market Value, as specified by the Office of the Comptroller of the Currency (OCC), the Board of Governors of the Federal Reserve System (FRS) and the Federal Deposit Insurance Corporation (FDIC) in compliance with Title XI of the Federal Financial Institutions Reform, Recovery and Enforcement Act (FIRREA) of 1989, is as follows:

The most probable price which a property should bring in a competitive and open market under all conditions requisite to a fair sale, the buyer and seller each acting prudently, knowledgeably, and assuming the price is not affected by undue stimulus. Implicit in this definition is the consummation of a sale as of a specified date and the passing of title from seller to buyer under conditions whereby:

- a. buyer and seller are typically motivated;
- b. both parties are well informed or well advised, and acting in what they consider their own best interests;
- c. a reasonable time is allowed for exposure in the open market;
- d. payment is made in terms of cash in U.S. dollars or in terms of financial arrangements comparable thereto; and
- e. the price represents the normal consideration for the property sold unaffected by special or creative financing or sales concessions granted by anyone associated with the sale.

Fee simple estate is defined as:

Absolute ownership unencumbered by any other interest or estate, subject only to the limitations imposed by the governmental powers of taxation, eminent domain, police power, and escheat.¹

Market value "As Is" is defined as:

An estimate of the market value of a property in the condition observed upon inspection and as it physically and legally exists without hypothetical conditions, assumptions or qualifications as of the date of inspection.

¹ *The Dictionary of Real Estate Appraisal*, Third Edition, Appraisal Institute, (Chicago, Illinois: 1993), p. 140.

APPRAISAL DEVELOPMENT AND REPORTING PROCESS

The scope of this assignment included an on-site inspection of the property; discussions with the owners' representative and a review of the parcels' physical features, such as access, zoning, flood zone status and utility availability. Recent sales of similar properties were confirmed. The most pertinent market data collected is presented in the Sales Comparison Approach used herein to value the property.

This summary appraisal report is a brief recapitulation of the appraisers' data, analyses and conclusions. Supporting documentation is retained in the appraisers' file.

TOWN OF WICKENBURG

Wickenburg is located approximately fifty (50) miles northwest of Metropolitan Phoenix at an elevation of 2,100 feet. Nestled in the foothills of the Bradshaw Mountains and along the banks of the Hassayampa River, Wickenburg boasts a rich western history that is still evident today. In 1863, Henry Wickenburg discovered the Vulture Mine that in time produced more than \$30 million and became the richest gold producing mine in Arizona's history. In the early 1900's, as the mine played out, ranching and tourism took over as economic mainstays in the area. In 1909, the Town of Wickenburg was incorporated. Today, tourism, retirement living and light industry contribute to a diversified economy.

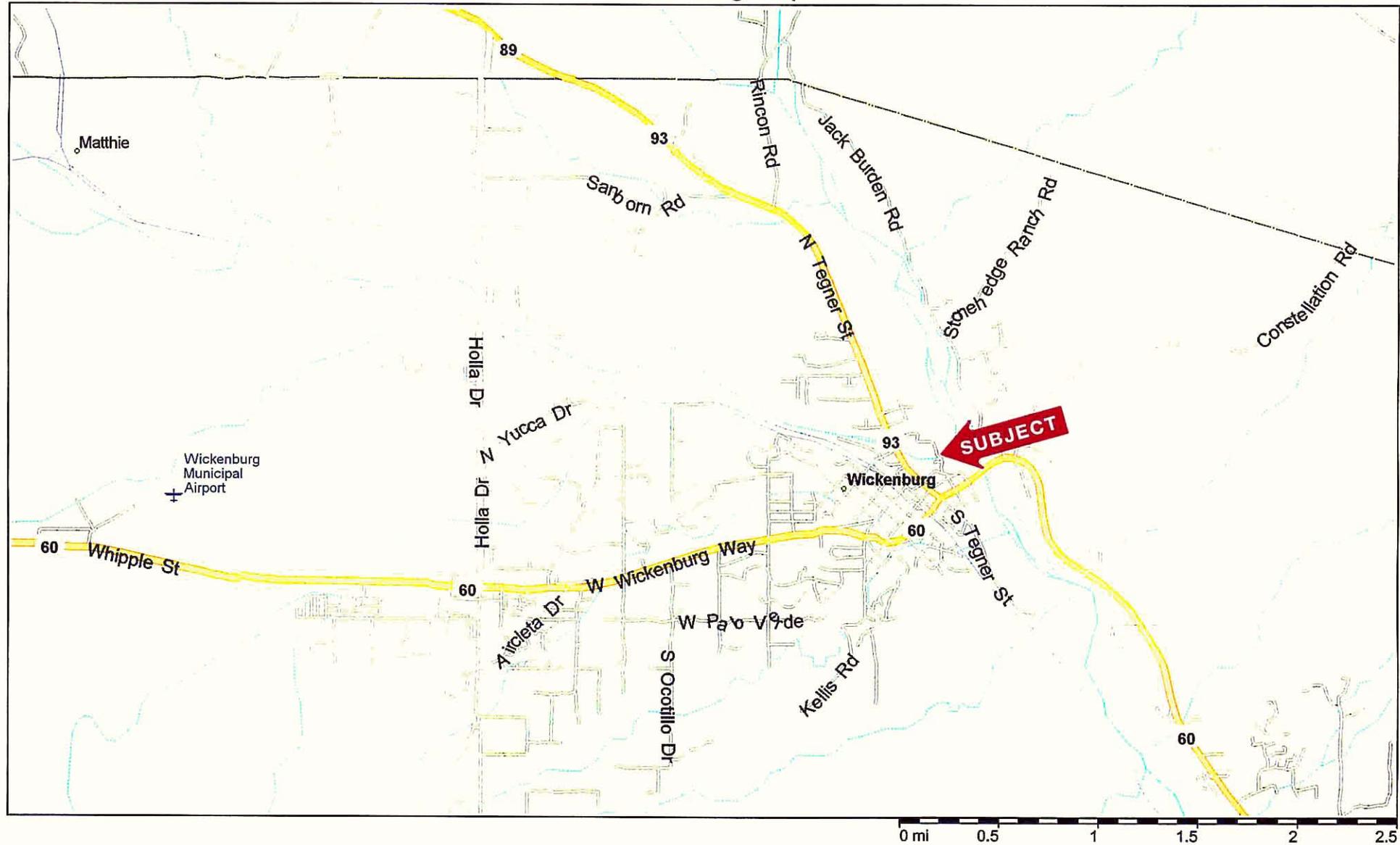
Population:

The 2000 Census indicates an increase of nearly 58% in the last decade to a population of 7,130. This is a faster rate of growth than experienced by the county or the state and substantially greater than the 28% growth of the prior decade, which was slower than the rate experienced in the county or state for the same period.

	<u>1980</u>	<u>1990</u>	<u>2000</u>
Wickenburg	3,535	4,515	7,130
Maricopa County	1,509,175	2,122,101	3,072,149
Arizona	2,716,546	3,665,228	5,130,632

Sources: Arizona Department of Economic Security and U.S. Census Bureau.
Note: Local sources estimate the population of the contiguous developed area to be 8,600, and the trade area to be 18,000.

Wickenburg Map



Economy/Employment:

Traditionally, tourism, cattle ranching and agriculture have been the main economic activities in Wickenburg. There has also been a small amount of gold mining, but this is done more as a tourist attraction than as a profitable enterprise. In 1964, Wickenburg began to diversify its economic base by developing an industrial airpark to encourage manufacturing firms to locate in town. Today, nine light manufacturing users occupy parts of the park. Hoping to encourage more diversification, the town developed Phase II (15 acres) of an industrial airpark with complete curb high infrastructure and town municipal services adjacent to the established manufacturers.

Tourism is the most important activity in Wickenburg's economy. Currently, 175 firms provide services to tourists. The combined sectors of service and retail trade employ approximately 68% of the total number of workers in the Wickenburg area.

The Wickenburg employment structure as provided by the U.S. Census Bureau through its 1997 Economic Census is as follows:

<u>Sector</u>	<u>Percent of Total</u>
Agriculture	4.8%
Construction	10.2%
Manufacturing	2.5%
Transportation, Communications & Public Utilities	2.4%
Wholesale Trade	1.3%
Retail Trade	29.4%
Finance, Insurance & Real Estate	6.4%
Services	38.8%
Public Administration	4.2%

	<u>1980</u>	<u>1990</u>	<u>2000</u>
Civilian Labor Force	1,141	1,976	2,659
Employed	1,105	1,872	2,564
Unemployed	36	104	95
Unemployment Rate	3.2%	5.3%	3.6%

	<u>1990</u>	<u>1996</u>	<u>1999</u>
Taxable Sales (\$)	64,755,820	85,490,000	100,713,000
New Building Permits*	56	78	54
School Enrollment**	1,101	1,385	1,520
Net Assessed Valuation (\$)	18,654,547	21,645,960	27,132,286

* Arizona Business, Arizona State University. 1997 figure from local source.

** Wickenburg Unified District.

Government:

The Town of Wickenburg is governed by a mayor, six council members and a town manager, and is served by the Department of Public Safety, Maricopa County Sheriff's office and the local police department. The town volunteer fire department has 27 firefighters on call.

Transportation:

Wickenburg offers adequate transportation access and close proximity to major markets. The town is served by Highway 60 connecting Wickenburg to West Phoenix and Los Angeles, and by Highway 93-93 connecting Wickenburg to Las Vegas.

The Atchison, Topeka and Santa Fe Railroads all service the Wickenburg area. Bus services from Greyhound, Continental Trailways and Reno-Las Vegas Bus Line are available.

The Wickenburg Municipal Airport has a 5,050-foot paved and lighted runway, paved parking, hangers, fuel (regular and jet), and repair service. Also available are a precision approach path indicator and UNICOM communications.

Health Care/Schools:

Wickenburg has one, 34-bed hospital and one, 40-bed nursing home. There are 12 physicians, four ophthalmologists, two surgeons, four optometrists and four dentists that serve the Wickenburg area. Specialists from the Phoenix metropolitan area are available as consultants. The town operates a 24-hour ambulance service with two units, EMTs and paramedics. Two helicopter ambulance services are readily available. There are two local medical supply and service companies in Wickenburg. The Meadows, a well known 77-bed psychiatric clinic specializing in drug and alcohol rehabilitation is located near the north-end of town and the 46-bed Remuda Ranch Center for Anorexia and Bulimia is situated on Jack Burden Road, northeast of the city limits. Remuda Ranch Center also has an adolescent facility northwest of town on Vulture Mine Road and are planning an acute patient facility in the same area.

There are two public elementary schools, one public junior high school, one public high school and one private school in Wickenburg. Arizona State University West, Glendale Community College and Estrella Community College are less than an hour drive from Wickenburg. The Wickenburg area is also served by the Yavapai College and Rio Salado Community College districts, with night classes throughout the year.

Commercial Development:

Commercial development in Wickenburg is concentrated along US Highway 60, or State Route 93. The heaviest concentration is in the downtown area to the north and east of the junction of Tegner Street (SR 93) and Wickenburg Way (US Highway 60). This area includes the city offices, tourist shops, professional offices and one of the city's two neighborhood shopping centers.

North and east of the downtown area the highway frontage is improved with a number of motels, fast food restaurants, gas station/convenience stores, car sales lots and freestanding retail buildings.

The other neighborhood center is near the west end of town at the southwest corner of Wickenburg Way (Highway 60) and Vulture Mine Road.

Recent Growth:

Wickenburg is also a popular retirement community due to its warm climate and attractive desert setting. Much of the area's growth in recent years has been from above-average income retirees. Growth has included a number of new subdivisions, plus on-going development of estate-sized homes in the surrounding county area.

Conclusion:

In summary, Wickenburg is a small rural community characterized by low-density residential uses in a scenic, rolling desert environment. The community caters to tourists and retirement residents and has maintained relatively stable growth. In our opinion, the long-term growth prospects for the area are good.

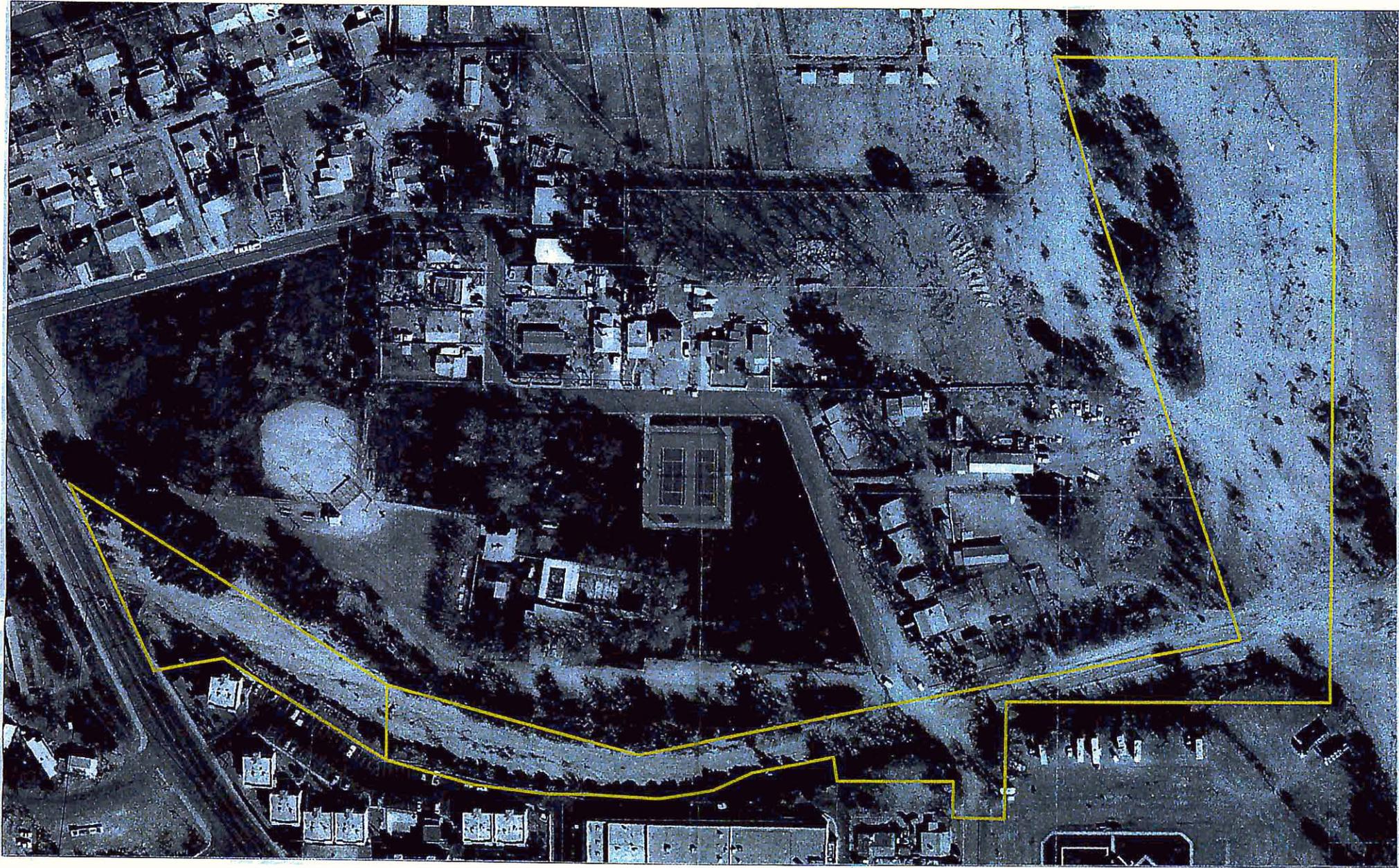
NEIGHBORHOOD DESCRIPTION

U.S. Highway 60 is one of the two highway/commercial thoroughfares in Wickenburg and is improved with two lanes of paved roadway in each direction. It has a center turn lane at major intersections for easy access to the businesses on either side of the roadway. Both sides of the street are improved with curbs, gutters and sidewalks. For a highway, it is relatively lightly traveled. The other main highway through the community, which connects Phoenix and Mexico with Las Vegas and points farther north, is Tegner Street (U.S. Highway 93). Tegner Street is improved with one lane of paved roadway in each direction and has a center turn lane for easy access to the businesses on either side of the roadway in the vicinity of the subject property. Both sides of the street are improved with curbs, gutters and sidewalks.

The subject's neighborhood is strip commercially zoned land stretching north along both sides of Tegner Street (U.S. Highway 93) from U.S. Highway 60 in downtown Wickenburg. Established single-family residential subdivisions interspersed with some multi-family are extended both east and west of the commercial strip along Tegner Street. The subject is one-quarter mile north of U.S. Highway 60. An interim bypass is in the talking stage. Wickenburg residents have a long-range hope of having all highway routes bypass the community.

A reduced copy of an aerial photograph identifying subject in yellow provided to us by the U. S. Army Corps of Engineers is included on the next page. An approximate 5,000-square-foot triangular area located south of the extreme west portion of subject is no longer part of subject as it has been sold to the Arizona State Highway Department. Also, the Yost and Gardener map used to identify the subject herein does not include the Valentine Road area in and south of Sols Wash that is shown to be included in the aerial exhibit.

Aerial Map



Immediate Neighborhood

A summary of the uses surrounding the subject is included below.

North - Coffinger Park

South - Residential condominiums, Bashas' supermarket, and a Community Center, then next south is the City Hall complex

East - Hassayampa River

West - U.S. Highway 93 bridge and vacant land part of which is being planned for commercial development (see Land Sale 5)

The shape of the subject property is irregular as it flows from Sols Wash into the Hassayampa River. A portion of the subject is south of Coffinger Park and another portion is east of the park. Coffinger Park is one of four parks in Wickenburg. It is improved with playground equipment, tennis courts, baseball field, grass play areas and a swimming pool. The park is approximately 12 acres in size. Surrounding the park to the north and the east are single-family homes. West of the park is Tegner Street and to the South is the subject portion of in Sols Wash.

River Street as it is commonly used, cuts through the subject Sols Wash approximately one-quarter of a mile east of Tegner Street. This reportedly is not legal access. There is no bridge crossing Sols Wash at River Street that becomes Valentine Street south of the wash. When the wash is flooded, there is no dry crossing at this point. Sols Wash is dry most of the time but can flow anytime there is heavy rain in the area or upstream. Many of the neighbors surrounding Coffinger Park use this cut-through to access both the Bashas' shopping center to the south of Sols Wash and U. S. Highway 60 to the south. This allows them to avoid Tegner Street, which can have considerable traffic congestion, much of which is semi-trucks.

A large percentage of the new residential construction in Wickenburg has taken place on the west side of town along Vulture Mine Road. There are also newer single-family residential communities in the south, north and east portions of the community.

In summary, the subject neighborhood is a mixture of older and newer commercial/retail and residential properties along Tegner Street. There are modest to middle priced single-family homes in the neighborhoods east and west of this major thoroughfare north of Sols Wash and to the west of U. S. Highway 93. There is a good deal of foot traffic from tourists and residents along Tegner Street between Wickenburg Way (Highway 60) and Sols Wash. Much of the commercial/tourist activity in Wickenburg is located within one quarter mile of the intersection of Wickenburg Way and Tegner Street in the area surrounding City Hall to the south of subject. However the city's major local retail complex is on the west side of town at the intersection of U. S. Highway 60 and Vulture Mine Road.

PROPERTY DATA

Property History:

The owner of record is:

George David Underdown and Gloria Underdown

We are unaware of any recent attempts to market the property or of any unsolicited offers to purchase.

Site Data:

The site contains 7.6 acres or 331,056 square feet. The area calculation is from Yost & Gardner Engineers. Its configuration is very irregular as it flows from a section of Sols Wash into a section of the Hassayampa Riverbed. On the following page we have included a reduced copy of a "Map of Underdown Property" prepared by Yost & Gardner. There are no improvements on the property.

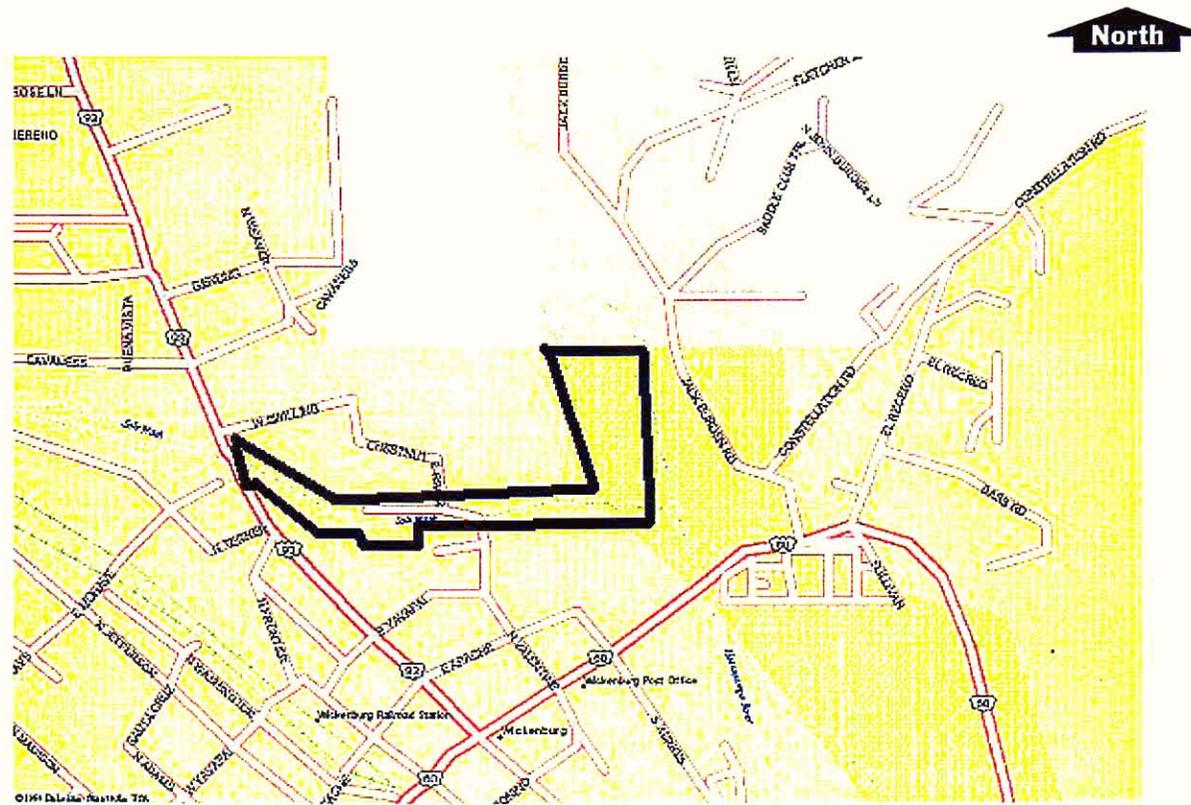
The site is zoned R1-12, Single Family Residential, by the City of Wickenburg. This permits one single family dwelling per 12,000 square feet (approximately one-quarter of an acre). However, because of the property's flood prone character, residential development would be cost prohibitive.

Access to the property from Tegner Street north of Sols Wash is east on Swilling Avenue, then south on Chestnut Street to River Street, which passes through Sols Wash and the subject property. To the south of Sols Wash River Street becomes North Valentine Street, which intersects with Division that connects with Tegner Street on the west to complete the loop.

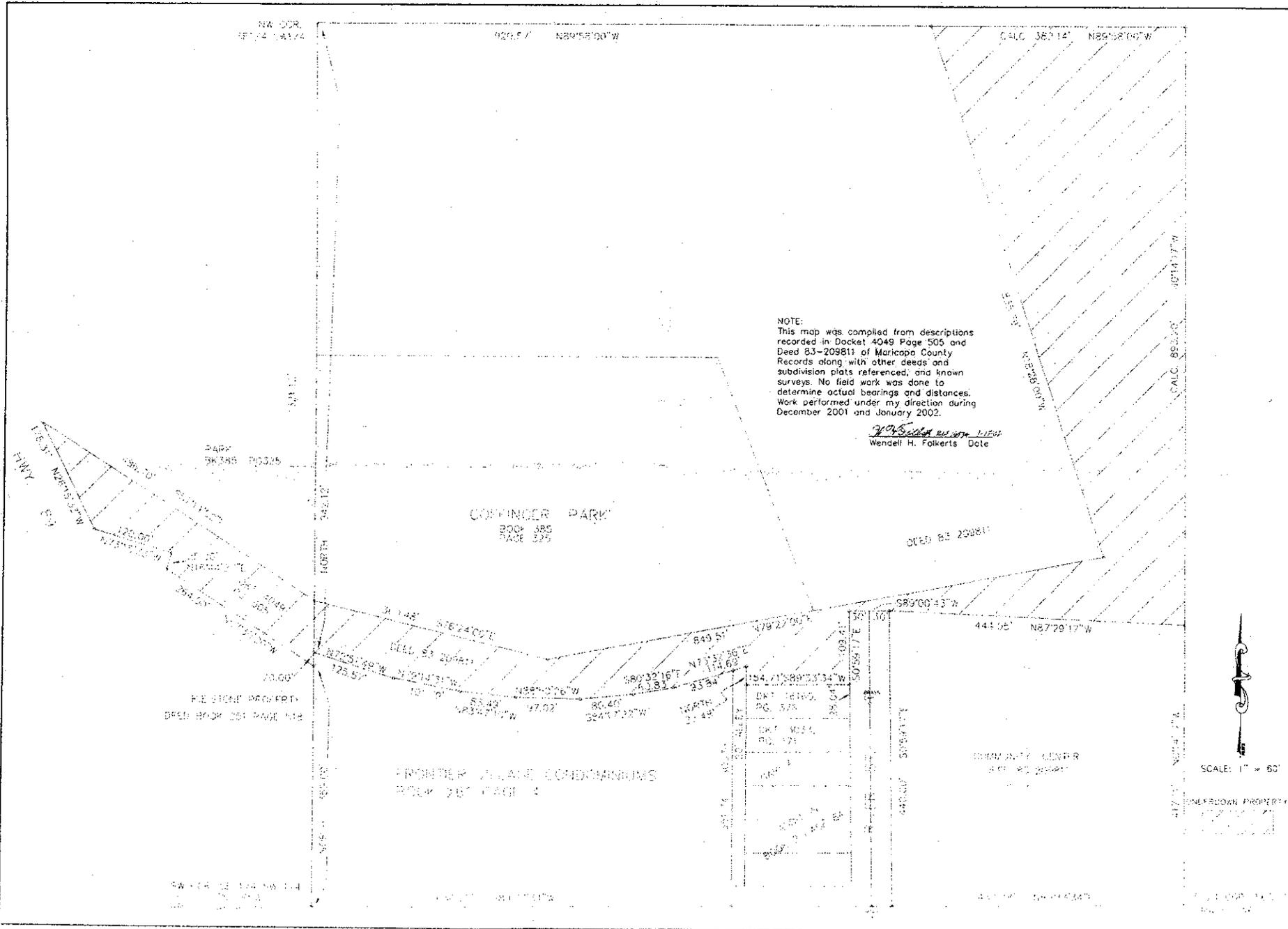
The access across Sols Wash through subject may not be legal other than through its established long-term use. River Street is an unimproved dirt road that is used by nearby homeowners. The configuration of the street pattern is shown on the page following the Underdown Property map, although the street names differ depending on the mapping source.

The site has no public utilities immediately available, although public utilities are available in the immediate area. The subject is entirely in the floodway of Flood Zone AE, which is a special Flood Hazard Area that is inundated by the 100-year flood.

Site Map



Underdown Property outlined in black. This is an appraiser's sketch that is not necessarily to scale.



NOTE:
 This map was compiled from descriptions recorded in Docket 4049 Page 505 and Deed 83-209811 of Maricopa County Records along with other deeds and subdivision plats referenced, and known surveys. No field work was done to determine actual bearings and distances. Work performed under my direction during December 2001 and January 2002.

Wendell H. Folkerts
 Wendell H. Folkerts Date

YOST AND GARDNER ENGINEERS
 2615 N. THIRD STREET
 PHOENIX, ARIZONA 85004
 PHONE (602) 264-6424
 FAX (602) 277-6716

CONTENTS
 PART OF THE SW 1/4 OF SECTION 1,
 T.7N., R.5E., S.8S., MARICOPA COUNTY, ARIZONA
 MAP OF UNDERDOWN PROPERTY

REVISIONS



SCALE: 1" = 60'

UNDERDOWN PROPERTY
 JOB NO. 7982
 DATE JAN 2002

Sols Wash can be an active wash, most recently causing flooding of Coffinger Park. It flows from the northwest to the southeast until it merges with the Hassayampa River. The construction of Sols Wash Bridge (Tegner Street crossing) was completed in early 2000 and there are concrete lined box culverts that have been placed to force water flows east of the bridge farther north than former flows. The elevation of the site at its far west end is about 2050 feet above sea level compared to the bridge crossing about 14 feet higher. Where Sols wash empties into the Hassayampa the elevation is about 12 feet lower than at the west end of subject. The south bank of Sols Wash is about 12 feet higher than the streambed and is protected from erosion by a partial rock and wire mesh embankment.

Apparently the box culverts were designed to minimize erosion of the developed south bank. In doing so they have created a propensity to flood to the north as happened during the last flood season, Sols Wash jumped its lower less defined bank, which is about 8 feet above the streambed, and flooded portions of Coffinger Park to the north and a handful of residences in the immediate area that apparently had not previously flooded.

On the southwest corner of Sols Wash and River Street, the subject property has a 200-300 square feet area of land that lies outside of the flood plain. There is also a similar and perhaps slightly smaller area immediately south of the east end of subject that also appears to lie outside the flood plain.

We are unaware of any adverse easements, soil problems or environmental hazards that impact the property. Included in the addenda is a flood map with subject highlighted.

Environmental Observations:

We have not had the benefit of a Phase I Environmental Study and are unqualified to complete it. Our inspection did not reveal any obvious environmental hazards. We have assumed for the purposes of this analysis that the property is free of any environmental contamination that could have an impact on value.

Property Taxes:

The property taxes were

Assessor's Parcel Number	Property Tax 2001
505-16-014A	\$15.20
505-15-036J	\$48.08
Total	\$63.28

The Treasurer's office reports that no delinquent prior-year taxes are owed.

Valuation Information:

Parcel #: 505 - 16 - 014-A				Parcel #: 505 - 15 - 036-J			
Valuation Information				Valuation Information			
Tax Year:	2003	2002	2001	Tax Year:	2003	2002	2001
FCV*:	\$25,500	\$25,500	\$976	FCV*:	\$57,500	\$57,500	\$3,704
LPV**:	\$11,682	\$7,076	\$935	LPV**:	\$26,732	\$16,476	\$2,801
Legal Class:	2	2	2	Legal Class:	2	2	2
Assmnt Ratio:	16%	16%	16%	Assmnt Ratio:	16%	16%	16%
Assessed FCV	\$4,080	\$4,080	\$156	Assessed FCV	\$9,200	\$9,200	\$593
Assessed LPV	\$1,869	\$1,132	\$150	Assessed LPV	\$4,277	\$2,636	\$448
Prop. Use Code:	0004	0004	0004	Prop. Use Code:	0021	0021	0021
Tax Area Code:	091800	091800	091800	Tax Area Code:	091800	091800	091800

*Full Cash Value **Limited Property Value

HIGHEST AND BEST USE

In the most recent edition of *The Appraisal of Real Estate*, the Appraisal Institute, defines highest and best use as:

The reasonably probable and legal use of vacant land or an improved property, which is physically possible, appropriately supported, financially feasible, and that results in the highest value.

To estimate highest and best use, four elements are considered:

1. Legally Permissible - Of the possible uses, which uses are permitted by zoning and deed restrictions?
2. Physically Possible - What uses are physically possible?
3. Financially Feasible - Which possible and permissible uses will produce a net return to the owner of the site?
4. Maximally Productive - Among the feasible uses, which use will produce the highest net return or the highest present value?

The highest and best use must be legal and probable, not speculative or conjectural. A demand for the use must exist and it must yield the highest net return to the land for the longest period.

The highest and best use of the land as if vacant and available for use may be different from the highest and best use of the improved property. This may be true when the improvement is not an appropriate use, but it makes a contribution to the total property value in excess of the value of the site. Therefore, to arrive at an estimate of highest and best use, the subject was analyzed 1) as though the site were vacant and available for development, and 2) as presently improved, if applicable.

Legally Permissible

The property is zoned R1-12, Single Family Residential, by the Town of Wickenburg. This permits one single family dwelling per 12,000 square feet. This zoning category permits single family residential, but the Town of Wickenburg would not issue a permit to build a single family home in a riverbed or wash. Although it is possible that an adequately elevated structure could be permitted land values in Wickenburg are not high enough to economically justify consideration of this possibility any further.

Because subject is directly in the riverbed or water passageway, a 404 Permit is required for the owner to be able to legally extract sand and gravel deposits. Obtaining a 404 Permit for subject would be very costly and not financially viable or probably not practically obtainable considering the site's combination of small size, irregular configuration and downtown Wickenburg location, where noise and dust pollution and protection of embankments in the proximity to residential and commercial properties, would be significant considerations.

Physically Possible

The property is positioned almost entirely in Sols Wash and the Hassayampa Riverbed. We have considered the possibility of building in the one small area of high ground of perhaps 100 to 200 square feet immediately south of Sols Wash and immediately west of its River Street crossing. There also may be another area or two of bank land that is not prone to flooding however they would be even smaller. These areas are too small for any development by themselves but at least the one largest area has the potential for assemblage with the property adjacent south. It may serve as part of a parking area or as a landscaped buffer for the adjoining commercial property.

Like most Arizona dry river bed and wash land the property does have an unknown quantity and quality of sand and gravel deposits. However, the parcel's configuration and size are limiting factors for these uses.

Financially Feasible

Constructing any elevated structure that would accommodate traditional construction that might otherwise be feasible for the site is not deemed to be cost effective because of the relatively low value of land in the area that provide equally desirable substitute locations.

Availability of a permit for legal extraction of sand and gravel deposits, albeit an occasionally replenished supply, of any economic quantity is cost prohibitive because of the permit cost, configuration and size. Even if assembled with additional similar land the chances for economic viability and the availability of a permit are slim and highly speculative.

After careful consideration we are not aware of any apparent financially feasible traditional use of subject; however, the site does possess a certain nuisance value because of its proximity to development.

In May 1999 Mr. Underdown reports he was approached by the contractors of the Tegner Street bridge crossing Sols Wash for the acquisition of what we believe to be about 5,000 square feet of land that was needed to accommodate the bridge apron to the east of the south part of the bridge structure. Mr. Underdown also reports he did not set an offer price but suggested the contractor, who was representing the Arizona Department of Transportation, set a price. They offered \$5,000 which Mr. and Mrs. Underdown accepted. We would define this as a nuisance value and portions or all of subject may be considered to have some financially feasible nuisance value by those agencies needing to control the occasional water flows of Sols Wash or the Hassayampa.

Maximally Productive

It is our opinion that the highest and best use of subject is for open space in conjunction with the adjacent park and for flood control. For these uses it would be best controlled if owned by the Town of Wickenburg. To a private owner the maximally productive use is for eventual sale to the Town of Wickenburg or to any adjoining property owner so that they can better control the developed banks of the wash. In this regard subject's potential maximally productive value is the value adjoining property owners are willing to assign the property in order to control the potential damage from unregulated water flows. Speculative possible uses of subject include a plant nursery or limited specialty recreation uses that could utilize its extensive sand cover.

VALUATION PROCESS

The estimation of a real property's market value involves a systematic process in which the problem is defined; the work necessary to solve the problem is planned; and the data required is acquired, classified, analyzed and interpreted into an estimate of value. In this process, three basic approaches, when applicable, are used by the appraisers: the Cost, Sales Comparison and Income Approaches. When one or more of these approaches is not applicable in the appraisal process, justification is presented. A brief explanation of each approach follows:

- 1) In the Cost Approach, the appraiser must first estimate the value of the subject site by comparing it to recent sales or offerings of similar sites. The reproduction/replacement cost new of the improvements, as determined by comparison to similarly constructed properties, is then estimated. Depreciation from all sources is determined and subtracted from the reproduction/replacement cost new of the improvements, to arrive at their present value. The present value of all improvements is added to the estimated site value. The result is the value indicated by the Cost Approach.
- 2) The Market or Sales Comparison Approach involves the comparison of similar properties that have recently sold or similar properties that are currently offered for sale, with the subject property. The notable differences in the comparable properties are adjusted from the subject property to indicate a value range for the property being appraised. This value range, as indicated by the adjusted comparable properties, is then correlated into a final indicated value for the subject property by this approach.
- 3) The Income Approach is the process in which the anticipated flow of future benefits (actual dollar income or amenities) is discounted to a present value figure through the capitalization process. The appraiser is primarily concerned with the future benefits resulting from net income. The steps in this approach include estimating potential gross income by comparison with competing properties and estimating expenses (derived from historical and/or market experience) to determine a projected net income stream. The income stream is then capitalized into an indication of value by using capitalization rates extracted from competitive properties in the market or by using other techniques when applicable.

The valuation analysis used herein is the Sales Comparison Approach. This is the only method that we are aware of for valuing subject.

SALES COMPARISON APPROACH

The Sales Comparison Approach utilizes a set of procedures by which an appraiser derives an indication of value by comparing the property being appraised to similar properties that have been sold recently. This is done by applying appropriate units of comparison and making adjustments to the sale prices of the comparables, based upon various possible elements of comparison.

Dollar or percentage adjustments are then made to the sale price of each comparable property, after consideration of the real property interest involved. Adjustments are made to the sale prices of the comparables because the values of the comparables are known, while the value of the subject property is unknown. Through this comparative procedure, the appraiser estimates one or more kinds of value as of a specific date.

Considered next are details of several flood prone or partially flood prone parcels that have been considered in valuing subject on a direct comparison basis. Due to the very limited data available in Wickenburg we have also considered a couple of historic sales in the Metro Phoenix area. A summary of these sales and a map showing the location of each comparison follow the detailed data.

LAND SALE (1)

GRANTOR: Lillian Sweeney

GRANTEE: Michael R. Grauer

DOCUMENT NO.: 95/0339210

LOCATION: Approximately 605 feet north of New River Road and 300 feet east of the I-17 Frontage Road, in the New River; legal access is available across adjoining government lots, although no improved access is available.

ASSESSOR'S PARCEL NO.: 202-12-4

DATE: June 1995

LAND SIZE: Total Net Area - 5.01 acres

ZONING: Rural-43, Maricopa County

PURCHASE PRICE: \$7,000 with \$3,000 (43%) down and the balance by seller carry back with about a two-year payoff at about 10% interest; the sale is treated as if it were cash equivalent.

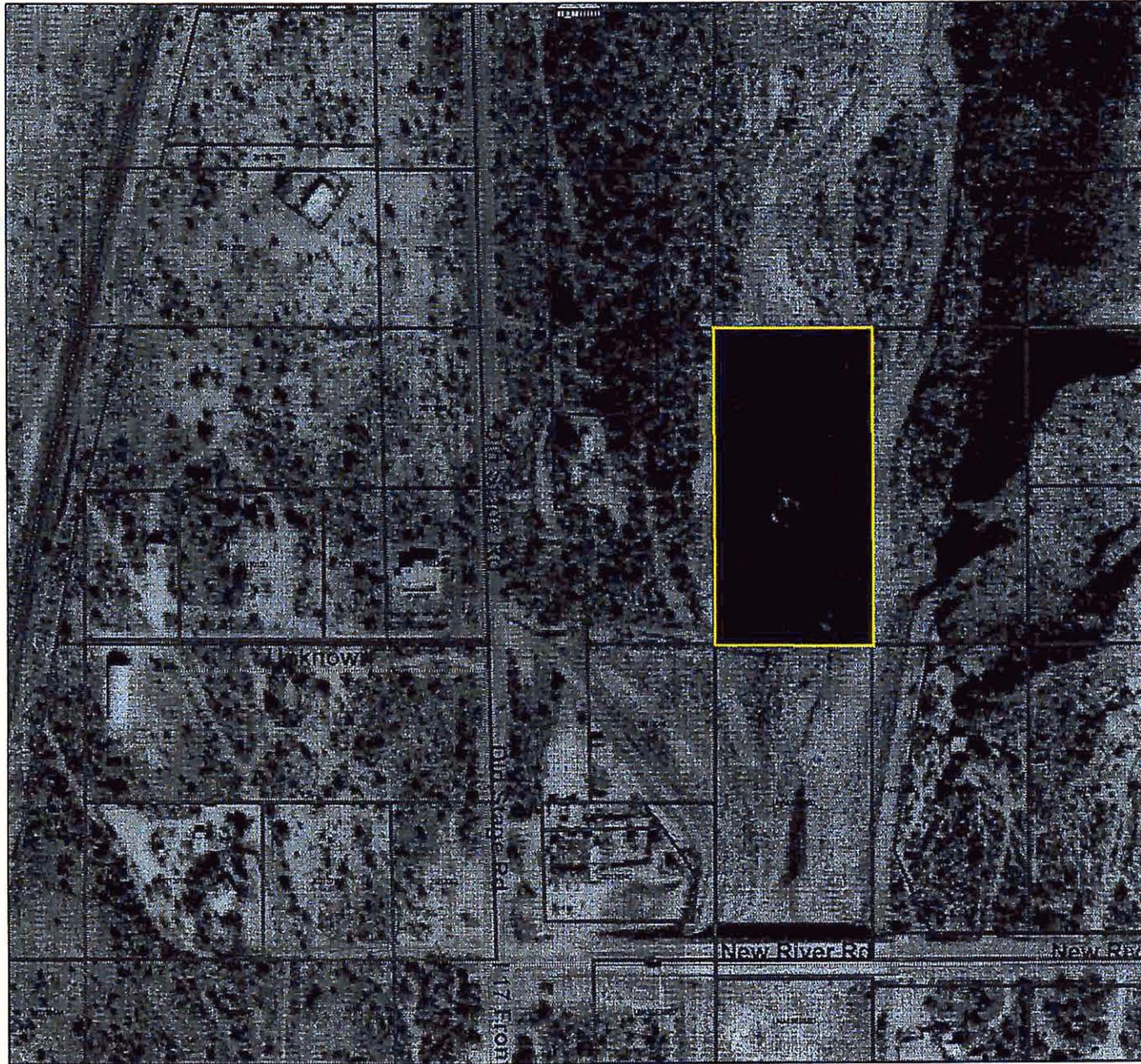
UNIT PRICE: \$1,397 per acre

COMMENTS: The entire site is in the New River floodplain which is also designated a floodway in this area and is not buildable. The site is in the low flow channel with virtually no speculative potential for any traditional private construction. There is no developed access. The buyer planned to use the site for a plant nursery. Electricity and telephone are available from an adjoining property. Mr. Grauer says there is an old well on the site.

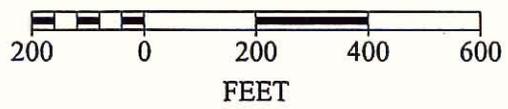
SALES HISTORY: The property was acquired by John F. Sweeney for \$4,500 on unknown terms in 1989, per County Assessor's records.

CONFIRMED BY: Wendell Montandon with Mr. Grauer

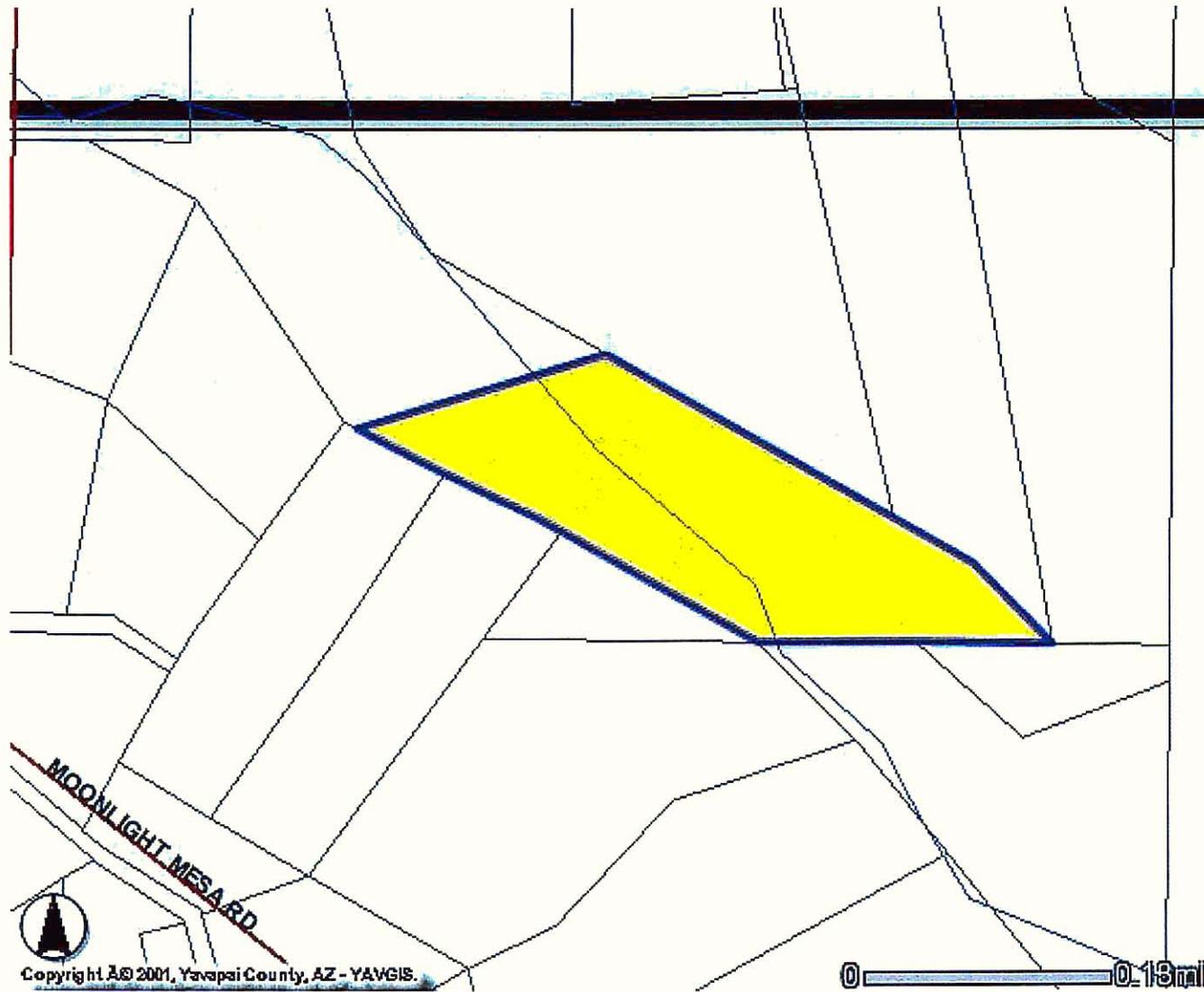
Sale 1 Aerial Map



SCALE 1 : 4,856



Sale 2 Plat Map



Copyright © 2001, Yavapai County, AZ - YAVGIS.

LAND SALE (2)

GRANTOR: Joyce Frazier

GRANTEE: Robbie D. and Tassie Jundt

DOCUMENT NO.: 141 3561

LOCATION: This is mostly Martinez Creek property in an unincorporated area of Yavapai County north of Wickenburg. Access is northwest from Wickenburg about four miles via US Highway 93 to Scenic Loop Road then north on Scenic Loop Road (dirt) one and one-half miles through Martinez Creek, then take the first right turn east downstream about one-half mile to subject. .

ASSESSOR'S
PARCEL NO.: 201-09-7K

DATE: April 1998

LAND SIZE: Total Net Area - 18.67 Acres

ZONING: RCU-2A, Residential Conditional Use, one dwelling per parcel, two-acre minimum.

PURCHASE PRICE: \$16,500, cash

UNIT PRICE: \$893/Acre

COMMENTS: This is mostly riverbed property in Martinez Creek with a small buildable site in its northeast corner. The site had electrical power and telco in the immediate area at the time of sale. A well would have to be drilled and a septic tank would have to be installed before the lot would be habitable. The water table in the area is relatively low and most wells do not exceed 150' in depth. The buyer acquired the property to eventually build a home on the useable portion of the site. The property had been listed for some time in conjunction with an adjacent acreage but could not be sold until he lowered the price to near this level.

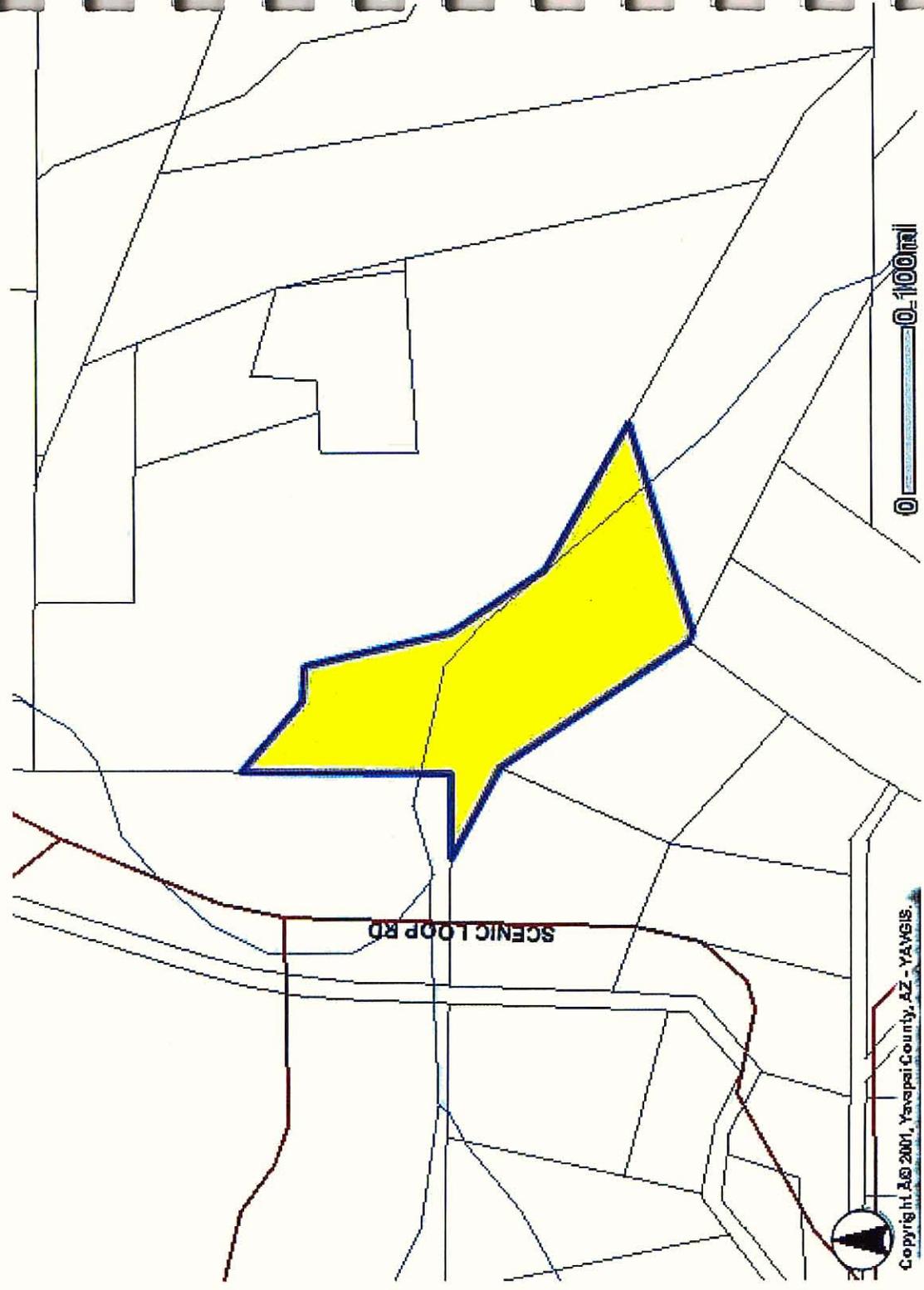
SALES HISTORY: The public records do not indicate a sale of this property within the three years prior to the sale date.

CONFIRMED BY: Ryan Crowley with Joyce Frazier (seller)



MARTINEZ CREEK AT RIGHT IN AREA OF SALES 2 & 3

Sale 3 Plat Map



0-100m

Copyright © 2001, Yavapai County, AZ - YAVGIS

LAND SALE (3)

GRANTOR: Joyce Frazier

GRANTEE: Roger D. and Michele Leavitt

DOCUMENT NO.: 139 3561

LOCATION: This is mostly Martinez Creek property in an unincorporated area of Yavapai County north of Wickenburg. Access is northwest from Wickenburg about four miles via US Highway 93 to Scenic Loop Road then north on Scenic Loop Road (dirt) one and one half miles through Martinez Creek, then take the first right turn east downstream about one tenth of a mile to subject.

ASSESSOR'S
PARCEL NO.: 201-09-7J

DATE: April 1998

LAND SIZE: Total Net Area - 14.62 Acres

ZONING: RCU-2A, Residential Conditional Use, one dwelling per parcel, two-acre minimum.

PURCHASE PRICE: \$16,500, cash

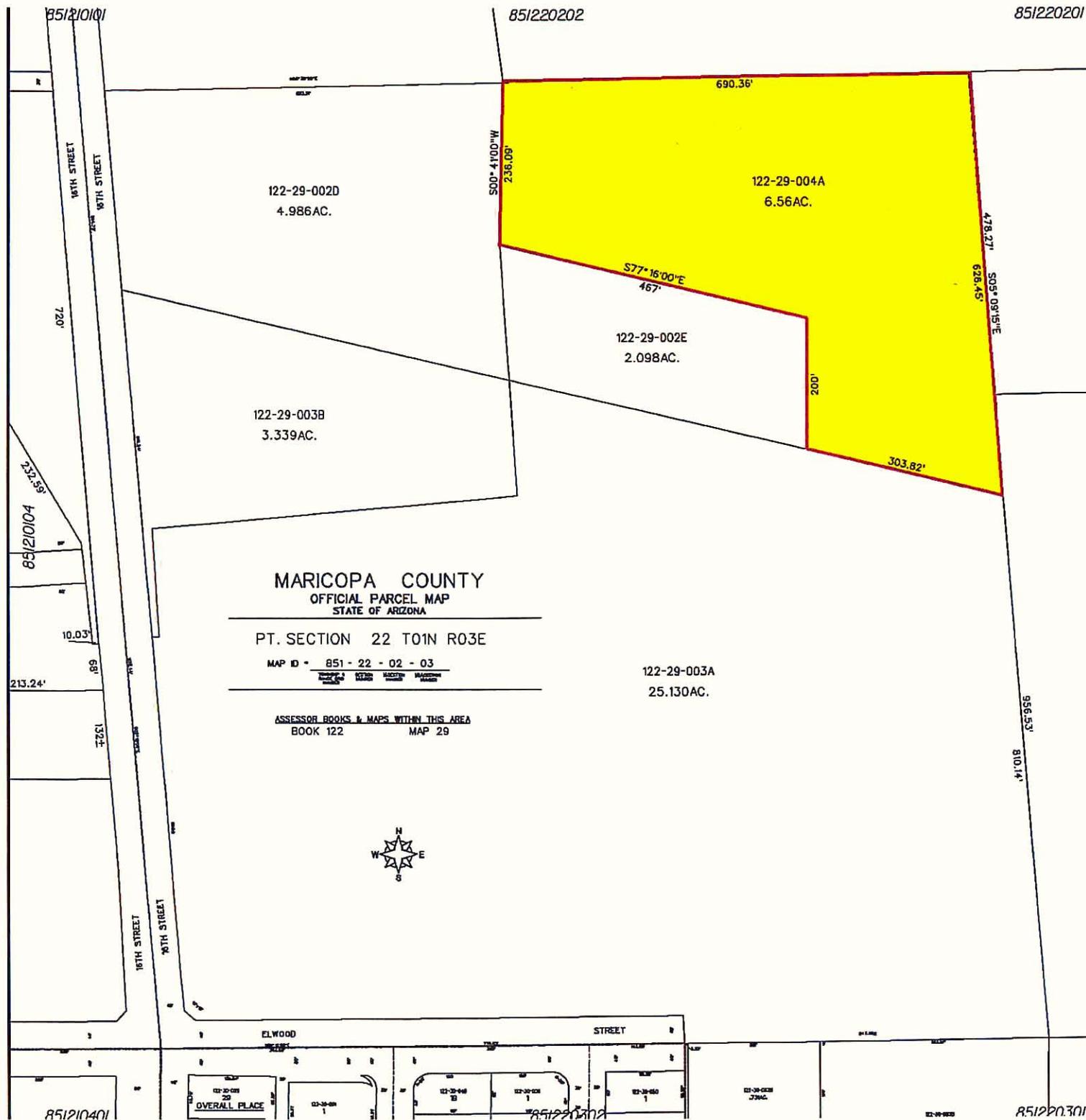
UNIT PRICE: \$1,128 per acre

COMMENTS: This is mostly riverbed property in Martinez Creek with a small buildable site in its northeast corner. The site had electrical power and telco in the immediate area at the time of sale. A well would have to be drilled and a septic tank would have to be installed before the lot would be habitable. The water table in the area is relatively low and most wells do not exceed 150' in depth. The buyer acquired the property to eventually build a home on the useable portion of the site. The property had been listed for some time in conjunction with an adjacent acreage but could not be sold until he lowered the price to near this level.

SALES HISTORY: The public records do not indicate a sale of this property within the three years prior to the sale date.

CONFIRMED BY: Ryan Crowley with Joyce Frazier (seller)

Land Sale 4 Plat Map



LAND SALE (4)

GRANTOR: Bruce and Dorothy Southern

GRANTEE: City of Phoenix

LOCATION: Approximately 500 feet east of 16th Street in the Salt River channel, Phoenix

ASSESSOR'S PARCEL NO.: 122-29-4A

DATE: November 1999

LAND SIZE: Total Net Area - 6.56 acres

ZONING: I-2, General Industrial, Phoenix

PURCHASE PRICE: \$35,000, cash

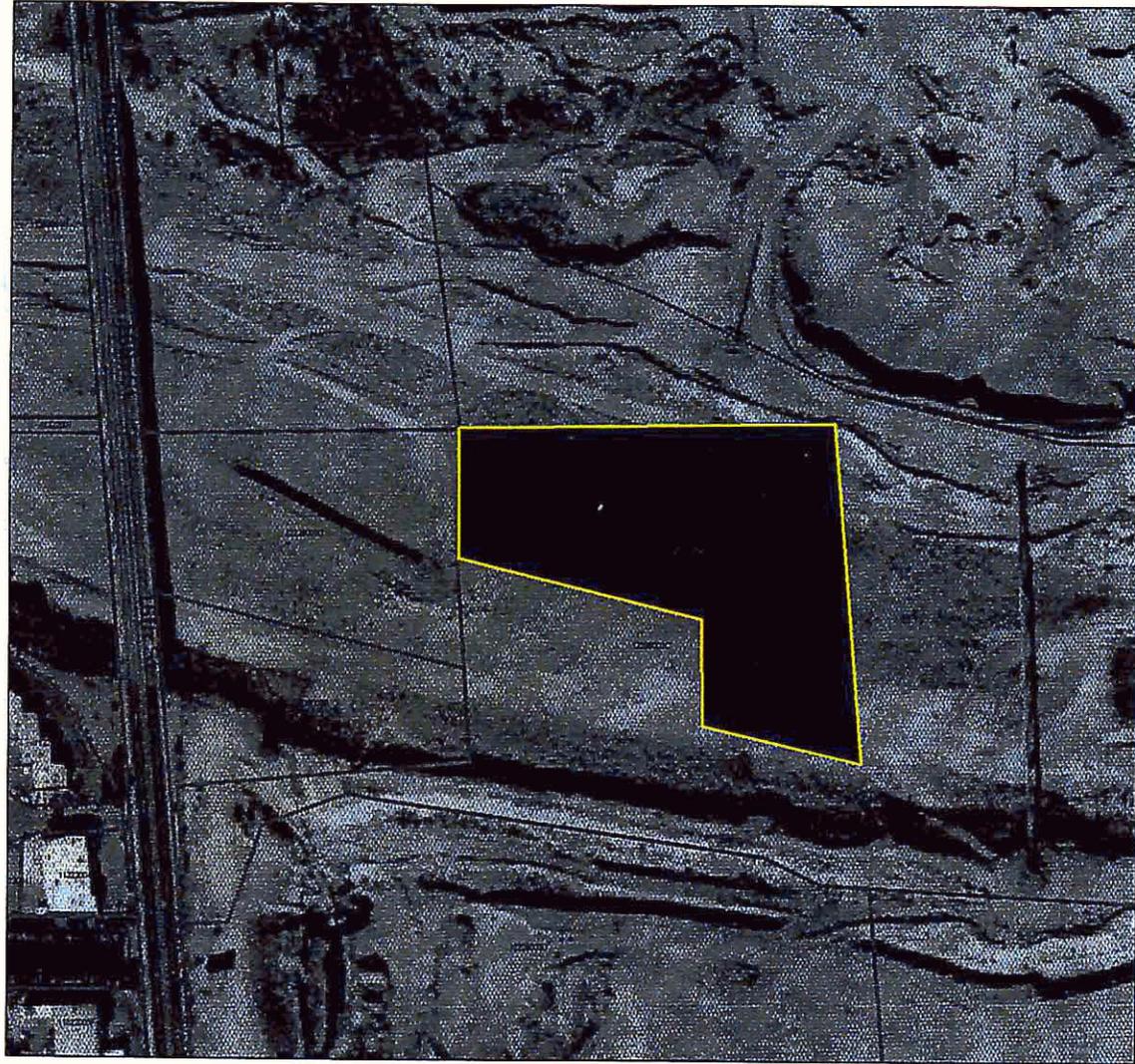
UNIT PRICE: \$5,335 per acre

COMMENTS: The City of Phoenix originally offered the grantor \$33,000, or \$5,030 per acre for this site based on an appraisal of the same amount. The city acquired the site as part of the Rio Salado Project. The grantor reportedly received an offer for \$35,000 from a sand and gravel operator in the area and considered this parcel to be a nuisance in terms of traversing the river bed. However, sources close to the negotiations have reported that the offer from the sand and gravel operator was withdrawn and the city purchased the property for the \$35,000 amount.

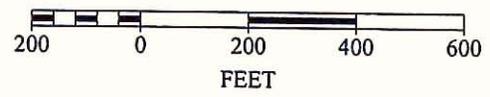
SALES HISTORY: This property was acquired by grantor through a tax lien in April 1999

CONFIRMED BY: John McDonald with Manny Diaz @ the City of Phoenix

Sale 4 Aerial Photo



SCALE 1 : 4,238



LAND SALE (5)

GRANTOR: D J Holdings LP

GRANTEE: P & J Investors, Inc.

DOCUMENT NO.: 01/783813

LOCATION: Southwest quadrant of Tegner Street and the Sols Wash in Wickenburg, Arizona; also being the northwest corner of Tegner Street and Tegner Lane (one street north of Frontier Street), Wickenburg

FLOOD ZONE STATUS: All but an acre or two in the southeasterly portion of the site is in a floodway portion of Flood Zone AE, the small southeasterly portion is in Zone X and a several-acre portion in the southeasterly most portion of the site is located in the flood plain where base flood elevations have been determined; the buyer anticipates being able to develop all of the site except the 4.42 acres identified as being in Sols Wash

ASSESSOR'S
PARCEL NOS.: 505-16-13A, 505-16-24C, 505-08-34, 505-16-24E

DATE: August 2001

LAND SIZE: Total Net Area – 19.68 acres

ZONING: Industrial – 2, Unrestricted Commercial

PURCHASE PRICE: \$260,000, cash

UNIT PRICE: \$13,211 per acre

COMMENTS: Of the 19.68 acres purchased, 15.26 acres is considered by the owner, Phil Richardson, to be useable for future development. Phil Richardson is a realtor in Wickenburg. He purchased the property for the 15.26 acres he deems useable and the Sols wash 4.42 acres were reportedly “thrown in”. When asked to allocate a contributing value to the Sol’s Wash acreage he suggested it may have contributed \$1,000 to \$2,000/acre.

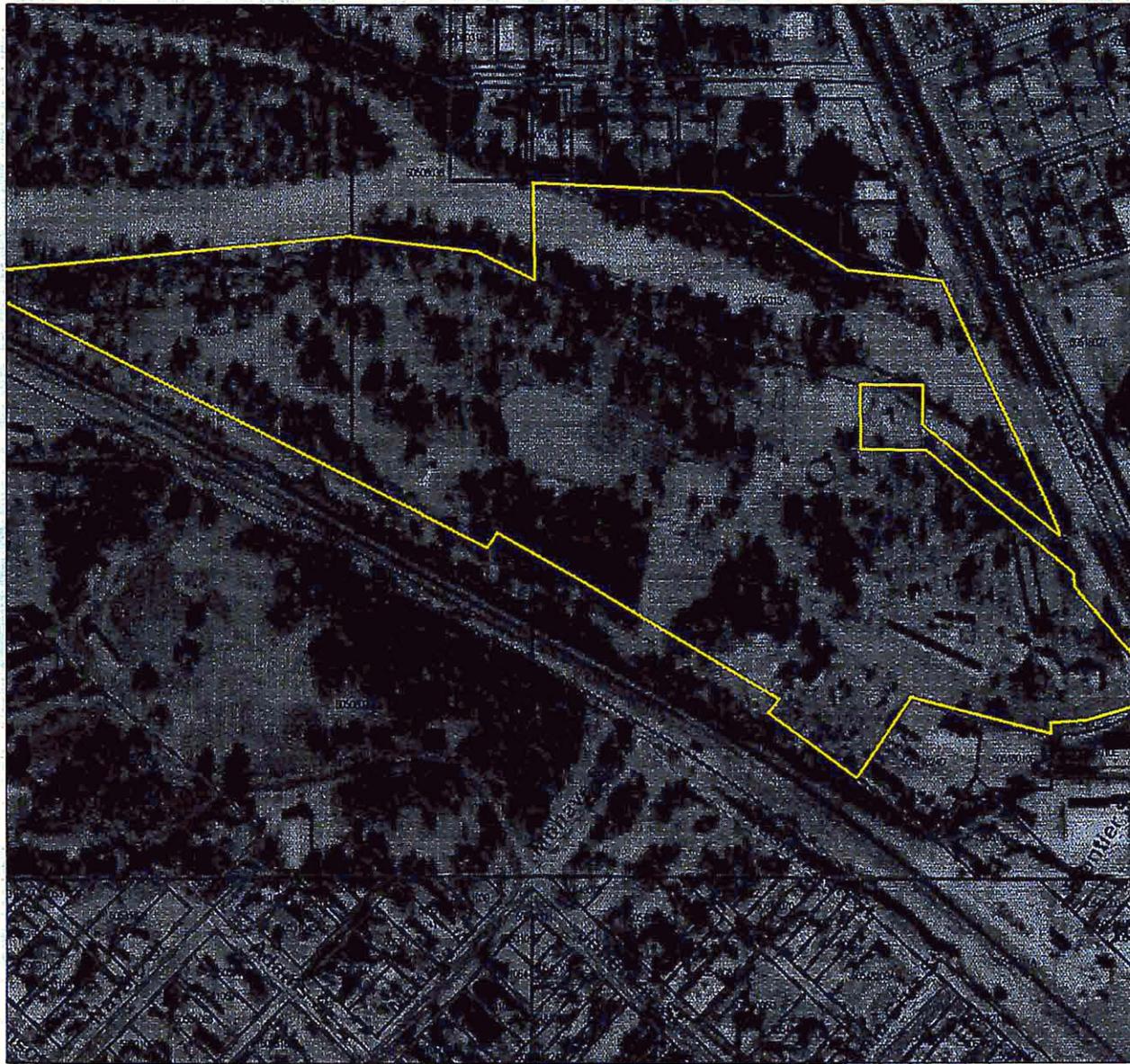
LAND SALE (5) - (Continued)

COMMENTS (Continued): Allocating the entire purchase price to the 15.26 acres of buyer identified useable land equates to \$17,038 per acre or \$.39 per square foot. This is substantially less than the value suggested by sales of other Wickenburg commercial sites, however this price does not consider the substantial development costs that the seller will incur to raise the site out of its flood zone status or to develop the site to accommodate future flooding.

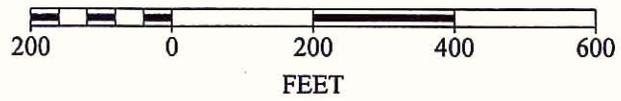
SALES HISTORY: The public records do not indicate a sale of this property within the three years prior to the sale date.

CONFIRMED BY: Ryan Crowley with Phil Richardson (buyer)

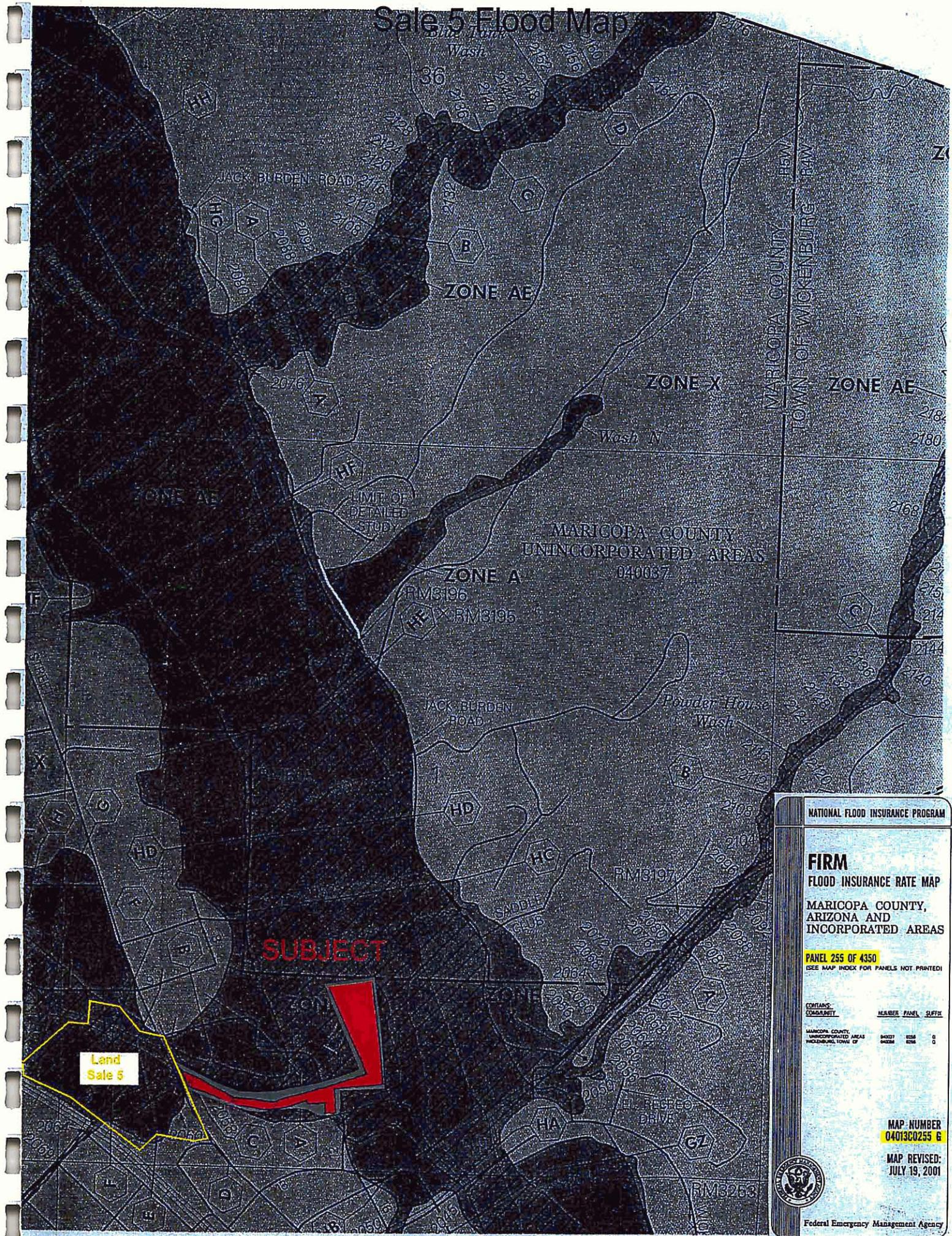
Sale 5 Aerial Photo



SCALE 1 : 3,620



Sale 5 Flood Map



NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP
MARICOPA COUNTY,
ARIZONA AND
INCORPORATED AREAS

PANEL 255 OF 4350
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:
COMMUNITY

NUMBER	PANEL	SUFFIX	
MARICOPA COUNTY UNINCORPORATED AREAS INCLUDING TOWN OF	04007	0255	0
	04008	0255	0

MAP NUMBER
04013C0255 G

MAP REVISED:
JULY 19, 2001

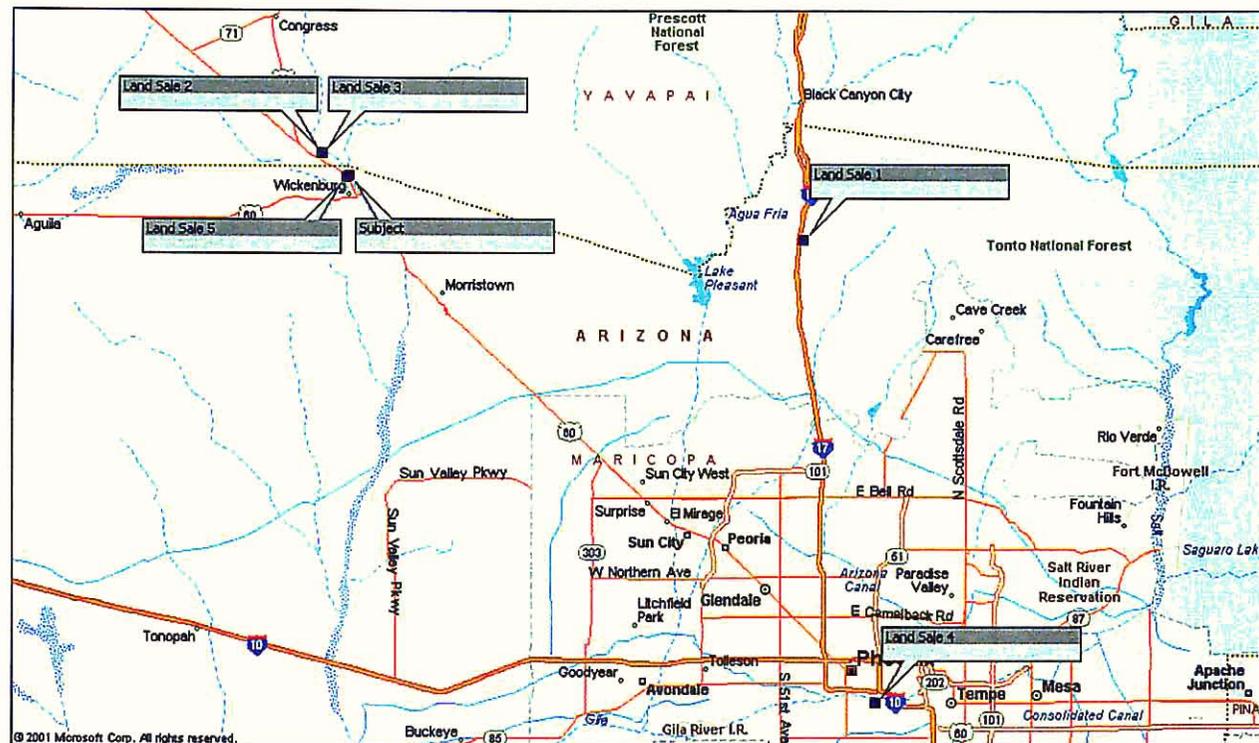


Federal Emergency Management Agency

The following summary emphasizes the total price paid or allocated price paid for the flood prone land involved in each sale.

No.	Date	Land Area (Acres)	Purchase Price	Price/Acre	Buyer Motivation
1	6/95	5.01	\$7,000	\$1,397	Plant Nursery/ Investment
2	4/98	18.67	\$16,500	\$893	Future home site on pad site outside of floodway
3	4/98	14.62	\$16,500	\$1,128	Future home site on pad site outside of floodway
4	11/99	6.65	\$35,000	\$5,335	Control a Nuisance
5	8/01	4.42	\$4,420 to \$8,840	Zero or \$1,000 to \$2,000	Came with purchase of usable land
Part of former Subject	10/99	.12	\$5,000	\$41,667	To accommodate bridge pylon apron
Subject	2/02	7.6 Acres			Probably to Control a Nuisance

Land Comparison Map



Land Value Discussion

The comparisons are parcels consisting of mostly floodway land located in Maricopa and Yavapai County, Arizona. Sale 5 is an allocation of price paid for floodway land that was included with the sale of non-flood prone land. The parcels used for comparison range from 4.42 acres to 18.67 acres and sold within the last seven years. The prices paid for the five detailed Comparable Sales range from zero to \$5,335 per acre. All are low utility parcels with similar very limited use prospects as subject. While these data suggest a value for subject within this per acre range, they do not lend themselves to specific quantitative adjustments. Therefore the comparison data have been used to bracket a reasonable area of value for subject on a qualitative basis. Although the unit of comparison used is the price per acre, given the low utility and relatively similar small size of each of the comparisons and subject, the total price paid is also an acceptable unit of comparison. Our initial emphasis of each discussed Sale will be on the price per acre.

Sale 1 is located entirely in the main channel of the New River floodway in the New River area north of Phoenix. Development in the area is predominately single family residences on one to five acre lots. Market conditions for useable land in the area have improved measurably since 1995 although this condition does not provide a basis for significant upward adjustment because of the very limited utility of this sold parcel. Subject's location next to downtown Wickenburg and greater potential for being a nuisance to nearby developed properties, is reason for a higher price per acre for subject. After considering time and location differences we have concluded that Sale 1 supports a value for subject in excess of \$1,397 per acre. Considering subject's larger size, the sale also supports a total value in excess of \$7,000 for subject.

Sales 2 and 3 are located in Yavapai County approximately 4 miles north of the subject parcel, north of U. S. Highway 93 (Tegner Street), immediately east of Scenic Loop Road in Martinez Creek. The majority of the two properties are directly in the floodway of Martinez Creek. The zoning use applicable to the two properties is RCU-2A, Residential Conditional Use, one dwelling per parcel, two-acre minimum. At the time of purchase, the properties were unimproved vacant land with nearby electric power. The portions of the properties that were not in the flood zone were hillside locations that will require considerable grading and earthmoving before construction could begin. The fact that there was potentially a home site included on these otherwise low utility parcels is a superior characteristic to subject requiring a downward adjustment for comparison to subject. Upward adjustments for improved market conditions since these April of 1998 transactions occurred, subjects more urban location, better nearby infrastructure, and smaller size serve to mostly offset comparison's inclusion of a potential home site. Therefore we interpret these data to support a value for subject of in excess of \$1,000 per acre. Given their superior potential for a home site the \$16,500 total price paid tends to bracket an upper limit of value for subject, however, subject's value as a nuisance tends to be more than offsetting suggesting a potential value for subject in excess of \$16,500 would still be within reason.

Sale 4 is located in the floodway of the Salt River in Phoenix, 500 feet east of 16th Street. This parcel had very limited mining potential if any (primarily only that needed to accommodate a low flow channel). The price paid by the city of Phoenix to acquire the property as part of a planned Riparian Habitat was primarily driven by an alternate users offer to acquire the site to control a nuisance. The nuisance was created by a riverbank mining company's need to haul deposits around the property rather than through the parcel. The relative prominence of this location near an active mining area two and one half miles southeast of downtown Phoenix suggests that subject would likely sell for substantially less than \$5,335 per acre. An indication of the property's nominal worth to a former owner is the fact that it was acquired within a year prior to its sale through a tax lien. Given its better location and similar size, the sale also suggests subject can be expected to sell for less than the total price paid by the city of Phoenix of \$35,000 for the 6.65 acres.

Sale 5 is the most location and time comparable sale discovered. Although it included some land with near identical Sols Wash characteristics to subject it also included 15.26 acres of potentially useable land requiring an allocation of price to the land most comparable to subject. The parcel is 100 feet west of the subject property across Highway 93 (Tegner Street). The indications of value available from this sale are from the buyer's (Phillip Richardson, owner/broker of Realty Executives in Wickenburg) comment that 4.42 acres in the mainstream of Sols Wash were "thrown in", suggesting it had no value. Or alternatively we have considered his opinion when specifically asked, that the Sols Wash mainstream portion of the property had a contributing value of \$1,000 to \$2,000 per acre. We interpret this sale to suggest that subject may have a value from zero to \$2,000 per acre. We can also conclude from the sale that subject has a value substantially less than the \$13,211 per acre price paid for the entire 19.68-acre site.

Finally we have considered the owners ability to sell about 5,000 square feet or .12 acres located immediately south of the extreme west end of subject for \$5,000 in October of 1999. The buyer was the Arizona State Department of Transportation. They needed additional land area to accommodate an apron located immediately east of the south bridge pylon that was under construction at the time. While this does not support a per acre unit of comparison that can be used to value subject, it does support that potential nuisance value premiums available when there is a need to control potential water passage damage.

In summary, the quantitative adjustment analysis supports a value for subject in a range from \$1,000 per acre to something less than \$5,000 per acre. The evidence is strongest for a per acre value within the low end of the range. The data also indicates a total value for subject in excess of \$7,000 and less than \$35,000 with Sales 2 and 3 suggesting a value near \$20,000 is reasonable.

We have concluded that the preponderance of the data supports a value of \$20,000 for subject. This equates to \$2,632 per acre for the subject 7.6 acres.

VALUATION CONCLUSION

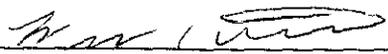
It is our opinion, subject to the underlying assumptions and limiting conditions contained herein, that the fee simple interest in the subject had a market value, as of March 14, 2002, of

\$20,000

CERTIFICATION

We certify that, to the best of our knowledge and belief:

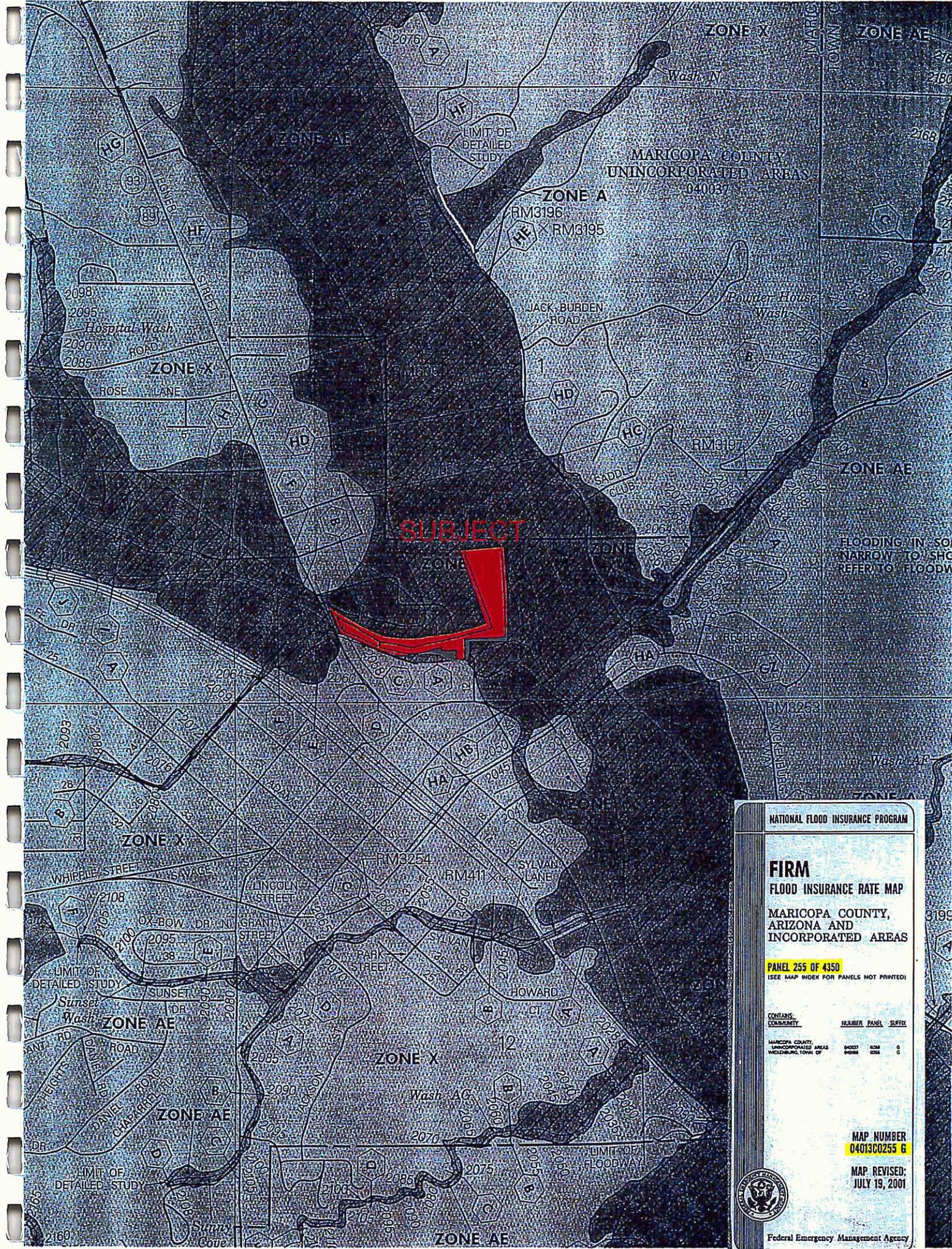
- The statements of fact contained in this report are true and correct.
- The reported analyses, opinions, and conclusions are limited only by the reported assumptions and limiting conditions, and are our personal, impartial, and unbiased professional analyses, opinions, and conclusions.
- We have no present or prospective interest in the property that is the subject of this report, and no personal interest with respect to the parties involved.
- We have no bias with respect to the property that is the subject of this report or to the parties involved with this assignment.
- Our engagement in this assignment was not contingent upon developing or reporting predetermined results.
- Our compensation for completing this assignment is not contingent upon the development or reporting of a predetermined value or direction in value that favors the cause of the client, the amount of the value opinion, the attainment of a stipulated result, or the occurrence of a subsequent event directly related to the intended use of this appraisal.
- Our analyses, opinions, and conclusions were developed, and this report has been prepared, in conformity with the Uniform Standards of Professional Appraisal Practice.
- Wendell L. Montandon, MAI and Ryan Crowley have made a personal inspection of the property that is the subject of this report.
- No one provided significant professional assistance to the person(s) signing this report other than the Ryan Crowley who assisted in the research, confirmation and analysis of the sales data and the original draft of a portion of this report.
- We certify that, to the best of our knowledge and belief, the reported analyses, opinions and conclusions were developed, and this report has been prepared, in conformity with the requirements of the Code of Professional Ethics and the Standards of Professional Appraisal Practice of the Appraisal Institute.
- We certify that the use of this report is subject to the requirements of the Appraisal Institute relating to review by its duly authorized representatives.
- As of the date of this report, Wendell L. Montandon, MAI, has completed the requirements of the continuing education program of the Appraisal Institute.


Wendell L. Montandon, MAI
Certified General Real Estate Appraiser
Certificate Number 30159[wml]/30158, State of Arizona

UNDERLYING ASSUMPTIONS AND LIMITING CONDITIONS

1. That title to the property is good and merchantable.
2. That no liability is assumed on account of inaccuracy or errors in any information furnished by others whom this appraiser contacted at the site or elsewhere and which has been used in making this appraisal.
3. That no responsibility is assumed for legal matters affecting the property, such as title defects, liens, overlapping boundaries, etc.
4. That no survey has been made of the property for purposes of this report.
5. That no right is given to publish this report or any part thereof without the written consent of the writer.
6. That the valuation estimates contained herein apply as of the date of this appraisal only.
7. That we do not authorize the out-of-context quoting from or partial reprinting of this appraisal report. Further, neither all nor any part of this appraisal report shall be disseminated to the general public by the use of media for public communication without the prior written consent of the appraiser signing this appraisal report, particularly as to valuation conclusions, the identity of the appraiser or firm with which he is connected, or any reference to the Appraisal Institute, or the MAI designation.
8. That the distribution of value between land and building applies only under the present program of utilization and does not apply under any other premise.
9. That there are no hidden or unapparent conditions of the property, subsoil, potential flooding hazards, hydrology, chemical contamination or structures, which would render it more or less valuable.
10. The appraiser has noted in the appraisal report any adverse conditions (such as needed repairs, depreciation, the presence of hazardous wastes, toxic substances, etc.) observed during the inspection of the subject or that he or she became aware of during the normal research involved in performing the appraisal. Unless otherwise stated in the appraisal report, the appraiser has no knowledge of any hidden or unapparent conditions of the property or adverse environmental conditions (including the presence of hazardous wastes, toxic substances, etc.) that would make the property more or less valuable, and has assumed that there are no such conditions and makes no guarantees or warranties, express or implied, regarding the condition of the property. The appraiser will not be responsible for any such conditions that do exist or for any engineering or testing that might be required to discover whether such conditions exist. Because the appraiser is not an expert in the field of environmental hazards, the appraisal report must not be considered as an environmental assessment of the property.

FLOOD MAP



SUBJECT

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

MARICOPA COUNTY,
ARIZONA AND
INCORPORATED AREAS

PANEL 255 OF 4350
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY, UNINCORPORATED AREAS	040027	0256	C
WICKLIFFSburg, TOWN OF	040088	0258	C

MAP NUMBER
04013C0255 G

MAP REVISED:
JULY 19, 2001



Federal Emergency Management Agency

SUBJECT PHOTOS



VIEW TO EAST FROM
SOLS WASH WITH
COFFINGER PARK ON
NORTH BANK AT LEFT
OF PHOTO



VIEW TO NORTH AT
RIVER STREET FROM
SOLS WASH



VIEW TO SOUTH AT
VALENTINE ROAD
FROM SOLS WASH



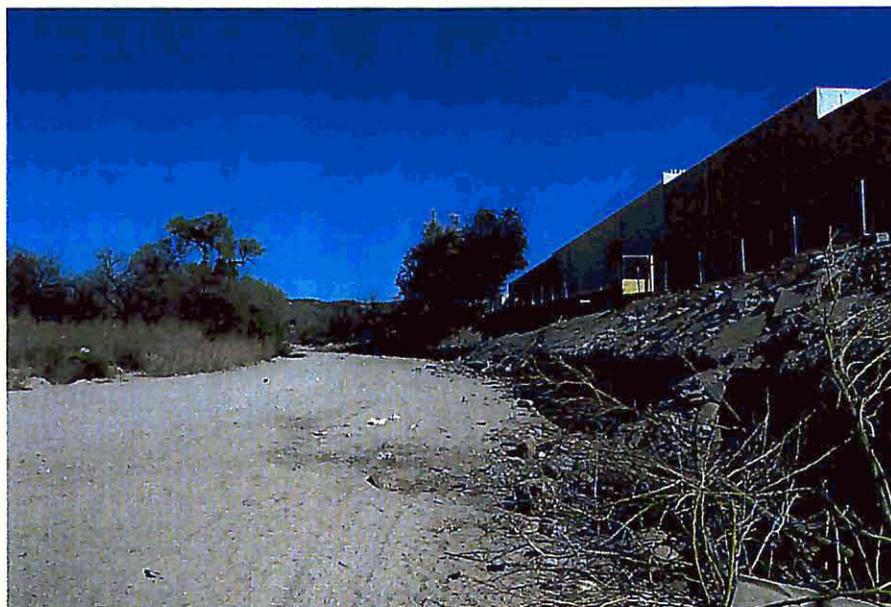
LOOKING NORTH AT HASSAYAMPA RIVER PORTION OF SUBJECT



VIEW TO WEST OF WEST
END OF SUBJECT'S
SOLS WASH LAND -
TEGNER STREET
BRIDGE IN
BACKGROUND



VIEW WEST OF SOUTH
BANK OF SOLS WASH
OPPOSITE RESIDENTIAL
CONDOMINIUMS



VIEW EAST OF SOUTH
BANK OF SOLS WASH
OPPOSITE SUPER
MARKET

CONTRACT

SOLICITATION/CONTRACT/ORDER FOR COMMERCIAL ITEMS OFFEROR TO COMPLETE BLOCKS 12, 17, 23, 24, AND 30				1. REQUISITION NUMBER W81EYN20388962		PAGE 1 OF 9	
2. CONTRACT NO. DACW09-02-P-0020		3. AWARD/EFFECTIVE DATE 20-Feb-2002		4. ORDER NUMBER		5. SOLICITATION NUMBER DACW09-02-T-0003	
7. FOR SOLICITATION INFORMATION CALL		8. NAME MATTHEWS TURNER		9. TELEPHONE NUMBER (NO COMBID CTRS) (213) 452-3237		6. SOLICITATION ISSUE DATE 14-Feb-2002	
9. ISSUED BY CONTRACTING DIVISION PO BOX 532711 LOS ANGELES CA 90053-2325		10. THIS ACQUISITION IS <input checked="" type="checkbox"/> UNRESTRICTED <input type="checkbox"/> SET ASIDE: %FOR <input type="checkbox"/> SMALL BUSINESS <input type="checkbox"/> SMALL DISADV. BUSINESS <input type="checkbox"/> 8(A) SIC: 6531 SIZE STANDARD: 1.5 million		11. DELIVERY FOR FOB DESTINATION UNLESS BLOCK IS MARKED <input type="checkbox"/> SEE SCHEDULE		12. DISCOUNT TERMS	
15. DELIVER TO WATER RESOURCES PLANNING SCT C JOSEPH DIXON 3636 NORTH CENTRAL AVENUE SUITE 740 PHOENIX AZ 85012-1936		16. ADMINISTERED BY SEE ITEM 9		13 a. THIS CONTRACT IS A RATED ORDER UNDER OPAS (15 CFR 700) <input type="checkbox"/>		13 b. RATING	
17 a. CONTRACTOR/ OFFEROR MONTANDON FARLEY RE AD GROUP INC WENDELL L. MONTANDON 1480 E BETHANY HOME ROAD STE 220 PHOENIX AZ 85014		18 a. PAYMENT WILL BE MADE BY USACE FINANCE CENTER ATTN: CEFCO-AO-P 5270 INTEGRITY DRIVE MILLINGTON TN 38054-5005		14. METHOD OF SOLICITATION <input checked="" type="checkbox"/> RFQ <input type="checkbox"/> IFB <input type="checkbox"/> RFP		17 b. CHECK IF REMITTANCE IS DIFFERENT AND PUT SUCH ADDRESS IN OFFER	
19. ITEM NO.		20. SCHEDULE OF SUPPLIES/ SERVICES SEE SCHEDULE		21. QUANTITY		22. UNIT	
25. ACCOUNTING AND APPROPRIATION DATA See Schedule		23. UNIT PRICE		24. AMOUNT		26. TOTAL AWARD AMOUNT \$3,500.00	
27 a. SOLICITATION INCORPORATES BY REFERENCE FAR 52.212-1, 52.212-4, FAR 52.212-3 AND 52.212-5 ARE ATTACHED.		27 b. CONTRACT/PURCHASE ORDER INCORPORATES BY REFERENCE FAR 52.212-4, FAR 52.212-5 IS ATTACHED.		ADDENDA <input type="checkbox"/> ARE <input type="checkbox"/> ARE NOT ATTACHED		ADDENDA <input type="checkbox"/> ARE <input checked="" type="checkbox"/> ARE NOT ATTACHED	
28. CONTRACTOR IS REQUIRED TO SIGN THIS DOCUMENT AND RETURN TO ISSUING OFFICE. CONTRACTOR AGREES TO FURNISH AND DELIVER ALL ITEMS SET FORTH OR OTHERWISE IDENTIFIED ABOVE AND ON ANY ADDITIONAL SHEETS SUBJECT TO THE TERMS AND CONDITIONS SPECIFIED HEREIN.		28. AWARD OF CONTRACT: REFERENCE <input type="checkbox"/> OFFER DATED . YOUR OFFER ON SOLICITATION (BLOCK 5), INCLUDING ANY ADDITIONS OR CHANGES WHICH ARE SET FORTH HEREIN, IS ACCEPTED AS TO ITEMS:		COPIES		29. AMOUNT VERIFIED CORRECT FOR	
30 a. SIGNATURE OF OFFEROR/CONTRACTOR		30 b. NAME AND TITLE OF SIGNER (TYPE OR PRINT)		30 c. DATE SIGNED		31 a. UNITED STATES OF AMERICA (SIGNATURE OF CONTRACTING OFFICER) <i>Tina A. Frazier</i>	
32 a. QUANTITY IN COLUMN 21 HAS BEEN <input type="checkbox"/> RECEIVED <input type="checkbox"/> INSPECTED <input type="checkbox"/> ACCEPTED, AND CONFORMS TO THE CONTRACT, EXCEPT AS NOTED		32 b. SIGNATURE OF AUTHORIZED GOVT. REPRESENTATIVE		32 c. DATE		33. SHIP NUMBER	
41 a. I CERTIFY THIS ACCOUNT IS CORRECT AND PROPER FOR PAYMENT		41 b. SIGNATURE AND TITLE OF CERTIFYING OFFICER		41 c. DATE		34. VOUCHER NUMBER	
42a. RECEIVED BY (Print)		42b. RECEIVED AT (Location)		42c. DATE REC'D (YYMMDD)		35. AMOUNT VERIFIED CORRECT FOR	
42d. TOTAL CONTAINERS		40. PAID BY		36. PAYMENT <input type="checkbox"/> COMPLETE <input type="checkbox"/> PARTIAL <input type="checkbox"/> FINAL		37. CHECK NUMBER	
38. S/R ACCOUNT NUMBER		39. S/R VOUCHER NUMBER		40. PAID BY		38. S/R ACCOUNT NUMBER	

AUTHORIZED FOR LOCAL REPRODUCTION

DACW09-02-P-0020

Page 2 of 9

SECTION SF 1449 CONTINUATION SHEET

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0001		1.00	Lump Sum	\$3,500.00	\$3,500.00
	APPRAISAL SERVICES WICKENBURG ARIZONA FFP - EVALUATE TWO PROPERTIES AND PRODUCE A CERTIFIED APPRAISAL REPORT IN ACCORDANCE WITH THE SCOPE OF WORK AND AT THE DIRECTION OF THE GOVERNMENT P.O.C. : MR. ALTON PITRE (602)640-2003. PURCHASE REQUEST NUMBER W81EYN20388962				

NET AMT	\$3,500.00
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DELIVERY INFORMATION

CLINS	DELIVERY DATE	UNIT OF ISSUE	QUANTITY	FOB	SHIP TO ADDRESS
0001		Lump Sum	1.00	Dest.	WATER RESOURCES PLANNING SCT C JOSEPH DIXON 3636 NORTH CENTRAL AVENUE SUITE 740 PHOENIX AZ 85012-1936

ACCOUNTING AND APPROPRIATION DATA

AA:	96 NA X 8862.0000 08 2450 004007 96041 2520 D49951	000000000000
AMOUNT:	\$3,500.00	

DACW09-02-P-0020

Page 3 of 9

SCOPE OF WORK

Purchase Order

1. LOCATION: Sols Wash Watershed, Wickenburg, Arizona
2. ITEM: Real Estate Report
3. AUTHORIZATION:
 - a. Section 22 Water Resources Development Act of 1974, as amended
 - b. FY 2001 Energy and Water Development Appropriations Bill
4. DESCRIPTION OF WORK AND SERVICES REQUIRED: The Contractor shall conduct an evaluation of two properties and produce a report, including a certified appraisal, for those properties as previously identified to the Contractor, and shall follow and comply with Arizona State law and regulations for certified appraisals, and following the guidelines outlined in this Scope of Work.
5. SERVICES REQUIRED: The Contractor shall perform the work and services as follows:
 - a. Inspection of the Property: The Contractor shall inspect the property and determine its monetary value.
 - b. Interviews with owner and Town Manager: The Contractor shall interview the owner of the two privately owned parcels of land within Sols Wash and also the Town Manager. The purpose of the interviews will be to obtain the necessary background information concerning the privately owned property and the Sols Wash Watershed.
 - c. Determination of highest and best use
 - (1) Research legal uses allowed: The Contractor shall research allowable legal uses of the properties.
 - (2) Consider physical attributes: The Contractor shall assess utilities availability, access to public roads and streets, and to other public and commercial areas.
 - (3) Research financially feasible uses: The Contractor shall research the financially feasible uses of the privately owned parcels of land (i.e residential and commercial).
 - d. Research, verify and inspect comparable sales: The Contractor shall research, verify and inspect sales of most similar properties available to the two privately owned parcels.
 - e. Analyze data: After conducting research and obtaining the necessary information, The Contractor shall analyze the data and determine a monetary value of the two privately owned parcels of land within Sols Wash.
 - f. Report: The Contractor shall prepare a summary narrative report of all acquired data, evaluations, and a certified appraisal for each property.
6. PERIOD OF SERVICE: The Contractor shall perform the work and services in the time allowed as follows.

DACW09-02-P-0020

Page 4 of 9

- a. Draft (75%) Report: Within thirty (30) days of notification to proceed.
 - b. Final (100%) Report: Within forty-five (45) days of notification to proceed
7. REVIEWS AND SUBMITTALS: All submittals are due as stated in paragraph 6, above, except where due dates have been changed by mutual agreement between the Corps' Study Manager and the Contractor. The materials shall be reviewed and submitted as follows:
- a. Draft Report (75%): The Contractor shall prepare for a review conference to be held in Phoenix, Arizona after submittal of the Draft. After the review period of five (5) calendar days, a review conference shall be held for the specific purpose of examining the progress of the work and resolving the written review comments concerning the preparation of the report material. The conference shall also provide support and guidance to the Contractor, as necessary; to assure that project criteria and planning regulation guidelines are followed as appropriate. Written review comments shall be returned to the Contractor for incorporation into the final study report documentation.
 - b. Final Study Report (100%): The Contractor shall prepare for a review conference to be held in Phoenix, Arizona after submittal of the Pre-Final. After the review period of five (5) calendar days, a review conference shall be held for the specific purpose of examining the progress of the work and resolving the written review comments concerning the preparation of the report material. The conference shall also provide support and guidance to the Contractor, as necessary; to assure that project criteria and planning regulation guidelines are followed as appropriate. Written review comments shall be returned to the Contractor for incorporation into the final study report documentation.
 - c. Final Report Backcheck (100%): After the Final has been reviewed, a conference may be held in the Phoenix office to resolve any written review comments. The Contractor shall immediately make the required corrections and resubmit the material. After submittal of the corrected material the Contractor shall be on call to make further corrections until the work and services are accomplished.
 - d. Review conferences are in addition to the required attendance of meetings specified elsewhere in this scope of work.
 - e. The Contractor shall submit one (1) unbound reproducible copy, and three (3) bound copies, of the Draft Report. The Draft, Final, and Final Backcheck submittals shall include all text files on diskette in an accessible format for spreadsheets (Excel) and word-processing (Word); electronic submittal of all maps, graphics or other types of files shall be included in a format accessible by the government. The Contractor shall submit five (5) original, bound copies of the Final Report and one (1) original unbound reproducible copy of the Final Report, and shall prepare the Final Report on CD in Adobe Acrobat (.pdf) format with links. One (1) master copiable CD and five (5) CD's of the backchecked Final Report shall be submitted upon completion of the report. All submittals shall be made to:

U.S. Army Corps of Engineers
Planning Section C
3636 North Central Ave. Suite 740
Phoenix, Arizona 85012-1936
ATTN: Alton Pire

8. PROJECT MANAGEMENT:

- a. The Contractor shall assign a responsible senior level individual as Project Manager. The Project Manager shall maintain a project file to contain all correspondence and criteria pertinent to this project, and provide the Contracting Officer with the name of the individuals responsible for the preparation and coordination of the project materials and reports.
- b. During the progress of the work, the Contractor shall confer with the Los Angeles District Study Manager, as required, to assure approval of the completed work.
- c. The Los Angeles District Study Manager may visit the Contractor's office at any time during the progress of the work for the specific purpose of examining the progress of the work, and to resolve any questions that the Contractor may have concerning the preparation of the report material. Technical specialists as necessary to provide guidance and to assure an adequate submittal shall support the Los Angeles District Study Manager.
- d. The Contractor shall use electronic means, such as e-mail, to the maximum extent for communications, submittals, and other matters between the Contractor and the Study Manager, Los Angeles District.

9. ITEMS AND DATA TO BE FURNISHED BY THE GOVERNMENT: The Government shall make available to the Contractor relevant information and pertinent available data in its files, which may contribute to the preparation of the material.

10. VISITS TO SITE, PRIVATE SOURCES, AND GOVERNMENT AGENCIES: The Contractor shall advise the Study Manager, Los Angeles District, Phoenix Office, of each proposed visit to the site by private sources, and governmental agencies (federal, state, county and city) at least three (3) calendar days prior to each visit. Contact with governmental agencies shall be limited to research and coordination of data pertinent to the project.

11. SPECIAL REQUIREMENTS

- a. The Contractor shall not incorporate into this project any instructions received, either verbally or in writing, from others without prior written approval from the Contracting Officer. Coordination with other governmental agencies is the responsibility of the Government.
- b. The Contractor shall not depart from or perform beyond this Scope of Work criteria on which the Scope of Work is based without the written direction of the Contracting Officer.

12. OTHER CONSIDERATIONS:

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- a. Release of Data: All data, reports and materials relative to this Scope of Work are the property of the Government, and shall not be released by the Contractor, subcontractors, or employees on temporary duty, without written approval of the Contracting Officer.
- b. Liability for Field Work: The Contractor shall be responsible for all damages to persons and property occurring as a result of the Contractor's fault or negligence in connection with fieldwork, and shall save and hold the Government free from all claims and suits arising from such damages.
13. PAYMENT FOR WORK AND SERVICES: The Government shall award a Firm Fixed Price Purchase Order. The agreed upon awarded price shall constitute full compensation by the Government to the Contractor for the work and services performed under this Purchase Order. Payments shall be made in accordance with the payment clause under the basic contract and the period of service of this task order.

CLAUSES INCORPORATED BY REFERENCE:

52.212-4 Contract Terms and Conditions--Commercial Items DEC 2001

CLAUSES INCORPORATED BY FULL TEXT

52.212-5 CONTRACT TERMS AND CONDITIONS REQUIRED TO IMPLEMENT STATUTES OR EXECUTIVE ORDERS--COMMERCIAL ITEMS (DEC 2001)

(a) The Contractor shall comply with the following FAR clauses, which are incorporated in this contract by reference, to implement provisions of law or executive orders applicable to acquisitions of commercial items:

- (1) 52.222-3, Convict Labor (E.O. 11755).
- (2) 52.233-3, Protest after Award (31 U.S.C. 3553).

(b) The Contractor shall comply with the FAR clauses in this paragraph (b) that the Contracting Officer has indicated as being incorporated in this contract by reference to implement provisions of law or Executive orders applicable to acquisitions of commercial items or components:

(Contracting Officer shall check as appropriate.)

n/a (1) 52.203-6, Restrictions on Subcontractor Sales to the Government, with Alternate I (41 U.S.C. 253g and 10 U.S.C. 2402).

n/a (2) 52.219-3, Notice of HUBZone Small Business Set-Aside (Jan 1999).

n/a (3) 52.219-4, Notice of Price Evaluation Preference for HUBZone Small Business Concerns (Jan 1999) (if the offeror elects to waive the preference, it shall so indicate in its offer).

n/a (4) (i) 52.219-5, Very Small Business Set-Aside (Pub. L. 103-403, section 304, Small Business Reauthorization and Amendments Act of 1994).

n/a (ii) Alternate I to 52.219-5.

n/a (iii) Alternate II to 52.219-5.

- n/a (5) 52.219-8, Utilization of Small Business Concerns (15 U.S.C. 637 (d)(2) and (3)).
- n/a (6) 52.219-9, Small Business Subcontracting Plan (15 U.S.C. 637 (d)(4)).
- n/a (7) 52.219-14, Limitations on Subcontracting (15 U.S.C. 637(a)(14)).
- n/a (8)(i) 52.219-23, Notice of Price Evaluation Adjustment for Small Disadvantaged Concerns (Pub. L. 103-355, section 7102, and 10 U.S.C. 2323) (if the offeror elects to waive the adjustment, it shall so indicate in its offer).
- n/a (ii) Alternate I of 52.219-23.
- n/a (9) 52.219-25, Small Disadvantaged Business Participation Program--Disadvantaged Status and Reporting (Pub. L. 103-355, section 7102, and 10 U.S.C. 2323).
- n/a (10) 52.219-26, Small Disadvantaged Business Participation Program--Incentive Subcontracting (Pub. L. 103-355, section 7102, and 10 U.S.C. 2323).
- xx (11) 52.222-21, Prohibition of Segregated Facilities (Feb 1999).
- xx (12) 52.222-26, Equal Opportunity (E.O. 11246).
- n/a (13) 52.222-35, Equal Opportunity for Special Disabled Veterans, Veterans of the Vietnam Era and Other Eligible Veterans (38 U.S.C. 4212).
- n/a (14) 52.222-36, Affirmative Action for Workers with Disabilities (29 U.S.C. 793).
- n/a (15) 52.222-37, Employment Reports on Special Disabled Veterans, Veterans of the Vietnam Era and Other Eligible Veterans (38 U.S.C. 4212).
- n/a (16) 52.222-19, Child Labor--Cooperation with Authorities and Remedies (E.O. 13126).
- n/a (17)(i) 52.223-9, Estimate of Percentage of Recovered Material Content for EPA-Designated Products (42 U.S.C. 6962(c)(3)(A)(ii)).
- n/a (ii) Alternate I of 52.223-9 (42 U.S.C. 6962(i)(2)(C)).
- n/a (18) 52.225-1, Buy American Act--Balance of Payments Program--Supplies (41 U.S.C. 10a-10d).
- n/a (19)(i) 52.225-3, Buy American Act--North American Free Trade Agreement--Israeli Trade Act--Balance of Payments Program (41 U.S.C. 10a-10d, 19 U.S.C. 3301 note, 19 U.S.C. 2112 note).
- n/a (ii) Alternate I of 52.225-3.
- n/a (iii) Alternate II of 52.225-3.
- n/a (20) 52.225-5, Trade Agreements (19 U.S.C. 2501, et seq., 19 U.S.C. 3301 note).
- n/a (21) 52.225-13, Restriction on Certain Foreign Purchases (E.O. 12722, 12724, 13059, 13067, 13121, and 13129).
- n/a (22) 52.225-15, Sanctioned European Union Country End Products (E.O. 12849).

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n/a (23) 52.225-16, Sanctioned European Union Country Services (E.O.12849).

xx (24) 52.232-33, Payment by Electronic Funds Transfer--Central Contractor Registration (31 U.S.C. 3332).

xx (25) 52.232-34, Payment by Electronic Funds Transfer--Other than Central Contractor Registration (31 U.S.C. 3332).

xx (26) 52.232-36, Payment by Third Party (31 U.S.C. 3332).

n/a (27) 52.239-1, Privacy or Security Safeguards (5 U.S.C. 552a).

n/a (28) 52.247-64, Preference for Privately Owned U.S.-Flag Commercial Vessels (46 U.S.C. 1241).

(c) The Contractor shall comply with the FAR clauses in this paragraph (c), applicable to commercial services, which the Contracting Officer has indicated as being incorporated in this contract by reference to implement provisions of law or executive orders applicable to acquisitions of commercial items or components:

(Contracting Officer check as appropriate.)

xx (1) 52.222-41, Service Contract Act of 1965, As amended (41 U.S.C. 351, et. seq.).

n/a (2) 52.222-42, Statement of Equivalent Rates for Federal Hires (29 U.S.C. 206 and 41 U.S.C. 351, et. seq.).

n/a (3) 52.222-43, Fair Labor Standards Act and Service Contract Act -- Price Adjustment (Multiple Year and Option Contracts) (29 U.S.C.206 and 41 U.S.C. 351, et seq.).

n/a (4) 52.222-44, Fair Labor Standards Act and Service Contract Act - Price Adjustment (29 U.S.C. 206 and 41 U.S.C. 351, et seq.).

n/a (5) 52.222-47, SCA Minimum Wages and Fringe Benefits Applicable to Successor Contract Pursuant to Predecessor Contractor Collective Bargaining Agreement (CBA) (41 U.S.C. 351, et seq.).

(d) Comptroller General Examination of Record. The Contractor shall comply with the provisions of this paragraph (d) if this contract was awarded using other than sealed bid, is in excess of the simplified acquisition threshold, and does not contain the clause at 52.215-2, Audit and Records--Negotiation.

(1) The Comptroller General of the United States, or an authorized representative of the Comptroller General, shall have access to and right to examine any of the Contractor's directly pertinent records involving transactions related to this contract.

(2) The Contractor shall make available at its offices at all reasonable times the records, materials, and other evidence for examination, audit, or reproduction, until 3 years after final payment under this contract or for any shorter period specified in FAR Subpart 4.7, Contractor Records Retention, of the other clauses of this contract. If this contract is completely or partially terminated, the records relating to the work terminated shall be made available for 3 years after any resulting final termination settlement. Records relating to appeals under the disputes clause or to litigation or the settlement of claims arising under or relating to this contract shall be made available until such appeals, litigation, or claims are finally resolved.

(3) As used in this clause, records include books, documents, accounting procedures and practices, and other data, regardless of type and regardless of form. This does not require the Contractor to create or maintain any record that the Contractor does not maintain in the ordinary course of business or pursuant to a provision of law.

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(e) Notwithstanding the requirements of the clauses in paragraphs (a), (b), (c) or (d) of this clause, the Contractor is not required to include any FAR clause, other than those listed below (and as may be required by an addenda to this paragraph to establish the reasonableness of prices under Part 15), in a subcontract for commercial items or commercial components—

(1) 52.222-26, Equal Opportunity (E.O. 11246);

(2) 52.222-35, Equal Opportunity for Special Disabled Veterans, Veterans of the Vietnam Era and Other Eligible Veterans (38 U.S.C. 4212);

(3) 52.222-36, Affirmative Action for Workers with Disabilities (29 U.S.C. 793);

(4) 52.247-64, Preference for Privately-Owned U.S.- Flag Commercial Vessels (46 U.S.C. 1241)(flow down not required for subcontracts awarded beginning May 1, 1996), and

(5) 52.222-41, Service Contract Act of 1965, As Amended (41 U.S.C. 351, et seq.).

(End of clause)

QUALIFICATIONS

QUALIFICATIONS

WENDELL L. MONTANDON, MAI

Real Estate Appraiser, Market Research Analyst, and Consultant

Professional Experience

Thirty-eight years as full-time real estate appraiser and consultant. Associated with Frank Kelly, MAI, from September of 1962 through July of 1972. Acquired appraisal firm of Kelly & Kelly from Estate of Frank Kelly in July of 1972. In December 1973, the Kelly & Kelly firm was merged with that of Walter Winius, Jr., MAI, to form the appraisal and planning firm of Winius Montandon, Inc. In July of 1997, the advisory and appraisal firm of Montandon Farley RE-AD Group Inc. was formed with analysts having a combined 70+ years experience of working together at Winius Montandon, Inc.

Education

BS degree in construction from Arizona State University in 1963; Graduate course in Current Real Estate Problems, 3/65

Various required and elective real estate courses by the American Institute of Real Estate Appraisers prior to obtaining the MAI designation in 1974. Subsequently attended numerous seminars sponsored by real estate affiliates, including week-long sessions in Investment Analysis and Statistical Analysis. Currently certified under the Appraisal Institute's continuing education program.

Professional Affiliations

Member, Appraisal Institute (a merger of the American Institute of Real Estate Appraisers and the Society of Real Estate Appraisers)

Served the American Institute of Real Estate Appraisers or the Appraisal Institute as follows:

National Appraisal Review Committee, 1975-77
National Elective Examinations Committee, 1978-85;
Chairman, 1984-85; Vice Chairman, 1983
National Board of Examiners - Examinations, 1984-85
National Division of Professional Certification and
Recognition Committee, 1983

Professional Affiliations

(Continued...)

Regional Panel of Professional Standards Committee,
1990-1992
President of Arizona Chapter 41, AIREA, 1980
Chapter Membership Committee, 1984
National Research and Information Committee, 1992-93
National General Examinations Committee, 1992-94
Assistant Regional Member, Review and Counseling
Committee, 1992-93
Member - Commercial Mortgage Bankers Association

Certifications

Certified General Real Estate Appraiser
Certificate Number 30159, State of Arizona

Certified General Real Estate Appraiser
License Number 01012, State of Nevada

Property Tax Agent, State of Arizona
Registration Number 910279

Community Service

Past President, Phoenix Sundown Rotary
Past Member, Phoenix Rehabilitation Appeals Board
Current Member at Rotary Club "100" Phoenix

Conduit Experience

Appraiser has completed reports for programs administered
by Bank of America, Norwest Bank and others.

**Geographic Area
of Expertise**

Specialize in Arizona assignments, but have evaluated
properties in more than 20 states, including California,
Nevada, Texas, and Utah.

**Qualification As
Expert Witness**

Maricopa County Superior Court
Pima County Superior Court
Yavapai County Superior Court
Yuma County Superior Court
Federal Bankruptcy Court
US District Court
US Tax Court

Representative Clients

Banc One
Bank of America
Bank of Boston
Bankers Trust Company, New York, NY
Chase Bank of Arizona
Chemical Bank, New York, NY
Citibank (Arizona)
Comerica Bank-California
Crocker National Bank, California
First Financial Bank
First National Bank of Arizona
First National Bank of Chicago
First Nationwide Bank
Firststar Metropolitan Bank
Great American First Savings Bank
Great Western Bank, Northridge, CA
Home National Bank
Imperial Thrift & Loan Association
Interfirst Bank of Dallas and Houston
National Bank of Arizona
NCNB Texas
The North American Bank
Northern Trust Bank
Norwest Bank Nebraska
Security Pacific Bank - Arizona
Pittsburgh National Bank
Republic National Bank of Arizona
Rio Salado Bank
Texas Commerce Bank, Houston
U.S. Bancorp, Portland
Wells Fargo Bank, N.A.
Valley Bank of Arizona

Atlantic Asset Management
Bank One, Arizona; Trust Real Estate Department
Baptist Foundation of Arizona
Bonnet Resources Corporation (A Banc One Company)
Crossland Mortgage
Financial Resource Management Trust Company
Harris Trust Bank of Arizona
Investors Mortgage Loan Service
J.E. Roberts
L.J. Melody
Minnesota Mutual Life Insurance Company
Principle Mutual Life Insurance Group
Property Reserve, Inc.

Standard Insurance Company, Portland, OR
State Mutual Life Assurance Company of America
United of Omaha Life Insurance Company

Aegon USA Realty Advisor
American National Insurance Company
Bankers Mutual
Construction Lending Corporation
Equitable Life Assurance Society
Freemont Investment & Loan
Illinois Mutual
Insurance Company of North America
Keig & Mure Mortgage, Inc.
Londen Insurance Group
McMorgan & Company
Metropolitan Life Insurance Company
Princeton American Corporation
State Bond & Mortgage Insurance Company

Beer, Toone & Ryan, P.C.
Bonnert, Fairbourn & Friedman
Bryan, Cave, McPheeters & McRoberts
Brown & Bain, Attorneys
Frazer, Ryan, Goldberg & Hunter
Larry Cohen, Attorney
Fennemore Craig
Hebert Schenk P.C.
Howard C. Meyers, P.C.
Jaburg & Wilk, P.C.
Jennings, Strouss & Salmon, Attorneys
Lewis & Roca, Attorneys
Loeb & Loeb, Attorneys
Mariscal, Weeks, McIntyre & Friedlander
M & I Thunderbird Bank
McCabe, O'Donnell, Wright & Merritt
Mitten, Goodwin & Raup
Mohr, Hackett, Pederson, Blakley, Randolph
& Haga, P.C.
Molloy, Jones & Donahue, P.C.
Murphy & Posner
The Cavanagh Law Firm
Ryley, Carlock & Applewhite, Attorneys
Shearman & Sterling
Snell & Wilmer, Attorneys
Streich Lang, PA
Tarkington, O'Connor & O'Neill
Warner, Angle, Roper & Hallam, P.C.

Representative Clients - (Continued...)

Arizona Public Service Company	City of Avondale
Artemus	City of Glendale
Bellamah Community Developers	City of Peoria
Cabot, Cabot & Forbes Development Company	City of Phoenix
Carl's Jr. Restaurants	City of Mesa
Chevron	City of Scottsdale
The Colby Company	City of Tempe
The Chris-Town Company	City of Tolleson
Combined Health Resources	Maricopa County
Empire Machinery	Maricopa County Flood Control District
Exeter Development, Inc.	Maricopa County Department of Transportation
Firestone Tire & Rubber Company	Arizona State University
General Electric Company	Cartwright School District
Goodyear Tire & Rubber Company	Osborn School District
Grossman Company Properties	Peoria School District
Heron Financial Corporation	Phoenix Elementary School District
Honeywell, Inc.	Phoenix Union High School District #210
Humble Oil & Refining Company	Wickenburg School District
IBM Corporation	
Jaren Corporation	Arizona State Retirement System
Kentucky Fried Chicken	Arizona Department of Transportation
Kroger	Arizona Parklands Foundation
Lucent	Arizona Department of Administration
MCO Properties/Horizon Corporation	Department of the Army, Los Angeles District,
Mariani-Buss Associates	Corps of Engineers
Marriott Corporation	Federal Bureau of Investigation
McDonald's Corporation	Federal Deposit Insurance Corp.
Mobil Oil Corporation	Federal Home Loan Bank Board
NAI Horizon	Federal Savings & Loan Insurance Corp.
P M Realty Advisors	General Services Administration
Irwin Pasternack, Architect	Internal Revenue Service
Perini Corporation	Resolution Trust Corporation
Retirement Corporation of America	USDA, Forest Service
Safeco Title Insurance Company	US Postal Service
Samaritan Health Services	
Schuck & Sons Construction Company	
Southwest Forest Industries	
Standard Oil Company of California	
Shell Oil Company	
Texaco, Inc.	
Trammell Crow Company	
Wal-Mart Stores	
Del E. Webb Corporation	
Westinghouse Electric Corporation	

STATE OF ARIZONA
BOARD OF APPRAISAL

BE IT KNOWN THAT
WENDELL L. MONTANDON

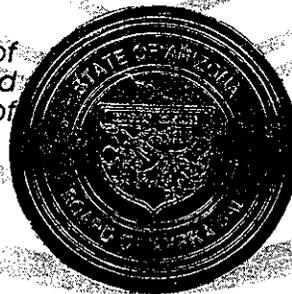
HAS MET ALL THE REQUIREMENTS AS A
Certified General Real Estate Appraiser

*In accordance with Arizona Revised Statutes
and on authority of the Board of Appraisal, State
of Arizona.*

*This certificate shall remain evidence thereof
unless or until the same is suspended, revoked
or expires in accordance with the provisions of
law.*

CERTIFICATE NUMBER
30159

EXPIRATION DATE
AUGUST 31, 2002



*In witness whereof the Arizona Board of Appraisal
caused to be signed by the Chair of the Board
and the Executive Director*

Melvin D. Young 7/25/00
Chair, Board of Appraisal Date

Edward C. Spivey 7/25/00
Executive Director of the Board of Appraisal Date

SHALL REMAIN PROPERTY OF ARIZONA BOARD OF APPRAISAL