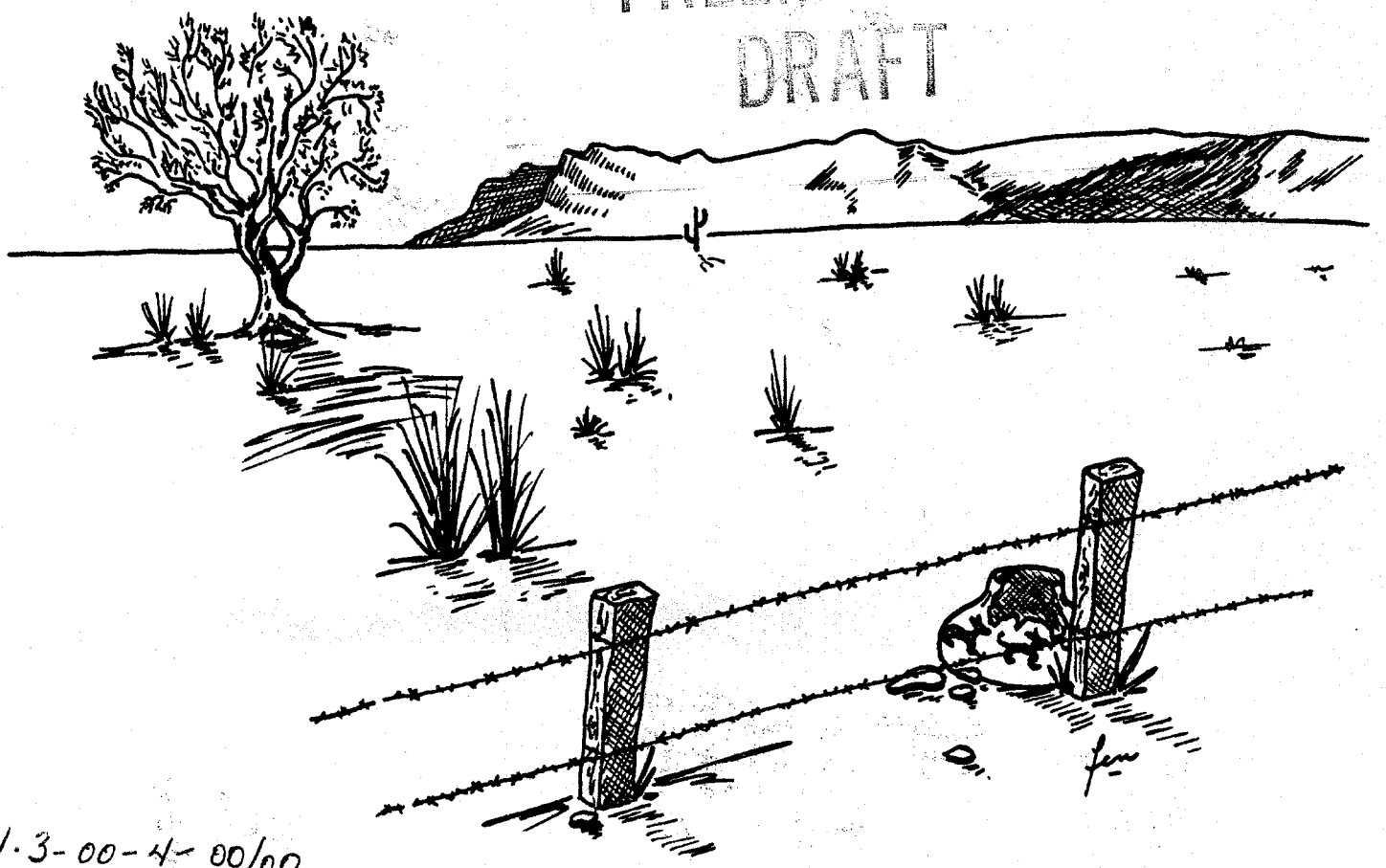
WATERSHED PLAN AND ENVIRONMENTAL IMPACT STATEMENT

PRELIMINARY DRAFT



LOWER QUEEN CREEK WATERSHED

MARICOPA & PINAL COUNTIES, ARIZONA

U.S. Department of Agriculture — Soil Conservation Service

1979

PRELIMINARY
DRAFT

WATERSHED PLAN

AND

ENVIRONMENTAL IMPACT STATEMENT

LOWER QUEEN CREEK WATERSHED

MARICOPA AND PINAL COUNTIES, ARIZONA

Prepared under the Authority of the Watershed Protection and Flood Prevention Act, Public Law 83-566, as amended (16 USC 1001-1008) and in accordance with Section 102(2)(C) of the National Environmental Policy Act of 1969, Public Law 91-190, as amended (42 USC 4321 et seq).

PREPARED BY: Gila River Indian Community Tribal Council
Roosevelt Water Conservation District
Pinal County Board of Supervisors
Flood Control District of Maricopa County
Florence-Coolidge Natural Resource Conservation District
East Maricopa Natural Resource Conservation District
U.S. Department of Agriculture, Soil Conservation Service

PREFACE

Enclosed are two documents, the Watershed Plan and Environmental Impact Statement for the Lower Queen Creek Watershed, Arizona.

The Watershed Plan has been developed by the local sponsors with the assistance of the U.S. Department of Agriculture and the State of Arizona and is the basis for the authorization of federal assistance to implement the proposed project in accordance with the Watershed Protection and Flood Prevention Act, Public Law 83-566, as amended (16 USC 1001-1008).

The Environmental Impact Statement has been prepared by the U.S. Department of Agriculture and the State of Arizona in compliance with Section 102(2)(C) of the National Environmental Policy Act of 1969, Public Law 91-190, as amended (42 USC 4321 et seq).

The Environmental Impact Statement contains the detailed information on impacts, alternatives, and irreversible and irretrievable commitments of resources.

TABLE OF CONTENTS

PRELIMINARY DRAFT WATERSHED PLAN

TABLE OF CONTENTS

PRELIMINARY DRAFT
ENVIRONMENTAL IMPACT STATEMENT

PRELIMINARY
DRAFT

WATERSHED PLAN

LOWER QUEEN CREEK WATERSHED
MARICOPA AND PINAL COUNTIES, ARIZONA

LOWER QUEEN CREEK WATERSHED PLAN*

MARICOPA AND PINAL COUNTIES, ARIZONA

SUMMARY AND DESCRIPTION

The Queen Creek basin is located in south central Arizona, approximately 35 miles southeast of Phoenix. The Corps of Engineers' Whitlow Ranch Dam divides the basin into lower and upper sub-basins. The dam, completed in November 1960, controls a drainage area of approximately 91,500 acres or 143 square miles. The project area studied in this report consists of the lower sub-basin designated as the Lower Queen Creek Watershed. The proposed floodwater retarding structure will control an additional 72,580 acres or 113 square miles of drainage area.

The Lower Queen Creek Watershed contains approximately 145,900 acres of which 22,000 acres are in Maricopa County and 123,900 acres in Pinal County. The watershed has an estimated population of about 3,500 and includes the unincorporated communities of Chandler Heights, Queen Valley, and Queen Creek.

The watershed plan was prepared by the Gila River Indian Community Tribal Council, Roosevelt Water Conservation District, Pinal County Board of Supervisors, Flood Control District of Maricopa County, Florence-Coolidge Natural Resource Conservation District.

Technical assistance was provided by the U.S. Department

---

* All information and data, except as otherwise noted, were collected by the Arizona Water Commission and the Soil Conservation Service.

of Agriculture, Soil Conservation Service and the State of Arizona, Arizona Water Commission.

Queen Creek and Sonoqui Wash have caused extensive flood and sediment damages to crops, irrigation systems, roads, land, homes, and equipment.

Installation of the project will eliminate most flood problems presently affecting the developed floodplain area. It will include the existing conservation land treatment program currently underway in most of the 145,900-acre watershed and a structural measure which will control the runoff from 113 $mi.^2$ of the Lower Queen Creek basin.

The structural measure will provide the following with protection from the 100-year frequency event:

1. 19,600 acres of developed land (an additional 2,400 acres of land will receive partial flood protection which will yield a total of 22,000 acres receiving some benefits from reduced exposure to flooding).
2. A 7.5 mile reach of the Salt-Gila aqueduct.
3. 35 miles of an irrigation distribution system.
4. An 11-mile reach of the Roosevelt Water Conservation District (RWCD) Floodway.
5. 15 miles of Queen Creek channel.

Land treatment measures are voluntarily applied and maintained by landowners and operators and are based on conservation or management plans developed in cooperation with conservation districts or land administering agencies.

The primary structural feature of the planned project

is the construction of the Queen Creek Floodwater Retarding Structure (FRS). It will be located immediately above the CAP Salt-Gila aqueduct in the transition area between irrigated agricultural lands and desert lands. The FRS will outlet floodwater into Queen Creek at a controlled rate. The principal spillway will outlet into Queen Creek through a 1,500 foot long outlet channel.

As proposed, the Queen Creek FRS will be approximately 8 miles in length, reach a maximum height of about 24 feet, and provide 11,720 acre-feet of storage including the 100-year sediment allocation (Table 3).

The flood control structure will contain a 790-acre gate-controlled sediment pool for wildlife uses. Water collected will also serve to recharge the groundwater table.

Construction of the FRS will eliminate all vegetation from about 180 acres in the immediate vicinity of the structure site and about 160 acres of borrow area along the CAP aqueduct site. Expected effects on 600 acres of downstream vegetation include reductions in growth and plant density with concomitant consequences on wildlife habitat.

Other possible impacts include specific effects on the 3,200-acre proposed reservoir area, possible reduction of air quality during and after construction, esthetic considerations, groundwater quantity and quality, sediment reduction and protection of natural resources. Implementation of the project plan will require detailed investigation, survey, and

retrieval of data from five archeological sites of Hohokam origin.

The installation period of the proposed project is five years. The total project cost is $12,933,000, of which $11,450,500 will be borne by Public Law 566 and $1,482,500 by other funds. Total project costs include $12,556,500 for structural measures and $376,500 for land treatment measures.

Land treatment measures in the watershed will be applied and maintained by the landowners and operators of the land in the Florence-Coolidge and East Maricopa Natural Resource Conservation Districts (NRCD).

The Flood Control District of Maricopa County (FCDMC) will operate and maintain the structural works of improvement. Operation and maintenance agreements will be executed between the FCDMC and the Soil Conservation Service (SCS) prior to issuing invitation to bid. Total average annual operation and maintenance cost is estimated at $15,000.

The estimated average annual benefits and costs of the proposed structural measures are $1,162,100 and $879,200 respectively. The ratio of benefits to costs is 1.32:1.00.

PROJECT PURPOSES AND GOALS

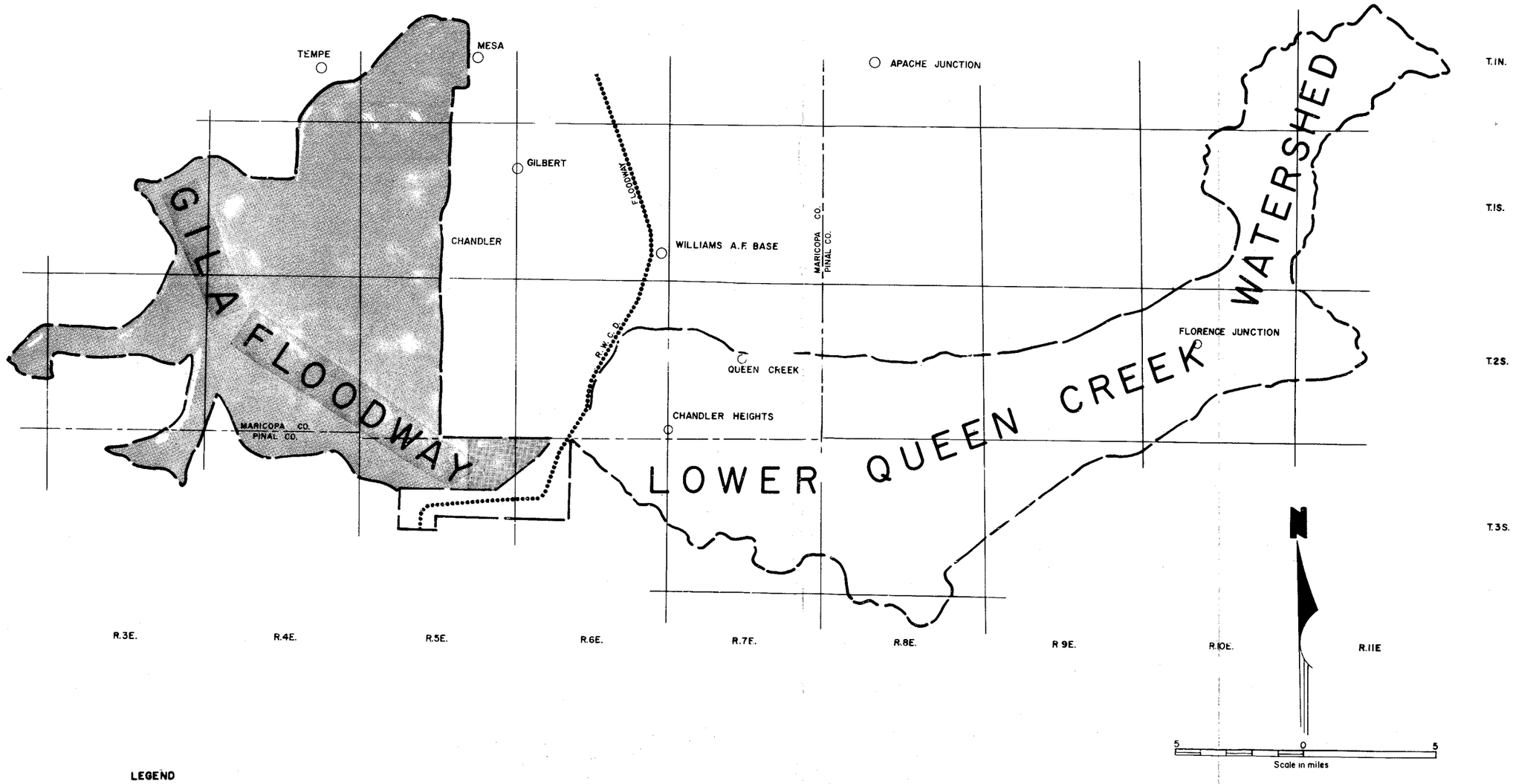
The sponsors of the Lower Queen Creek Project intend to establish watershed protection and to continue conservation land treatment programs to prevent and reduce floodwater, sediment, and erosion damages to the following:

1. productive agricultural lands
2. existing irrigation facilities
3. county and farm roads
4. commercial establishments
5. residences
6. public facilities
7. Roosevelt Water Conservation District Floodway

It is also desired that project measures provide maximum protection to a 7.5 mile reach of the proposed Central Arizona Project Salt-Gila aqueduct and the proposed system of canals, laterals, and other improvements that will be installed to distribute CAP water.

The delineation of the watershed, as shown in the Watershed Boundary Map seen on the following page, shows two watershed areas. This delineation is shown in the application for watershed assistance. One area is termed Gila Floodway and the other Lower Queen Creek. This watershed plan/environmental impact statement only relates to the Lower Queen Creek portion of the Gila Floodway-Lower Queen Creek Watershed.

The sponsors' goals in continuing to provide technical assistance for the on-going land treatment program in the



LEGEND

- AREA WITHIN LOWER QUEEN CREEK WATERSHED
- AREA IN APPLICATION NOT INCLUDED AS PART OF THE LOWER QUEEN CREEK WATERSHED
- R.W.C.D. FLOODWAY

GILA FLOODWAY – LOWER QUEEN CREEK WATERSHED, BOUNDARY MAP

SOURCE OF DATA: ARIZONA WATER COMMISSION

watershed are:

1. Improved soil and water management techniques on cropland to maintain erosion and sediment yield at negligible rates in order to improve soil condition, to increase water infiltration rates on certain soils, to reduce the amount of irrigation water lost through overwatering and seepage, and to increase crop yields.
2. Improved management of rangeland in order to reduce erosion and sediment yield, to reduce overgrazing in order to realize an increase in forage plant production for livestock and wildlife, and to increase production of red meat.

The sponsors wish to implement a project plan that, where possible, will provide a 100-year level of protection and maximize the enhancement, restoration, and continued use of the existing environmental community. In recognition of conflicting interests, the planned project was prepared as an optimum solution which will adequately meet the sponsors' objectives.

PLANNED PROJECT

Land Treatment Measures [1,2]

General

The land treatment program to be carried out in the project area will consist of those practices currently being voluntarily applied by cooperators in the ongoing

programs of the Florence-Coolidge and East Maricopa NRCD's. No accelerated land treatment program under Public Law 83-966 is planned. Federal monies expended on State and private land will consist solely of cost-share funds of the Agricultural Conservation Program administered by the Agricultural Stabilization and Conservation Service and technical assistance funds utilized by the SCS during planning, application and follow up on the practices applied.

Agricultural land in the project consists of irrigated land and range. It is recognized that cultural resources may be encountered either during the planning or application stages of land treatment. Should this occur during an SCS-assisted undertaking, the SCS will follow its regulations as set forth in Title 7 CFR Part 656.

Determination of needed measures has been made largely by assessing the soils present, their capabilities and inherent problems. The SCS has recently completed and published a soil survey report that includes the cropland within the project area.

Irrigated Land

Presently, land users of about 48 percent (24,000 acres) of the cropland in the project are cooperators with the East Maricopa NRCD. Each has developed a resource conservation plan, which is in some stage of implementation.

Cooperators, through plan implementation, and non-cooperators

who utilize good farming practices are considered to have applied land treatment measures that provide adequate soil erosion protection to an estimated 29,500 acres of land. Of that, about 6,000 acres have been treated with those practices essential for a sustained use of the resource base.

The major land treatment measures being applied on cropland are land leveling, lining of irrigation ditches, installation of pipeline, irrigation water management, minimum tillage, crop residue management and conservation cropping systems. Measures for soil management include mulching, chiseling, and hayland management. The small portion of State trust land that is irrigated will be treated in the same manner as private cropland.

Rangeland

Unlike cropland, the predominant portion of rangeland is State trust land (63 percent) with the rest of rangeland divided among the U.S. Forest Service (17 percent), the Bureau of Land Management (5 percent), Indian reservation (5 percent), and private interests (10 percent).

State trust land users can receive planning and technical assistance from the SCS through natural resource conservation districts. Stocking rates are determined by the Arizona Land Department's Division of Natural Resources. Land treatment measures to be applied on State and private rangeland will consist primarily of fencing, water development, and proper grazing use to increase the amount of forage.

Land treatment measures such as fencing, water bars, erosion control structures, and range seeding have been implemented in the Tonto National Forest. Forest Service range personnel continually monitor forage production and range condition to determine stocking rates on forest range. This program will continue beyond the end of the project installation period.

Public land, administered by the Bureau of Land Management, is managed under the multiple-use concept. Land treatment will be management oriented until comprehensive management plans are completed.

Presently, about 36,700 acres (including 15,600 acres of National Forest) of rangeland are considered to be adequately protected. Another 14,500 acres of State and private land are expected to be adequately protected by the end of the project installation period.

Other Land

Private individuals, municipalities, local governments and similar nonfederal owners of other than agricultural land are also eligible for SCS technical assistance by request through resource conservation districts. As with agricultural land, remedial actions on the part of the landowner are voluntary.

Structural Measures 3,4,5

The primary structural feature is the construction of

Queen Creek FRS, a class "C" earthen structure. This "class" of structure is assigned in accordance with a dam classification system established by the Soil Conservation Service. The basic concept of this system is tied directly to the potential danger or hazard to life and property in the event of a dam failure. The Queen Creek FRS is classified a class "C" structure. This is predicated on the fact that this structure is located where failure may cause loss of life or serious damage to homes, businesses, highways, and a railroad. The location of the structure is shown on the Project Map, Appendix F.

The dam is designed to discharge, without overtopping, not only the floodwaters associated with the probable maximum precipitation that is expected to occur in this watershed, but also those floodwaters being passed through the Whitlow Ranch Dam.

The proposed FRS is located immediately above the CAP Salt-Gila aqueduct along an alignment that would intercept floodwaters from both the Queen Creek and Sonoqui drainages. The selected alignment is at an approximate junction between irrigated agricultural lands and desert. The structure would intercept flows from a total drainage area of 256 square miles of which 143 square miles are above Whitlow Ranch Dam and 113 square miles are in the intervening drainage area below the dam.

The reservoir is designed to safely contain 9,660

acre-feet of floodwater which is equivalent to 1.6 inches of runoff from the controlled drainage area. Design sediment capacity is based upon the expected sediment accumulation at the site over the 100-year design life and amounts to 2,060 acre-feet.

The Lower Queen Creek Watershed is located between the Williams-Chandler Watershed on the north and the Magma Watershed on the south. Authorized P.L. 566 projects in these adjacent watersheds include the construction of Vineyard FRS and Rittenhouse FRS (Williams-Chandler Watershed) and Magma FRS (Magma Watershed). The Queen Creek FRS will be located between Rittenhouse FRS and Magma FRS and will follow the same general alignment as the adjacent structures.

As proposed, the Queen Creek FRS will be approximately 8 miles in length, reach a maximum height of about 24 feet, and contain a 100-year sediment and flood pool storage of 11,720 acre-feet.

The principal and emergency spillways will be located on the northern segment of the structure. The principal spillway facilities consist of a rectangular weir box inlet with an antivortex device, a double-barreled (7 feet x 7 feet each) monolithic conduit and a stilling basin.

Releases from the principal spillway conduits will be conveyed to Queen Creek through a rock lined trapezoidal channel designed to carry the 100-year release of 1,755 cfs. The outlet channel will approximately parallel Queen Creek and then bend northwesterly and proceed for a short distance

until it intercepts the main stem of the Queen Creek channel. Principal spillway releases will pass into the Queen Creek channelized system, a 15-mile reach beginning approximately at the proposed Queen Creek FRS and ending at the RWCD Floodway. The Salt-Gila aqueduct crosses the proposed principal spillway outlet channel approximately 790 feet downstream from the stilling basin. The USBR will install a structure at the aqueduct crossing.

The emergency spillway for the proposed Queen Creek FRS will outlet into Queen Creek. The spillway structure will consist of a 1,600 foot wide ungated concrete baffled chute. The crest elevation was set at the top of the combined 100-year sediment and flood pool storage elevation.

The spillway chute will use concrete baffles to dissipate the water's energy as it falls to the lower grade. A uniform layer of coarse riprap material will be placed at the outlet of the spillway chute to control expected scour and erosion.

Between the FRS and the Salt-Gila aqueduct the spillway flows will be contained between dikes on both sides of the channel. The north bank of the principal spillway outlet channel will be elevated to serve as the southern emergency spillway dike. The inside faces of the dikes will be riprapped. There will be no facilities constructed to convey emergency spillway releases across the aqueduct.

The crest elevation of the principal spillway was set at the top of the 100-year sediment pool elevation. Designed

sediment capacity is based upon the expected sediment accumulation at the site over the 100-year design life and amounts to 2,060 acre-feet. Storage control in the sediment pool would be maintained through a gated drain located in the lower elevations of the spillway riser. The proposed drainage system will be added for outlet control. The flow will discharge directly into the principal spillway's conduit. The gate would remain closed except in the case when emergency repairs are required. Future sediment deposition will reduce the available storage and reduce the need for drainage.

Regulation of the gate controlled sediment pool will be the responsibility of the Flood Control District of Maricopa County. The water rights to the floodwaters in the sediment storage pool are owned by the Roosevelt Water Conservation District.

A hydraulic model study of both the principal and emergency spillway systems will be made to determine type, size, and performance needs. The results will be incorporated into final designs.

Foundation investigations indicate that there are two basic soil types underlying the FRS alignment. From south to north, approximately the first 5 miles are primarily underlain by fine grained plastic soils ranging in thickness from a maximum encountered 40 feet at the south end and thinning northward to a minimum of 3 feet before reaching continuous and extensive underlying gravel deposits. This portion of

the alignment will require minimum foundation treatment consisting of trench excavations and backfilling. The excavations will vary in width and depth depending on the materials encountered.

The foundation of the north portion on the remaining 3 miles of FRS alignment contains fine to medium grained non-plastic soils, ranging from 3 to 14 feet in depth which are underlain by a loose unconsolidated gravel. The foundation treatment will consist of excavating through the weak gravel zones. The excavations will vary in width and depth depending on the materials encountered (Plate-1, Appendix D).

The Queen Creek FRS will be an earthen structure with an embankment section consisting of fine grained soils. The design plan will incorporate a filter system using two different types of design configurations. The embankment section requires two designs to meet the needs of the two general foundation types found along the FRS alignment. Typical cross sections are shown on Plate-2 in Appendix D.

All of the materials needed for the construction of the structure are located in the site area. Approximately 220 acres will be needed for borrow area consisting of 160 acres from the CAP construction right-of-way and 60 acres from the emergency spillway area.

The embankment material would come from the fine grained soils found along the CAP alignment outside of the Queen Creek channel area. The gravel shell and filter materials would primarily come from the Queen Creek floodplain area.

Surveying monuments will be installed during construction. These monuments together with existing monuments will be checked periodically by the SCS and the sponsors to determine changes in elevations. Also, periodic field checks will be made during the effective economic life of the structure to determine the extent of development of subsidence in the area.

Implementation of the proposed structural measures will require a slight modification to two existing electrical transmission lines, both of which are located near the southern end of the proposed FRS. The lines will have to be elevated and their supporting structures protected at their intersection with the FRS and for a slight distance into the reservoir area.

Provisions will also be required for the relocation of approximately two miles of a private access road that presently crosses the FRS and reservoir area. This is a secondary improved road constructed across State Trust Lands. It is anticipated that access will be provided around the southern end of the structure.

In order to properly maintain the existing Queen Creek channel system, the Flood Control District of Maricopa County will obtain a perpetual maintenance easement from each of the landowners of the approximately 700 acres of channel area. The major portion of the channel area is on private land.

Public use of the dam and reservoir will be controlled

by the Flood Control District of Maricopa County. If future use is of such a magnitude as to damage the structure or create health and safety problems, the District will limit public access.

Structural landscaping will consist of seeding and transplanting native vegetation on approximately 100 acres consisting of structural surface and construction disturbed areas. Preliminary evaluations indicate that white bursage, white brittlebush, and adapted saltbrush species would be best suited for seeding the proposed FRS gravel surface.

Construction and borrow areas will be cleared and grubbed. Preceding this operation, those desert plants that can, will be salvaged and stored until they can be reestablished in disturbed areas around the completed dam. Protected plants such as mesquite and paloverde that cannot be stored will be sold or disposed of according to Arizona Native Plant Law, Section 3-902, et seq. At the time of revegetation, these plants will be replaced through purchase. Through selected vegetative measures, existing habitat will be preserved where possible. Where preservation is impossible or clearly not feasible, lost habitat is to be replaced by revegetating disturbed areas.

Soil Conservation Service policy requires that care be exercised during construction to preserve and protect the natural landscape and to minimize soil erosion, water, air, and noise pollution. All construction work will be done in

conformance with this policy. Plans may include watering haul roads and earth fills to suppress dust, reducing erosion by mulching of exposed areas, and burying unsalvageable material. State and federal laws and regulations will be observed in minimizing air and noise pollution.

Archeological investigations, conducted by Arizona State University, located five sites within the FRS and reservoir area. Adverse effects to these sites and their respective artifacts include destruction by construction activities or potential water damage by inundation.

Alleviation of the effects on archeological sites will be achieved through detailed survey and recovery of data. The Office of Cultural Resource Management, Arizona State University, was contracted with and, in consultation with the State Historic Preservation Office, has developed a proposed program for detailed testing of the resources. The testing program will result in the development of a cultural resource management plan for the recovery, protection and/or preservation of artifacts and data.

Development and implementation of the final research design will be done in close consultation with the State Historic Preservation Officer and the Interagency Archeological Services of the Heritage Conservation and Recreation Service. The Advisory Council on Historic Preservation will be asked to comment on the research design at the appropriate time. Recovery and preservation of cultural resources will be

undertaken in accordance with "The Archeological and Historic Preservation Act of 1974," P.L. 39-291 (16 U.S.C. 469 et seq) and Title 7 CRF Part 656.

The basic vegetative communities making up the terrestrial habitat in the vicinity of the structural measures consist of (1) mesquite-ironwood-hackberry, (2) mesquite-creosote-wolfberry, (3) creosote, (4) creosote-triangle leaf bursage, and (5) desert willow-blue paloverde.

An interagency team of biologists representing the Arizona Game and Fish Department, the Fish and Wildlife Service and the Soil Conservation Service assessed these vegetative communities in terms of wildlife habitat value and the effects the project will have on habitat over its designed life.

Habitat types were designated as desert upland and desert riparian. Vegetative communities 3 and 4 are considered upland and communities 1, 2, and 5, desert riparian.

Value of the habitat types to wildlife was evaluated on an acre per acre value basis, converted to habitat unit value and graphically examined over the life of the project as loss and gain in habitat unit years (HUY).

It was concluded that the structural measures will cause a loss of 33,261 HUY and gain of 30,565 HUY in desert riparian habitat. Desert upland projections show a loss of 25,556 HUY and gain of 29,622 HUY.

The projected gains are computed on the basis of ameliorant fencing around the "top of dam" reservoir area. It was

agreed by all concerned that the creation of a sediment pool and a fenced, upstream habitat area would constitute adequate compensation, through tradeoff, for the net loss of 2,696 HUY of desert riparian habitat.

Construction of the FRS will require the purchase of 3,440 acres of land of which 2,750 acres are State Trust Land and 690 acres are private. All of the land required has been designated as rangeland.

Operation and Maintenance

The Flood Control District of Maricopa County will be responsible for operation and maintenance of the Queen Creek FRS and of a 15-mile reach of the Queen Creek channel below the proposed structure. The total annual operation and maintenance cost is estimated at $15,000. An operation and maintenance plan will be prepared in accordance with the Soil Conservation Service Operation and Maintenance Handbook. A specific operation and maintenance agreement will be entered into between the sponsors and the Soil Conservation Service prior to certification of land rights and execution of a project agreement.

Project Installation Costs

The project installation costs include all P.L. 566 and other costs, and are summarized as follows:

	P.L. 566 Funds	Other	Total
Total Project	$11,450,500	$1,482,500	$12,933,000
Land Treatment	-	376,500	376,500
Structural Measures	11,450,500	1,106,000	12,556,500

ENVIRONMENTAL SETTING

Physical Resources 5,6,7,8,9,10,11

Physical Setting

The Queen Creek basin is located in south central Arizona, approximately 35 miles southeast of Phoenix. The construction of Whitlow Ranch Dam divided the basin into a lower and upper sub-basin. The dam, completed in November 1960, controls a drainage area of approximately 143 square miles. The project area studied in this report consists of the lower sub-basin designated as the Lower Queen Creek Watershed.

The watershed is in the Gila Water Resource subregion of the Lower Colorado Region, as designated by the U.S. Water Resources Council. The Region includes most of Arizona and parts of Nevada, New Mexico, and Utah, comprising 4.8 percent of the contiguous United States. The Gila River, largest surface water system in the region, flows in a westerly direction through Arizona, originating in western New Mexico and emptying into the Colorado River at Yuma.

Queen Creek, a tributary of the Gila River, drains a basin typical of the Gila subregion ranging from rugged mountainous terrain to flat Sonoran desert. The Lower Queen

Creek Watershed contains 145,900 acres of which 22,000 acres are in Maricopa County and 123,900 acres in Pinal County. The watershed heads in the Superstition Mountains and drains onto a wide alluvial fan on which valuable agricultural and nonagricultural properties have been established and are developing. Basin flows release into the RWCD Floodway, the western boundary of the watershed. The watershed is bounded by the Williams-Chandler and Magma Watersheds which have had projects installed under P.L. 566. The San Tan Mountains form the southwestern boundary of the watershed.

The watershed's estimated permanent population of 3,541 is concentrated in three areas. The largest is the unincorporated town of Queen Creek located in the northwest portion of the watershed. Queen Creek serves as a small supply center for the surrounding farms and ranches, and has an estimated population of 1,947. Queen Valley, near the eastern boundary of the watershed and located immediately below Whitlow Ranch Dam, is a retirement and winter home area with a small permanent population of about 300. Its winter population reaches approximately 650. Chandler Heights, in the southwest portion of the watershed, is an area of mini-farms and ranchettes ranging in size from one to several acres and mainly producing citrus. The population is estimated to be 1,294.

The watershed is 20 miles southeast of Chandler, the closest incorporated city. It has a population of 15,000-20,000

and is a major service and supply center for agri-business concerns in the area.

Major Soil and Water Resource Problem Areas

The major problem area is located on the portion of the alluvial floodplain which is highly developed for irrigated agriculture. The floodplain is directly below mountains which produce floodwaters entering the floodplain from the southwest and east. The two major tributaries contributing to flooding are Queen Creek and Sonoqui Wash.

There is intensive agricultural activity on land which is very productive. Flooding causes severe damage to crops, irrigation systems, land, homes, and equipment.

Subsidence fissures are another problem in the watershed. These generally occur on the north foot slopes and pediments of the San Tan Mountain Range.

The numerous earth fissures occurring in the area were mapped from the air jointly by the U.S. Bureau of Reclamation and the Arizona Water Commission early in 1976. The general area is also being monitored for subsidence by the Bureau of Reclamation.

The irrigation districts located within the watershed below the structure contain approximately 46,630 cultivated acres and about 4,070 irrigable acres left idle. All of the cultivated lands are considered prime farmlands or lands of local importance. There are approximately 10,000-15,000

acres of additional land that could be developed for irrigation. All of the cultivated lands are irrigated by wells and organized under four irrigation districts: Queen Creek, San Tan, Chandler Heights, and New Magma. The watershed is a highly productive agricultural area with a great potential for expansion into producing crops if sufficient water would become available. The average frost free period is about 244 days per year.

Topography

Elevations in the watershed range from 1,302 feet at the Queen Creek-RWCD Floodway junction to about 4,620 feet at the divide. Approximately 45 percent of the watershed lies in hills and mountains and 55 percent within the alluvial fan.

Physiographically, south central Arizona lies in the Sonoran section of the Basin and Range Province and is characterized by northwest trending mountains separated by wide alluvial plains. The topography of the area suggests that the mountains are tilted or uplifted fault blocks and the basins are the downfaulted counterparts.

Geology

The portion of the San Tan Mountains included in the lower watershed area is composed mainly of Pre-Cambrian Pinal schist (metamorphosed sedimentary and volcanic rocks) and such granitic intrusive rocks as granite, quartz monzonite, granodiorite, and quartz diorite. In addition, the watershed

boundary line traverses the outer fringes of Tertiary silicic to mafic volcanic rock outcrops, along with their associated sedimentary tuffaceous beds.

The Superstition Mountains included in the upper watershed area are composed mainly of silicic to intermediate Tertiary volcanic rocks. Also included is Pre-Cambrian Pinal schist.

Gentle to steep alluvial slopes extend basinward from the mountains. Quaternary-Tertiary sand, gravel, and conglomerate are present near the mountain fronts with Quaternary clay, silt, sand, and gravel occurring at the lower elevations.

Soils and Land Capabilities

The soils range from deep moderately coarse and fine textured soils on valley plains and floodplains to shallow and very shallow soils and exposures of bedrock occurring on steep mountains and low hills.

Four main soil associations comprise the major portion of the cultivated lands and are described as follows:

Antho-Valencia association consists of well-drained, nearly level to gently sloping sandy loams and gravelly sandy loams on alluvial fans. Antho, with a class II land capability comprises about 55 percent of the association. Class I Valencia series makes up about 20 percent with the remaining 25 percent consisting of

soils of the Tremant, Pinamt, Cavelt and Rillito series.

Gilman-Estrella association consists of well-drained, nearly level loams and clay loams on alluvial fans and floodplains. Both soils are class I and comprise about 80 percent of the association. Avondale clay loam, also class I, comprises about 10 percent with Vint, Trix, Antho, Pimer, Carrizo, Glenbar, Agualt, Cashion and Pinamt soils making up the remaining 10 percent.

The Laveen association comprises a relatively small part of the cropland area and consists of well-drained, nearly level to gently sloping classes I and II limy loams and gravelly sandy loams on alluvial fans and terraces.

Mohall-Contine association consists of well-drained, nearly level loams and sandy clay loams on old alluvial fans. About 55 percent of this association consists of class I Mohall soils, 35 percent is Contine, capability class II with the remaining 10 percent being Vecont, Antho, Laveen and Estrella soils.

Non-cultivated land in the watershed, consisting of the above associations, is suitable for livestock grazing for short periods following adequate seasonal rains. The grazing capacity could be increased by rangeland management. Mountains and buttes are marked by shallow gravelly and very gravelly loams that provide seasonal grazing in some areas. However, the mountain association, Rock Land, is considered to have little value as rangeland.

Climate

The watershed has an arid climate, averaging approximately 11 inches of precipitation per year. May and June are the driest months. The wettest season of the year typically occurs in the summer in association with late afternoon thunderstorms that originate in the flow of warm, moist tropical air from the Gulf of Mexico. These storms are usually accompanied by gusty winds when they move westward across the desert plains from the eastern mountains.

Temperature in the summer often reaches 110 degrees or higher from mid-June to mid-August, accompanied by low relative humidities. Late night temperatures during this period are 75 degrees or higher.

The winter months are mild with daily temperatures in December and January averaging in the 50's. Temperatures drop to 32 degrees or lower on an average of 21 days between late November and early March.

Mineral Resources

Historically, mineral prospecting activity in the watershed has been light. Within the past ten years, major mineral exploration has been active. The Bureau of Mines reports that gold, silver, copper, lead, zinc, mercury, iron, antimony, bismuth, manganese, tungsten, molybdenum, and uranium ores are present in the watershed.

The most significant mineral activity within the watershed is the on-going mineral exploration activity by

at least ten mineral exploration companies. The discovery and potential development of a copper deposit near Florence has increased exploration activity. Geothermal energy resources appear to also hold potential for future development.

Abandoned borrow pits are common along most of the primary roads. Currently there is one borrow pit in operation on Queen Creek. A few abandoned sand and gravel quarries are scattered throughout the watershed.

Land Use

The watershed contains a total of 145,900 acres. Private ownership accounts for 55,700 acres, State Trust Lands account for 65,800 acres, Indian Trust Land amounts to 4,400 acres, Bureau of Land Management manages 4,400 acres of public land, and the National Forest has 15,600 acres.

Cultivated land accounts for 50,700 acres, with 2,800 acres devoted to urban uses.

The cultivated land is irrigated, with most production devoted to field crops and grains. Approximately 3,000 acres in the watershed are used for citrus, grapes, peaches, plums, apricots, and other specialized tree crops.

Approximately 62 percent of the total watershed is unimproved desert which is used for grazing, wildlife, and recreation.

Surface Water Resources

Essentially there are no perennial streams in the watershed.

However, there is a continuous low flow of less than 10 cubic feet per second which enters the lower watershed through the outlet at Whitlow Ranch Dam. The source is a small spring located within the reservoir area. This flow is diverted and used by the Queen Valley community.

Queen Creek varies in characteristics from a well-defined channel at Whitlow Ranch Dam to a wide braided channel as it enters the developed areas within the lower alluvial fan.

This upper desert reach traverses a distance of about 16 miles. Queen Creek then enters a 15-mile reach of constructed channel, completed in 1961 and originally designed for a capacity of 6,500 cfs.

Sonoqui Wash originates near Florence Junction and drains in a southwesterly direction. In this reach there are no designated watercourses. Sonoqui consists of a conglomerate of small braided channels. In the developed areas Sonoqui Wash is essentially nonexistent. Sonoqui Wash enters Queen Creek at a location approximately one mile upstream from the Queen Creek junction with the RWCD Floodway.

Groundwater Resources

The Lower Queen Creek Watershed is in the Queen Creek-Superstition critical groundwater area as established in 1951. As defined by State law, a critical groundwater area "is any groundwater basin or designated subdivision thereof not having sufficient groundwater to provide a reasonably safe

supply for irrigation of the cultivated lands in the basin at the current rates of withdrawal." (Arizona Revised Statutes, Sec. 45-301 1 .)

Precipitation generally evaporates, runs off, or is used by plants. Only about one percent of the total precipitation is estimated to recharge the groundwater basins.

Several technical studies were conducted to gather groundwater data from the irrigation districts. The resultant information is considered to be representative of the watershed's general groundwater conditions.

Queen Creek Groundwater Data [7,8,9,10]

Irrigation District	Depth to Water Maximum (feet)	Depth to Water Minimum (feet)	Average Pump Lift (feet)
New Magma	630	122	542
Queen Creek	1500	500	-
San Tan	547	500	572
Chandler Heights	561	519	550

During irrigation periods the pumping rate for individual wells averages about 1,000 gallons per minute.

The groundwater withdrawal rate is considerably in excess of the recharge rate and constitutes a serious problem. The increase in idle land particularly reflects the continuing escalation of pumping costs because of lower groundwater levels.

The quality of the groundwater in the watershed is

generally considered good to excellent. Studies done in the Queen Creek Irrigation District indicate total hardness of about 210 ppm, with a range of total dissolved solids from 513 ppm to 716 ppm.

The San Tan Irrigation District had six wells tested in 1964 with total dissolved solids ranging from 416 ppm to 1,135 ppm, averaging about 661 ppm. Total soluble salts averaged below 1,000 ppm.

The New Magma Irrigation District's groundwater has an average total hardness of 177 ppm.

Wetlands

The wetlands consist of 20 manmade stock ponds. These wetlands are classified as type 1, Inland Fresh Water areas, as defined in Wetlands of the United States, U.S. Fish and Wilflife Service Circular 39, 1971.

Present and Projected Population [12,13,14,15,16]

The estimated population of 3,541 people for 1978 includes 3,434 White, of which 1,296 are Spanish surname, 94 Indian, 10 Negro and 3 Oriental and other. The residents are primarily located in the settlements of Queen Creek, Chandler Heights, and Queen Valley.

The population projections were found to be reasonable when compared with OBERS factors. The Queen Creek population projections were also consistent with State of Arizona projections of population by county. Population densities

range from 2.55 to 3.45 persons per housing unit as presented in the following table.

About 50 homes have been built within the past five years on irrigated lots or "ranchettes" of one acre or more. This trend is expected to continue in the area.

Population and Housing Units
Queen Creek Watershed, Arizona
Estimated 1975-1978
Projected 1980-2030

Year	Population	Housing Units
1975	3,224	986
1978	3,541	1,120
1980	3,752	1,217
1990	4,236	1,394
2000	4,862	1,617
2010	5,303	1,912
2020	6,547	2,318
2030	8,462	2,902

Economic Resources [17,18]

There are 321 farm units of varying size in the watershed. Major enterprises include field crops, deciduous and evergreen orchards, vineyards and cattle feeding operations.

Principal crops are cotton, sugar beets, small grains, citrus, peaches, plums, and grapes. The acreage devoted to vegetable and forage crops is minor.

In 1977, cotton, sugar beets, grain, citrus, peaches, and plums were principal crops under cultivation.

The following table shows crops under cultivation and yields received in 1977.

Estimated Total Acres and
Average Crop Yield Per Acre
1977

Crop	Total Acres	Average Yield Per Acre
Cotton	26,640	971 lbs.
Sugar Beets	580	239 tons
Grain		
Wheat	620	4,320 lbs.
Barley	4,580	3,710 lbs.
Sorghum	6,740	3,980 lbs.
Citrus		
Oranges	1,740	400 cartons
Grapefruit	850	537.5 cartons
Fruit Trees		
Peaches	120	720 lugs
Plums	130	480 lugs
Apricots	40	480 lugs
Grapes	690	3.4 tons
Lettuce	80	220 cwt.
Potatoes	80	270 cwt.
Idle Land	4,070	
Misc. Cropland	3,740	
TOTAL ACRES	50,700	

Other agricultural enterprises in the watershed include a dairy farm and feed lot operations.

Current values for developed irrigated lands are $1,000-$2,000 per acre. Unimproved range used solely for cattle operations is valued at approximately $200 an acre.

The watershed's economy is primarily based on agriculture and related services. Agricultural labor generally tends to be in the lower income levels. Harvesting is done almost exclusively by migrant labor which is primarily of Spanish speaking heritage.

Farms and farm related activities employ many of the area residents. Unemployment in the area approximates the level that prevails in the Phoenix metropolitan area. An estimated 12 percent of the population or 424 residents of the watershed have incomes less than the current federal poverty level.

The project area and Maricopa County are similar in economic and social conditions. The growth outlook is optimistic with practical planning and improved development techniques expected to complement growth. Although land-use planners are aware of the desirability of preserving quality agricultural lands, the problems of land ownership, high land values, and taxing and zoning will need to be recognized and resolved in order to preserve prime irrigated cropland.

The Hohokam Resource Conservation and Development Project has been authorized for operation and includes all of Maricopa

County and the Gila River Indian Reservation in Pinal County. The Lower Queen Creek FRS is one of the associated measures included in the Hohokam Resource Conservation and Development Area Program of Action.

Pinal County has been designated a Redevelopment Area by the Economic Development Administration under Title IV of the Public Works and Economic Development Act of 1965. The county also lies within the Four Corners Economic Development Region which includes Arizona, Colorado, New Mexico, and Utah.

Plant and Animal Resources [19,20,21,22,23]

In Arizona, the Sonoran Desert is represented by only two of its several major subdivisions:

1) Arizona Upland desertscrub - a highly diverse, subtropical community that has developed on coarse, rocky upland soils of desert mountains and upper bajadas. Representative plants include desert trees such as the paloverdes, ironwood, mesquite, crucifixion thorn, hackberry and desert willow; cacti such as cholla, prickly pear, hedgehog, fish-hook, barrel and saguaro; large shrubs such as jojoba, ocotillo, ratany and creosote may be present. Either triangle-leaf bursage or brittle-bush along with annual and perennial forbs and grasses is almost always present in the understory.

   The list of representative fauna for this subdivision is long, but includes such game species

as gambel quail, whitewing dove, javelina and desert mule deer. Other characteristic animals include the cactus wren, curvebill thrasher, Gila woodpecker, elf owl, regal horned lizard, tiger rattlesnake, Gila monster, desert tortoise, and several species of rodents.

2) Lower Colorado desertscrub - a less diverse, more westerly community found on the sandier soils of the valleys and basins that surround the rocky uplands. Creosotebush and white bursage are the most prevalent plant species in the subdivision. Others, depending on location, include desert and fourwing saltbush, white-thorn, desert-thorn, mesquites, catclaw and big galleta.

The list of representative fauna is neither as long nor as diverse as that of the Arizona upland. Representative species include gambel quail, Le Conte thrasher, desert kangaroo rat, desert pocket mouse, desert sparrow, desert and flat-tailed horned lizard and sidewinder rattlesnake.

The area of proposed construction is an ecotone between the two subdivisions and contains a variety of plant communities ranging from sparse creosote flats to excellent desert riparian vegetation. In 1976, SCS plant specialists conducted a vegetative analysis of the damsite and identified five major plant community interdigitations present. That analysis was

subsequently used by an interagency (FWS, AGF, SCS) biology team in 1978 to determine habitat types and values.

Brief descriptions of the communities and their habitat designations follow:

#1 Mesquite-Ironwood-Hackberry community is scattered throughout the site but mostly at the southern end of the proposed structure. The community is generally located on heavy soils that are areas of water accumulation. Other plants - wolfberry, haplopappus, greythorn, creosote, blue and little leaf paloverdes, saguaro and chainfruit cholla. Habitat designation - desert riparian.

#2 Mesquite-Creosote-Wolfberry community is a transition between 1 and 3 found on heavy soils in the southern portion of the dam site. It is characterized by dwarf mesquite interspersed throughout the stand. Other plants - triangle-leaf bursage, greythorn and hackberry. Habitat designation - desert riparian.

#3 Creosote community is almost a pure stand with a trace of barrel cactus. It is found throughout the entire area on sandy loam to loamy sand soils. Habitat designation - desert upland.

#4 Creosote-Triangle-leaf-Bursage community occurs toward the middle of the proposed site in areas of sandy loam hummocks surrounded by lower, heavier, loam soils. The community is an even mixture of creosote

on the hummocks and bursage growing on the loamy soils. Other plants - barrel cactus. Habitat designation - desert upland.

#5 Desert willow-Paloverde community occurs in the immediate vicinity of the Queen Creek channel on gravelly sands to loamy sands and sandy loams. It is characterized by an overstory of large, old, desert willows and blue paloverdes with an understory of burrobrush and goldeneye. Other plants - desert broom, mesquite, ironwood, catclaw, creosote, tree tobacco, sandpaper plant, buckwheat and clammy weed. Habitat disignation - desert riparian.

In general, most of the perennial, close growing forbs and grasses have decreased allowing an increase in woody plants and cacti. Certain annual and perennial forbs such as filaree, janusia, globe mallow, ditaxis and twinberry are usually present in the understory of one or more of the communities. Grasses present are mostly annual and, along with the annual forbs, are scarce or abundant depending on seasonal rainfall. The most common grasses include bush muhly, three-awns, Mediterranean grass, Arizona cottontop, plains bristlegrass and slim tridens.

A wide variety of bird and mammal species have been recorded in the watershed as have several species of herpetofauna. The list of those animals does not vary significantly from the one published in the final EIS for

the Buckhorn-Mesa Watershed project, the main exception being the Yuma clapper rail which is not present in lower Queen Creek.

The proposed area of construction was incidentally studied in 1975 by a team of ASU researchers conducting a biotic survey along the proposed route of the Salt-Gila aqueduct. That study indicates that several species of birds, mammals and reptiles, and, possibly, at least one turtle species will be encountered during construction.

The most common birds are expected to be gambel quail, mourning dove, phainopepla, cactus wren and verdin. Seasonal variations will add or remove from the list such species as whitewing dove, mockingbird, cowbird, hooded oriole and various species of sparrows.

Small mammals frequently encountered are expected to include Merriam's kangaroo rat, antelope and round-tailed ground squirrels, pocket mouse species, deer moise, desert cottontail and jackrabbit.

Larger mammals such as the coyote, mule deer, badger and javelina may hunt or feed in the area but large numbers of these species aren't anticipated.

Depending on seasonal and other primarily meteorlogical conditions that affect reptilian activity, several species of snakes and lizards may be encountered. Snakes include the coachwhip, gopher snake, glossy snake, kingsnake, long-nosed snake, western diamondback and sidewinder. Common

lizards include the side-blotched, western whiptail and desert spiny. Although uncommon, the Gila monster is known to inhabit the Queen Creek area.

The turtle species that may be encountered is the desert tortoise which, like the Gila monster, is protected by State law.

There are no fishery resources within the project area and no amphibians are expected to be encountered.

Endangered or Protected Species [19,20,21,22,23]

Plants

Many species of the desertscrub are protected by the Arizona Native Plant Law. Ironwood, the mesquites and paloverdes, ocotillo, crucifixion thorn and the cacti are included in the law and are present in the project area. No plant species listed as threatened or endangered by the U.S. Fish and Wildlife Service are present in the project area.

Procedures mandated by the Arizona Native Plant Law and the Endangered Species Act, if applicable, will be followed as necessary.

Animals

There are no animals inhabiting the proposed construction area that are listed as threatened or endangered by the U.S. Fish and Wildlife Service. Two local species of concern, however, are the Gila monster and the desert tortoise. Both

are listed in Group III of Threatened and Unique Wildlife of Arizona. Animals in this group are species or subspecies whose status in Arizona may be in jeopardy in the foreseeable future. Construction personnel, both federal and private, will be forbidden to knowingly disturb or harm individuals of either species. Collection and relocation efforts would be done in collaboration with the Arizona Game and Fish Department.

Recreational Resources

Recreational activities which are available include picnicking, camping, hiking, horseback riding, off-road recreational vehicle travel and hunting. There are no surface water areas in the watershed which can be utilized for water sports or fishing. However, large recreational lakes on the Salt River and river-based recreation on the Salt and Gila Rivers are within short commuting distance. Mountain climbing and amateur prospecting are popular activities in the watershed. There is also a golf course facility available in the Queen Valley community.

The watershed contains about 15,600 acres of multiple use lands located in the Tonto National Forest with most of the land designated as range. The State of Arizona controls about 65,800 acres in the watershed, with segments of this land having a potential for recreational use. However, there are no current plans for recreational development.

Archeological, Historical, and Scenic Resources 4

Archeological investigation shows that Hohokam Indians were present from AD 500 to 1400. These early food gatherers developed a culture based upon prehistoric desert farming, utilizing water from the area's rivers and streams to irrigate their crops. Five prehistoric Hohokam cultural sites have been located within the project impact area. Consultation with the State Historic Preservation Officer has resulted in these sites being declared eligible for nomination to the National Register of Historic Places.

There are at least three historic stage depots in the watershed. Two of the depots have standing walls but have been badly vandalized. The third is little more than a score of broken bricks and a large ash heap. None of the stage depot sites have been added or nominated to the Arizona or National Register of Historic Places, nor will they be affected by the project.

There are features of natural scenic value in the watershed including the San Tan and Goldmine mountains. The Superstition Mountains are visible from many locations in the area.

Soil, Water, and Plant Management Status

Land use trends indicate slight increases in all uses except rangeland which will decrease slightly.

The application of most land treatment measures on

cropland is generally adequate. Management of irrigation water is not as efficient as it could be but those operators who have diligently practiced efficient water use have increased efficiencies from an estimated 60 percent to 75 percent or better.

Land treatment on rangeland consists mainly of fencing and water development. Due to few or no economic sources of seed, land treatment measures such as brush management and reseeding have not proven successful in the lower desert, consequently ranchers rely primarily on management practices to improve rangeland.

The East Maricopa and Florence-Coolidge Natural Resource Conservation Districts (NRCD) have been active in soil and water conservation activities for more than 25 years. Besides providing technical assistance to land users under the regular ongoing program, the board members have been active in civic affairs, other watershed projects and Hohokam Resource Conservation and Development (RC&D) area activities.

Forty-eight cooperators of the East Maricopa NRCD own and/or operate 24,100 acres of cropland and each has developed a resource conservation plan. Land under cooperative agreement and conservation plan accounts for about 16 percent of the total project area.

Conservation practices planned for these lands include crop residue management, conservation cropping system, irrigation land leveling, minimum tillage, and irrigation

water management. The percent of planned practices applied on cooperating units averages 55 percent while similarly needed practices applied on non-cooperating units is estimated at around 30 percent. About 29,500 acres of cropland are estimated to be adequately protected.

Of the 89,700 acres of land classed as rangeland, 8,700 acres are privately owned. The majority is State Trust and National Forest. The private lands are interspersed among the State Trust Lands. One ranch, 12,700 acres, is under NRCD cooperative agreement at this time. Ranchers on State Trust and National Forest lands operate under grazing allotment plans developed by the respective jurisdictional agencies. Planned practices are mainly management oriented to achieve proper use of forage plants. It is estimated that 51,200 acres of range are adequately protected.

The Agricultural Conservation Program administered by the Agriculture Stabilization and Conservation Service provides cost sharing to farmers and ranchers who apply enduring conservation measures on private, State Trust and Indian Trust lands. Conservation practices are applied on National Forest and public lands under the ongoing programs of the U.S. Forest Service and Bureau of Land Management respectively.

Requirements of these programs and of loan programs such as those administered by the Farmers Home Administration not only provide for high standards of practice application

but also for a higher level of management of the resources.

Projects of Other Agencies [7,8,9,10,24]

The U.S. Army Corps of Engineers completed construction of Whitlow Ranch Dam in November 1960. The structure is located on the eastern border of the watershed about 50 miles southeast of Phoenix and 7 miles northeast of Florence Junction. This dam is an earthfill structure, 139 feet high, 837 feet long and 20 feet wide at crest. There is a dike on the southern boundary of the reservoir approximately one mile southeast of the dam. The dike is compacted earthfilled 25 feet high and 978 feet long.

The Salt-Gila aqueduct will traverse the watershed from north to south and will provide supplemental irrigation water and municipal water to communities in central Arizona. The aqueduct which will be approximately 63 miles long, consists of an open concrete lined canal with a design flow capacity of 2,500 cubic feet per second. The USBR Planned Project indicates that Reach-3 of the aqueduct would cross under the Queen Creek channel in an 18-foot diameter siphon, 1,400 feet in length, and would cross the Sonoqui drainage in a 2,500 cfs open channel aqueduct. The plan includes the proposed construction of a 7-mile long FRS, located immediately above the aqueduct, and providing a 100-year level of protection through the Sonoqui segment of the watershed.

Implementation of the Lower Queen Creek Watershed Plan

would allow the proposed siphon to be replaced with an open aqueduct and eliminate the FRS across the Sonoqui drainage.

The four irrigation districts in the watershed have all applied for Central Arizona Project water. Consulting engineers have prepared preliminary distribution system plans for delivering Central Arizona Project water to the four irrigation districts.

WATER AND RELATED LAND RESOURCE PROBLEMS

Land and Water Management

Rangeland

Perennial forage species of grasses, forbs and shrubs on desert rangelands above the proposed structure have decreased to the point where annual grasses and forbs comprise the major forage producers. This decrease in perennial forage species has also been accompanied by an increase in woody plants and cacti.

The change from economic perennial range to marginal annual or ephemeral range is difficult to reverse in the lower desert. At the present time there are no feasible methods of procuring seed for brush management and reseeding programs that would help in converting the annual range to perennial.

Management practices such as proper grazing use and planned grazing systems have proven successful in improving annual range and will continue to be used until improved methods are developed.

Other Land

Development of land to urban and/or suburban uses generally leaves land vulnerable to wind and water erosion for varying periods of time. Protective measures are usually established by owners shortly after they occupy the land.

Cropland

The irrigated land is highly productive and economic return is good. However, the continuing reduction in the groundwater level increases pumping costs at a fast rate and discourages the development of additional land. In areas where land can be developed, high capital investment is required to bring the desert into production. The cost to deepen established wells is high. In order to remain competitive, farmers must continue to mechanize and adopt new technology as it becomes available. This necessitates additional capital expenditures and increases operation and maintenance costs. These land users are willing and able to install conservation measures that will help offset the high cost of producing crops.

Floodwater Damage [24]

The watershed has experienced numerous floods over the years. Most of the damage has been concentrated in the lower segments of the Queen Creek and Sonoqui basins where development has been the most rapid. Approximately 20 percent of the watershed's developed area is considered to be in the floodplain.

Historically, the watershed has experienced a relatively large number of damaging floods. Records indicate that large damaging floods have occurred in 1884, 1891, 1896, 1916, 1919, 1925, 1926, 1930, 1954, 1958, and 1959.

Whitlow Ranch Dam, constructed in November of 1960, has been responsible for the control of several large floods and a lessening of downstream damages. However, storm runoff from the large contributing drainage area below the dam and above the developed areas has resulted in damaging floods occurring in 1965, 1966, 1967, 1970, 1972, and 1978.

The storm and resulting flood of August 19, 1954, according to accounts, was the most severe experienced in the Queen Creek area. Measurement of rainfall at the Boyce Thompson Arboretum reported a total of 5.3 inches of precipitation. Florence Junction reported 1.8 inches in one hour and 4.2 inches in six hours. Discharge rates at the Whitlow Ranch damsite were estimated at 42,900 cfs with a total volume of 5,300 acre-feet. Flood damages were estimated at over two million dollars.

The storm of October 18-19, 1972, resulted in flood damage in the watershed. Precipitation totalled 3.42 inches with data unavailable as to stages of flow and volume of discharges. The resulting flooding from this storm was responsible for agricultural and nonagricultural damage. The storm struck as cotton harvest was commencing. Damages varied from 10 to 50 percent reduction in yield depending

on depth of floodwater. Approximately $344,000 in agricultural damage occurred as a result of this storm.

The storm and resulting flood of February 27 to March 3, 1978, caused considerable damage in the watershed. Preliminary evaluation of the precipitation data collected at Queen Valley indicates that the precipitation that caused this flood can generally be expected to occur once in 5 to 10 years.

The maximum flood discharge occurred on Queen Creek during the March 1-2 period with most of the runoff producing the maximum discharge coming from the area above U.S. Highway 89 and below Whitlow Ranch Dam. A peak discharge of 3600 cfs was estimated at a location approximately 2 miles upstream of the Queen Creek-Tomahawk Road junction. Maximum release from Whitlow Ranch Dam was estimated at about 700 cfs.

The damages were considerable, and were mostly caused by erosion. However, there was floodwater damage resulting from inundation of approximately 600 acres of agricultural land. Cost of inundation damages was estimated at $160,000.

Although Whitlow Ranch Dam provides partial protection in the project area, a flood expected on the average of once in 100 years would seriously affect the economy of this area. A flood of this magnitude would inundate about 22,000 acres below the Queen Creek FRS site.

It is estimated that at least 122 farms and 320 homes would be affected by the flood occurring on the average of once in 100 years.

Erosion Damage

Erosion rates range from a low of 0.18 tons/acre/year for fine grained basin fill deposits to 1.10 tons/acre/year for the rocky, higher mountains. The majority of the watershed agriculture occurs on land with a rated 0.48 tons/acre/year of erosion, with minor agriculture occurring on land rated at 0.18 tons/acre/year and 0.58 tons/acre/year. Irrigated croplands are subject to about half the erosion as are nonirrigated lands.

Erosion has not caused any major problems in the undeveloped portions of the watershed. Minor headcutting of several of the inner basin washes appears to be related to differential subsidence occurring as a result of groundwater withdrawal. Queen Creek is presently channelized with channel construction started about 1961. Since completion, the channel has been subjected to several flood flows of differing magnitudes. Each flow has created erosion damage either to the channel banks or to the adjacent developed areas.

Sediment Damage [1]

Sediment deposition on rural, urban and commercial establishments, roads, highways, canals, and mechanical equipment have caused flood-related damages. Agricultural sediment damages have historically been high and have included direct crop damages, reduction in yield, need for field releveling and disruption of irrigation water supply.

Queen Creek and Sonoqui Wash channel flow is the major vehicle by which sediment is transported. Queen Creek, containing the larger more damaging flows, is the major sediment contributor to the lower developed areas. Where Queen Creek enters a channelized reach about two miles upstream of the Tomahawk Road crossing, the contributing basin has a sediment yield of about 13 acre-feet per year. Queen Creek is channelized for approximately 15 miles with no runoff contributing tributaries until the channel intercepts Sonoqui Wash approximately one mile above the Queen Creek junction with the RWCD Floodway. The noncontributing channelized segment of Queen Creek is considered as a sediment source due to the potential for lateral bank and levee erosion.

Most of the Sonoqui basin does not contain well-defined drainage channels. The floodplain is subject to sheet runoff with maximum flood discharges considerably less than those expected in Queen Creek. At its mouth, Sonoqui Wash is considered as a minor sediment source, with an annual yield of about 1.6 acre-feet.

Average annual sediment yield at the mouth of Queen Creek, at its junction with the RWCD Floodway, is estimated at 14.0 acre-feet of which 5.2 acre-feet is bedload and 8.8 acre-feet would continue downstream as suspended load.

Irrigation Problems 9

The local residents are experiencing many of the problems

which are usually found in highly developed irrigated agricultural areas throughout the State of Arizona. A declining water table, the need for more efficient use of irrigation water, energy and production costs, erosion controls and soil fertility are among the most serious problems facing agricultural producers in the watershed.

The watershed is in the Queen Creek-Superstition critical groundwater area established in 1951. The continuous decline of the water table has necessitated the deepening of irrigation wells to maintain a continuous supply of irrigation water. The relatively limited supply of water for irrigation has forced producers to practice skip-row planting and to maintain 10 percent or more of their land idle. The watershed has approximately 10,000-15,000 additional acres which could be developed for irrigated agriculture. However, the limited water supply prevents this potential development.

Depths to water are expected to increase steadily at about 2 feet per year. The use of Central Arizona Project water in lieu of pumped water is expected to help stabilize the rate at which the water table is declining.

Recreational Problems

The recreational demand for Phoenix and adjacent areas has been increasing over the past few years. As agricultural areas convert to domestic use the recreational demands will continue to increase. It is assumed that continuing

recreational pressures will initiate future recreational development in federal and State controlled lands within the watershed.

Plant and Animal Problems [21,22,23]

No plants listed by the U.S. Fish and Wildlife Service (USFWS) as threatened or endangered are in the project area. Several species, however, are listed in the Arizona Native Plant Law. Procedures mandated by the law will be followed before construction.

Plant communities upstream of the structure will be altered by the impoundment of water for wildlife habitat mitigation. Alteration will depend on the amount and longevity of standing water but is considered a positive tradeoff and beneficial to wildlife.

No animals listed by the USFWS as threatened or endangered are in the project area. Two species listed in Group III of the Arizona Game and Fish Commission's "Threatened and Unique Wildlife of Arizona" inhabit or may inhabit the Queen Creek area. A known population of Gila monsters are present and encounters with the desert tortoise are probable. Disposition of encountered individuals of these species will be done in collaboration with the Arizona Game and Fish Department.

Water Quality Problems

The major watershed pollutant in flood flows is sediment. Watershed flooding transports large amounts of sediment

either in suspension or as bedload. Annual sediment leaving the watershed is estimated at about 30,500 tons with approximately 19,200 tons as suspended material.

Flood runoff flows over cultivated land mixing with fertilizers, pesticides and other chemicals associated with crop agriculture. The extent of this type of pollution is not known since there are no water quality monitoring programs within the watershed.

Sewage waste is normally placed in individual septic tanks. Generally these tanks would not be subject to flood damage. However, under high flood discharges, the septic tanks could be damaged and floodwaters polluted. An open cattle feedlot operation is located in the Queen Creek floodplain, near the community of Queen Creek, and could become a source of pollution during significant flood events.

Economic and Social Problems

The economic base within the area is agriculture-related along with a small number of service related firms. However, most family income in the area is generated by outside area employment in metropolitan Phoenix. The unemployment rate in the area approximates the Phoenix rate of 5.5 percent. About 90 percent of the families receive incomes greater than the current federal poverty level income of $6,200 for a family of four.

There is a need for additional jobs for people in the area but currently there are ample job opportunities in

nearby Mesa and Chandler as well as throughout the Phoenix metropolitan area. Most future population growth in the area will be related to the availability of jobs located outside Queen Creek watershed.

RELATIONSHIP TO LAND USE PLANS, POLICIES, AND CONTROLS

The State Flood Control Act of 1973 established the authority for implementation of floodplain regulations within the State of Arizona. In compliance with this act, Maricopa County has adopted regulations governing development within floodplain areas; to date, Pinal County has not.

The Maricopa County regulations are not applicable in the Lower Queen Creek Watershed until the floodplain has been adequately delineated. When the delineations are completed and the regulations can be implemented and enforced, flood damages will be prevented to only new nonagricultural developments. The county regulations will not result in reduced damages to agricultural developments or to existing nonagricultural developments.

The Maricopa County regulation is a two district regulation which defines a floodway district and a floodway fringe district within a floodplain. No structures or obstructions of any kind are allowed in the floodway district, and development in the floodway fringe district must be elevated or otherwise protected from a 100-year flood. All habitable residential floors must be constructed above the

elevation of the 100-year flood and all industrial or commercial developments must either be elevated or flood-proofed to the 100-year flood elevation.

The National Flood Insurance Program was established by the National Flood Insurance Act of 1968 to make specified amounts of flood insurance available under federal auspices. In return for the provision of federally subsidized insurance, the act requires state and local governments to adopt and enforce land use and control measures that will control land development in flood prone areas.

Both Maricopa and Pinal Counties are participating in the National Flood Insurance Program. When county floodplain regulations are implemented through a flood insurance program, they will become a major factor in reducing potential flood damages to new nonagricultural development in these counties.

Floodproofing or elevating new nonagricultural development within the floodplain will be required in county regulations in order to comply with the requirements of the flood insurance program.

There are no know conflicts between the project and any approved or proposed federal, state, or local use plans, policies, or controls. Implementation of the project will improve and supplement local regulations and provide a more productive and more liveable rural community atmosphere.

INSTALLATION COSTS - MONETARY

For the purpose of this plan, the land treatment costs listed in Table 1 reflect the voluntary outlays expected from farmers, ranchers and other landowners during the five-year installation period that begins two years before construction. The cost of technical assistance will be borne by funds allocated to the SCS under P.L. 46. (Refer to Table 1.)

The total installation cost for structural measures is approximately $12,556,500 and includes cost of construction, engineering services, project administration, State dam filing fees, cultural resources protection, road and utility relocations, and land rights. Tabulation of the installation costs are shown in Tables 1 and 2.

The construction costs shown in the plan include the cost of materials, equipment, labor and profit associated with the construction of the works of improvement. Construction costs were derived using heavy equipment performance handbooks, the 1978 Dodge Guide, and recent price bids on similar type flood control projects in Arizona. The estimated construction costs include a contingency factor of 10 percent. Contingency costs cover minor differences in actual and estimated quantities, omission of minor items incidental to listed pay items, unforeseeable difficulties at the construction site, probable minor changes in plan and all other uncertainties.

Engineering services costs are estimated to be $962,200 all of which will be from P.L. 566 funds. They are estimated at 10 percent of the construction cost and include the direct cost of engineers and other technicians for surveys, investigations, design and preparation of plans and specifications for structural measures including the vegetative work associated therewith. Cost will also include an expenditure of approximately $50,000 for the engineering modeling of the emergency and principal spillway systems. It does not include the cost of similar services for land rights or for project administration.

A land rights cost estimate was furnished by the sponsoring local organizations and concurred in by the Soil Conservation Service. This cost is estimated to total $887,000 of which the major portion will be for the purchase of approximately 2,750 acres of State Trust Land and 690 acres of private land located in the construction and reservoir areas. Also included in this total are costs for land rights surveys, title reports, appraisals, escrow fees, right-of-way negotiators and necessary utility and road relocations. A $5,000 allotment was also included in the total figure of $887,000 to defray expenditures associated with the acquisition of "maintenance easements" required for approximately a 15-mile segment of the Queen Creek Channel. Dam construction and filing fees mandated by the Arizona Revised Statutes are $22,700.

In order to recover, protect, and/or preserve data from five significant archeological sites located in the project area, an additional $100,000 was provided for "cultural resources protection."

Due to the absence of farms, businesses, and private dwellings in the proposed construction and reservoir areas, it is anticipated there will be no requirement for the implementation of the "Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970" (P.L. 91-646).

Project administration costs are estimated to be $962,200 of which $866,000 will be borne by P.L. 566 funds and $96,200 borne by other funds. The P.L. 566 costs include the cost for government representatives, necessary inspection services during construction to insure that structural measures are installed in accordance with plans and specifications, and administrative costs related to the project. Project administration costs borne by other funds include review of engineering plans, contract administration, and other administrative costs of the sponsors associated with the project.

Administrative costs for P.L. 566 funds are estimated at 9 percent of the construction cost. Administrative costs for other funds are estimated at one percent of construction costs.

Necessary water rights have previously been acquired by

the Roosevelt Water Conservation District, a sponsor of the Lower Queen Creek Project. There are no project costs associated with water rights acquisition.

ECONOMIC BENEFITS

Evaluation of the project measures is based upon the following assumptions: (1) that the Roosevelt Water Conservation District Floodway is enlarged and extended to the Gila River; and (2) that the Salt-Gila aqueduct, which includes a 1,400-foot siphon under the Queen Creek channel along with a 7-mile long floodwater retarding structure to the south of the channel, is included in the without project condition.

Estimated average annual damage reduction benefits are presented in Table 5 and include specific watershed items from agricultural, nonagricultural, sediment, indirect and benefits accrued from outside the watershed area. Table 6 presents total benefits used including total damage reduction benefits from Table 5, Central Arizona Project construction cost savings, Roosevelt Water Conservation District (RWCD) construction cost savings and employment benefits.

Economic benefits resulting from the annual average reduction of damages to the watershed include $263,700 from direct floodwater damages, $28,000 from indirect damages and $13,000 for the removal of sediment deposited by floodwaters for a total of $304,700. The average annual reduction in

direct and indirect floodwater damages to crop and pasture is $88,700 and $8,900 respectively. Direct and indirect damage reductions to other agriculture lands are $104,700 and $11,800. Direct benefits to nonagriculture property include residential, $63,400; highways and roads, $6,900. The reduction of indirect damages to nonagricultural property is $7,300.

The Central Arizona Project is an authorized water resources project to be planned and constructed by the U.S. Bureau of Reclamation. With implementation of the P.L. 566 planned project, the USBR plan is to replace a proposed 1,400-foot siphon crossing on Queen Creek with an equivalent length of open aqueduct and an overchute and to eliminate a proposed 7-mile long floodwater retarding structure. The resultant construction cost savings are $7,886,000 or $557,300 in average annual savings. Implementation of the planned project will realize a Central Arizona Project operation, maintenance and replacement (OM&R) and energy cost savings of approximately $14,500 per year.

Since approximately 75 percent of the total Central Arizona Project cost will be repaid by local water users, the State of Arizona is considered to be the primary benefactor of the estimated Central Arizona Project cost savings.

The RWCD Floodway, from the Queen Creek outlet to the Gila River, will, under proposed conditions, provide protection from a flood expected to occur on the average of once every

30 years. The Lower Queen Creek FRS will increase the RWCD Floodway protection to contain a flood expected to occur on the average of once in every 100 years. The estimated additional cost to upgrade the RWCD Floodway to this level without the Lower Queen Creek FRS is $263,400 annually. This additional cost to increase the level of protection for reducing hazards, such as loss of life, is considered a construction cost saving.

Average annual benefits to the region from the employment of unemployed resources are $30,700. The estimated average annual benefits and cost of the proposed structural measures are $1,156,100 and $879,200 respectively. The ratio of benefits to cost is 1.32:1.00.

INSTALLATION AND FINANCING

The execution of this work plan will be a coordinated effort involving federal and county agencies, local landowners, and various local organizations. The Flood Control District of Maricopa County (FCDMC) will have the primary responsibility for accomplishing the proposed plan. Itemized responsibilities for the installation of the works of improvement are as follows.

The FCDMC will:

1. Have the financial responsibility for the operation, maintenance, and replacement of structural measures and assume all liabilities for the completed FRS and related appurtenances and the Queen Creek channel.

2. Carry out needed legal surveys and acquire all land rights needed in connection with the structural works of improvement. The power of eminent domain will be exercised if necessary.

3. Acquire or provide assurance that any necessary water rights required by State law have been acquired by landowners or water users.

4. Acquire and bear costs for all permits needed for installation of the proposed works of improvement.

5. Provide relocation assistance, advisory services, and make relocation payments if any person or business is displaced by the project. At the present time no relocations are expected.

6. Assure that the land needed for construction of the project is appraised in accordance with P.L. 91-646.

7. Act as contracting organization for the construction of all structural measures. Construction contracts for installation of all structural measures will be awarded through the process of competitive bidding. The FCDMC, at a later date, may request the Soil Conservation Service to administer the contracts.

The SCS will:

1. Furnish engineering services for engineering surveys, design, construction plans, specification for structural works of improvement for flood prevention and supervision of construction and arrange for management of cultural resources.

2. Allot construction money in accordance with cost-sharing and the installation schedule outlined in this plan or as may be revised by mutual agreement. Money allocations will be in accordance with national priorities and availability of funds at the time of installation.

3. Maintain liaison with sponsors, State and federal agencies involved in order that the objectives of this work plan will be accomplished to the benefit of all concerned.

The installation of structural measures will begin as soon as practical after the approval of the work plan and allocation of P.L. 566 funds for participation of the project. A five-year installation period is planned. Construction of the structural measures will be completed within three years. Land treatment measures will begin two years prior and will continue to be applied throughout the three-year construction period. The structures will be planned and installed as follows.

First Year

Land treatment will be applied under an ongoing program at an estimated expenditure of $75,300.

Second Year

Land treatment will be applied under an ongoing program at an estimated expenditure of $75,300.

Third Year

Work will be started to acquire the necessary land, easements, and rights-of-way for the project. Three electrical utility lines and a property access road will be relocated. Final engineering surveys, geologic and archeological investigations and design will be completed. In the first year of construction, installation costs are estimated to equal $1,904,100 with $885,200 P.L. 566 funds and $1,018,900 other funds. Land treatment costs will be $75,300.

Fourth Year

Construction will be initiated after land rights have been acquired. In the second year, installation costs are estimated to equal $5,337,800 with $5,282,700 P.L. 566 funds, and $55,100 other funds. Land treatment costs will be $75,300.

Fifth Year

Construction will be completed. In the third year installation costs are estimated to equal $5,314,600 with $5,282,600 P.L. 566 funds, and $32,000 other funds. Land treatment costs will be $75,300.

The FCDMC will operate and maintain the structural measures outlined in this plan. The FCDMC is a public political taxing subdivision of the State of Arizona and a municipal corporation. It has the power to acquire property by eminent domain or otherwise and issue bonds.

The FCDMC has analyzed its financial needs in consideration of the scheduled works of improvement so that funds will be available when needed through cash resources or tax and assessment levies. Taxes are presently being levied for the benefit of the FCDMC.

The loan provisions of the Watershed Protection and Flood Prevention Act will not be utilized by the sponsors. That portion of the local sponsors' share of the installation cost will result from the acquisition of land rights.

No relocation payments are anticipated for this project. However, if some become necessary before the project is installed, the FCDMC will be responsible for providing relocation assistance advisory services. The cost of any resulting relocation payments would be distributed between the FCDMC and the SCS in accordance with the terms of the Watershed Work Plan Agreement. The funds for these costs will be obtained from the current program of the FCDMC.

Prior to entering into agreements that obligate funds of SCS, the FCDMC will develop a code of conduct governing the performance of its officers, employees, or agents in contracting with or expending P.L. 566 funds and a financial management system for control, accountability, and disclosure of P.L. 566 funds received and for control and accountability for property and other assets purchased with P.L. 566 funds.

Program income earned during the grant period will be reported on the sponsors' requests for advance or reimbursement from SCS.

Costs for the application of land treatment measures on privately owned and State Trust Lands are estimates of all costs to be expended by the landowners and operators in installing the measures, and for the technical assistance provided under existing programs. Cost-sharing programs such as the Agricultural Conservation Program administered by the Agricultural Stabilization and Conservation Service may be utilized, depending on availability.

The Bureau of Land Management (BLM) and the U.S. Forest Service will continue to manage public lands and national forest lands under the multiple use concept. Range management on public land will be primarily management oriented until the BLM has completed its comprehensive management plans.

An archeological survey has revealed the need for detailed investigation, recovery, protection, and/or preservation of significant cultural resources prior to construction. Recommendations include a multiphased detailed investigation to gather sufficient data for the development of a research design or plan for data recovery. The State Historic Preservation Officer (SHPO) is in agreement with this approach which shall be the responsibility of SCS in consultation with SHPO and Heritage Conservation and Recreation Service-Interagency Archeological Services. If additional cultural resources are discovered during construction, appropriate consultation

will be entered into with the SHPO and the Secretary of the Interior in accordance with Section 3, P.L. 93-291. The Advisory Council on Historic Preservation will be given the opportunity to review and comment on this undertaking at the appropriate time.

OPERATION, MAINTENANCE, AND REPLACEMENT

The East Maricopa and Florence-Coolidge Natural Resource Conservation Districts will encourage landowners and operators to operate and maintain the land treatment measures by making technical assistance available to them and by sending out periodic news items concerning cost-share programs and other helpful information.

The Flood Control District of Maricopa County's (FCDMC) responsibility for operation and maintenance begins when a part of or all of the work of installing the floodwater retarding structure, related appurtenances, and vegetative work are completed and accepted or completed as determined jointly by the SCS and FCDMC. This responsibility shall continue until the expiration of the evaluated life of all the installed project measures. This does not relieve the sponsors' liability which continues throughout the life of the measure or until the measure is modified to remove potential loss of life or property.

The responsible sponsors' representative will inspect the dam and appurtenances at least annually and after each

major storm or occurrence of any unusual condition that might adversely affect the dam and appurtenances. The SCS will make inspections to determine whether or not project measures are operating properly, and that all operation and maintenance is performed in a timely manner and in compliance with the operation and maintenance agreement.

A written report will be made of each inspection. A copy of each report will be provided by the inspecting party to the other party within ten days of the date on which the inspection was made. The report will describe the conditions found and list any corrective action needed with a time frame to complete each action.

Operation and maintenance of wildlife mitigation measures are the responsibility of the FCDMC and will consist of maintaining the fencing required in the mitigation plan.

An operation and maintenance agreement will be entered into between the FCDMC and the SCS prior to the signing of a project agreement. An operation and maintenance plan will be prepared for the structural measure. All phases of operation and maintenance of the dam and appurtenances will comply with applicable local, State, and federal regulations.

Surveying monuments installed during construction together with existing monuments will be checked periodically by the SCS and the sponsors to determine changes in elevations in the vicinity of the structure.

In order to properly maintain the existing Queen Creek

channel, the FCDMC has agreed to establish a right-of-way for the Queen Creek channel for which it will obtain maintenance rights only. This right-of-way will be of sufficient width to contain the post-project 100-year floodplain, any existing or proposed dikes, levees and revetments, and sufficient area for parallel maintenance access on each side of the channel. Within this right-of-way the maintenance activity will consist of removal of such growth or sediment and control of such construction which may reduce the capacity of the channel below the 100-year post-project FRS discharge. Additionally, after significant flows in the channel, the FCDMC will inspect the channel for damage which may allow subsequent flows to escape the channel right-of-way and for location where the flow actually had escaped the right-of-way, then perform necessary maintenance to restore the channel to the 100-year post-project flow capacity. The FCDMC does not intend to guarantee that a specific flow could not escape from the right-of-way or to maintain a specific channel cross section configuration. However, the FCDMC will maintain the 100-year post-project flow capacity right-of-way limits. The FCDMC will obtain all necessary funds for operation, maintenance, and replacement from tax or assessment levies. The total annual operation, maintenance, and replacement cost is estimated at $15,000.

Usefulness of the planned floodwater retarding dam for protecting downstream areas will continue beyond the 100-year effective economic life of the sediment pools. The dam will

become slightly less efficient as sediment accumulates in that space reserved for flood storage. Flood protection will not decrease significantly after 100-year period because the rate of sediment accumulation will be low, and the amount of flood storage is high. Most of the sediment will pass through the dam after its economic life. However, periodic removal of sediment from the sediment pool could restore the trap efficiency of a dam, thereby allowing it to continue to function as a sediment trap and flood prevention dam indefinitely.

In order to insure the proper operation and maintenance of the structure, the following items will require periodic attention:

A. Operation

A drain gate located within the sediment pool will be closed at all times except in those cases when emergency repairs are required.

B. Maintenance

1. The drain gate located in the sediment pool should be kept in operating condition until encroaching sediment makes further maintenance infeasible.
2. Trash and debris will be removed from the principal spillway inlet.
3. Any damage caused to emergency spillway, including downstream spillway dikes, will be repaired.

4. Damage caused to outlet channel and stilling basin will be repaired.

5. There should be control of weeds and debris in the principal spillway outlet channel and in a 15-mile reach of the Queen Creek channel below the FRS.

6. Sediment deposits will be removed from the principal spillway outlet.

7. Sediment deposits will be removed from a 15-mile reach of the Queen Creek channel below the FRS when needed to maintain existing capacity.

8. Special attention will be given to the seven bridge crossings, Southern Pacific Railroad crossing and the Southern Paicifc Gas line crossing of the Queen Creek channel downstream from the Queen Creek FRS. The channel crossings will be periodically checked for excessive scour so that immediate repairs or maintenance may be effected.

9. A satisfactory outlet will be maintained at the junction of the Queen Creek channel and the RWCD Floodway.

10. Maintain fences.

11. Remove excessive amounts of sediment that accumulate immediately upstream of the emergency spillway.

AGREEMENT

between the following local organizations:

Gila River Indian Community Tribal Council
Roosevelt Water Conservation District
Pinal County Board of Supervisors
Flood Control District of Maricopa County
Florence-Coolidge Natural Resource Conservation District
East Maricopa Natural Resource Conservation District

(Referred to herein as sponsors)

State of Arizona
and the
Soil Conservation Service
United States Department of Agriculture
(Referred to herein as SCS)

Whereas, application has heretofore been made to the Secretary of Agriculture by local organizations for assistance in preparing a plan for works of improvement for the Lower Queen Creek Watershed, State of Arizona, under the authority of the Watershed Protection and Flood Prevention Act (16 U.S.C. 1001-1008); and

Whereas, the responsibility for administration of the Watershed Protection and Flood Prevention Act, as amended, has been assigned by the Secretary of Agriculture to the Soil Conservation Service (SCS); and

Whereas, there has been developed through the cooperative efforts of local organizations and SCS this plan for works of improvement for the Lower Queen Creek Watershed, State of Arizona:

Now, therefore, in view of the foregoing considerations, the Secretary of Agriculture, through the Soil Conservation Service, and the sponsors hereby agree on this plan and that the works of improvement for this project will be installed, operated, and maintained in accordance with the terms, conditions, and stipulations provided for in this watershed plan and including the following:

1. The Flood Control District of Maricopa County will acquire, with other than PL-566 funds, such land rights as will be needed in connection with the works of improvement. (Estimated cost $887,000.)

2. The Flood Control District of Maricopa County assures that comparable replacement dwellings will be available for individuals and persons displaced from dwellings, and will provide relocation assistance advisory services and relocation assistance, make the relocation payments to displaced persons, and otherwise comply with the real property acquisition policies contained in the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646, 84 Stat. 1894) effective as of January 2, 1971, and the Regulations issued by the Secretary of Agriculture pursuant thereto. The costs of relocation payments will be shared by the Flood Control District of Maricopa County (FCDMC) and SCS as follows:

	FCDMC (percent)	SCS (percent)	Estimated Relocation Payment Costs (dollars)
Relocation Payments	11	89	0

Note: Investigation has disclosed that, under present conditions, the project measures will not result in the displacement of any person, business, or farm operation. However, if relocations become necessary, relocation payments will be cost-shared in accordance with the percentages shown.

3. The Flood Control District of Maricopa County will acquire or provide assurance that landowners or water users have acquired such water rights pursuant to State law as may be needed in the installation and operation of the works of improvement.

4. The total construction cost of the structural measures will be borne by the SCS. (Estimated cost $9,622,300.)

5. The total engineering services cost will be borne by the SCS. (Estimated cost $962,200.)

6. The Flood Control District of Maricopa County and SCS will each bear the costs of Project Administration which it incurs, estimated to be $96,200 and $866,000, respectively.

7. The sponsors will obtain agreements from owners of not less than 50 percent of the land above each reservoir and

floodwater retarding structure that they will carry out conservation farm or ranch plans on their land.

8. The sponsors will provide assistance to landowners and operators to assure the installation of the land treatment measures shown in the watershed plan.

9. The sponsors will encourage landowners and operators to operate and maintain the land treatment measures for the protection and improvement of the watershed.

10. The Flood Control District of Maricopa County will be responsible for the operation, maintenance, and replacement of the works of improvement by actually performing the work or arranging for such work in accordance with agreements to be entered into prior to issuing invitations to bid for construction work.

11. The costs shown in this plan represent preliminary estimates. In finally determining the costs to be borne by the parties hereto, the actual costs incurred in the installation of works of improvement will be used.

12. This agreement is not a fund obligating document. Financial and other assistance to be furnished by SCS in carrying out the plan is contingent upon the fulfillment of applicable laws and regulations and the availability of appropriations for this purpose.

13. A separate agreement will be entered into between SCS and the Flood Control District of Maricopa County before either party initiates work involving funds of the other party. Such agreements will set forth, in detail, the financial and working arrangements and other conditions that are applicable to the specific works of improvement.

14. This plan may be amended or revised only by mutual agreement of the parties hereto except that SCS may deauthorize funding at any time it determines that the sponsors have failed to comply with the conditions of this agreement. In this case, SCS shall promptly notify the sponsors in writing of the determination and the reasons for the deauthorization of project funding, together with the effective date. Payments made to the sponsors or recoveries by SCS shall be in accord with the legal rights and liabilities of the parties when project funding has been deauthorized. An amendment to incorporate changes affecting a specific structural measure may be made by mutual agreement between SCS and the Flood Control District of Maricopa County having specific responsibilities for the structural measure involved.

15. No member of or delegate to Congress, or resident commissioner shall be admitted to any share or part of this plan, or to any benefit that may arise therefrom; but this provision shall not be construed to extend to this agreement if made with a corporation for its general benefit.

16. The program conducted will be in compliance with all requirements respecting nondiscrimination as contained in the Civil Rights Act of 1964, as amended, and the regulations of the Secretary of Agriculture (7 CFR 15.1-15.12), which provide that no person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any activity receiving federal financial assistance.

Gila River Indian Community
Tribal Council

By _____
Alexander Lewis, Sr.

_____
Address Zip Code

Title _____

Date _____

The signing of this plan was authorized by a resolution of the governing body of the Gila River Indian Community Tribal Council adopted at a meeting held on _____

_____
(Typed name below signature)
Secretary

_____
Address Zip Code

Date _____

Roosevelt Water Conservation
District

By _____
Grant Ward

_____
Address Zip Code

Title _____

Date _____

The signing of this plan was authorized by a resolution of the governing body of the Roosevelt Water Conservation District adopted at a meeting held on _____

_____
(Typed name below signature)
Secretary

_____
Address Zip Code

Date _____

Flood Control District of
Maricopa County

By _____
Hawley Atkinson

Title _____

Address Zip Code

Date _____

The signing of this plan was authorized by a resolution of the governing body of the Flood Control District of Maricopa County adopted at a meeting held on _____

Rhea Woodall
Clerk of the Board

Address Zip Code

Date _____

Pinal County Board of Supervisors

By _____
James Karam

Title _____

Address Zip Code

Date _____

The signing of this plan was authorized by a resolution of the governing body of the Pinal County Board of Supervisors adopted at a meeting held on _____

(Typed name below signature)
Secretary

Address Zip Code

Date _____

Florence-Coolidge Natural Resource Conservation District

By _____
Edward J. Cunningham

Title _____

_____
Address Zip Code

Date _____

The signing of this plan was authorized by a resolution of the governing body of the Florence-Coolidge Natural Resource Conservation District adopted at a meeting held on _____

_____
Richard LaPaglia
Secretary

_____
Address Zip Code

Date _____

East Maricopa Natural Resource Conservation District

By _____
James A. Miller

Title _____

_____
Address Zip Code

Date _____

The signing of this plan was authorized by a resolution of the governing body of the East Maricopa Natural Resource Conservation District adopted at a meeting held on _____

_____
Robert J. Bogle
Secretary

_____
Address Zip Code

Date _____

Appropriate and careful consideration has been given to the environmental impact statement prepared for this project and to the environmental aspects thereof.

Soil Conservation Service

United States Department of Agriculture

Approved by:

_____

Thomas G. Rockenbaugh
State Conservationist

Date _____

TABLE 1

ESTIMATED INSTALLATION COST
Lower Queen Creek Watershed, Arizona

Installation Cost Item	Number Unit	Number Non Federal Land	Estimated Cost (Dollars) 1/ P.L.566 Funds SCS 3/	Estimated Cost (Dollars) 1/ Other Funds SCS 3/	Estimated Cost (Dollars) 1/ Total
LAND TREATMENT-Going Program					
Land Areas 2/					
Cropland	Acres to be	10,500	0	306,600	306,600
Rangeland	protected	14,500	0	2,200	2,200
Urban		200	0	24,000	24,000
Technical Assistance				43,700	43,700
Total Land Treatment			0	376,500	376,500
STRUCTURAL MEASURES					
Construction					
Floodwater Retarding Structures	No	1	9,622,300		9,622,300
Subtotal-Construction			9,622,300		9,622,300
Engineering Services			962,200		962,200
Project Administration					
Construction Inspection			519,600	0	519,600
Other 6/			346,400	119,000	465,400
Subtotal-Administration			866,000	119,000	988,000
Other Costs					
Land Rights 4/				887,000	887,000
Cultural Resources Protection 5/				100,000	100,000
Subtotal-Other Costs				987,000	987,000
Total Structural Measures			11,450,500	1,106,000	12,556,500
TOTAL PROJECT COSTS			11,450,500	1,482,500	12,933,000

1/ Price Base: Land Treatment 1976 Prices; Structural Measures 1978 Prices.

2/ Includes only areas estimated to be adequately protected during the project installation period. Treatment will be applied throughout the watershed, and dollar amounts apply to total land areas, not just to adequately protected areas.

3/ Federal agency responsible for assisting in installation of works of improvement.

4/ Includes $805,000 for land purchase and associated acquisition costs; $70,000 for land rights survey; $8,000 for electrical utility relocation costs; and $4,000 for road relocation.

5/ This item will be federally funded.

6/ Includes $22,750 for State of Arizona dam and construction filing fee.

March 1979

TABLE 1A - STATUS OF WATERSHED WORKS OF IMPROVEMENT
(at time of plan preparation)

Lower Queen Creek Watershed, Arizona

Measures	Unit	Applied to Date	Total Cost (Dollars) 1/
Land Treatment			
Conservation Cropping System	Acre	29,120	58,200
Crop Residue Management	Acre	22,850	182,800
Irrigation Ditch Lining	Feet	982,630	2,947,900
Land Leveling	Acre	15,530	1,863,600
Irrigation Pipeline	Feet	177,990	711,900
Irrigation Water Management	Acre	12,080	36,200
Tailwater Recovery System	Number	25	125,000
Pond (Livestock)	Number	34	34,000
Well	Number	3	15,000
Fence	Mile	130	233,500
Structural			
Queen Creek Channelization	Mile	15	100,000 3/
TOTAL	-	-	6,308,100
Area Adequately Protected	Acre	66,000	xxxxxx

1/ Price Base 1976.

2/ Historic application.

3/ Price Base 1962.

March 1979

TABLE 2 - ESTIMATED COST DISTRIBUTION

Lower Queen Creek Watershed, Arizona

(Dollars) 1/

Item	Installation Cost P.L.566 Funds			Installation Cost Other Funds			Total Installation Cost
	Construction	Engineering	Total PL-566	Land Rights	Cultural Resources Protection	Total Other	
STRUCTURAL MEASURES							
Queen Creek FRS	9,622,300	962,200	10,584,500	887,000 2/	100,000 3/	987,000	11,571,500
SUBTOTAL - Structural	9,622,300	962,200	10,584,500	887,000	100,000	987,000	11,571,500
PROJECT ADMINISTRATION	xxx	xxx	866,000	xxx	xxx	119,000 4/	985,000
GRAND TOTAL	9,622,300	962,200	11,450,500	887,000	100,000	1,106,000	12,556,500

1/ Base year 1978.

2/ Includes $805,000 for land purchase and associated acquisition costs; $70,000 for land rights survey; $8,000 for electrical utility relocation costs; and $4,000 for road relocations.

3/ This item will be federally funded.

4/ Includes $22,750 for Arizona State dam construction and filing fee.

March 1979

TABLE 3 - STRUCTURAL DATA

DAMS WITH PLANNED STORAGE CAPACITY

Lower Queen Creek Watershed, Arizona

Item	Unit	Queen Creek FRS
Class of Structure		C
Drainage Area (Total)	Sq.Mi.	256.6
Controlled	Sq.Mil	143.3
Runoff Curve No.(1-day)(AWC II)		84
Elevation Top of Dam	Ft.	1592.3
Elevation Crest Emergency Spillway	Ft.	1582.7
Elevation Crest Principal Spillway	Ft.	1576.3
Maximum Height of Dam	Ft.	24
Volume of Fill	Cu.Yd.	1,729,000
Total Capacity 1/	Ac.Ft.	11720
Sediment Submerged	Ac.Ft.	1650
Sediment Aerated	Ac.Ft.	410
Beneficial Use	Ac.Ft.	0
Floodwater Retarding	Ac.Ft.	9660
Surface Area		
Sediment Pool	Acres	790
Beneficial Use Pool	Acres	0
Floodwater Retarding Pool 1/	Acres	1860
Principal Spillway Design		
Rainfall Volume (1-day)	In.	4.1
Rainfall Volume (10-day)	In.	8.6
Runoff Volume (10-day)	In.	4.1
Capacity of Principal Spillway(Max.) 2/	cfs	1755
Dimensions of Conduit	Ft.	2 - 7'x 7'
Emergency Spillway Design		
Frequency Operation-Emergency Spillway	% chance	Less than 1.0
Rainfall Volume (ESH)	In.	7.5
Runoff Volume (ESH)	In.	5.6
Storm Duration	Hrs.	24
Type		Baffled Apron
Bottom Width	Ft.	1600
Velocity of Flow (V_e)	Ft.Sec.	6.0
Slope of Exit Channel	Ft./Ft.	0.0
Max. Reservoir Water Surface Elevation	Ft.	1586.9
Freeboard Design		
Rainfall Volume (FH)	In.	15.1
Runoff Volume (FH)	In.	13.0
Storm Duration	Hrs.	24
Max. Reservoir Water Surface Elevation	Ft.	1592.3
Capacity Equivalents		
Sediment Volume	In.	0.15
Floodwater Retarding Volume	In.	0.71
Beneficial Volume	In.	0

1/ Crest of Emergency Spillway.

2/ 100-Year Discharge.

March 1979

TABLE 4 - ANNUAL COST

Lower Queen Creek Watershed, Arizona

(Dollars) 1/

Evaluation Unit	Amortization of Installation Cost 2/	Operation and Maintenance Cost	Total
Queen Creek FRS	796,400	15,000	811,400
Project Administration	67,800	xxx	67,800
GRAND TOTAL	864,200	15,000	879,200

1/ Price Base: 1978.

2/ Amortized @ 6-7/8 percent interest rate for 100 years.

March 1979

TABLE 5 - ESTIMATED AVERAGE ANNUAL DAMAGE REDUCTION BENEFITS

Lower Queen Creek Watershed, Arizona

(Dollars) 1/

Item	Estimated Average Annual Damage		Damage Reduction Benefits
	Without Project	With Project	
Floodwater			
Crop and Pasture	94,800	6,100	88,700
Other Agricultural	114,400	9,700	104,700
Nonagricultural			
Residential	64,300	900	63,400
Highways and Roads	7,700	800	6,900
Subtotal	281,200	17,500	263,700
Sediment Deposition	17,800	4,800	13,000
Indirect	30,200	2,200	28,000
Total	329,200	24,500	304,700

1/ Price Base: Current normalized prices for crop and pasture; 1978 prices for all other.

March 1979

TABLE 6 - COMPARISON OF BENEFITS AND COSTS

Lower Queen Creek Watershed, Arizona

(Dollars)

Evaluation Unit	Average Annual Benefits 1/					Average Annual Cost 3/	Benefit Cost Ratio
		Construction Cost Savings					
	Damage Reduction 2/	Salt-Gila Aqueduct	RWCD Floodway	Employment	Total		
Queen Creek FRS	304,700	557,300	263,400	30,700	1,156,000	811,400	1.4:1.0
Project Administration	xxx	xxx	xxx	xxx	xxx	67,800	xxx
GRAND TOTAL	304,700	557,300	263,400	30,700	1,156,100	879,200	1.3:1.0

1/ Price Base: Current normalized prices for crop and pasture, 1978 prices for all other.

2/ From Table 5.

3/ From Table 4.

March 1979

PRELIMINARY
DRAFT

ENVIRONMENTAL IMPACT STATEMENT

LOWER QUEEN CREEK WATERSHED

MARICOPA AND PINAL COUNTIES, ARIZONA

March 1979

USDA-SCS-EIS-WS-(ADM)-79-1-(D)-AZ

LOWER QUEEN CREEK WATERSHED

Maricopa and Pinal Counties, Arizona

DRAFT ENVIRONMENTAL IMPACT STATEMENT

Thomas G. Rockenbaugh
State Conservationist
Soil Conservation Service

Sponsoring Local Organizations

Gila River Indian Community
Tribal Community
P.O. Box 97
Sacaton, Arizona 85247

Roosevelt Water Conservation
District
P.O. Box 168
Higley, Arizona 85236

Flood Control District of
Maricopa County
3335 West Durango Street
Phoenix, Arizona 85009

Board of Supervisors of
Pinal County
P.O. Box 827
Florence, Arizona 85232

Florence-Coolidge Natural
Resource Conservation
District
770 South Arizona Boulevard
Coolidge, Arizona 85228

East Maricopa Natural Resource
Conservation District
110 North Oregon
Chandler, Arizona 85224

March 1979

Prepared By:

UNITED STATES DEPARTMENT OF
AGRICULTURE

Soil Conservation Service
Room 3008, Federal Building
230 North First Avenue
Phoenix, Arizona 85025

Assisted By:

STATE OF ARIZONA

Arizona Water Commission
222 North Central, Suite 800
Phoenix, Arizona 85004

USDA ENVIRONMENTAL IMPACT STATEMENT

LOWER QUEEN CREEK WATERSHED PROJECT

Maricopa and Pinal Counties

Arizona

Prepared in Accordance with
Sec. 102(2)(C) of P.L. 91-190

SUMMARY

I Preliminary Draft

II Soil Conservation Service

III Administrative

IV Description of Project Purpose and Action

A project for watershed protection and flood prevention located in Maricopa and Pinal Counties, Arizona, is to be implemented under authority of the Watershed Protection and Flood Prevention Act (P.L. 566, 83d Congress, 68 Stat. 666), as amended. The planned works of improvement consist of an 8-mile flood retarding structure across both the Queen Creek and Sonoqui drainages. Land treatment in the watershed will consist of the ongoing conservation district program.

V Summary of Environmental Impacts

The Queen Creek Floodwater Retarding Structure (FRS) will intercept and retard floodwaters via a controlled release system. This temporary detention of floodwaters and the controlled releases will increase the quantity and improve the quality of the groundwater supply.

Construction of the FRS will eliminate the native desert type vegetation from 340 acres of land and reduce the density and growth of the native vegetation on an additional 600 acres. Additionally 3,200 acres of land in the reservoir will be fenced as part of a wildlife habitat protection measure, thus restricting access to the land and removing it from other than controlled livestock grazing. Plant communities in the 790-acre wet sediment pool will be altered depending on frequency, severity and longevity of inundation. Visual impacts will be softened by seeding and transplanting native vegetation on approximately 100 acres of land consisting of the FRS surface and related areas disturbed by the project construction.

The structural measures will provide the following with protection from the 100-year frequency event:

1. 19,600 acres of developed land (an additional 2,400 acres of land will receive partial flood protection which yields a total of 22,000 acres receiving some benefits from reduced exposure to flooding).
2. A 7.5-mile reach of the Central Arizona Project Salt-Gila aqueduct.
3. 35 miles of an irrigation distribution system.
4. An 11-mile reach of the Roosevelt Water Conservation District (RWCD) Floodway.

5. 15 miles of Queen Creek channel.

Project construction will provide 31 skilled and 5 unskilled man years of work in addition to the creation of a 790-acre gate controlled sediment pool which will be used to store water for wildlife and provide groundwater recharge. Project construction will temporarily increase the amount of dust and noise.

The proposed FRS will reduce the amounts of both bedload and suspended sediment entering the RWCD Floodway. Sediment inflow to the RWCD Floodway will be reduced from 14.0 acre-feet per year to 4.5 acre-feet per year after project implementation.

Five significant archeological sites located in the project area will be studied in order to recover and preserve valuable artifacts and data for analysis by subsequent researchers. The five sites will lose their in situ value.

The quality of living and the health, welfare, and safety of the residents in the area will be improved as a result of project construction. Economic benefits should result from the availability of additional money for community pruposes that would have formerly been required for periodic repair of flood damages. Negative social impacts to the surrounding area should be minimized since project implementation will not result in the relocation of any residences, businesses, or farms.

VI Alternatives Considered

1. No project.

2. Nonstructural measures for minimizing flood losses.

3. Elephant Butte Floodwater Retarding Structure.

4. Queen Creek Floodwater Retarding Structure with the enlargement of 10 stockwater ponds and the construction of 3 reservoir habitat islands.

VII Agencies from Which Written Comments Are Requested

Federal Government

Department of the Army
Department of Commerce
Department of Health, Education, and Welfare
Department of the Interior
Department of Transportation
Office of Equal Employment Opportunity, USDA
Environmental Protection Agency
Federal Power Commission
Advisory Council on Historic Preservation

State and Local Government

Governor of Arizona
Arizona Bureau of Geology and Mineral Technology
Arizona Commission of Agriculture and Horticulture
Arizona Office of Economic Planning and Development
(State Clearinghouse)
Arizona Department of Transportation
Arizona Game and Fish Department
Arizona Historical Preservation Officer
Arizona State Parks Board
Arizona State Land Department
Arizona State Parks Natural and Cultural Resource
Conservation Section
Arizona Outdoor Recreation Coordinating Commission
Arizona Department of Health Services
Department of Watershed Management, University of Arizona
Arizona State Museum
Arizona Department of Economic Security
Arizona Historical Society
Arizona Power Authority
Flood Control District of Maricopa County

Maricopa County Parks and Recreation Department
Maricopa County Highway Department
Maricopa County Manager
Maricopa Association of Governments
Maricopa County Board of Supervisors
Center for Public Affairs, Arizona State University
Central Arizona Association of Governments
Pinal County Highway Department
Council for Environmental Studies, University of Arizona
Pinal County Board of Supervisors
Department of Anthropology, Arizona State University
City of Chandler
Indian Affairs Commission
City of Gilbert
Governor's Commission on Arizona Environment
Maricopa County Planning Department

Other

Natural Resource Defense Council
Friends of the Earth, Washington, D.C.
Friends of the Earth, Scottsdale, Arizona
Environmental Defense Fund
National Wildlife Federation
National Audubon Society
Environmental Impact Assessment Project
League of Women Voters of Arizona
Sierra Club
Roosevelt Water Conservation District
East Maricopa Natural Resource Conservation District
Gila River Indian Community Tribal Council, Governor
Gila River Indian Community Natural Resource Committee
Arizona Public Service Company
Salt River Project
Mountain Bell Telephone Company
Maricopa Audubon Society
Arizona Wildlife Federation
Arizona Water Resources Committee
Arizona State Reclamation Association
Arizona Conservation Council
Archaeological Society
Southern Pacific Transportation Company
Williams Air Force Base
El Paso Natural Gas Company
Florence-Coolidge Natural Resource Conservation District

ENVIRONMENTAL IMPACT

Conservation Land Treatment

Current annual erosion rates in the watershed are generally low, ranging from slightly less than 0.2 ton per acre in the lower elevations to 1.1 tons per acre in the higher, steeper elevations. Land treatment practices being applied under the ongoing conservation district program are expected to maintain those rates and no accelerated program under P.L. 566 is planned.

It is recognized that the project, by virtue of providing flood protection, might stimulate the ongoing land treatment program to some extent downstream. If such were to occur, it is expected that the increase would be related primarily to enduring water conservation practices such as land leveling, concrete ditch lining, irrigation pipeline installation and tailwater recovery system installation.

Expected secondary impacts, therefore, would include an increase in airborne dust levels from land leveling and construction activities, removal of earthen and/or concrete ditches in disrepair by lining and piping, an increase in tailwater pond surface water with accompanying edge, increase in irrigation water management with accompanying decrease in energy use by reduced groundwater pumpage and reduction in groundwater depletion.

The procedures set forth in Title 7 CFR Part 656 will be followed should any cultural resources be encountered during the planning or installation of an SCS-assisted treatment measure.

Structural Measures

Cultural Resources

The cultural resources assessment of the dam and reservoir areas resulted in the location of five archeological sites linked with the prehistoric Hohokam culture. Locations of the sites are such that impacts of the project will include obliteration by construction and possible prolonged inundation.

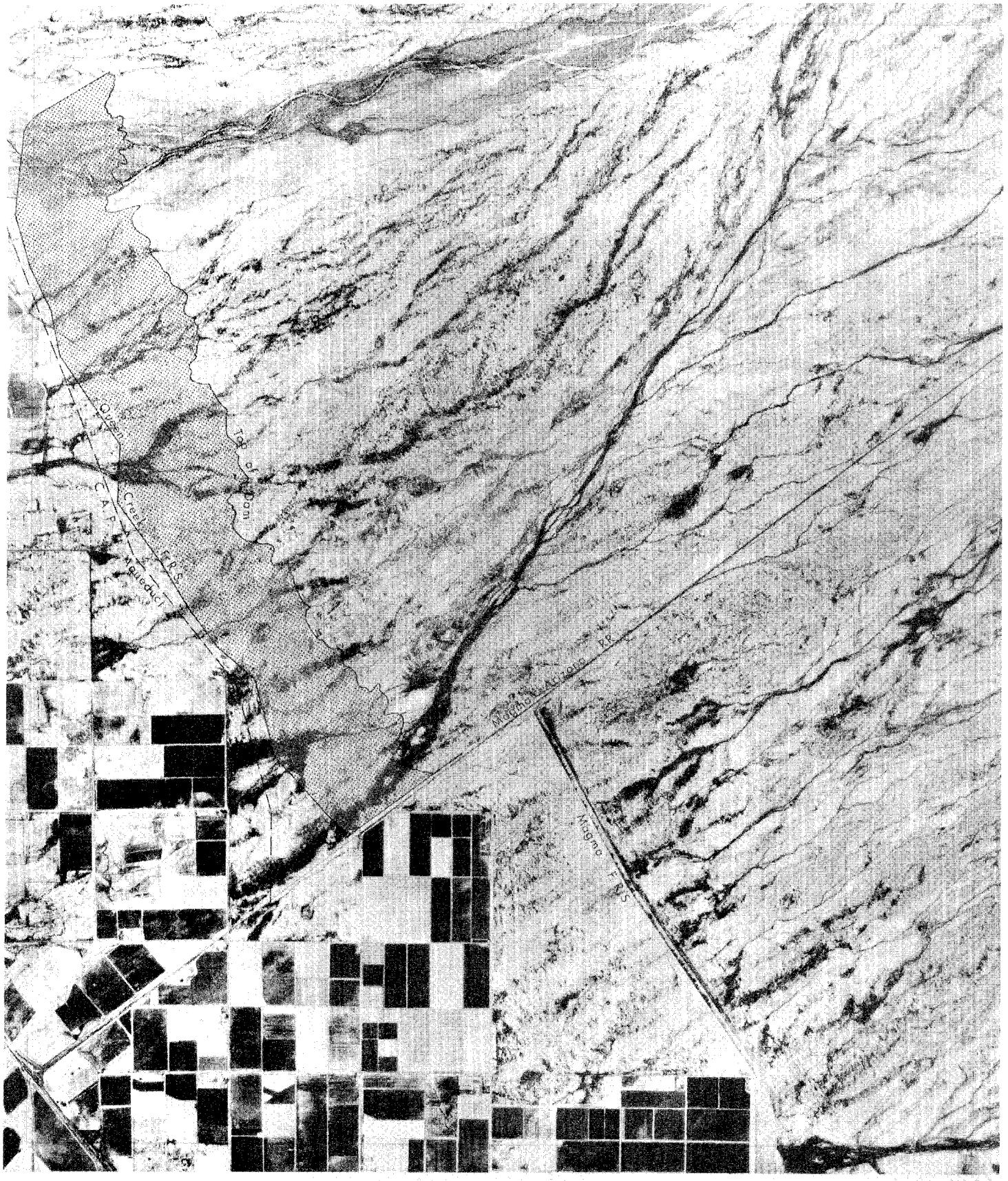
The State Historic Preservation Officer has rendered the opinion that the sites are eligible for inclusion in the National Register of Historic Places and that adverse effects on the sites can be avoided by detailed survey and data recovery.

Mitigation measures include detailed survey and recovery of data and artifacts based on a research design to be developed by a qualified, professional archeologist. Appropriate consultation with SHPO, Heritage Conservation and Recreation Service and the Advisory Council on Historic Preservation will be solicited as prescribed by Title 7 CFR Part 656.

Impacts are loss of the in situ value of each site, preservation of currently extractable data for use by contemporary and future researchers and protection of the sites from vandalism.

Wildlife and Wildlife Habitat

Effects on the Gila monsters and desert tortoises include disruption by construction or water impoundment of burrows, dens, tunnels, paths, or other places frequented



Aerial view showing approximate location of Queen Creek F.R.S. and reservoir area.

by each during their normal day to day activities and possible fatalities caused by construction activities or, seemingly less likely, drowning in the impounded water.

Mitigation efforts will include contractually forbidding the trapping or injuring of either species as a result of private construction. Local Arizona Game and Fish officials will be utilized to determine the disposition of any individuals encountered in these actions.

During construction, native vegetation will be removed from 180 acres of watershed project land and 160 acres of Salt-Gila aqueduct land that has been designated as a borrow area for the dam.

After construction, water impoundment will have a two-fold effect. First, 600 acres of downstream native vegetation will receive less water and consequently will suffer in vigor and density. Second, 790 acres of vegetation in the wet sediment pool will be altered depending on the severity and longevity of inundation.

The biology team concluded that the project will cause a loss of 33,261 habitat unit years (HUY) and a gain of 30,565 HUY in desert riparian habitat for a net loss of 2,696 HUY. Projections over the 100-year life of the project for desert upland habitat show a loss of 25,556 HUY and a gain of 29,622 HUY for a net gain of 4,066 HUY.

The projected habitat gains are based on fencing the 3,200-acre top of dam flood pool and restricting grazing to

that deemed necessary by interagency biologists for fuel reduction to suppress wildfire.

Compensation for the 2,696 HUY desert riparian net loss was agreed by the sponsors, Arizona Game and Fish, Bureau of Sport Fisheries and Wildlife, Arizona Water Commission and the Soil Conservation Service to be the creation of the 790-acre, natural ground, wet sediment pool addressed in the Work Plan. The natural ground aspect is expected to provide a pothole effect during low water years and hillocks and islands during wetter years. Determinations of the HUY value of the sediment pool is not possible; the prospect of providing water and related habitat is considered an acceptable trade-off for the lost desert riparian habitat.

The 3,200-acre reservoir will be retained as a wildlife habitat and open space area. Project fencing and the location of the Queen Creek FRS will make the impact area less accessible and provide limited protection to the land, vegetation, and cultural resources. The 3,200 acres will be removed from open grazing.

Vectors

The storage of floodwaters within the sediment pool could create a mosquito or other vector breeding habitat.

In the site area of the Queen Creek FRS, vector problems are not considered significant. However, if the problem arises, the Flood Control District of Maricopa County will

contact the Maricopa County Department of Health Services and appropriate action will be implemented.

Visual

The desert terrain is flat with the existing view obstructed only by naturally occurring vegetation. The construction of the Queen Creek FRS, with a maximum vertical height (ground level to top of dam) of 24 feet, will create a visual impact but will be lessened by landscaping which will consist of seeding and transplanting native vegetation on approximately 100 acres of structural surface and construction disturbed areas. Preliminary evaluations indicate that white bursage, white brittlebush and adapted saltbush species would be best suited for seeding the proposed FRS gravel surface.

Groundwater

Transmission loss estimates of Queen Creek channel indicate a high infiltration rate. Flood flows entering the FRS reservoir will be impounded and released slowly through the principal spillway. Hydrological indications are that detention and slow release will allow opportunity for increasing the amount of water reaching the groundwater table and a corresponding improvement of quality

Sediment

The Queen Creek FRS is estimated to trap an average of

20.6 acre-feet per year of sediment. At the Queen Creek-Roosevelt Water Conservation District (RWCD) Floodway junction the existing average sediment yield is about 14.0 acre-feet per year. After project implementation, the average sediment yield will decrease to approximately 4.5 acre-feet per year. In February 1978, extended flood flows from Queen Creek were responsible for a reduction in the channel capacity of the existing RWCD Floodway. The photographs on Page E-17 show the quantity of sediment deposited during the 1978 flood at the junction of the RWCD Floodway and the Chandler Heights Road bridge. Construction of the Lower Queen Creek Project will reduce this type of impact.

= photo caption uses March

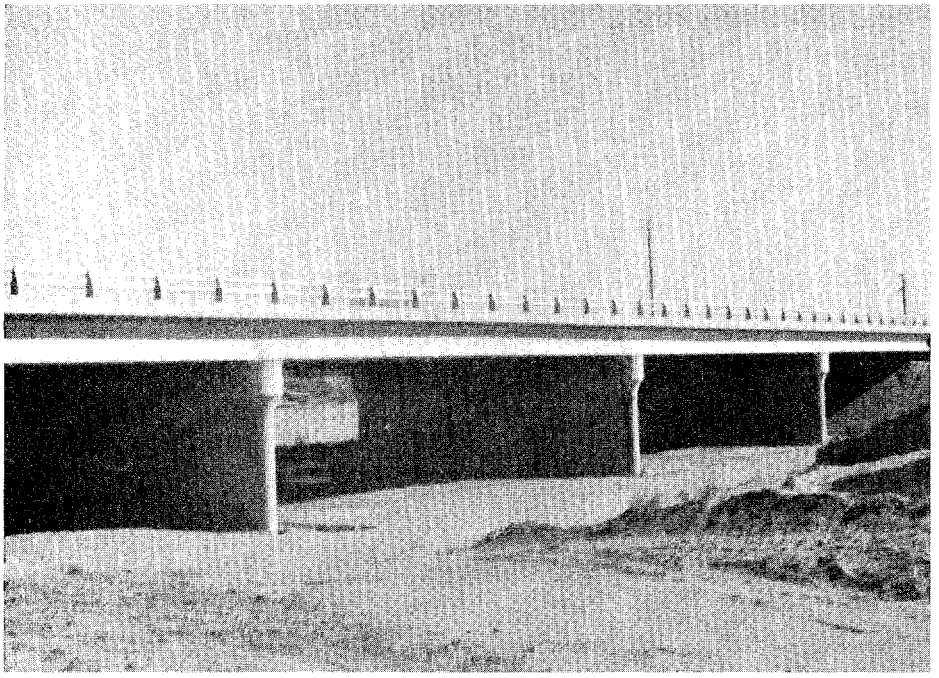
Water Quality

Overland flood flows mix with fertilizers, pesticides, chemicals, feedlot sewage, and septic tanks to form a source of surface water pollution. The implementation of the project plan will significantly reduce these impacts.

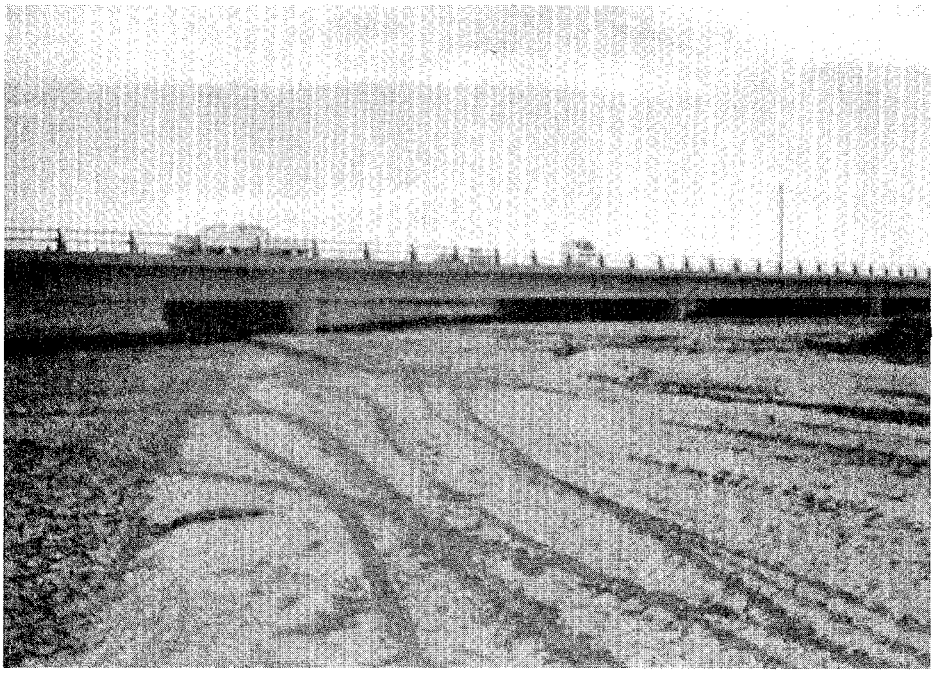
Air Quality and Noise

Dust levels at, and adjacent to, the construction site are the only air quality parameter that will be affected by project implementation. Dust abatement measures will be enforced during construction.

The completed structure will be covered with a thin shell of sand and gravel. The resultant gravel blanket will serve to decrease the present levels of dust pollution and reduce wind and water erosion on the dam.



RWCD Floodway Bridge crossing at Chandler Heights Road. Photo taken prior to March 1978 flood events.



RWCD Floodway Bridge crossing at Chandler Heights Road. Photo taken after the March 1978 flood events.

Noise during construction will cause an adverse environmental effect.

Economic and Social

The most significant economic and social impact will result from reduced flood damages. Project implementation will provide flood protection to 22,000 acres of developed land thus protecting the value of project land and preserving the tax base.

Along with the reduction of flooding downslope of the FRS, flooding also will be reduced in areas on the Gila River Indian Reservation.

Project construction will provide jobs for 31 skilled and 5 unskilled labor positions; improve the health, welfare, and quality of living in the project. Locally, monetary impacts from construction are expected to be slight due to the lack of significant retail or service establishments. Most impacts will occur in the Chandler, Tempe, Mesa, Apache Junction and Phoenix areas.

Regional benefits realized from utilization of unemployed or underemployed labor resources have been estimated at $30,000 per year from project construction and $15,000 per year from operation and maintenance activities.

On a long term basis, flood protection combined with water provided by the Central Arizona Project will help

assure the continuation of agriculture as the predominant economic sector. The maintenance of the agriculture sector and any increase in urbanization will bring about the growth of some additional services with consequent increase in jobs for local residents.

Population is forecast to increase from 3,541 in 1978 to 4,862 by the year 2000, accompanied by the addition of about 500 housing units. The average age of the population will increase moderately due to young adults leaving farm households for employment elsewhere and due to the trend to smaller families. The proportion of minority people is expected to remain unchanged.

The maintenance of agriculture as the primary employment sector will not alter the present distribution of income. The current proportion of the population below the poverty level may be expected to decline slightly, with any additional employment opportunities occurring in service oriented businesses.

The prevention of periodic flooding will mean less destruction of farm land and adjacent areas and should enhance the quality of the environment. This will contribute to the enhancement of the area, create a more desirable place to live and preserve the rural lifestyle in the area.

Flood protection is expected to stimulate investment in upgrading farms and housing through a release of funds which otherwise would be used for repairs following periodic floods.

The FRS land rights will require the purchase of 690 acres of private land which will remove approximately $2,000 from annual tax revenue.

UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS

Adverse environmental effects which cannot be avoided have been evaluated and are summarized as follows:

1. Remove 340 acres of desert type vegetation by construction of the proposed FRS. (Total acres include about 160 acres from Central Arizona Project aqueduct construction area.)
2. Reduce density and growth of vegetation on 600 acres below Queen Creek FRS. (Total acres include about 60 acres from Central Arizona Project aqueduct construction area.)
3. Prolonged inundation and/or sediment cover on 790 acres of desert type vegetation located within the gate controlled sediment pool.
4. Subject five significant archeological sites to testing and data recovery and consequent loss of their <u>in situ</u> value to future archeological field studies.
5. Construction of FRS will create visual impact on flat desert landscape.
6. Increase amounts of dust and noise during construction.
7. Remove 690 acres of private land from the tax rolls valued at about $2,000 annually.

8. Remove 3,200 acres from open grazing.

9. Provide opportunity of secondary impacts downstream through stimulation of ongoing land treatment program.

10. Disturb the habitat of a known population of Gila monsters with the possibility of construction caused fatalities among those animals.

11. Possible disturbance of habitat of and/or construction caused fatalities of individual desert tortoise.

ALTERNATIVES

Alternatives entitled, "Accelerated Conservation Land Treatment Only" and "Accelerated Conservation Land Treatment Supplemented by Nonstructural Measures for Minimizing Flood Losses" are not presented because conservation land treatment is considered as being adequately installed and maintained under existing programs. All alternatives include an ongoing land treatment program as described in the Planned Project section.

ALTERNATIVE NO. 1

No Project

Land use projections for the "No Project" alternative are the same as for the planned project with the following impacts to be expected: increase in floodwater runoff; flood damage to productive cropland; loss in scenic quality; reduced air and water quality; more energy use; loss in wildlife habitat; and more traffic congestion.

Selection of this alternative will result in continued floodwater, erosion, and sediment damage to existing and future agricultural developments within the Queen Creek floodplain. State and county floodplain regulations, flood insurance and flood proofing requirements would continue to be implemented but would affect only future nonagricultural developments.

This alternative assumes that a basic USBR plan would be implemented under Central Arizona Project authority. The present USBR plan indicated that Reach-3 of the Salt-Gila aqueduct will cross under Queen Creek channel in an 18-foot diameter siphon 1,400 feet in length and will cross the Sonoqui drainage in a 2,500 cfs open channel aqueduct. The plan includes the proposed construction of a 7-mile long FRS, located immediately above the aqueduct, and providing a 100-year level of protection only through the Sonoqui segment of the watershed, the Lower Queen Creek basin would remain uncontrolled. As a result, the RWCD Floodway and adjacent lands below the RWCD-Queen Creek junction would only receive a 30-year level of protection. Central Arizona Project construction costs would increase requiring a corresponding increase in the local repayment obligations. Also, major damage to the proposed Central Arizona Project irrigation distribution system could be expected.

If the project is not installed, a net average annual benefit of $25,700 will not accrue to the region and the sponsors' goals would not be realized.

ALTERNATIVE NO. 2

Nonstructural Measures for Minimizing Flood Losses (Purchase of Floodplain)

This alternative consists of the purchasing of the 100-year floodplain.

The present 100-year floodplain for the Lower Queen Creek watershed area downstream of the proposed Central Arizona Project aqueduct includes approximately 22,000 acres of which 12,500 acres are in Maricopa County and 9,500 acres are in Pinal County. After implementation of the basic Central Arizona Project plan, as described under Alternative No. 1, the Sonoqui basin floodplain would receive flood protection and the total remaining uncontrolled portion of the floodplain would be reduced to 16,400 acres. Most of the remaining floodplain consists of developed agricultural land and could be purchased for an estimated $24,600,000.

Although purchase of the floodplain would remove the private landowners from exposure to further flood damages, the land so purchased would still be subject to floodwater, erosion, and sediment damages.

Adverse impacts resulting from selection of this alternative are increased Central Arizona Project construction costs, reduced level of flood protection to the RWCD Floodway, and major damage to a proposed Central Arizona Project irrigation distribution system.

The sponsors' goals would not be realized.

ALTERNATIVE NO. 3

Elephant Butte Floodwater Retarding Structure (National Economic Development Plan)

This alternative consists of the construction of Elephant Butte FRS. (Following Page 26 is an aerial view of the location of this structure.)

The proposed structure would be located in Whitlow Canyon, 1.4 miles upstream of its junction with Queen Creek. The mouth of Whitlow Canyon is 2.5 miles downstream from Whitlow Ranch Dam and 12 miles upstream from the proposed Queen Creek FRS.

The structure would be 1,137 feet long, 106 feet high and would control a drainage area of approximately 38 square miles. Design considerations include a 100-year release of 380 cfs and the establishment of an 860 acre-foot permanent pool for wildlife uses.

Implementation of this alternative would provide an 11-mile reach of the RWCD Floodway and a 22.5-mile reach of a proposed irrigation distribution system with protection from a flood with a recurrence interval of 100 years. It would reduce the developed Queen Creek 100-year floodplain from 14,730 acres to 1,790 acres.

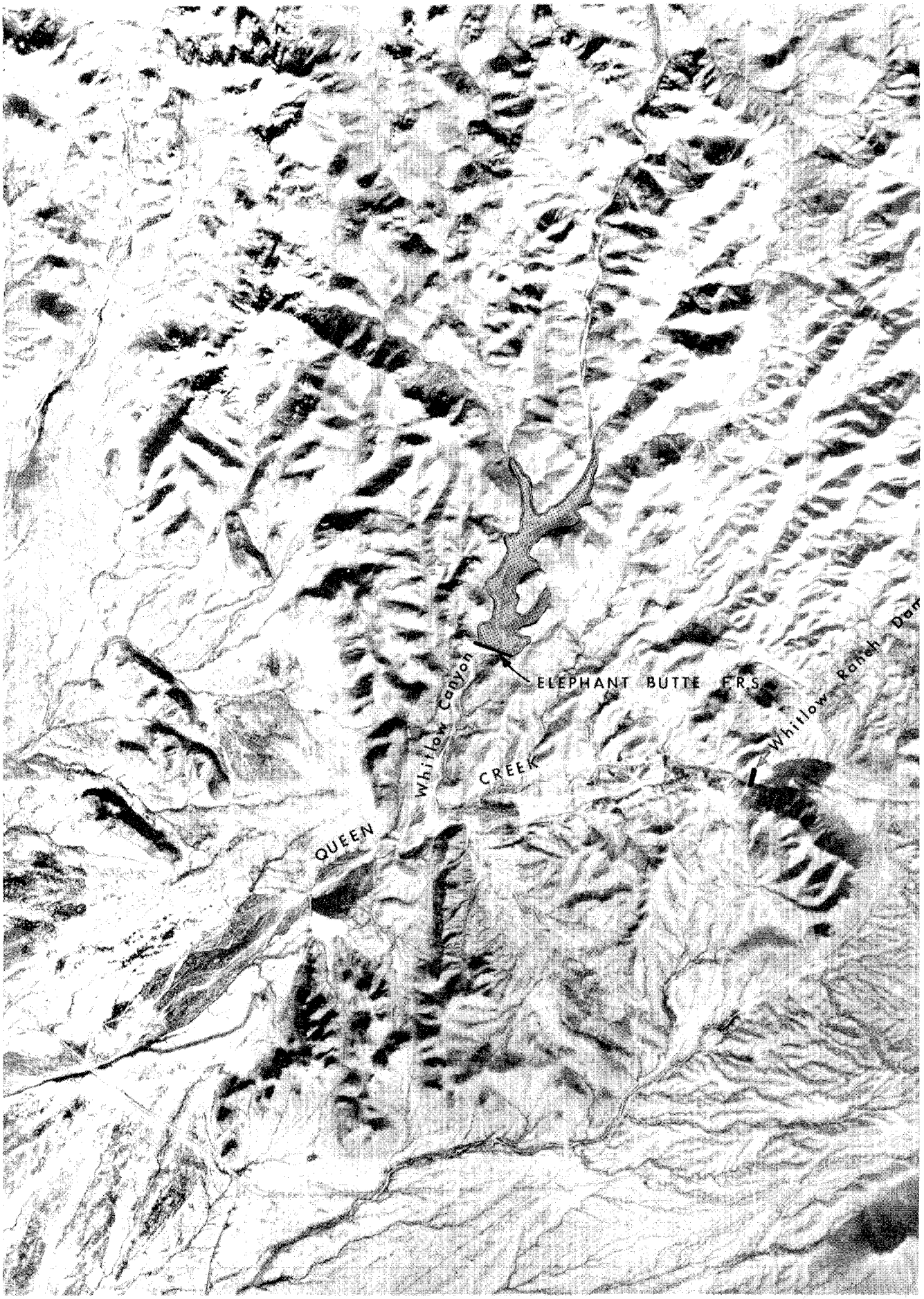
The No Project alternative assumes that a basic USBR plan would be implemented under Central Arizona Project authority. The present USBR plan indicates that Reach-3 of the Salt-Gila aqueduct would cross under Queen Creek channel

in an 18-foot diameter siphon 1,400 feet in length and would cross the Sonoqui drainage in a 2,500 cfs open channel aqueduct. The plan includes the proposed construction of a 7-mile long FRS, located immediately above the aqueduct, and providing a 100-year level of protection only through the Sonoqui segment of the watershed. Implementation of Alternative No. 3 would result in a substantial Central Arizona Project construction cost savings by replacing the proposed 1,400-foot siphon with an equivalent length of open aqueduct and a cross drainage overchute.

The land area affected by the installation of this alternative includes 110 acres directly impacted by construction and 190 acres within the respective reservoir area. The impacted vegetation is of excellent quality and has the capacity to support a large and diverse wildlife population. Any loss of habitat in this area would effect several species of animals including desert mule deer and javelina.

There are no animals in the impacted areas that are classified as endangered or threatened under the Endangered Species Act of 1973 (as amended). There are, however, desert tortoises and Gila monsters in the area, both of which are listed in the Arizona Game and Fish Department's "Threatened and Unique Wildlife of Arizona."

An archeological assessment conducted by Arizona State University indicated there were no significant archeological sites within the Elephant Butte Area.



Aerial view showing approximate location of Elephant Butte FRS and reservoir area.

Installation costs of this alternative are estimated at $7,700,000 of which $7,547,000 would be P.L. 566 funds and $153,000 would be from other funds.

Average annual benefits are summarized as follows:

1.	Damage reduction	$264,500
2.	Construction cost savings	$559,400
3.	Employment	$ 26,500
	Total	$850,400

Operation and maintenance costs were evaluated at $15,000 per year.

The ratio of benefits to costs is 1.56:1.00.

ALTERNATIVE NO. 4

Queen Creek Floodwater Retarding Structure
with the Enlargement of Ten Stockwater Ponds
and the Construction of Three Reservoir Habitat Islands
(Environmental Quality Plan)

This alternative provides for the installation of the FRS described in the selected plan and includes additional environmental considerations.

There are 20 stockwater ponds located in the watershed. As a part of this environmental plan ten of these ponds would be enlarged and the peripheral areas of each would be seeded and fenced. The enlarged ponds would provide upstream sediment entrapment and would furnish additional habitat enhancement. They would increase the existing surface water and sediment entrapment potential capacities by about 100 acre-feet and provide about 12 acres of new habitat cover.

All of these enlarged ponds are located upstream of the proposed FRS and are on State land.

This alternative also includes the construction of three reservoir habitat islands within the wet sediment pool. The islands would have approximate base dimensions of 600 feet x 600 feet and top surface dimensions of 200 feet x 200 feet. When the sediment pool is filled with floodwaters each island would show about 40,000 square feet of surface area and would extend approximately one foot above the water surface. These island surface areas would be seeded and designated for use as a habitat area for waterfowl and general desert birds. The islands would remove approximately 100 acre-feet of storage from the sediment pool. It has been determined that this small loss in sediment storage would be replaced by the capabilities of the enlarged upstream stockwater ponds.

This alternative realizes the same flood benefits and environmental impacts described in the planned project.

Installation costs of this alternative are estimated at $12,923,400 of which $11,802,000 would be P.L. 566 funds and $1,121,400 would be from other funds.

Average annual benefits are summarized as follows:

1.	Damage reduction	$304,700
2.	Construction cost savings	$820,700
3.	Employment	$ 33,000
	Total	$1,158,400

Operation and maintenance costs were evaluated at $15,000 per year.

The ratio of benefits to costs is 1.28:1.00.

SHORT-TERM vs. LONG-TERM USE OF RESOURCES

The ongoing land treatment program is expected to increase the amount of adequately treated cropland and rangeland. It will continue to be effective in reducing soil movement and improving irrigation water management.

Land use projections indicate that agricultural and residential development will occur with or without the project. A declining groundwater table could restrict future cropland development but would not affect nonagricultural development. The use of Central Arizona Project water in lieu of pumped water is expected to help slow the rate at which the water table is declining.

This project will aid in the orderly development of natural resources in the area by using conservation and environmental measures to maintain the usefulness of the lands for future generations.

Land treatment measures and the structure will continue to be effective as long as they are properly maintained.

The Queen Creek FRS will not interfere with any plans for optional use of land except for the land committed to the structural measures. The flood pool will be available for long-term habitat management, but will be removed from open grazing.

The project is not designed to correct land and water resource use problems on a short-term or immediate basis, but for a 100-year period.

The project is expected to be effective in conserving land and water resources long after its designed life. Sediment control will continue long after the designed life of the structures, especially if hydrologic conditions are improved beyond those proposed in this project or if sediment is removed.

Use of land for project measures will not significantly restrict future options or limit productivity. The floodwater retarding structure and wildlife mitigation areas will preclude full optional use of 2.2 percent of the project area. Opportunities for productive use will be maintained or enhanced on the remaining 97.8 percent.

The project area comprises less than one percent of the total area of the Gila Subregion within the Lower Colorado Region in Arizona. Five P.L. 566 watershed projects have been completely installed, and eight P.L. 566 watershed projects are being installed in the Subregion. Three other projects have been approved for planning. Thirty-six additional watersheds in the Subregion have been identified as having development potential.

There are several complementary watershed protection and flood prevention projects adjacent to or near the Lower Queen Creek Watershed.

Watershed Project	Structural Measures	Project Status
Buckhorn-Mesa (north of Apache Junction-Gilbert)	Spookhill FRS & Floodway	in construction
	Signal Butte FRS & Floodway	authorized for construc.
	Pass Mt. FRS	" " "
	Bulldog Diversion	" " "
	Apache Junction FRS	" " "
	Weeks Wash FRS	" " "
	RWCD Floodway	" " "
Apache Junction-Gilbert (north of Williams-Chandler)	Powerline FRS & Floodway	(completed)
	RWCD Floodway	authorized for construc.
Williams-Chandler (north of Lower Queen Creek)	Vineyard Rd. FRS & Floodway	(completed)
	Rittenhouse Floodway	(completed)
	RWCD Floodway	authorized for construc.
Magma (south of Lower Queen Creek)	Magma FRS & Channel	(completed)
Florence Area (south of Magma)	Florence FRS & Floodway	(completed)

The Lower Queen Creek Watershed is located south of the Williams-Chandler Watershed and north of the Magma Watershed. The Queen Creek FRS will be located between Rittenhouse and Magma floodwater retarding structures and will follow the same general alignment as the adjacent structures.

The system of structures will greatly reduce peak flows and allow an orderly runoff of floodwaters to the Salt and Gila Rivers through a connecting system of floodways.

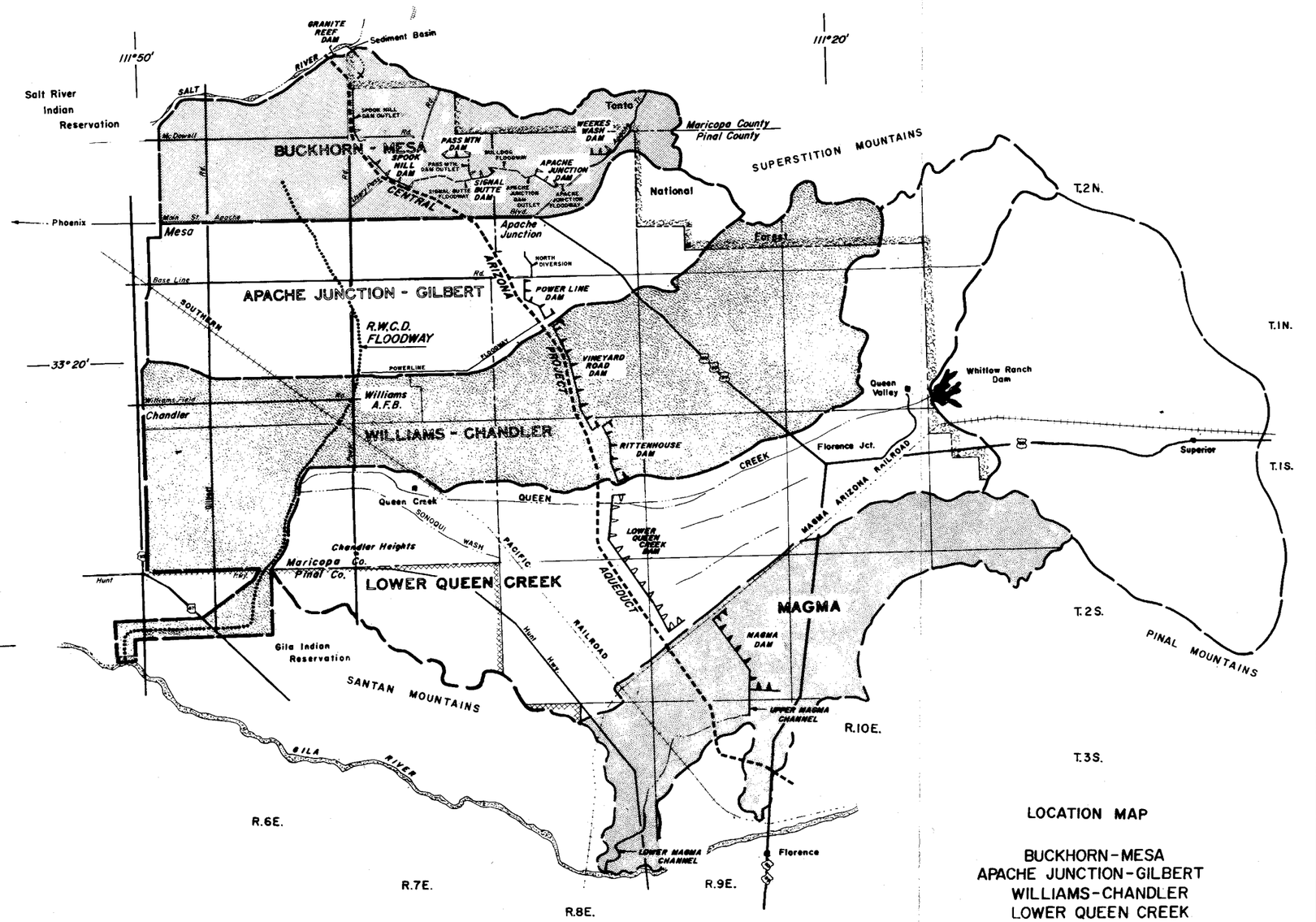
The FRS system follows a general alignment to provide substantial protection to the Central Arizona Project Salt-Gila aqueduct from the Salt River to the end of the Florence FRS, south of the Gila River. In all, the combined system of

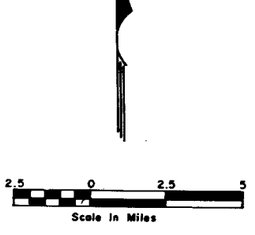
U.S. DEPARTMENT OF AGRICULTURE

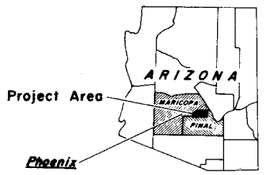
SOIL CONSERVATION SERVICE

LEGEND

- WATERSHED BOUNDARY
- NATIONAL FOREST BOUNDARY
- INDIAN RESERVATION BOUNDARY
- COUNTY LINE
- RANGE & TOWNSHIP LINE
- PAVED ROAD — STATE-LOCAL — U.S. HWY.
- RAILROAD
- CHANNEL WORKS FOR FLOOD PREVENTION — PROPOSED — EXISTING
- CENTRAL ARIZONA PROJECT AQUEDUCT
- ROOSEVELT WATER CONSERVATION DISTRICT FLOODWAY — R.W.C.D. (PROPOSED)
- INTERMITTENT STREAM
- FLOODWATER RETARDING STRUCTURE — PROPOSED — EXISTING







LOCATION MAP

LOCATION MAP

BUCKHORN-MESA
APACHE JUNCTION-GILBERT
WILLIAMS-CHANDLER
LOWER QUEEN CREEK
MAGMA WATERSHEDS
AND
ROOSEVELT WATER CONSERVATION
DISTRICT FLOODWAY

SOURCE OF DATA: ARIZONA WATER COMMISSION

structures will provide complete flood protection to 29.2 miles of CAP aqueduct and partial protection to an additional 11.0 miles of CAP aqueduct.

Implementation of the Lower Queen Creek project, the Buckhorn-Mesa project and various segments of the RWCD Floodway, supplemented with the existing structural measures, will provide an optimum flood control solution for all of the benefitted areas.

Individually, the effects of the PL-566 watershed projects on the main stem of the Gila River will be very difficult to assess. Taken collectively, the 40 floodwater retarding structures proposed or installed in the 14 PL-566 watershed projects will control a drainage area of 855 square miles. This is about 1.5 percent of the total Gila River drainage area. About 625 square miles of the controlled drainage area are located above the junction of the Santa Cruz River and the Gila River. In other words, the PL-566 projects will control 2.2 percent of the drainage area above this junction. Structures in these projects call for 9,301 acre-feet of sediment storage and 56,805 acre-feet of floodwater detention storage. Over 48 miles of floodways have been installed and 45 miles are planned for construction.

Storage provided in these dams for floodwater detention amounts to about 1.25 inches of runoff per acre controlled. Hydrologic studies of large drainage areas indicate that this type of structure will influence peak flow in the main channel

generally in direct proportion to the percent of the total drainage area controlled. This will indicate a total reduction of about two percent in peak flows in the Gila River immediately below its confluence with the Santa Cruz River and a one and one-half percent decrease in peak flows for the total drainage area of the Gila River.

Works of improvement in this project are complementary to those in other water resource projects in the Gila Subregion. The Corps of Engineers has a system of floodwater retarding structures and channels either planned or installed to give flood protection to portions of the Phoenix metropolitan area. A system of floodwater retarding structures to protect the CAP aqueduct across the Paradise Valley area is complete. At the same time, these structures will be protecting developments downslope. Floodwater retarding structures adjacent to the Queen Creek FRS will supplement the protection provided by the Corps of Engineers and the Bureau of Reclamation projects by giving additional protection to those developments in the eastern part of the Phoenix metropolitan area.

Status of the PL-566 Watersheds in the Gila Subregion

Installation Completed	Dams No.	Drainage Area Controlled Sq. Mi.	Sediment Storage Ac. Ft.	Floodwater Storage Ac. Ft.	Channel Improvement Mi.
Florence	1	63.4	755	4,060	1
Frye Creek-Stockton	5	203	2,800	7,500	14
Magma	1	62	160	4,850	11
White Tanks	2	34	170	3,520	11
Vanar	0	0	0	0	6
Arroyos No. 1	12	29	420	1,400	1
Wickenburg	2	1.9	26	274	0
Guadalupe	1	1.9	25	265	0
Buckeye	3	88.9	2,310	8,000	3.5
Subtotal	27	484.1	6,666	29,869	47.5
Authorized for Installation					
Buckhorn-Mesa	5	42.5	825	3,551	7
Apache Junction-Gilbert	1	49.9	175	3,960	15
Williams-Chandler	2	109.1	380	7,700	9
Perilla Mountain	2	32.8	330	3,018	6.5
Harquahala Valley	3	136.7	925	8,707	15.0
Subtotal	13	371.0	2,635	26,936	52.5
Total	40	855.1	9,301	56,805	100

Authorized for Planning	Location
St. David	Cochise County
Dos Cabezas	Cochise County
Eagle Tail	Maricopa County
Lower Queen Creek	Maricopa and Pinal Counties

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Resources committed are summarized as follows:

1. Remove 340 acres of desert type vegetation by construction of the proposed FRS.
2. Alteration of 790 acres of desert type vegetation located within the sediment pool.
3. Five significant archeological sites will be subjected to testing and data recovery and will lose their in situ value to future archeological field studies.
4. Thirty-six man-years of labor would be required for construction and an average of one man-year annually for maintenance of the structure will be irretrievably committed.

CONSULTATION AND REVIEW WITH APPROPRIATE AGENCIES AND OTHERS

The Environmental Impact Statement was developed in consultation with Federal, State and local agencies, and interested groups and individuals. Interagency coordination and discussion meetings were held. Open public meetings were held in Queen Creek on March 12, 1974, and on April 25, 1978. These meetings were publicly advertised by community postings, notice in the Chandler newspaper and verbal invitation to attend. Federal, State and selected local representatives were given special written notice.

Continuous coordination has been maintained with the U.S. Bureau of Reclamation, U.S. Army Corps of Engineers,

U.S. Fish and Wildlife Service, Arizona State Land Department, State Historic Preservation Officer, Arizona Game and Fish Department, Gila River Indian Community, Roosevelt Water Conservation District, Pinal County Board of Supervisors, Flood Control District of Maricopa County, Florence-Coolidge Natural Resource Conservation District and the East Maricopa Natural Resource Conservation District, other involved or interested agencies, groups and individuals.

Wildlife considerations were evaluated in consultation with the U.S. Fish and Wildlife Service and the Arizona Game and Fish Department. They assisted the SCS in conducting wildlife habitat assessments, conferring on expected impacts and developing the habitat replacement plan.

Archeological investigations were conducted by the Office of Cultural Resource Management, Arizona State University. Consultation with the State Historic Preservation Officer and staff followed. Interagency Archeological Services of the Heritage Conservation and Recreation Service was asked to review and comment on the report. The Advisory Council on Historic Preservation will be asked to comment at the appropriate time.

SIGNATURE BLOCK

APPROVED BY: _____

Thomas G. Rockenbaugh
State Conservationist

Date: _____

REFERENCES

1. U.S. Department of Agriculture, Soil Conservation Service, Final Environmental Impact Statement, Roosevelt Water Conservation District Floodway, Arizona, June, 1978.

2. U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Eastern Maricopa and Northern Pinal Counties Area, Arizona, November, 1974.

3. Emmett M. Laursen, Scour Depth from Emergency Spillway Flows, Queen Creek Watershed, University of Arizona, June, 1978. (Report prepared for USDA Soil Conservation Service.)

4. Glen E. Rice and Don E. Simonis, An Archaeological Survey of a Portion of the Queen Creek Delta, Pinal County, Arizona, Arizona State University, December 1977. (Report prepared for the USDA Soil Conservation Service.)

5. William D. Sellers and Richard H. Hill, Arizona Climate, 1931-1972, The University of Arizona Press, 1974.

6. Arizona State Land Department, Arizona Land Marks, Vol. 1, Book 5, 1971.

7. R.W. Beck and Associates, Central Arizona Project, Engineering and Planning Study - New Magma Irrigation and Drainage District, March, 1971.

8. W.S. Gookin & Associates, Report on Chandler Heights Citrus Irrigation District, October, 1969.

9. W.S. Gookin & Associates, Report on San Tan Irrigation District, October, 1969.

10. W.S. Gookin & Associates, Report on Queen Creek Irrigation District, December, 1969.

11. U.S. Department of the Interior, Fish & Wildlife Service, Circular 39, Wetlands of the United States, 1971.

12. U.S. Department of Commerce, Social and Economic Statistics Administration, Bureau of Economic Analysis, 1972 OBERS Projections, Economic Activity in the U.S., Volume 3, Water Resources Regions and Subareas, April, 1974.

13. U.S. Department of Commerce, Social and Economic Statistics Administration, Bureau of Economic Analysis, 1972 OBERS Projections, Series E' Population Supplement, Agricultural Projections, Volumes 1,3, and 4, May, 1975.

14. Maricopa Association of Governments, Transportation and Planning Office, Socio-Economic Projections 1975 through 2000.

15. Arizona Department of Economic Security, Population Estimates of Arizona as of July 1, 1977.

16. United States Census Bureau, U.S. Census of Population, 1970.

17. Arizona Crop and Livestock Reporting Service, U.S. Department of Agriculture, Arizona Agriculture Statistics, Bulletin S-13, April, 1978.

18. U.S. Department of Agriculture, Agricultural Statistics 1974, 1974.

19. U.S. Department of the Interior, Fish & Wildlife Service, Endangered and Threatened Wildlife and Plants, Federal Register, Vol. 41, No. 117, June 16, 1976.

20. Charles H. Lowe and David E. Brown, The Natural Vegetation of Arizona, Arizona Resources Information System, Publication #2, 1973.

21. Arizona Game and Fish Department, Threatened and Unique Wildlife in Arizona, October, 1978.

22. U.S. Department of the Interior, Bureau of Reclamation, Draft Environmental Statement - Salt-Gila Aqueduct, A Feature of Central Arizona Project, Jan. 4, 1979.

23. Schwartzmann, J.L., w.r. Laudenslayer, R.D. Ohmart, and R.W. Smith, Field Studies of the Nongame Mammals, Birds, Herpetofauna, and Vegetation Analysis of the Proposed Salt-Gila Aqueduct, Department of Zoology, Arizona State University, Tempe, Arizona, 1976.

24. U.S. Department of the Army, Corps of Engineers, Whitlow Ranch Dam Reservoir Regulations Manual, October, 1975.

APPENDICES

APPENDIX A - Display Accounts for Selected Alternative

APPENDIX B - Summary Comparison of Alternative Plans

APPENDIX C - Letters of Comment Received on Draft EIS

APPENDIX D - Structural Drawings

APPENDIX E - Land Use and Ownership Map

APPENDIX F - Project Map

APPENDIX A

DISPLAY ACCOUNTS FOR SELECTED ALTERNATIVE

National Economic Development Account

Environmental Quality Account

Regional Development Account

Social Well-Being Account

SELECTED ALTERNATIVE
NATIONAL ECONOMIC DEVELOPMENT ACCOUNT
Lower Queen Creek Watershed, Arizona

Components	Measures of Effects (Average Annual) 1/ 2/	Components	Measures of Effects (Average Annual) 1/ 2/
Beneficial Effects:		Adverse Effects:	
A. The value to users of increased outputs of goods and services.		A. The value of resources required for a plan.	
1. Flood prevention	304,700	1. Flood retention structure	796,400
2. Construction cost savings	820,700	Project installation OM&R	15,000
3. Utilization of unemployed and underemployed labor sources.		2. Project administration	67,800
a. Project construction	30,700		
Total Beneficial Effects	1,156,100	Total Adverse Effects	879,200
Net Beneficial Effects	276,900		

NOTE: The ongoing land treatment program was not accelerated, therefore, effects were not evaluated.

1/ 100 years @ 6-7/8 percent interest.

2/ Price Base: Current normalized prices for agricultural products and current prices for agricultural and nonagricultural properties; construction, 1978.

SELECTED ALTERNATIVE
ENVIRONMENTAL QUALITY ACCOUNT
Lower Queen Creek Watershed, Arizona

Components	Measures of Effects	Components	Measures of Effects
Beneficial and adverse effects:			
A. Areas of natural beauty.	1. Remove 340 acres of desert type vegetation by construction of the proposed FRS. (Total acres include about 160 acres from CAP aqueduct construction area.)	C. Biological Resources and selected ecosystems	1. Project fencing will provide an exclusive 3200 acres wildlife habitat area.
	2. Vegetative seeding and transplanting on approximately 100 acres.		2. Provide a 790 acre sediment pool as a source of water for wildlife and as a source of moisture for vegetation on pool fringe area.
	3. Construction of FRS will create visual impact on flat desert landscape.		3. Potential creation of a vector breeding habitat.
	4. Conversion of 790 acres of desert type vegetation, located in sediment pool to a 790 acre permanent reservoir area.		4. Increase in wildlife habitat from seeding approximately 100 acres and a loss of habitat from: a. Removal of 340 acres of desert type vegetation by construction of the proposed FRS. (Total acres include about 160 acres from CAP aqueduct construction area.) b. Reduction of density and growth of vegetation on 600 acres below Queen Creek FRS.(Total acres incl. about 60 ac. from CAP aqueduct construction area.) c. Prolonged inundation and/or sediment cover on 790 acres of desert type vegetation located within the sediment pool.
	5. Retain 3200 acres within the reservoir area as open space.		
	6. Reduce density and growth of vegetation on 600 acres below Queen Creek FRS. (Total acres include about 60 acres from CAP aqueduct construction area.)		
B. Quality considerations of water, land and air resources.	1. Controlled flood releases will increase the quantity and improve the quality of the groundwater supply.		
	2. At the Queen Creek-RWCD floodway junction total sediment will decrease from an estimated existing sediment yield of 14.0 AF/yr to 4.5 AF/yr.	D. Irreversible or irretrievable commitments.	1. Remove 340 acres of desert type vegetation by construction of the proposed FRS. (Total acres include about 160 acres from CAP aqueduct construction area.)
	3. Reduce potential for pollution of surface water flows.		2. Conversion of 790 acres of desert type vegetation, located within the sediment pool, to a 790 acre permanent reservoir area.
	4. FRS gravel blanket will decrease dust pollution.		
	5. Increase amounts of dust and noise during construction.		3. Five significant archeological sites will be subjected to testing and data recovery and will lose their in situ value to future archeological field studies.
	6. Fencing and location of Queen Creek FRS will make area less accessible.		
	7. Archeological data and artifacts will be recovered from five significant sites.		

SELECTED ALTERNATIVE
REGIONAL DEVELOPMENT ACCOUNT
Lower Queen Creek Watershed, Arizona

Components	Measures of Effects		Components	Measures of Effects	
Income:	State of Arizona (Average Annual)	Rest of Nation 1/ 2/	Income:	State of Arizona (Average Annual)	Rest of Nation 1/ 2/
Beneficial Effects:			Adverse Effects:		
A. The value of increased output of goods and services to users residing in the region			A. The value of resources contributed from within the region to achieve the outputs		
1. Flood prevention	304,700	-	1. Single purpose flood prevention	67,900	728,500
2. Construction cost savings	820,700	-	Project installation OM&R	15,000	-
3. Utilization of regional unemployed or under-employed labor resources			2. Project administration	8,200	59,600
a. Project construction	30,700	-			
B. The value of output to users residing in the region from external economies					
1. Indirect activities associated with increased net returns from flood prevention	202,000	345,000			
Total Beneficial Effects	1,358,100	345,000	Total Adverse Effects	91,100	788,100
Net Beneficial Effects	1,267,000	(-)443,100			
Employment:			Employment:		
Beneficial Effects:			Adverse Effects:		
A. Increase in number and types of jobs			B. Decrease in number and types of jobs		
1. Agricultural Employment	no change	-	1. Lost in agricultural employment of project take area	no change	-
2. Employment for project construction	31 skilled jobs, 5 unskilled jobs for 1 year	-	2. Lost in indirect and induced employment associated with project take area	no change	-
3. Employment for project OM&R	no change	-			
Total Beneficial Effects	-		Total Adverse Effects	-	-
Net Beneficial Effects	-	-			

1/ 100 years @ 6-7/8 percent interest.

2/ Price Base: Current normalized prices for crop and pasture; 1978 prices for all other.

SELECTED ALTERNATIVE
REGIONAL DEVELOPMENT ACCOUNT
(Continued)
Lower Queen Creek Watershed, Arizona

Components	Measures of Effects	
	State of Arizona	Rest of Nation
Population Distribution		
Beneficial Effects	Creates 31 skilled and 5 unskilled jobs for 1 year	-
Adverse Effects	-	
Regional Economic Base and Stability		
Beneficial Effects	Provide 100-year flood protection to 19,600 acres of which 17,200 acres are prime agricultural irrigated acres	

SELECTED ALTERNATIVE
SOCIAL WELL-BEING ACCOUNT
Lower Queen Creek Watershed, Arizona

Components	Measures of Effects
Beneficial and adverse effects:	
A. Real income distribution	1. Creates 31 skilled and 5 unskilled jobs for area residents for 1 year.
	2. Creates regional income benefit distribution of 1,358,100 by income uses as follows:

Income Class (dollars)	Percentage of Adjusted Gross Income in Class	Percentage Benefits in Class
Less than 3,000	8.5	8.5
3,000-10,000	42.5	42.5
More than 10,000	49.0	49.0

3. Local costs to be borne by region total 91,100 with distribution by income class as follows:

Income Class (dollars)	Percentage of Adjusted Gross Income in Class	Percentage Benefits in Class
Less than 3,000	8.5	8.5
3,000-10,000	42.5	42.5
More than 10,000	49.0	49.0

B. Life, health and safety

1. Provide one percent level of flood protection to 19,600 acres of agricultural and residential lands.

APPENDIX B

SUMMARY COMPARISON OF ALTERNATIVE PLANS

SUMMARY COMPARISON OF ALTERNATIVE PLANS

Lower Queen Creek Watershed, Arizona

ACCOUNT	SELECTED PLAN	NATIONAL ECONOMIC DEVELOPMENT PLAN 1/2/	ENVIRONMENTAL QUALITY PLAN	NO PROJECT ALTERNATIVE 1/
National Economic Development				
Beneficial Effects	1,156,100	850,400	1,158,400	
Adverse Effects	879,200	545,000	904,500	
Net Beneficial Effects	276,900	305,400	253,900	
Environmental Quality				
Beneficial and Adverse Effects:				
A. Areas of Natural Beauty	Remove 340 acres of desert type vegetation as a result of construction activities. (Total acres include about 160 acres from CAP aqueduct construction area.)	Remove 110 acres of excellent quality (high carrying capacity) desert type vegetation as a result of construction activities.	Remove 340 acres of desert type vegetation as a result of construction activities. (Total acres include about 160 acres from CAP aqueduct construction area.)	Remove 310 acres of desert type vegetation as a result of USBR construction activities. (Total acres include about 160 acres from CAP aqueduct construction area.)
	Vegetative seeding and transplanting on approximately 100 acres.	Vegetative seeding and transplanting on approximately 70 acres.	Vegetative seeding and transplanting on approximately 140 acres.	Vegetative seeding and transplanting on approximately 70 acres.
	Construction of FRS will create visual impact on flat desert landscape.	No effect.	Construction of FRS will create visual impact on flat desert landscape.	Construction of FRS will create visual impact on flat desert landscape.
	Conversion of 790 acres of desert type vegetation, located in sediment pool to a 790-acre permanent reservoir area.	Conversion of 50 acres of excellent quality (high carrying capacity) desert type vegetation located in sediment pool, to a 50-acre permanent reservoir area.	Conversion of 790 acres of desert type vegetation, located in sediment pool to a 790-acre permanent reservoir area.	Conversion of 410 acres of desert type vegetation, located in USBR sediment pool to a 410-acre sediment deposition area.
	Retain 3200 acres within the reservoir area as open space.	No effect.	Retain 3200 acres consisting of reservoir and wildlife areas as open space.	Retain 1670 acres within the USBR reservoir area as open space.
	Reduce density and growth of vegetation on 600 acres below Queen Creek FRS. (Total acres include about 60 acres from CAP construction area.)	No effect.	Reduct density and growth of vegetation on 600 acres below Queen Creek FRS. (Total acres from CAP aqueduct construction area.)	Reduce density and growth of vegetation on 500 acres below USBR FRS. (Total acres include about 50 acres from CAP aqueduct construction area.)
B. Quality Considerations of Water, Land, and Air Resources	Controlled flood releases will increase the quantity and improve the quality of the groundwater supply.	Controlled flood releases will increase the quantity and improve the quality of the groundwater supply.	Controlled flood releases will increase the quantity and improve the quality of the groundwater supply.	USBR controlled flood releases will increase the quantity and improve the quality of the groundwater supply.
	At the Queen Creek-RWCD floodway junction total sediment will decrease from an estimated existing sediment yield of 14.0 AF/yr. to 4.5 AF/yr.	At the Queen Creek-RWCD floodway junction total sediment will decrease from an estimated existing sediment yield of 14.0 AF/yr. to 7.7 AF/yr.	At the Queen Creek-RWCD floodway junction total sediment will decrease from an estimated existing sediment yield of 14.0 AF/yr. to 4.5 AF/yr.	At the Queen Creek-RWCD floodway junction total sediment will decrease from an estimated existing sediment yield of 14.0 AF/yr. to 13.3 AF/yr.
	Reduce potential for pollution of surface water flows.	Reduce potential for pollution of surface water flows.	Reduce potential for pollution of surface water flows.	Reduce potential for pollution of surface water flows.
	FRS gravel blanket will decrease dust pollution.	No effect.	FRS gravel blanket will decrease dust pollution.	No effect.
	Increase amounts of dust and noise during construction.	Increase amounts of dust and noise during construction.	Increase amounts of dust and noise during construction.	Increase amounts of dust and noise during construction.
	Fencing and location of Queen Creek FRS will make area less accessible.	Impact area is presently fairly inaccessible. However, if Elephant Butte FRS is constructed the area will become accessible and subject to environmental damage.	Fencing and location of Queen Creek FRS will make area less accessible.	Fencing and location of USBR FRS will make area less accessible.
	Archeological data and artifacts will be recovered from five significant sites.	No effect.	Archeological data and artifacts will be recovered from five significant sites.	Archeological data and artifacts will be recovered from four significant sites.
C. Biological Resources and Selected Ecosystems	Project fencing will provide an exclusive 3200-acre wildlife habitat area.	Project fencing will provide an exclusive 190-acre wildlife habitat area.	Project fencing will provide an exclusive 3200-acre wildlife habitat area.	USBR FRS will preclude grazing in the 1670-acre reservoir area.
	Provide a 790-acre sediment pool as a source of water for wildlife and as a source of moisture for vegetation on pool fringe area.	Provide a 50-acre sediment pool as a source of water for wildlife and as a source of moisture for vegetation on pool fringe area.	Provide a 790-acre sediment pool as a source of water for wildlife and as a source of moisture for vegetation on pool fringe area.	No effect.
	Potential creation of a vector breeding habitat.	Potential creation of a vector breeding habitat.	Potential creation of a vector breeding habitat.	No effect.

APPENDIX B

SUMMARY COMPARISON OF ALTERNATIVE PLANS (cont'd)
Lower Queen Creek Watershed, Arizona

ACCOUNT	SELECTED PLAN	NATIONAL ECONOMIC DEVELOPMENT PLAN 1/2/	ENVIRONMENTAL QUALITY PLAN	NO PROJECT ALTERNATIVE 1/
C. Biological Resources and Selected Ecosystems (cont'd)	Increase in wildlife habitat from seeding approximately 100 acres and a loss of habitat from: a. Removal of 340 acres of desert type vegetation as a result of construction activities. (Total acres include about 160 acres from CAP aqueduct construction area.) b. Reduction of density and growth of vegetation on 600 acres below Queen Creek FRS. (Total acres include about 60 acres from CAP aqueduct construction area.) c. Prolonged inundation and/or sediment cover on 790 acres of desert type vegetation located within the sediment pool.	Increase in wildlife habitat from seeding approximately 70 acres and a loss of habitat from: a. Removal of 110 acres of excellent quality (high carrying capacity) desert type vegetation as a result of construction activities. b. No effect. c. Prolonged inundation and/or sediment cover on 50 acres of desert type vegetation located within the sediment pool.	Increase in wildlife habitat from seeding approximately 140 acres and a loss of habitat from: a. Removal of 340 acres of desert type vegetation as a result of construction activities. (Total acres include about 160 acres from CAP aqueduct construction area.) b. Reduction of density and growth of vegetation on 600 acres below Queen Creek FRS. (Total acres include about 60 acres from CAP aqueduct construction area.) c. Prolonged inundation and/or sediment cover on 790 acres of desert type vegetation located within the sediment pool.	Increase in wildlife habitat from seeding approximately 70 acres and a loss of habitat from: a. Removal of 310 acres of desert type vegetation as a result of USBR construction activities. (Total acres include about 160 acres from CAP aqueduct construction area.) b. Reduction of density and growth of vegetation on 500 acres below Queen Creek FRS. (Total acres include about 50 acres from CAP aqueduct construction area.) c. Sediment deposition on 410 acres of desert type vegetation located within the sediment pool.
D. Irreversible or Irretrievable Commitments	Remove 340 acres of desert type vegetation as a result of construction activities. (Total acres include about 160 acres from CAP aqueduct construction area.)	Remove 110 acres of excellent quality (high carrying capacity) desert type vegetation as a result of construction activities.	Remove 340 acres of desert type vegetation as a result of construction activities. (Total acres include about 160 acres from CAP aqueduct construction area.)	Remove 310 acres of desert type vegetation as a result of USBR construction activities. (Total acres include about 160 acres from CAP aqueduct construction area.)
	Conversion of 790 acres of desert type vegetation, located within the sediment pool, to a 790-acre permanent reservoir area.	Conversion of 50 acres of excellent quality (high carrying capacity) desert type vegetation located in sediment pool, to a 50-acre permanent reservoir area.	Conversion of 790 acres of desert type vegetation located within the sediment pool, to a 790-acre permanent reservoir area.	Conversion of 410 acres of desert type vegetation located within the USBR sediment pool, to a 410-acre sediment deposition area.
	Five significant archeological sites will lose their in situ value to future archeological field studies.	No effect.	Five significant archeological sites will lose their in situ value to future archeological field studies.	Four significant archeological sites will lose their in situ value to future archeological field studies.
Regional Development State of Arizona				
A. Income:				
Beneficial Effects	1,358,100	1,024,900	1,360,400	
Adverse Effects	91,100	25,500	92,200	
Net Beneficial Effects	1,267,000	999,400	1,268,200	
B. Employment:				
Project Construction	31 skilled jobs and 5 unskilled jobs for one year.	10 skilled jobs and 5 unskilled jobs for one year.	31 skilled jobs and 5 unskilled jobs for one year.	
Social Well-Being	Provide one percent level of flood protection to 19,600 acres of agricultural and residential lands.	Provide one percent level of flood protection to 12,900 acres of agricultural and residential lands.	Provide one percent level of flood protection to 19,600 acres of agricultural and residential lands.	USBR FRS will provide one percent level of flood protection to 5600 acres of agricultural and residential lands.

1/ In the N.E.D. plan and the No Project Alternative, the USBR will construct a Floodwater Retarding Structure across Sonoqui drainage. The impacts of the USBR structure have been estimated and are included under the No Project Alternative.

2/ Only the impacts of the construction of Elephant Butte FRS have been displayed. Since the USBR structure will be constructed along with the N.E.D. plan, the total actual impacts consist of the respective items displayed plus the impact items attributable to the USBR structure.

NOTE: Land treatment beneficial effects were not evaluated. Land treatment (on-going) costs for the Selected Plan $376,509. Implementation of other alternatives will not effect the land treatment costs and will be the same as was evaluated for the selected plan.

APPENDIX C

LETTERS OF COMMENT RECEIVED ON DRAFT ENVIRONMENTAL IMPACT STATEMENT

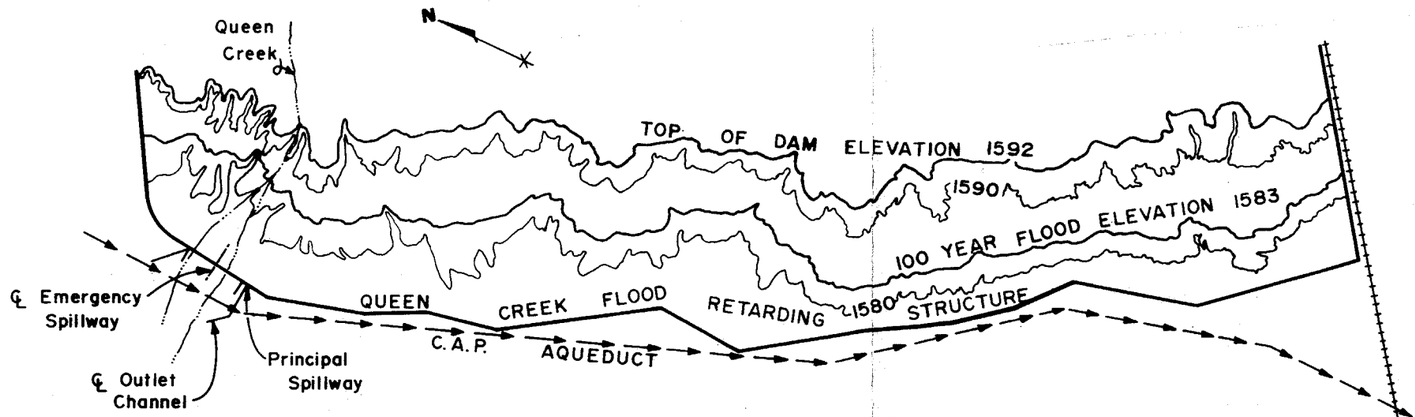
(to be included in final environmental impact statement.)

APPENDIX D

STRUCTURAL DRAWINGS

Plate-1 Plan and Profile--Queen Creek Floodwater Retarding Structure

Plate-2 General Engineering Data--Queen Creek Floodwater Retarding Structure



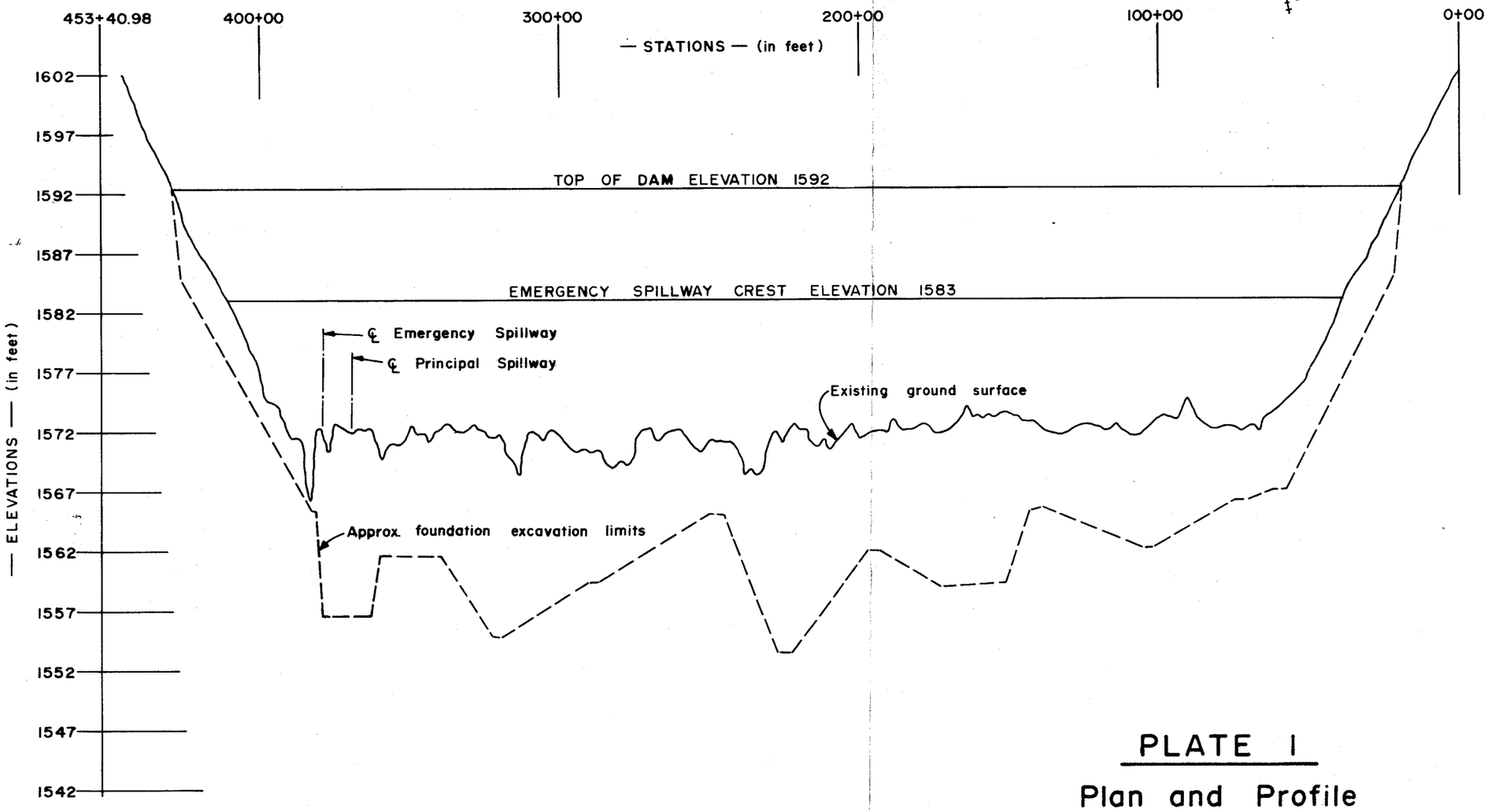
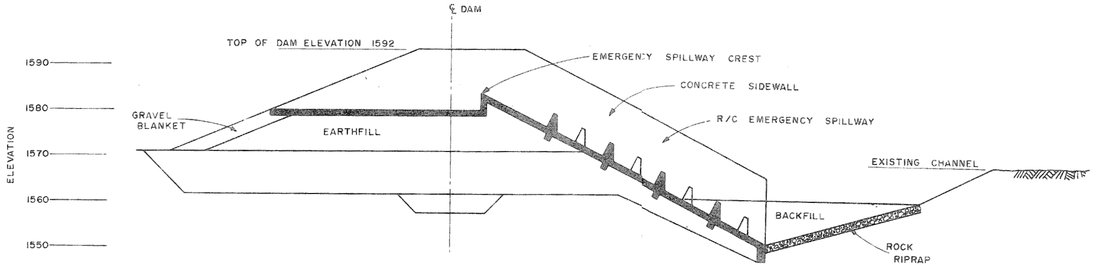


PLATE I

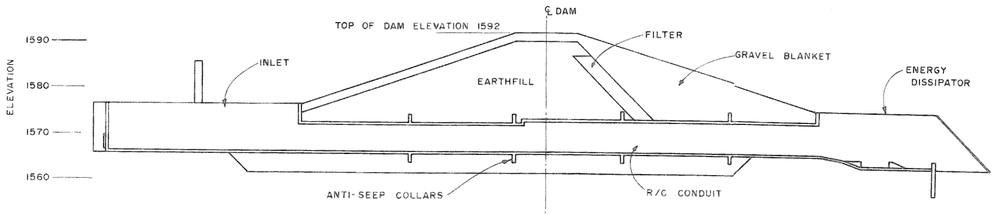
Plan and Profile

Queen Creek Floodwater Retarding Structure

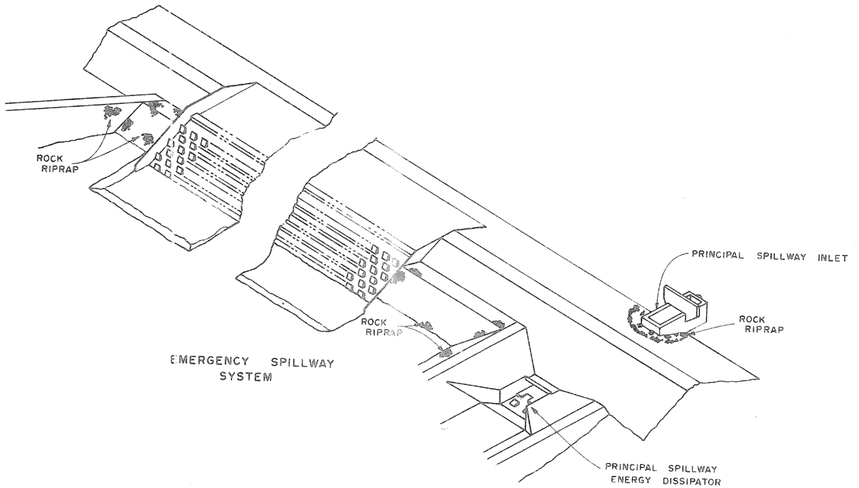
Lower Queen Creek Watershed – Maricopa & Pinal Counties



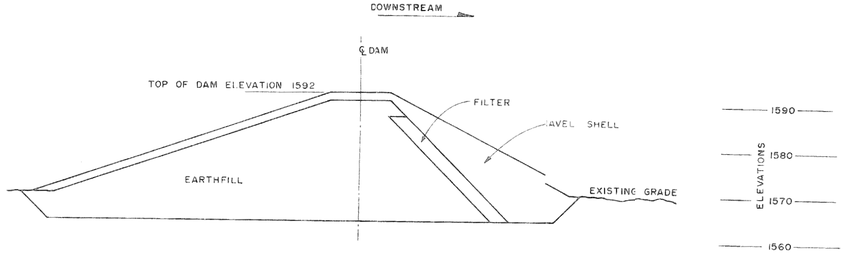
PROFILE ON CENTERLINE
EMERGENCY SPILLWAY



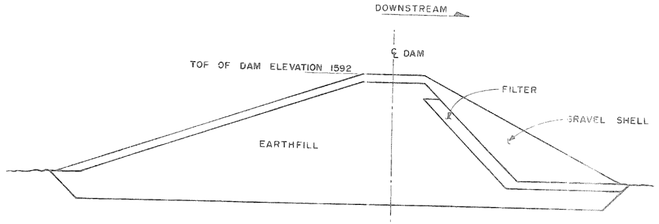
PROFILE ON CENTERLINE
PRINCIPAL SPILLWAY



EMERGENCY SPILLWAY
SYSTEM



PROFILE ON CENTERLINE
TYPICAL CROSS-SECTION
(DESIGN CONFIGURATION-1)



PROFILE ON CENTERLINE
TYPICAL CROSS-SECTION
(DESIGN CONFIGURATION-2)

PLATE 2

General Engineering Data
Queen Creek Floodwater Retarding Structure

APPENDIX E

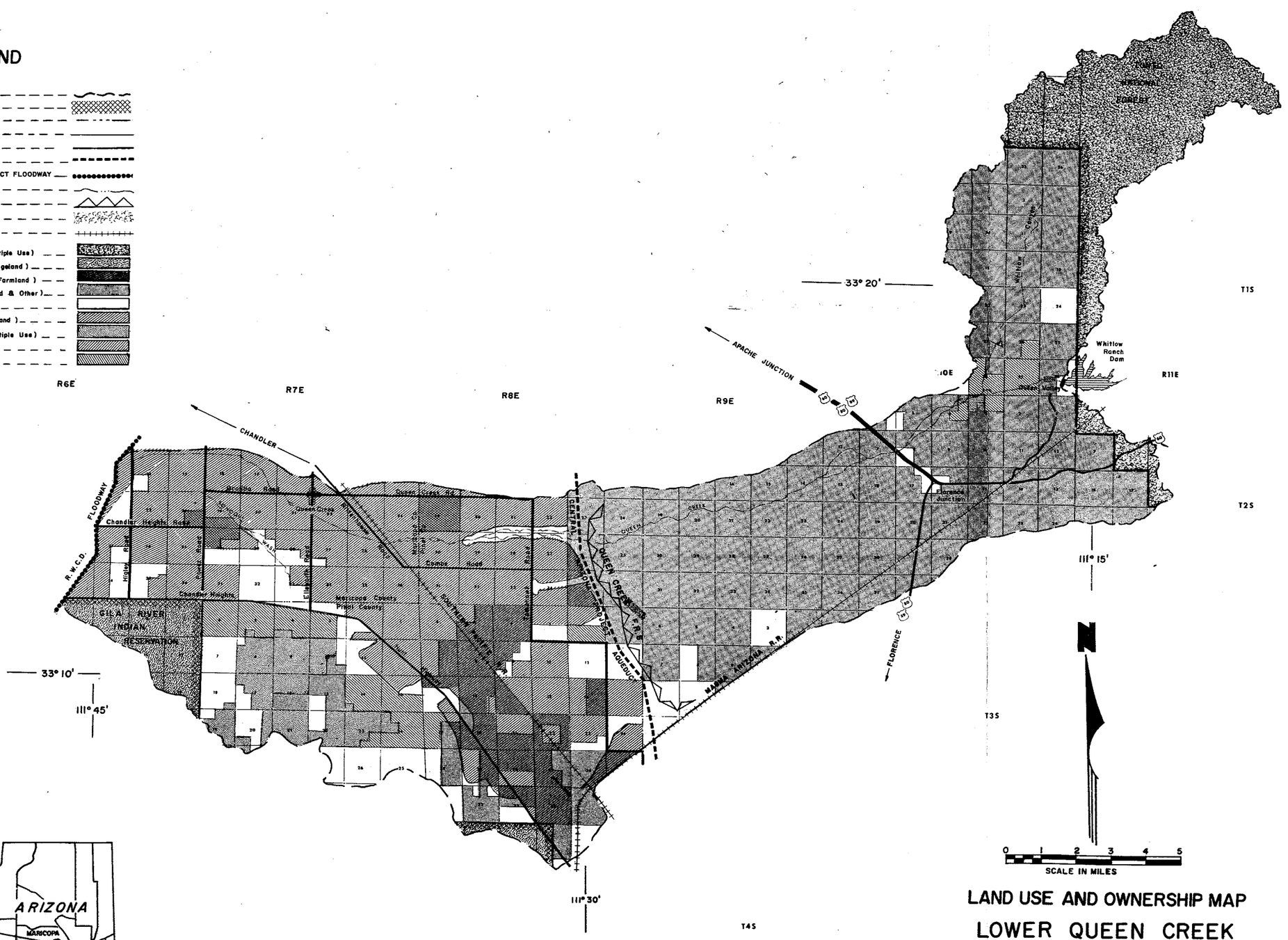
LAND USE AND OWNERSHIP MAP

U.S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

LEGEND

- WATERSHED BOUNDARY
- INDIAN RESERVATION BOUNDARY
- COUNTY LINE
- RANGE & TOWNSHIP LINE
- PAVED ROAD
- CENTRAL ARIZONA PROJECT AQUEDUCT
- ROOSEVELT WATER CONSERVATION DISTRICT FLOODWAY
- INTERMITTENT STREAM
- FLOODWATER RETARDING STRUCTURE
- NATIONAL FOREST
- RAILROAD
- NATIONAL FOREST (Multiple Use)
- INDIAN TRUST LAND (Rangeland)
- STATE TRUST LAND (Irrigated Farmland)
- STATE TRUST LAND (Desert Rangeland & Other)
- PRIVATE LAND (Non-Farmland)
- PRIVATE LAND (Irrigated Farmland)
- NATIONAL RESOURCE LAND (Multiple Use)
- IRRIGATED LAND
- URBAN



LOCATION MAP

LAND USE AND OWNERSHIP MAP

LOWER QUEEN CREEK WATERSHED

MARICOPA & PINAL COUNTIES, ARIZONA
AUGUST 1978

SOURCE OF DATA ARIZONA WATER COMMISSION

APPENDIX F

PROJECT MAP

U.S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

LEGEND

WATERSHED BOUNDARY

INDIAN RESERVATION BOUNDARY

COUNTY LINE

RANGE & TOWNSHIP LINE

PAVED ROAD

CENTRAL ARIZONA PROJECT AQUEDUCT

ROOSEVELT WATER CONSERVATION DISTRICT FLOODWAY

INTERMITTENT STREAM

FLOODWATER RETARDING STRUCTURE

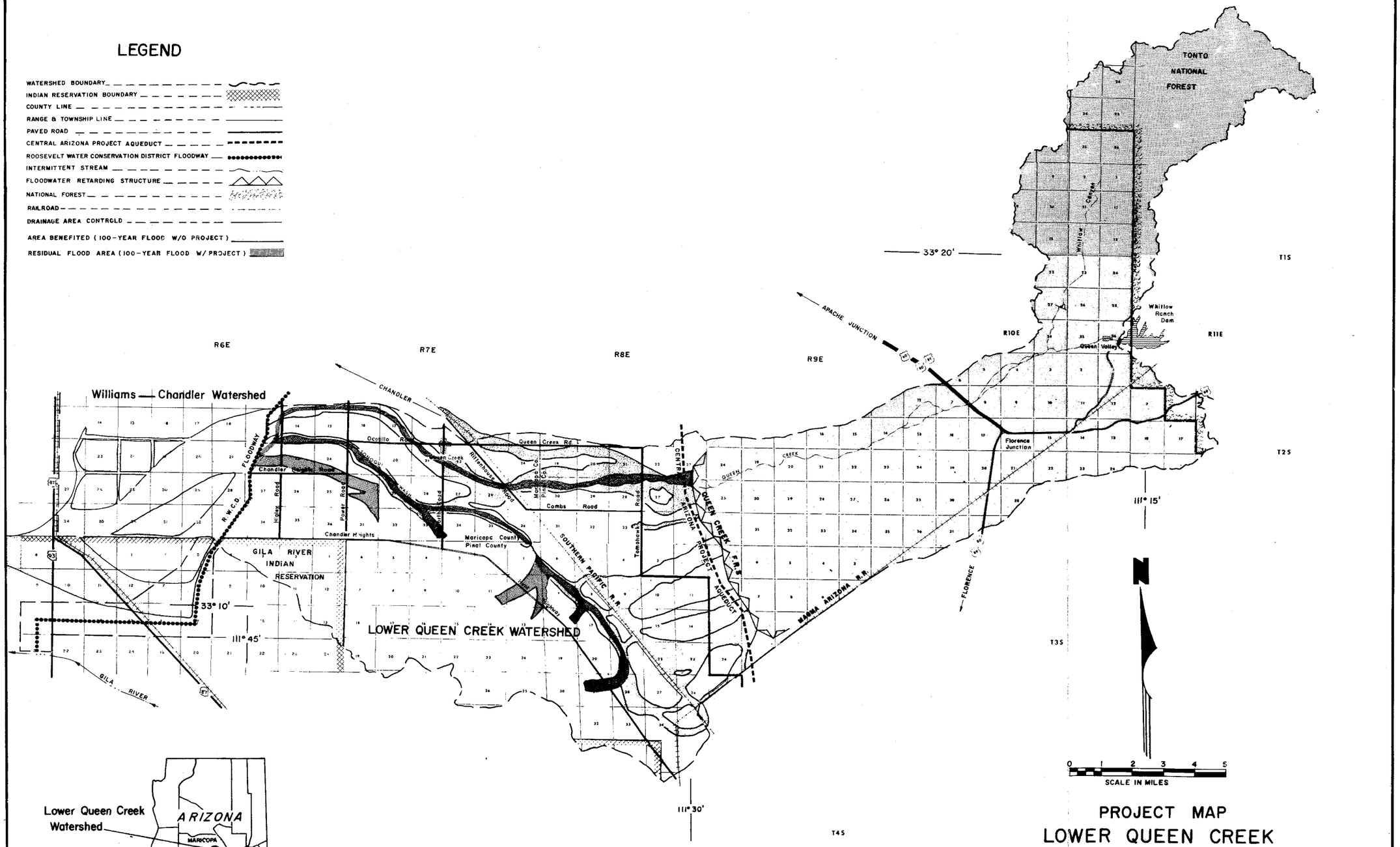
NATIONAL FOREST

RAILROAD

DRAINAGE AREA CONTROLD

AREA BENEFITED (100-YEAR FLOOD W/O PROJECT)

RESIDUAL FLOOD AREA (100-YEAR FLOOD W/ PROJECT)



LOCATION MAP

PROJECT MAP
LOWER QUEEN CREEK WATERSHED

MARICOPA & PINAL COUNTIES, ARIZONA
AUGUST 1978

SOURCE OF DATA: ARIZONA WATER COMMISSION