Data Collection Report
Hohokam Area Drainage Master Study (Phase I)

Contract FCD 2009C029
December 2011

Prepared for:

Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, AZ 85009

and

City of Phoenix
200 W. Washington St.
Phoenix, AZ 85003

Prepared by:

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Stanley Consultants INC.

Contributions by:

JE FULLER HYDROLOGY & GEOMORPHOLOGY, INC.

LOGAN SIMPSON DESIGN INC.

Riada Engineering, Inc.

RG Civil Engineering Services

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1 INTRODUCTION

1.1 PROJECT DESCRIPTION

The Hohokam Area Drainage Master Study/Plan (ADMS/ADMP) is a two-phase regional flood control planning project to determine the nature and magnitude of existing flood hazards; develop and evaluate potential mitigation alternatives; provide preliminary design plans for recommended improvements; and ultimately provide a comprehensive plan to address flooding within the study area and guide future development and flood control improvements.

Phase I is the Hohokam Area Drainage Master Study (ADMS). The Hohokam ADMS is a comprehensive data collection and investigation effort to identify and quantify existing and potential future flood hazards; document archeological, cultural resource, landscape characteristics and recreational resources and opportunities that will serve as the basis to formulate and assess mitigation alternatives. The effort includes development of hydrologic/hydraulic models to simulate flooding conditions; data collection and site investigations; and public outreach to gather essential information on existing flooding conditions and to incorporate the issues, concerns and values of the public into the decision making process. In addition, stakeholder involvement and participation is included to inform stakeholder agencies, to help facilitate the data collection effort and to identify potential opportunities for flood control improvements.

Phase II is the Hohokam Area Drainage Master Plan (ADMP). The Hohokam ADMP will utilize the results of the ADMS to formulate flood control alternatives and through three progressive levels of alternative development and evaluation, make final recommendations for improvements. The ADMP will expand upon the public outreach and involvement efforts and develop concept plans for recommended improvements. These improvements will be prioritized and a strategy for implementation prepared.

1.2 PROJECT LOCATION

The Hohokam study area is located within the corporate limits of the City of Phoenix and the City of Tempe. The study area is approximately 28 sq. miles in size and bounded by the Interstate-10 to the north and the east, the Salt River to the north, South Mountain Park to the south, and the limits of the Laveen ADMS to the west (Figure 1-1).

1.3 PROJECT AUTHORIZATION

The Flood Control District of Maricopa County (District) authorized the performance of the Hohokam ADMS/ADMP under contract FCD 2009C029 on May 18, 2010 with an effective Notice-to-Proceed date of May 12, 2010.

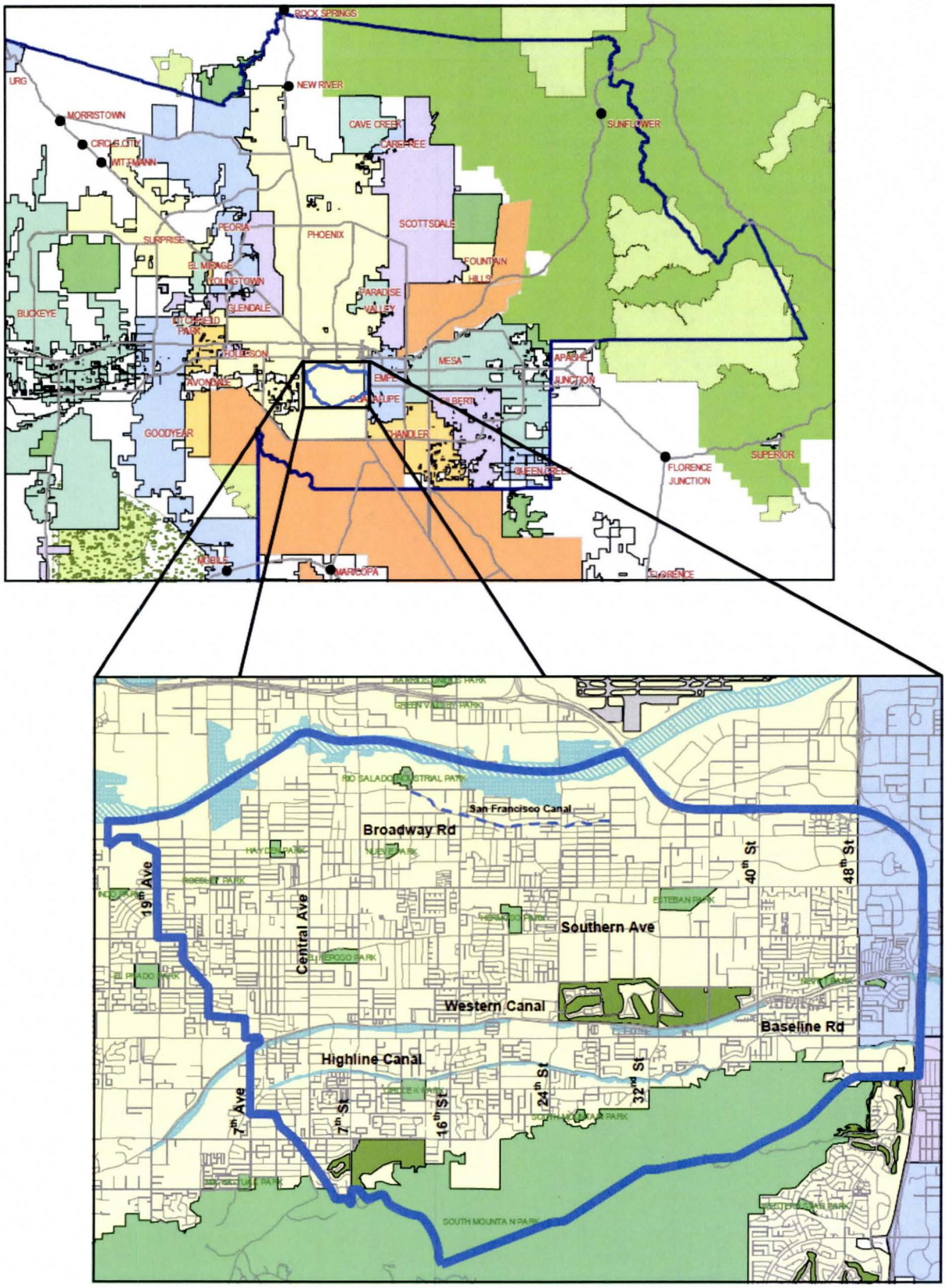


Figure 1-1: Study Area Location and Vicinity Map

1.4 PURPOSE AND SCOPE OF REPORT

The purpose of this report is to document and summarize the data collection effort and present pertinent data collected for the Hohokam ADMS. The data collection effort included obtaining and/or reviewing:

- Topographic mapping, existing and future land use and development plans.
- Transportation and other regional planning studies, documents and plans.
- Hydraulic and hydrologic studies including available development drainage reports
- Flooding complaints provided by the COP and submitted by residents during Public Meetings
- FEMA Studies, FIRM Maps, Letter of Map Amendments (LOMAs), Letter of Map Revisions (LOMRs) and elevation certificates for houses located along the Western and Highline Canals.
- Development of a comprehensive database of City of Phoenix flooding complaints and drainage problems impacting the study. The database includes a qualitative evaluation accomplished through site investigations and interpretation of collected data to assess the severity, frequency and regional nature of the drainage problems.
- AZPDES storm water ordinances and regulations
- District's Landscape Inventory and Analysis data and map coverages for Maricopa County
- Historic flooding photographs available from the District's and COP's library.
- Identification of Historic Districts within the study area.
- Preparation of a Class I Cultural Resource Literature Search to identify known prehistoric and historic cultural resources in the study area.
- Parks, trail, recreation and open space inventory maps.
- Identification of biological resources.

1.5 PROJECT PARTICIPATION

The District and the City of Phoenix (COP) are the primary agencies intimately involved in project activities. The consultant team included staff members from Stanley Consultants Inc. (SCI), JE Fuller Hydrology and Geomorphology (JEF), Logan Simpson Design (LSD), Riada Engineering (RE) and RG Engineering Services (RG).

1.5.1 Study Contacts

In addition to the primary agencies and project team, the following list of study contacts and stakeholders were instrumental in the collection of project data and the conduction of project activities.

City of Phoenix

Engineering Records
200 W Washington, Phoenix, AZ 85003

Neighborhood Services
200 W Washington, Phoenix, AZ 85003
Contact: Ray Buchanan (602) 534-2274

Parks & Recreation
200 W Washington, Phoenix, AZ 85003
Contact: Mike Bornhoeft (602) 262-4925

Street Transportation Department – Floodplain Management
200 W Washington, Phoenix, AZ 85003
Contact: Hasan Mushtaq (602) 262-4026

Street Transportation Department – GIS
200 W Washington, Phoenix, AZ 85003
Contact: Robert Marsh (602) 534-1552

Village Planning – South Mountain
200 W Washington, Phoenix, AZ 85003
Contacts: Joshua Bednarek (602) 262-6823

City of Tempe

Public Works Department - Engineering Division
31 East Fifth St, Tempe AZ 85281
Contact: Donna Sullivan-Hancock (480) 350-8341

Public Work Department – Neighborhood Services Division
31 East Fifth St, Tempe AZ 85281
Contact: Elizabeth Thomas (480) 350-8223

Flood Control District of Maricopa County (District)

GIS Branch
2801 W Durango St Phoenix AZ 85009
Contact: Eric Feldman (602) 506-8736

Hydrology/Hydraulics Branch
2801 W Durango St Phoenix AZ 85009
Contact: Julie Cox (602) 506-8401

Engineering Special Projects Branch
2801 W Durango St Phoenix AZ 85009
Contact: Tom Loomis (602) 506-4767

Maricopa Association of Governments (MAG)

302 N 1st Ave, Phoenix AZ 85003
Contact: Tim Strow (602) 254-6300

Salt River Project

Water Engineering
P.O. Box 52025, Phoenix AZ 85072-2025
Contact: Bob Gooch (602) 236-5227

Northside Water O & M
P.O. Box 52025, Phoenix AZ 85072-2025
Contact: Dave Kieffer (602) 236-4954

Southwest Gas

10851 N Black Canyon Highway, Phoenix AZ 85029-4755
Contact: Greg Cooper (602) 484-5276

Valley Metro/Metro Light Rail

101 N 1st Ave, Suite 1100, Phoenix AZ 85003
Contact: Robert Forest (602) 322-4514

1.5.2 Stakeholders

In addition to assisting in the data collection effort, stakeholders provided input regarding their concerns and shared information on existing, ongoing and future projects in the study area.

City of Phoenix (COP)

The COP has jurisdictional authority over most of the study area including South Mountain Park. In addition to the Street Transportations – Floodplain Management Department, other city departments are considered area stakeholders including neighborhood services, parks & recreation, and planning.

The Street Transportation – Floodplain Management Department provided 32 flooding complaints received by the city dating back to before 2000. In addition, the city provided an Emergency Storm Report for the July 31 to August 1, 2010 storm event. This report identified 19 additional areas in which city personnel were deployed to

address various storm related events ranging from vactoring/cleaning storm sewers/catch basins to debris removal from streets.

Among the COP's concerns are to remove or reduce the floodplains along the Western and Highline Canals. The COP is also interested in determining the capacity and effectiveness of the existing storm drain system and identifying potential storm drain deficiencies.

City of Tempe (COT)

The study area east of 48th St. is located within the COT. The city has provided information on the city's storm drain system and assistance in identifying neighborhood contacts for the purpose of public involvement. The city has no data base that documents flooding complaints within the study area.

Salt River Project (SRP)

SRP operates and maintains both the irrigation facilities as well as the power utilities in the study area. SRP has provided operational information and access on its irrigation facilities. SRP expressed interested in the approaches being used to model their irrigation facilities, primarily the Western and Highline Canals, and have recommended that any hydrologic models consider the canals to be a bank full capacity.

Arizona Department of Transportation (ADOT)

ADOT holds jurisdiction within the ADOT ROW along the I-10 corridor. ADOT expressed no significant concerns with the Hohokam ADMS. ADOT currently is conducting a Design Concept Study and Environmental Impact Study (EIS) for improvements along the I-10 corridor from SR51 to SR202. Concept designs are due in the spring of 2012 and proposed for construction in 2013. Proposed improvements will not have a significant impact on the Hohokam ADMS.

ADOT, the COP and the COT have an intergovernmental agreement (IGA) for flow discharges to the Tempe Drain, the outfall for the 48th St storm drain line and the only outfall that is not to the Salt River. The IGA stipulates the maximum amount of flow each agency can discharge into the Tempe Drain.

Valley Metro

Metro Light Rail will be conducting a feasibility study to extend a Metro Light Rail line into the South Phoenix area in the future. It is not foreseen that the study or any potential feasible alignments will be adequately completed or defined to consider in the Hohokam ADMS/ADMP. The most likely alignment for any extension would likely be along the Central Avenue corridor.

1.6 REGIONAL PLANNING

1.6.1 General Plan – City of Tempe

A portion of the Hohokam project area bounded by 48th St, Baseline Road and the I-10 freeway are located in the City of Tempe and fall under the COT's General Plan for future development. No special redevelopment areas were identified in the Tempe corporate limits.

1.6.2 South Mountain Village - City of Phoenix

The COP has divided the city into 14 planning areas called urban villages in order to work better with the community on planning and development issues. The majority of the Hohokam study area is located within the South Mountain Village. Each village has a planning committee which represents the interests of local residents. The committee is comprised of volunteers appointed by the City Council and their recommendations are advisory in nature. The committees help develop General Plans, review and comment on General Plan amendments, zoning ordinance amendments, rezoning requests and assists the City in developing plans for areas within the village.

1.6.3 Redevelopment Areas

The South Phoenix Village and Target Area B Redevelopment Areas are located within the project area (Figure 1-2). These areas were identified by the City of Phoenix Planning Department as needing revitalization and reinvestment in order to stabilize declining neighborhoods and reverse the spread of urban blight

Redevelopment plans were prepared for each area to guide and implement the needed redevelopment and revitalization activities.

- South Phoenix Village Redevelopment Area Plan, City of Phoenix Planning Department, 2001.
- Community Development Target Area B Redevelopment Plan, City of Phoenix Planning Department, Adopted 1980, Expanded 1998.

1.6.4 Other Area Plans and Planning Areas

Within the South Mountain Village, the COP has identified a number of other targeted planning areas to address the city's planning and development needs. These planning areas include the Esteban Park Area Plan (EPAP, October 2003), Baseline Areas Master Plan (BAMP), Rio Solado Beyond the Banks Area Plan, Rio Solado Interim Overlay (RSIO) Zoning District, Rio Montana Area Plan (May, 2000) and the South Central Corridor Study (May 1993).

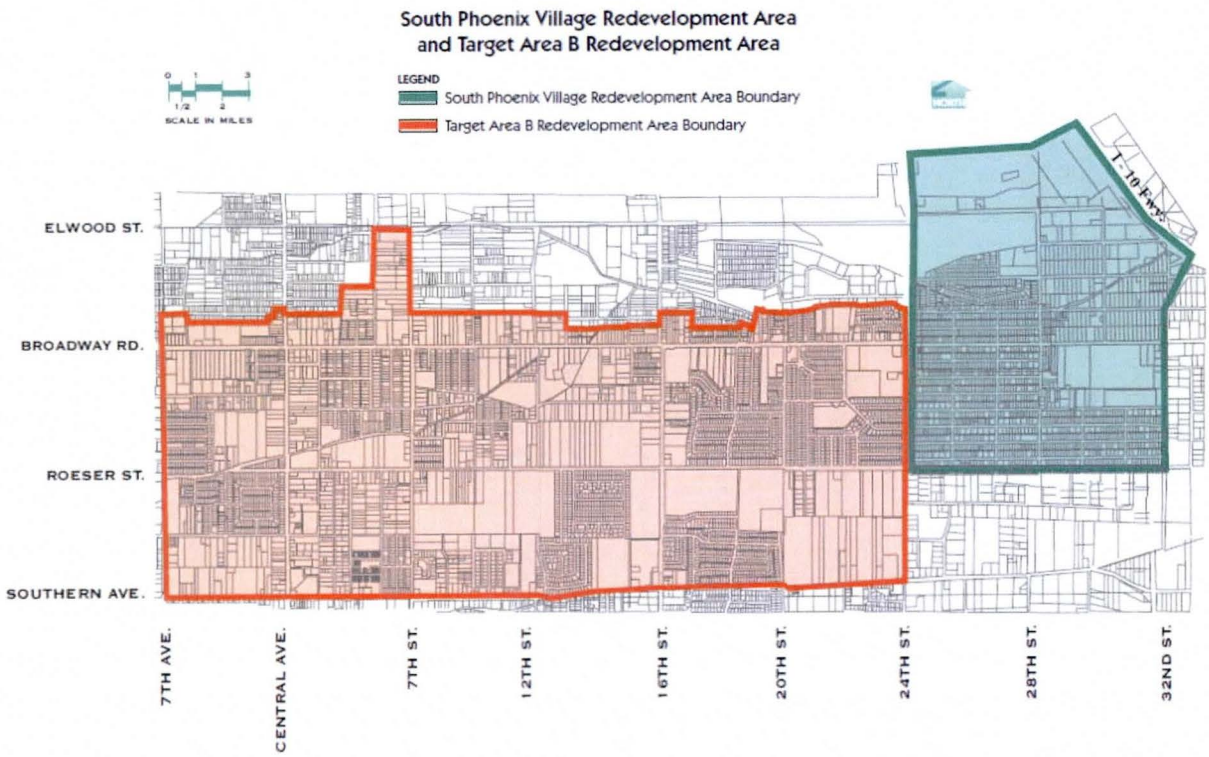


Figure 1-2. Redevelopment Areas

2 STUDY AREA

2.1 INTRODUCTION

The Hohokam ADMS/ADMP study area is located within the corporate limits of the City of Phoenix and the City of Tempe. The study area is approximately 28 sq. miles in size and bounded by the I-10 freeway, the Salt River, South Mountain Park and the eastern limits of the Laveen ADMS (see Appendix A).

2.2 WATERSHED

The study area watershed generally drains to the northwest; from the South Mountains to the Salt River. Possibly due the area's extended history of agriculture and its gradual urban conversion, no continuous natural washes remain to drain the watershed to the Salt River, nor are there any continuous manmade conveyances except as provided by the City's storm drain system. Storm water not captured by the storm drain system, retained in basins or impounded behind canals is carried overland and along surface streets.

The upper portion of the watershed (roughly south of the Western Canal) is more steeply sloped and primarily residential developments. This area is directly impacted by runoff from the South Mountains and some remnant washes still remain to convey flow through developed areas. The lower portion of the watershed (north of the Western Canal) is much flatter and surface drainage is almost exclusively carried overland or along streets.

2.3 TOPOGRAPHIC MAPPING

Project mapping is a composite of multiple mapping sources provided by the District. The Hohokam and New West Hohokam mapping supplemented the Phoenix-Tempe mapping from a previous District project. This mapping is two-foot contour interval (C.I.) on NAVD88 vertical datum and covers the developed portion of the watershed. Countywide 10-ft C.I. (NAVD88) mapping was utilized for the more mountainous areas in the South Mountain Regional Park. Figure 2-1 shows the extents of the mapping sources (see Appendix A).

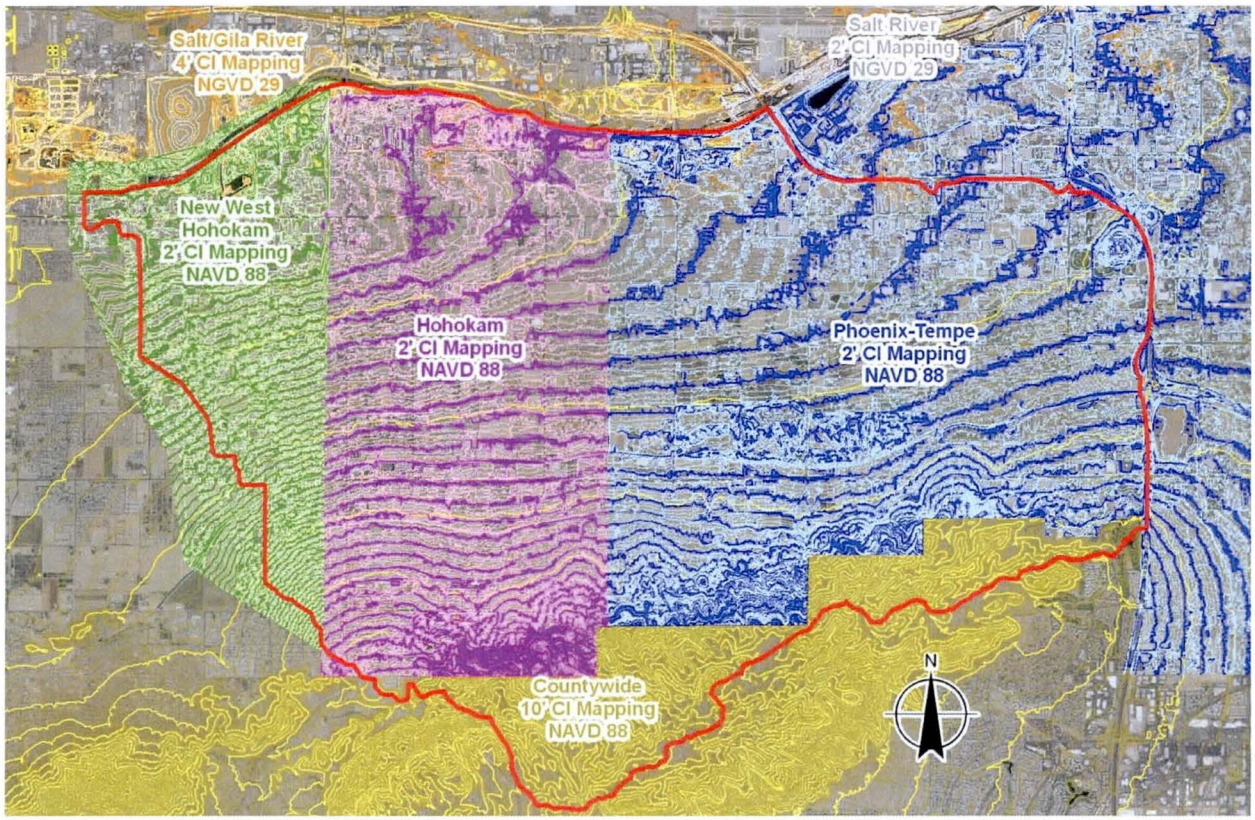


Figure 2-1: Extents of Mapping Sources

2.4 STORM DRAIN SYSTEM

2.4.1 Existing Storm Drain System

With the exception of the 48th St storm drain line which outfalls to the Tempe Drain, all study area storm drain outfall to the Salt River. Storm drain lines extend down all major north-south arterial streets from the Salt River or I-10 upstream to Baseline Road. Laterals extending down many east-west major and minor arterial streets supplement the storm drain systems. With the exception of the 7th Avenue storm drain system, no storm drain system extends south of Baseline Road. (See Appendix A for Storm Drain Exhibit).

As previously mentioned, ADOT, the COP and the COT have an IGA for flow discharges to the Tempe Drain, the outfall for the 48th St storm drain line and the only outfall that is not to the Salt River. The IGA stipulates the maximum amount of flow each agency can discharge into the Tempe Drain.

2.4.2 Future Storm Drain

With the exception of the relatively minor drainage improvements constructed in conjunction with roadway improvement projects, there are no known plans to upgrade or significantly improve the existing storm drain system within the study area.

2.5 CANALS

Among the most significant features in the watershed are the SRP's Western and Highline Irrigation Canals. The canals are roughly parallel to each other, draining from east to west across the study area and disrupting the natural pattern of flow to the northwest from the South Mountains to the Salt River. The canals and some smaller delivery ditches/pipes remain active serving remnant agricultural fields and residential customers. Other small canals and delivery ditches can also be found in the watershed but appear to be inactive.

The Western Canal is a large trapezoidal channel (~40 ft top width) that serves as the primary source of irrigation for the area. The Highline Canal is a smaller (<8ft top width) trapezoidal concrete-lined lateral of the Western Canal that noticeably decreases in size as it progresses downstream to the west until it transitions to an underground irrigation pipe just west of Central Avenue. Located south of Baseline Road, the Highline Canal intercepts and is directly impacted by runoff from the South Mountains.

Storm drains do extend across the Western Canal at major road crossings but no overchutes provide surface drainage across the canals. While the canals may capture and convey some storm water, the Salt River serves as the primary outfall for the storm drain system and study area.

2.6 TRANSPORTATION

2.6.1 Interstate-10 Corridor

ADOT currently is conducting a Design Concept Study and Environmental Impact Study (EIS) for improvements along the I-10 corridor from SR51 to SR202. Concept designs are due in the spring of 2012 and possible construction as early as 2013. Proposed improvements will not have a significant impact on the Hohokam ADMS.

2.6.2 Municipal Roadway Improvements

There are a few roadway improvement projects planned for construction within the study area at this time. Foreseen improvements are generally limited to minor roadway improvements with minimal storm drain upgrades primarily to address the additional roadway drainage due to improvements. The most significant planned roadway

improvement project identified in the study area is the *Avenida Rio Salado/Broadway Rd – 15th Ave to 7th St. Paving & Storm Drain Project.* The project is currently at 30% design and will provide limited roadway improvements including intersection improvements (curb returns), bus bays, right turn and merge lanes, intersection improvements at 15th Ave. catch basins and pipe connections to existing storm drain.

2.6.3 Metro – Light Rail

Metro Light Rail will be conducting a feasibility study to extend a Metro Light Rail line into the South Phoenix area in the future. It is not foreseen that the study or any potential feasible alignments will be adequately completed or defined to consider in the Hohokam ADMS/ADMP. The most likely alignment for any extension would be likely be along the Central Avenue corridor.

2.7 LAND USE AND DEVELOPMENT

2.7.1 Existing Land Uses

In the past, the study area was largely agricultural land irrigated by a system of canals that included the Western and Highline Canals. While a few fields remain, much of the agricultural land has been replaced with residential housing, commercial developments, business centers and industrial areas. Today the study area is mostly urbanized with some undeveloped parcels (no structures) dispersed throughout the study area. An exhibit of existing land use and the COP General Plan are provided in Appendix A.

2.7.1.1 Residential

Residential land uses in the study area are diverse and widely distributed throughout the study area. Recent development has generally focused on areas along Baseline Road and south of the Western Canal. This area tends to consist of more planned subdivision development. North of the Western Canal, the residential housing tends to consist of older single family residential areas, the general exception being development within the Legacy Golf Resort and the Raven Golf Course at South Mountain.

2.7.1.2 Commercial, Industrial and Business

Commercial, industrial, and business properties are generally concentrated along the Salt River and I-10 corridor but can also be found along most major collector roads. Material mining is still active along the Salt River between 19th Ave and 32nd St.

2.7.1.3 Agricultural

While much of the agricultural land has been retired and redeveloped, some agricultural areas remain. The largest area is located south of Southern Road between 24th St and 40th St. and north of the Legacy and Raven Golf Courses. Much of this area remains

agricultural in nature with greenhouses, small produce farms, tree farms and plant nurseries.

2.7.1.4 Parks

There is a number of City of Phoenix parks located in the study area. A list is provided in Table 2-1. The parks that appear to be the most significant for the purposes of this study are futher described in this section.

South Mountain Park/Preserve. The South Mountain Park/Preserve is a Sonoran Desert preserve with hiking, mountain biking and horseback trails, scenic views/lookout points and picnic areas. The park encapsulates the South Mountains which serve as the south boundary of the project area. At 16,000+ acres, South Mountain Park/Preserve is reported as the largest municipal park in the country.

Table 2-1: COP Parks in Study Area

Name	Location
Roseley Park	15th Ave & Atlanta Ave
Momo Mini Park	7th Ave & Roeser Rd
Hayden Park	5th Ave & Broadway Rd
Ho-E-Mini Park	3rd Ave & Illini St
South Mountain Park/Preserve	Main entrance at Central Ave south of Dobbins Rd (south boundary of study area)
El Reposo Park	7th St & Alta Vista Rd
Nueve Park	9th St (south of Broadway Rd)
Rio Solado Park	12th St & Elwood St (Rio Solado Habitat Restoration Project runs along the Salt River–the north boundary of the study area)
Circle K Park	12th St & South Mountain Ave (south of Highline Canal)
Aholi Mini Park	17th St (north of Broadway Rd)
Aya Mini Park	20th St & Broadway Road
Hermoso Park	20th St & Southern Ave
Eototo Mini Park	23rd St & Pueblo Ave
Lenang Mini Park	24th St & Broadway Rd
Francisco Highland Park	28th St & South Mountain Ave (south of Highline Canal)
Esteban Park	32nd St & Roeser Rd
Nevitt Park	46th St (north of Western Canal)
Svob Park	48th St (west of) & Vineyard Rd (south of Western Canal)

Circle K Park. Circle K Park is a multi-purpose park with baseball and soccer fields, tennis and racquetball courts, ramadas/picnic areas and restrooms. The park is located

on South Mountain Ave between 12th St and 14th St. The park is generally located in one of the most significant problem areas.

Francisco Highland Park. The Francisco Highland Park is similar to but smaller than Circle K Park. It has a multi-purpose field, playground area, ramadas/picnic areas and restrooms. The park is located on South Mountain Ave between 27th St and 28th St. The park is located in the general proximity of several drainage complaints.

2.7.1.5 Golf Courses

There are four existing golf courses in the study area. The Legacy Golf Resort and the Raven Golf Course at South Mountain are located just north of the Western Canal between 24th St and 40th St. The Thunderbird Country Club Golf Course is located just south of Dobbins Road between 7th St and 14th St. The Arizona Grand Golf Course is located south of Baseline Road along the Arizona Grand Parkway.

2.7.1.6 South Mountain Community College

The campus of the South Mountain Community College is located just north of the Western Canal between 20th St and 24th St.

2.7.1.7 Tempe Diablo Stadium Complex

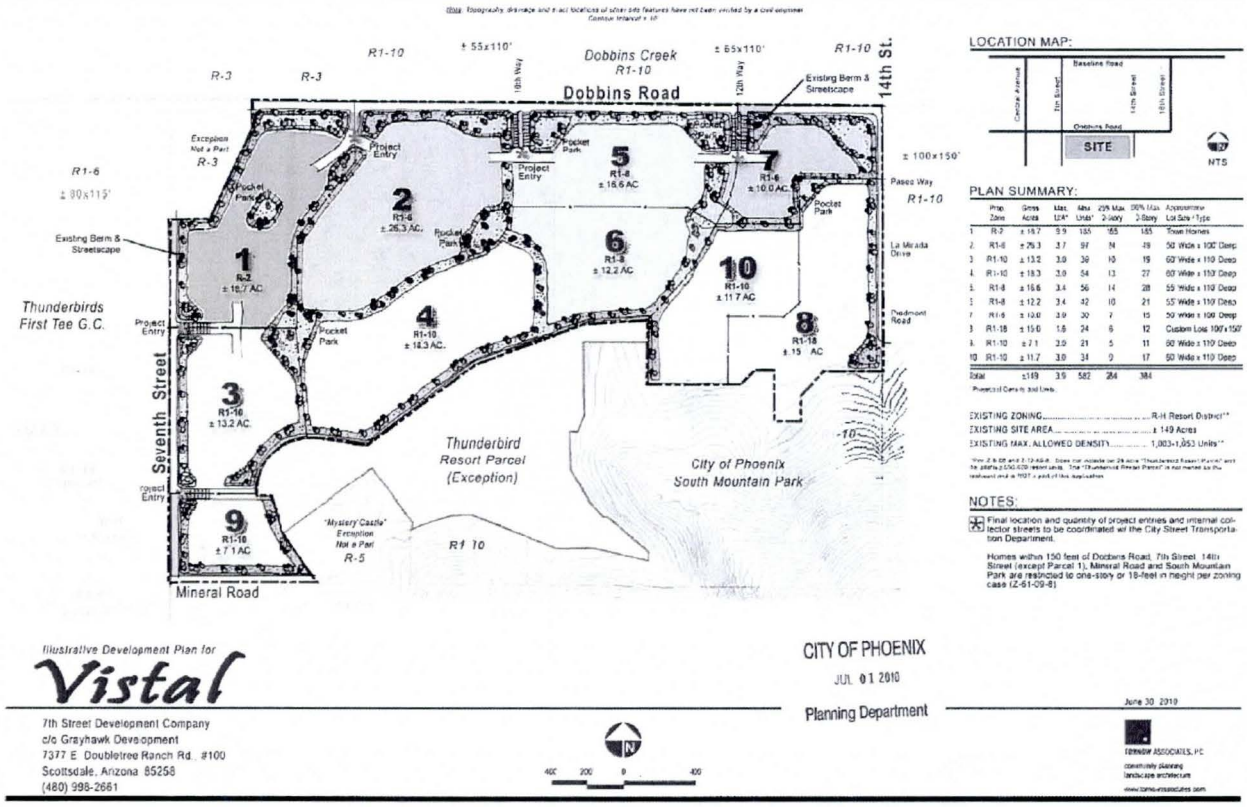
The Tempe Diablo Stadium Complex is located on 48th St and Roeser. The complex primarily serves as the Spring Training Facility for the Anaheim Angels.

2.7.2 Future Land Uses

It is assumed that undeveloped parcels within the study area will be developed in accordance to the COP's General Land Use Plan (Appendix A).

Among the most significant potential future land uses involves the possible redevelopment of the Thunderbird Country Club Golf Course (TCCGC). The TCCGC is strategically located at the base of the South Mountains and providing detention and attenuation of mountain runoff. The 149 acre site has been rezoned from R-H BAOD (Resort, Baseline Area Overlay District) to a Planned Residential Development (PRD) including R-2 (Multiple-Family Residence), R1-6 (Single-Family Residence), R1-8 (Single-Family Residence), R1-10 (Single Family Residence) as conceptually depicted in the illustrative development plan for Vistal (Figure 2-2).

Figure 2-2: Vistal Development Plan for TCC Golf Course



2.8 CULTURAL RESOURCES

2.8.1 Introduction

The preparation of the Hohokam ADMS includes an investigation of the cultural resource within the project area. Logan Simpson Design (LSD) conducted a Class I cultural resources inventory of the study area to identify and evaluate cultural resources that could be affected by the project. Land jurisdiction includes private, City of Tempe, and City of Phoenix-owned land, as well as land under the jurisdiction of the Bureau of Reclamation (Reclamation). The Class I survey study area includes a one-mile buffer around the study area boundary. A small parcel of land under the jurisdiction of the Bureau of Land Management occurs within the 1 mile buffer. This section is a summary of the results of the Class I survey. The complete survey, *A Class I Cultural Resources Inventory Survey of 16, 000 Acres for the Hohokam Area Drainage Master Plan, Phoenix, Maricopa County, Arizona. October 2010 (LSD)* is provided separately.

2.8.2 Cultural History

Southern Arizona has been extensively occupied over the last 11,000 years by various prehistoric archaeological cultures. The Paleoindian culture, a group that hunted now

extinct mega-fauna such as the mastodon, sparsely occupied the area until around 8500 B.C. During the subsequent Archaic period (8500 B.C. – A.D.1), prehistoric people began to utilize the area to a greater extent. The Archaic culture was mobile, relying on seasonally available wild plant and animal resources.

The ceramic period in the Phoenix Basin dates from A.D. 1 to A.D.1450, and is characterized by the Hohokam, known for their canal systems, architecture, and ceramics. The Hohokam culture, collapsed around 1450 afterwards the area was sparsely populated by the Pima and other groups.

The late 1800s saw an influx of nonnative settlement into the Salt River Valley. Settlement of the area was encouraged by a series of national public land laws, such as the National Homestead Act and the Desert Land Act. The majority of homesteads filed in Arizona during this period were along the Salt River and by the 1870s many settlers were cultivating land. President Roosevelt signed the National Reclamation Act of 1902, creating the first national effort to build large-scale irrigation projects, such as the Granite Reef and Roosevelt dams, in the western United States. With government construction of the dams and acquisition of the extensive canal network that would become the Salt River Project (SRP), a more reliable water supply became a reality and quelled many of the prior conflicts. In addition, the electricity provided by the SRP was also instrumental in providing the economic stability for the Phoenix Basin.

2.8.3 Class I Survey Summary

LSD consulted archaeological site files and inventory reports at the Arizona State Historic Preservation Office (SHPO) and the Arizona State Museum (ASM) using AZSITE, the state's electronic cultural resources inventory. Site files at the Pueblo Grande Museum (PGM) were also consulted, as was the City of Phoenix and City of Tempe Historic Preservation Departments to determine boundaries of City-listed historic districts. The National Register Information System database was accessed electronically to gather information about National Register of Historic Places (NRHP)-listed properties in the study area. Historic General Land Office (GLO) maps were also reviewed and road features and canals are depicted on those maps.

The records search indicated that more than 200 surveys have been completed within the study area. Collectively, these surveys encompass 616 acres, or approximately 4 percent of the study area. Ethnic heritage surveys and historic property inventories conducted by the City of Phoenix resulted in the identification of 43 historic buildings and structures within the study area. Twenty-seven buildings are associated with African-American social, political, and cultural history from 1868 to 1970, 13 buildings reflect Hispanic-American cultural contexts from 1870 to 1975, and 3 buildings are associated with the history of Asian-Americans in Phoenix.

One residential district within the study area, the Roosevelt Park Historic District, is listed on the Phoenix Historic Property Register.

Archaeological surveys conducted within the Hohokam study area identified 112 prehistoric and historic cultural resources, including archaeological sites and linear structures (e.g., roads, railroads), and buildings. The 60 prehistoric sites span the length of the Hohokam occupation in the Phoenix Basin; site types range from artifact scatters and petroglyph sites, to agricultural sites associated with canals and field houses, to large village sites with cemeteries. The 26 historic period sites include canals (Roosevelt Canal, Western Canal, San Francisco, Hayden, and North Branch Highline), multiple spurs of the Southern Pacific Railroad (Welton-Phoenix-Eloy and Tempe-West Chandler), and cemeteries, as well as artifact/trash scatters with and without features, and buildings. The inventory also includes 14 multi-component sites that contain both prehistoric and historic components, and 12 sites of unknown affiliation and age.

The majority of previously recorded cultural resources within the Hohokam study area have not been evaluated for their NRHP eligibility. Determinations of NRHP eligibility are made by the appropriate land-managing agency in consultation with the SHPO, and are based on the information and recommendations resulting from inventory surveys or subsequent data recovery investigations. To be eligible for listing in the NRHP, cultural resources must be at least 50 years old and possess integrity of location, design, setting, materials, workmanship, feeling and association. They must also meet one of the following criteria (National Park Service 2002):

- Association with events that have made a significant contribution to the broad patterns of our history (Criterion A);
- Association with the lives of persons significant in our past (Criterion B);
- Embodiment of the distinctive characteristics of a type, period, or method of construction, represent the work of a master, possess high artistic values, or represent a significant and distinguishable entity whose components may lack individual distinction (Criterion C);
- Have yielded, or may be likely to yield, information important in prehistory or history (Criterion D).

Three historic properties are listed in the NRHP including the Niels Peterson House, the Phoenix Carnegie Library and Park, and the Ralph H. Stoughton Estate. Eight other cultural resources within the Hohokam study area have been previously determined eligible for inclusion in the NRHP. Five sites have been previously determined not eligible for inclusion in the NRHP: For the remainder of the identified cultural resources, 4 were recommended for testing to determine NRHP-eligibility, 45 were recommended NRHP-eligible, and 60 are unevaluated or of unknown eligibility.

The completion of Class III surveys is not part of the project scope of work. LSD recommends that Class III cultural resources surveys that meet current ASM and SHPO standards for survey and site recording should be completed for the identified improvement areas prior to future ground-disturbing activities. In areas where new survey is not necessary but previously recorded sites exist, a field visit should be conducted to evaluate each site's current condition and NRHP eligibility and to assess

project impacts to NRHP-eligible cultural resources. Coordination and consultation with Native American Tribes regarding Traditional Cultural Properties is also necessary.

The Western, San Francisco, and Highline are all historic canals under the jurisdiction of the Bureau of Reclamation. Reclamation and SRP have completed Historic American Engineering Record documents for several canals and are developing an interpretive program and historic-context study for the entire canal system. Reclamation, SRP, SHPO, and the Advisory Council on Historic Preservation have agreed on a protocol for treatment of canals when a project has been judged as constituting an "adverse effect", and if a historic canal will be impacted by activities, coordination with Reclamation and SRP will determine the need for interpretive signs pursuant to the stipulations of the PA.

If it is not possible for the drainage improvements to proceed without impact to existing or newly recorded NRHP-eligible cultural resources, these resources should be treated in a manner consistent with the Secretary of the Interior's Guidelines for the Treatment of Historic Properties, applicable Arizona statutes, and City of Tempe and City of Phoenix regulations. Pursuant to City of Phoenix guidelines, archaeological monitoring may also be necessary when construction occurs within 50 ft of a projected prehistoric canal or within 250 ft of a known archaeological site.

3 EXISTING FLOODING DATA

3.1 FEMA FLOODPLAINS

Flood Insurance Rate Maps (FIRMs) for the study area are provided in Appendix B.

3.1.1 Zone AE

Several locations along the Salt River are located in a Zone AE. These locations are limited to material mining operations located along the Salt River. FEMA defines Zone AE as:

> *Zones AE and A1-A30 are the flood insurance rate zones used for the 1-percent-annual-chance floodplains that are determined for the FIS by detailed methods of analysis. In most instances, BFEs derived from the detailed hydraulic analyses are shown at selected intervals in this zone. Mandatory flood insurance purchase requirements apply. AE zones are areas of inundation by the 1-percent-annual-chance flood, including areas with the 2-percent wave runup, elevation less than 3.0 feet above the ground, and areas with wave heights less than 3.0 feet. These areas are subdivided into elevation zones with BFEs assigned. The AE zone will generally extend inland to the limit of the 1-percent-annual-chance Stillwater Flood Level (SWEL).*

3.1.2 Zone A

Zone A areas have been delineated along the upstream sides of the Western and Highline Canals where ponding is expected to occur. FEMA defines Zone A as:

> *Zone A is the flood insurance rate zone used for 1-percent-annual-chance (base flood) floodplains that are determined for the Flood Insurance Study (FIS) by approximate methods of analysis. Because detailed hydraulic analyses are not performed for such areas, no Base Flood Elevations (BFEs) or depths are shown in this zone. Mandatory flood insurance purchase requirements apply.*

3.1.3 Zone X (shaded)

The remainder of the study area is located in Zone X (shaded) with the exception of properties that have submitted Letter of Map Amendments (LOMAs) or Letter of Revision (LOMRs) and received approval. FEMA defines Zone X (shaded) as:

> *Zones B and X (shaded) are areas of 0.2-percent-annual-chance floodplain, areas of 1-percent-annual-chance (base flood) sheet flow*

flooding with average depths of less than 1 foot, areas of base flood stream flooding with a contributing drainage area of less than 1 square mile, or areas protected from the base flood by levees. No BFEs or depths are shown in this zone, and insurance purchase is not required

3.1.4 Special Flood Hazard Zone X (unshaded)

Specific properties that have submitted LOMAs or LOMRs and received approvals for redesignation as Zone X (unshaded). FEMA defines Zone X (unshaded) as:

Zones C and X (unshaded) are flood insurance rate zones used for areas outside the 0.2-percent-annual-chance floodplain. No BFEs or depths are shown in this zone, and insurance purchase is not required.

3.2 DRAINAGE/FLOODING COMPLAINTS

A list of drainage complaints/locations are provided on an exhibit in Appendix D.

3.2.1 Drainage Complaints

The COP provided an initial list of 32 specific flooding complaints dating back to the early 1990's. Of the complaints listed, one is not located in the study area, 20 appear to have been addressed in some manner either by study or local improvements and 11 have not been documented as having been specifically addressed or resolved. Due to the age of some complaints and subsequent changes in the study area such as new developments and street or drainage improvements, it was not always possible to discern the nature of the initial complaint or if the complaint had been fully addressed and resolved. However, all 31 drainage complaints located in the study area were investigated and assessed as to the possible nature and potential cause of the flooding or complaint.

The COT does not have a record of drainage complaints for the study area.

3.2.2 Emergency Storm Report/Storm Related Events

Several significant storm events occurred during the course of the study. From a July 31, 2010 event, the COP provided an "Emergency Storm Report" that listed locations were emergency personnel were deployed to address problems related to storm flooding, identified the nature of the problem and indicated the action taken to address the issue. From that report, an additional 20 "complaints" were identified and investigated. In addition, an additional location was identified by project personnel during field reconnaissance during a January 19, 2010 event and included in the site investigations. This location was not documented in any reports provided by the COP

but was supported in comments received from the public during the public meeting process.

3.2.3 Public Meetings/Neighborhood Meetings

Public Meetings were held to gather and document first-hand information on existing flooding problems. Information received from the meetings generally confirmed known problem areas previously documented in the drainage complaints and/or COP Emergency Storm Report and therefore were not documented separately. However, several residents and HOA members of the Pines at South Mountain development at ~21st St and Baseline attended public meetings to discuss storm related flooding and damage from the July 31, 2010 event. Drainage issues at this location are related to several other previously identified drainage complaints but due to the interest and involvement of the residents, a separate complaint location was noted. Complaints and comments received from the public during the public meetings are provided in Appendix E. At the public meetings, attendees were also asked to fill out a survey on their preference between different flood control approaches and landscape aesthetics.

3.3 SITE INVESTIGATIONS

A total of 53 drainage and flooding complaints/locations within the study area were investigated to determine the possible nature of the drainage problem, the potential cause or source of the problem and whether the issue should be considered a local or a regional drainage/flooding problem. In several instances, multiple related complaints/locations were identified that resulted from a common issue. These complaints were often grouped together and addressed comprehensively.

Site investigations are documented and presented in Appendix D.

3.3.1 Regional Versus Local Drainage Problems

One of the goals of the site investigations is to categorize the nature of the drainage problems as either regional or local. In assessing a problem as either regional or local a number of factors were taken into consideration. Most factors are interrelated and no single factor is used to make an evaluation. A comprehensive assessment of all the factors is necessary in making determination. Some of these factors include:

Drainage Area. The larger the size of the contributing drainage area, the more likely the problem is considered to be regional in nature.

Source of Flood Water. If the contributing drainage area and source of the flood water is very localized, the problem is more likely to be considered local than if the source of floodwater extends into the South Mountains or from a mile away.

Magnitude of Expected Flow Causing Condition. Locations where large flows are noted in the complaint, locations where flow is expected to concentrate or where there is a significant conveyance (a wash or even a street that conveys a lot of flow) are more likely to be considered a regional problem. If a location could be expected to have problems due to even small rainfall events (e.g. due to simply overtopping the adjacent roadway curb), it is more likely to be considered a local problem.

Nature of Complaint. A complaint that is very specific to the property (e.g. low finished floor elevations) is more likely to be considered local than a complaint that effects multiple properties or by nature a regional complaint (e.g. 20th St from Baseline Rd to Dobbins Rd).

Number of Complaints. Areas with multiple complaints are more likely to be considered regional as opposed to an isolated single complaint.

Extent of Problem. Locations where the complaint is very specific to the property or the problem occurs frequently, even for small storm events, are more likely to be considered a local issue.

Severity of Complaint. Locations where residential structures are impacted or conditions present potential safety issues are more likely to be considered significant or regional in nature. Complaints of nuisance ponding or landscaping flooding would be less significant and less likely to be considered regionally significant.

Potential Mitigation Solutions. Is the foreseeable solution to the problem a local in nature (a catch basin adjacent to the property) or would the solution require improvements at a larger more regional scale.

4 EXISTING HYDROLOGY / HYDRAULICS

4.1 INTRODUCTION

There have been a number of hydrologic and hydraulic studies in the project area but with the exception of the *Southeast Phoenix Drainage Study*, none have encompassed the Hohokam Study area and few have been regional in nature. Most studies have been related to the design of roadway improvements or storm drain systems and focus on determining drainage runoff from streets or localized areas to determine spread and to size catch basins and storm drain pipes.

4.2 BACKGROUND

4.2.1 Previous Studies

The most significant previous studies are briefly discussed below. Agency funded drainage studies and projects gathered during the data collection process are summarized in Appendix C. This summary does not include the numerous site development drainage reports, grading & drainage plans or roadway improvements plans also gathered.

Southeast Phoenix Storm Drainage Study (Yost & Gardner Engineers, 1972). This concept study presents conceptual design to size and estimate construction costs for storm drain trunk lines from roughly the Western Canal to the Salt river for 7th St, 16th St. and 24th St. as well as a trunk line for the 30th St Salt River Outfall and the associated laterals down 32nd, 40th and 48th St. This study is the most comprehensive study for the COP storm drain system in the Hohokam Study Area and generally representative of the existing storm drain system layout. Included in the design recommendations are alternative for regional detentions basins located upstream of the Highline Canal. The hydrologic basis for the concept design was the Rational Method.

Drainage Study for 48th St Storm Sewer - Baseline Rd to the Tempe Ditch (Sverdrup & Parcel & Assoc., 1985). This is the design report for the design of storm drain line on 48th St. from the Tempe Ditch to Baseline Road. The pipe sizes and alignments are consistent with the COPs GIS data. TR-20 was used to develop project hydrology.

Storm Drain Report for 40th St - Baseline Road to Southern Avenue (Project Engineering Consultants, 1988). Storm drain design report for roadway improvements project. Provides design of drainage and private irrigation facilities along 40th St. The Rational Method was used to develop project hydrology.

Comprehensive Flood Control Program Report for Maricopa County, Arizona, (District, 1991). This Flood Control Program report provides brief summaries of flood control

general plans, concepts and updates for areas within Maricopa County. Included is a brief section on South Mountain Structures which presents concepts from the "1963 Report" that include a channel paralleling the South Mountain foothills and flood storage reservoirs. One project proposed was a concrete trapezoidal channel parallel to the Highline Canal on the south side from 48th St to the Indian Reservation boundary and then to the Salt River. Not a hydrologic report.

Final Drainage Report; Central Avenue - South Mountain Park to Baseline Road (Parsons Brinckerhoff Quade & Douglas, Inc., 1992). The report is for roadway and storm drain improvements on Central Avenue. Improvements to include 24"-39" storm drain improvements on Central from Piedmont Road just outside of South Mountain Park to just south of the Highline Canal where it would discharge to a proposed detention basin at the SE corner of Highline Canal and Central Ave. The storm drain is designed for the 2-yr storm. The proposed storm drain improvements are not reflected in COPs GIS data but catch basins and manholes were observed in the field as well as a detention basin south of the Highline Canal. The Rational Method was used to develop project hydrology.

Final Drainage Report - 7th Ave Bridge Over Western Canal. (Parsons Transportation Group, 1999). Design report to extend a 66" storm drain south of Baseline on 7th Avenue for 570 ft to just south of the Western Canal bridge. Extension includes catch basin inlets. Connection is to be to a proposed 66" storm drain on Baseline (coming from the west) which is to be a joint COP/District project. The Rational Method was used to develop project hydrology.

Drainage Report for Southern Avenue - 19th Ave to 7th Ave (Entellus, 2001). This report documents storm drain improvements that connect to 36" stub out from the 19th Ave trunk line. The 36" storm drain lateral extended down to short of 7th Ave (storm drain layout/plans not in report). The 36" lateral does not achieve 2-yr design criteria but it is limited in size by the downstream 36" stub out. The Rational Method was used to develop project hydrology.

Storm Drain Report - Baseline Road 16th St to 24th St. (Dibble & Assoc., 2002). Storm drain design report for future widening of Baseline Rd. Drainage improvements include inlets and storm drain to tie into 16th St and 24th St trunk lines for a 2-yr storm drain design. Drainage improvements/trunk lines at the connection are less than 36" in size and not within the current scope of Hohokam ADMS. The Rational Method was used to develop project hydrology.

Final Drainage Report - Baseline Road 32nd St to 40th St (Primatech, 2002). A drainage design report for the widening of Baseline Rd from 4 to 6 lanes. Drainage improvements include inlets and storm drain to tie into 32nd St trunk line for a 2-yr storm drain design. Drainage improvements/trunk lines at connection are less than 36" in size and not within the current scope of Hohokam ADMS. The Rational Method was used to develop project hydrology.

Design Plans - Baseline Road - 51st Ave to 7th Ave (URS Greiner Woodward Clyde, 2000). These design plans include construction of a storm drain line down Baseline Road. The project is generally outside the study are but does confirm a 66" diameter storm drain line turning south down 7th Ave from Baseline Road. (see Final Drainage Report 7th Ave Bridge Over Western Canal). The Rational Method was used to develop project hydrology.

4.2.2 Site Development Drainage Reports

Site development drainage reports and plans were also gathered from the COP during the data collection process. This information was used to help clarify the drainage design and facilities in specific areas of interest. These reports are too numerous to list and summarize, however, PDFs of the collected development drainage reports are include in the Data Collection Report CD/DVD provided with this report.

4.3 EXISTING HYDROLOGY/ HYDRAULIC MODELS

No regional hydrology model has been developed for the project area. Most studies have been related to the design of roadway improvements or storm drain systems and focus on determining drainage runoff from streets or localized areas to determine spread and to size catch basins and storm drain pipes. Consequently, the Rational Method was generally applied to develop project hydrology. Even the Southeast Phoenix Drainage Study utilized the Rational Method.

No hydraulic models for storm drain or other conveyances are available n the project area. Most storm drain analyses are limited to an analysis of the facilities being designed and based on tabular hand calculations.

5 CONTEXT SENSITIVE FLOOD HAZARD MITIGATION

5.1 INTRODUCTION

The Context Sensitive Flood Hazard Mitigation (CSFHM) Planning and Design Approach serves as a framework for the development of FHM solutions that integrate the three required basic functions of being **Acceptable** to local communities, **Compatible** with landscape resources and **Effective** in reducing flooding hazards (**ACE**). The CSFHM Approach provides water resource and design professionals with an innovative tool for consistently delivering multi-objective results.

A context sensitive solution is one that integrates and delivers all three basic functional outputs of being acceptable, compatible and effective. It should be recognized that achievement of only one or two of these functional outputs, does not constitute a context sensitive solution. Conversely, it should also be recognized that in real world application of the CSFHM Approach, the degree to which context sensitive solutions will be produced will depend upon the complexities, opportunities and constraints that are presented by the project. A solution that meets two of the three functions may be determined to be the solution that best meets the District's wider mission and goals. Nevertheless, performance of the required basic functions contained in the ACE challenge is a critically important initial intent.

The CSFHM model focuses on the interrelationship between three contexts: Flooding, Land and Resource, and the Community (Figure 5-1). The Flooding Context is defined through an analysis of risk and exposure to flooding. The Land and Resource Context is defined through the analysis of valued characteristics of landscape resources. The Community Context is defined through the analysis of direction and vision provided in local community plans and public sensing.

The range of acceptable, compatible and effective FHM solutions is identified in the analysis step of the CSFHM planning and design process. This is accomplished by undertaking a predictive analysis of the range of possible FHM solutions (Figure 5-2). By using the information contained in the inventories of the flooding, land and resource, and community contexts a series of matrices is completed that identify ratings as to whether or not each FHM solution is acceptable, compatible or effective. The information from the matrices and the inventory is then utilized in GIS to produce flood hazard mitigation acceptability, compatibility and effectiveness maps for the project study area.

The following sections briefly describe the inventory and analysis of the three ACE components for the Hohokam Area Drainage Master Study and present the resulting context sensitive solutions. A more detailed description of the CSFHM process is provided in Appendix H and all maps developed in the analysis for each ACE component are provided Appendix H.

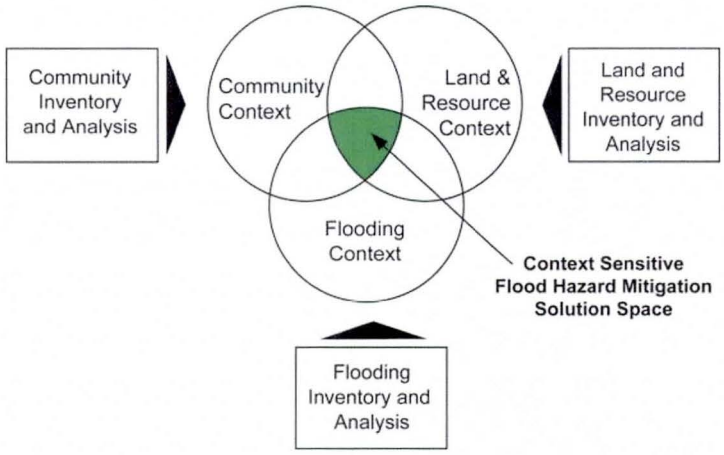


Figure 5-1: Context Sensitive Flood Hazard Mitigation Planning & Design Model

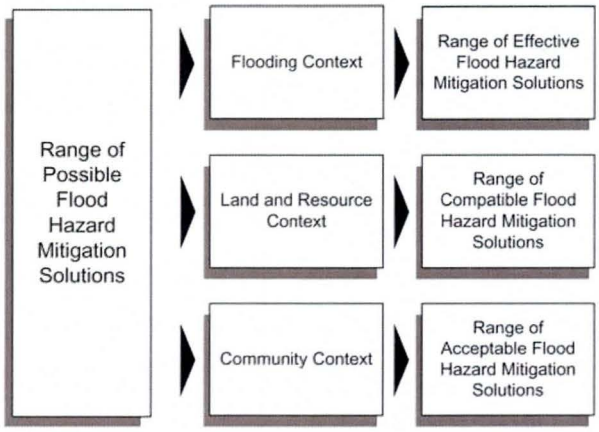


Figure 5-2: Predictive Analysis Process

5.2 LAND AND RESOURCE CONTEXT

The land and resource context is one element of the District's Context Sensitive Flood Hazard Mitigation approach to project planning and design and is derived from the existing landscape character and cultural settings in the project area. The District developed the Landscape Inventory and Analysis (LIA) for the Hohokam ADMS/P study area from the County-wide LIA. The landscape inventory includes assessments of existing and planned future landscape character, existing parks and recreation resources and existing open space resources within the regional and local context of the Hohokam ADMS/P study area. The Hohokam LIA is summarized below and the complete LIA is in Appendix G.

5.2.1 Purpose of the Project LIA

The purpose of the project LIA is to provide: 1) a basic understanding of the land and resource context of the project study area; 2) an analysis of the compatibility of the

range of possible flood hazard mitigation solutions with the inventoried landscape resources; and 3) guidelines and recommendations for development of context sensitive flood hazard mitigation alternatives. The project LIA is intended to serve as a framework and the starting point for any additional inventories and analyses of the land and resource context that may be required as a part of the ADMP.

5.2.2 Scope of the Project LIA

The District provided project LIA contains inventory and analysis maps from the District's Landscape Inventory and Analysis for Maricopa County that have been clipped to the boundary of the project study area. Mapped information is provided at two scales: the regional scale and the local project scale. Local project scale maps are provided in this summary and encompass the project study area boundary.

5.2.3 Project Goals and Objectives for the Land & Resource Context

District goals and objectives for development of context sensitive flood hazard mitigation solutions for District planning studies and project designs are outlined in the document titled: *Flood Control District Land & Resource Goals & Objectives for Planning Studies and Project Design*, District, November 13, 2008.

5.2.4 Regional Context

The purpose of the regional scale landscape inventory is to identify landscape resources of regional significance that are situated within the project study area and its regional context.

5.2.4.1 Scenery Resources

The project study area is situated entirely within the Sonoran Desert Landscape Character Type. All three of the landscape character subtypes of the Sonoran Desert Character Type, the Sonoran Riverlands, Sonoran Mountain Lands, and Sonoran Valley Lands are represented within the project study area. Regionally significant scenery resources situated within the region of the project study area include the Gila River and Estrella Mountains located to the west, the Papago Mountains, Camelback Mountain and Phoenix Mountains to the North of the project study area.

5.2.4.2 Open Space & Recreation Resources

Regionally significant open space and recreation resources situated within the project study area include the South Mountain Regional Park. Segments of the Maricopa County Regional Trail are located along the Salt River and the Summit of South Mountain. Significant open space resources situated within the regional context of the project study area include the remainder of the South Mountain City Regional Park extending westerly from the project study area, the Sierra Estrella County Regional Park located further West and Papago Mountain city regional park, Camelback Mountain city

regional park, and the Phoenix Mountains preserve located to the North of the project study area.

5.2.5 Local Project Area Context

5.2.5.1 Landscape Character Physical Settings

Physical settings represent subdivisions of the Landscape Character Sub-Types that display similar visual and physical characteristics. The project area contains the Valley Plains and Valley Washes physical settings within the Sonoran Valley Lands sub-type and the Mountains and Foothills or Bajada physical settings within the Sonoran Mountain Lands sub-type. Within the Sonoran River Lands subtype, the project area contains the River Terrace and the River Channel physical settings.

5.2.5.2 Landscape Character Cultural Settings

The project area is mostly developed with typical urban and suburban land uses. Natural settings comprise approximately one-quarter of the study area and rural and industrial settings are limited to smaller areas. As development continues in the project area the Urban and Suburban settings are expected to increase while the natural and rural settings will decrease. Industrial settings will remain generally similar to their current area.

5.2.5.3 Landscape Character Units

Landscape Character Units are the product of combining the physical and cultural landscape character settings. The combination of these settings provides an overall view of the expected visual character of the project area by showing the distribution of the various land use or cultural resource within each of the physical settings. Details on the percentages of the distribution and the change from existing to future conditions are provided in Appendix G.

5.2.5.4 Parks, Recreation and Open Space Resources

In addition to the previously mentioned South Mountain City Regional Park and the Maricopa County Regional Trail Segments, ten (10) city parks are situated within the Project study area. These include: Circle K, El Reposo, Esteban, Hayden, Hermoso, Nevitt, Nueve, Roesley, SVOB and Rio Salado Industrial Park. Four golf courses are also situated within the project study area. They include: Thunderbirds, The Raven, The Legacy and Phantom Horse.

The South Mountain City Regional Park represents the major open space resources within the project study area. The existing local city parks, noted above, and existing golf courses represent additional open space resources within the study area. The floodway and floodplain fringe of the Salt River, that is expected to remain natural, represents the only other potential future natural open space resources within the

project study area. The floodplain zones of the Western and Highline Canals which pass through areas that are predominantly suburban valley plain represent the only other potential open space within the project study area.

5.2.6 Landscape Analysis

The following is a summary of the compatibility of the preliminary range of possible structure types, structural methods and landscape design themes with the combined landscape resources (scenery, recreation and open space) of the Hohokam ADMS/P study area. The compatibility of structure types, structural methods and landscape themes in the land and resource context are shown in the LIA in Appendix H.

5.2.6.1 Structure Types Compatibility – Combined Resources

Natural structure types (Natural Resource Preservation Strategy) are the only flood hazard mitigation structure types that are compatible within the floodway and flood fringe of the Salt River as well as the slopes of South Mountain (Figure 5-3). The valley plain landscape unit is classified as compatibility Class 6 and is compatible with natural structures, underground facilities, channel levees, conveyance channels, storage basins and dams at various scales. The remainder of the study area is classified as compatibility class 5 and is compatible with all of the aforementioned structure types at various scales, except for Dam structures.

Structure types compatibility based upon planned future conditions remains essentially the same as for existing conditions.

5.2.6.2 Structural Methods Compatibility – Combined Resources

Natural is the only structural method that is compatible within the floodways, flood fringe areas and the slopes of South Mountain (Figure 5-4). The Semi-Soft, Soft and Natural Methods are compatible for a majority of the suburban valley plains, while the Hard Structural Method is additionally compatible within urban valley plain landscapes. All of the structural methods are compatible within the industrial valley plain landscape units.

Structural methods compatibility based upon planned future conditions remains essentially the same as for existing conditions.

5.2.6.3 Landscape Design Theme Compatibility

The Natural Desert Uplands and Uplands Riparian landscape design themes will be compatible within the Mountain Lands Subtype of South Mountain (Figure 5-5). Natural Lower Sonoran Desert Riparian and Hydro-riparian landscape design themes will be compatible within the River Lands Subtype along the Salt River. Within the developed parts of the project study area, culturally influenced landscape design themes including the Semi-natural Desert, Enhanced Desert, Desert Park, Oasis and plaza themes will be compatible.

5.2.7 Recommendations

- Conduct further landscape inventories and analyses as required in the project scope of work
- Maximize opportunities for preserving the remaining natural resources of the project study area as a part of the development of project alternatives
- The District is a sponsor of the Maricopa County Regional Trail. In accordance with the regional trail master plan, maximize opportunities for implementation of segments of the Maricopa Regional Trail within District flood control projects
- Protect and enhance all existing parks and recreation resources within the project study area.
- Develop a minimum of one alternative that is designed to be context sensitive to the maximum degree possible (i.e. one that is acceptable to the local community, compatible with the environment and effective in reducing the risks of flooding).

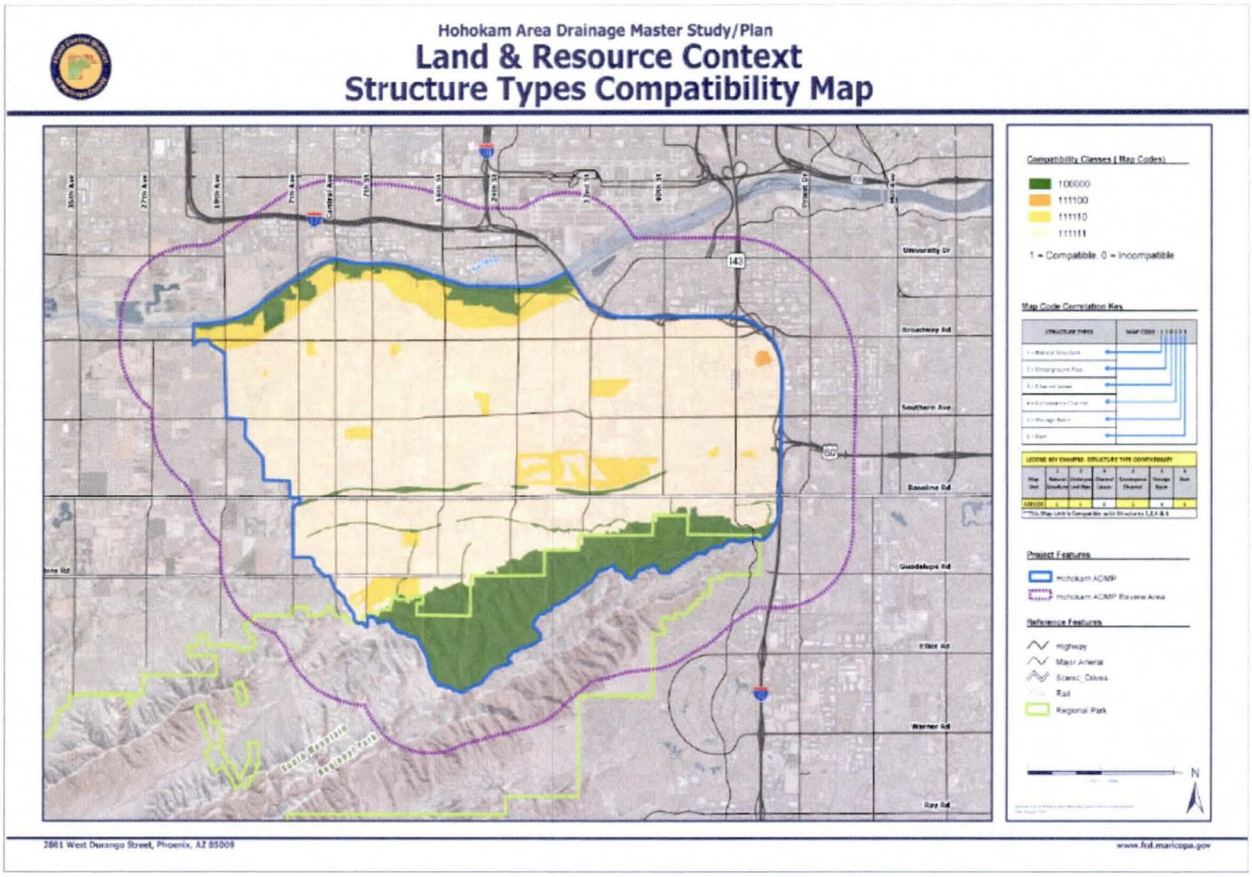


Figure 5-3: Future Combined Structure Types Compatibility

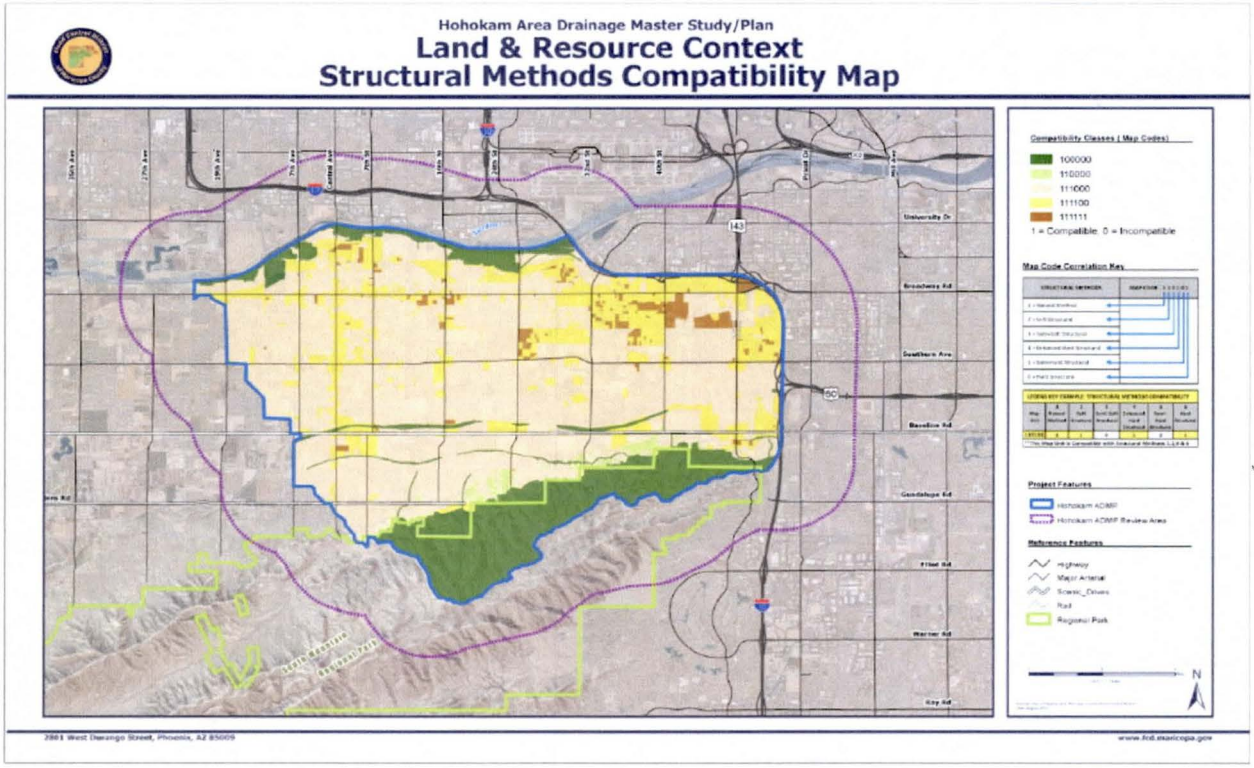


Figure 5-4: Future Combined Structural Methods Compatibility

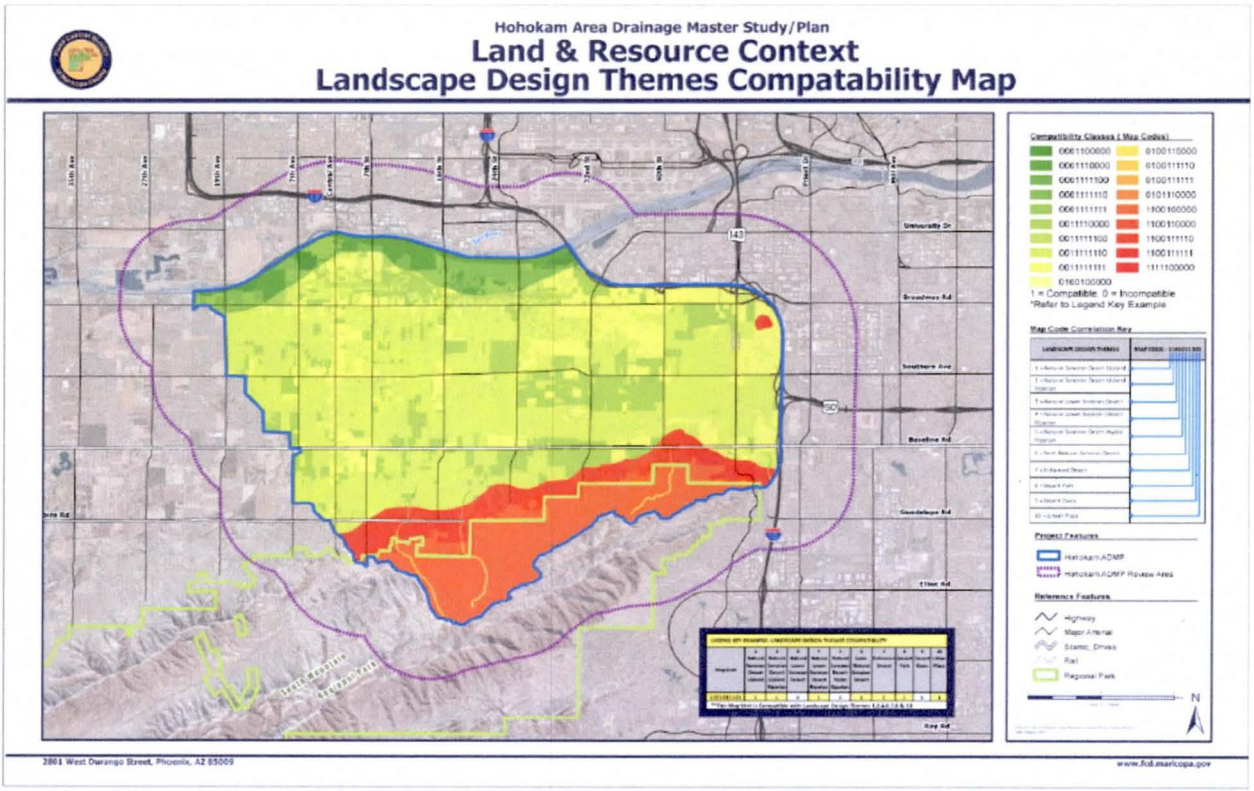


Figure 5-5: Future Combined Landscape Theme Compatibility

5.3 COMMUNITY CONTEXT

The community context element of CSFHM considers the value the communities in the study area place on the scenery and recreation resources in the context of being acceptable to how they envision the community as place to live and work. The primary sources of information on how the various areas communities and areas within the study area see their future development are the general plans and specific areas plans developed with public input that guide future growth.

For the Hohokam ADMS a report that summarizes the relevant planning documents that guide the future planning and development of Phoenix and Tempe within the study area was prepared as part of the data collection process. This section is an overview of the results of the plan review. Additional information on policies and recommendations are contained in the report in Appendix F. The goals deemed pertinent to the potential acceptability of the District's flood hazard mitigation planning efforts are provided as included in the plans.

5.3.1 City of Phoenix

The following plans developed by the City of Phoenix cover the Hohokam ADMS/P planning area (Figure 5-6).

- Phoenix General Plan 2002
  - Open Space Element
  - Recreation Element
  - Neighborhood Element
- Baseline Area Master Plan (1996)
- Target Area B Redevelopment Plan (1998)
- Rio Salado Beyond the banks Area Plan (2003)
- Rio Montana Area Plan (2000)
- South Central Avenue Corridor Study (1993)

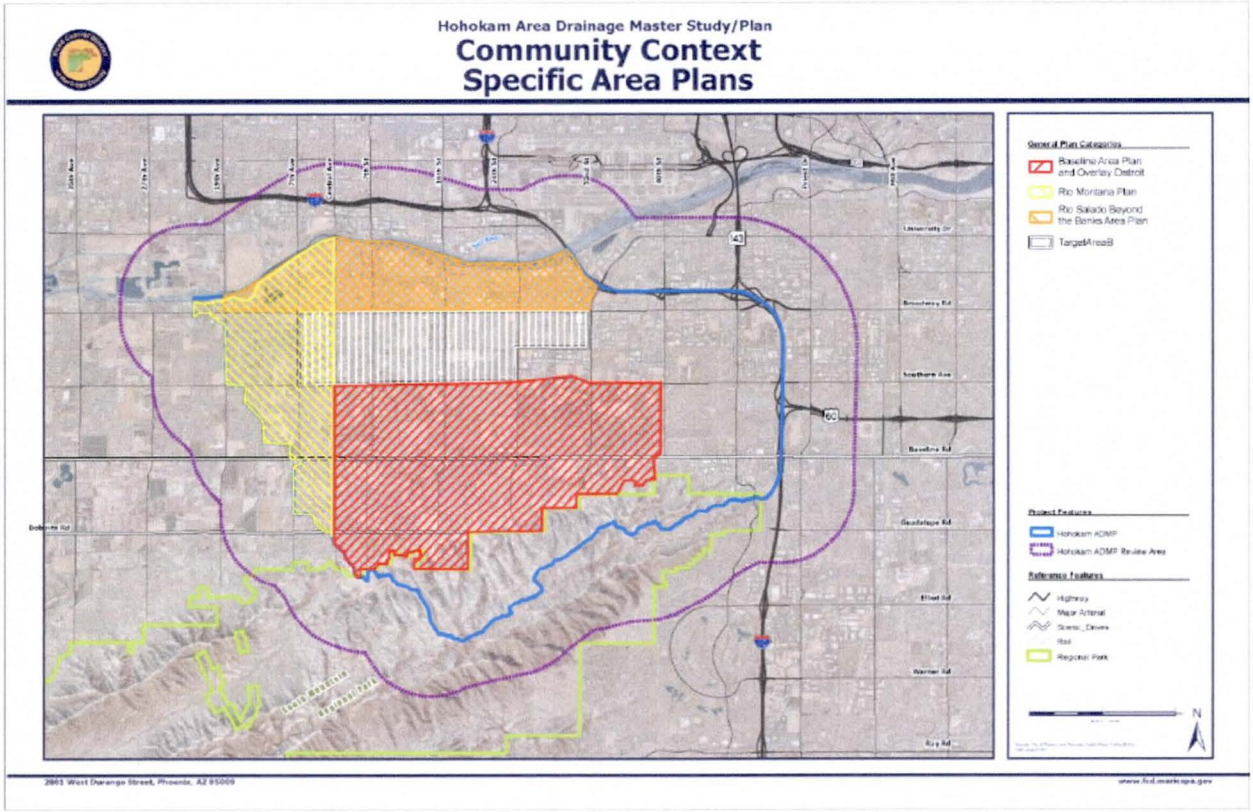


Figure 5-6: Community Context - Specific Area Plans

5.3.1.1 General Plan – Open Space Element

The City of Phoenix has a long History in the preservation of Natural Open Space and currently manages more than 29,000 acres of mountain preserves and desert parks. The Salt River runs for 24 miles through Phoenix and as the northern boundary of the study area is a key element of the City's open space planning. In addition to its planned active parks and recreation areas the City is committed to working with other agencies and landowners to achieve the planned goals of providing natural open space for its residents.

Goal 1: Open Spaces – *Unique or significant natural open spaces should be preserved and protected.*

Goal 2: Linear Open Space *– Linear systems of open space such as canals, washes, drainage corridors and rivers should contribute to a continuous non-motorized trail system that serves as an alternative transportation system, provides a positive recreational experience and forms a neighborhood amenity.*

5.3.1.2 General Plan – Recreation Element

The Recreation Element of the General plan identifies the specific components of the City's park and recreation system and lays out the goals and objectives to meet the resident's recreation needs. The general purpose of the plans components are provided below.

Parks System: provide a parks and recreation system that meets the needs of the resident and visitor population and is convenient, accessible and diverse in programs, locations and facilities.

Parks and preserve interface: develop design guidelines for private development adjacent to preserves, washes and open space to promote visibility and access to all park facilities.

Trails and pathways: link multi-purpose trails from parks to major open spaces and village cores.

The parks system consists of a variety of park types to provide a range of recreation opportunities both close to neighborhoods and on a regional basis. The following is a general description of the levels of parks and associated facilities that the City identifies in its parks recreation planning.

Urban Parks. These are special parks that are small, pedestrian-oriented and feature green open spaces in the midst of the more densely-developed urban areas. Serve the distinct purpose of providing, for daytime use and pedestrian respite, small areas that beautify the streetscapes of buildings and concrete with trees, plants, seating and art.

Neighborhood Parks. Parks that are within walking or bicycling distance of residences and typically 15 acres in size and are designed to serve an area within a radius of one-half mile. Most neighborhood parks include children's playground and picnic areas, open play turf areas, parking, lighted volleyball and basketball courts, and restroom facilities.

Community Parks. These parks are typically 40 acres or larger and serve an area of one and one-half miles. They have active recreation improvements to support organized team sports, leagues, and may have large-activity facilities. Existing community parks include lighted basketball, volleyball, soccer and softball facilities; playgrounds; picnic areas, restroom facilities, and turf areas that are unprogrammed open spaces, which can be used for a variety of activities and events.

District Parks. District Parks draw from several communities and are generally 200 acres or larger. They provide for active and passive recreation and may include specialized activities such as a golf course, festival area, or an amphitheater. They are usually located on arterial streets, or in areas where the size and function will have minimum impact, i.e., commercial or industrial areas. District Parks can also serve the

immediate local communities as neighborhood parks or community parks and may contain playgrounds and picnic areas, lighted basketball and volleyball courts, lighted racquetball courts, lighted softball and soccer facilities, restroom facilities, lighted tennis courts, and picnic ramadas.

Goal 2: Preserve Interface *– The interface of private development, parks and natural areas is critical to the natural function and public enjoyment of these areas.*

Goal 3: Trails and Pathways *- A functional network of shared urban trails that are accessible, convenient, and connected to parks, major open spaces, and village cores should be developed throughout the city. The trails should connect with future regional trail systems wherever possible.*

5.3.1.3 General Plan–Natural Resources Conservation Element

Goal 1: Flooding Protection – *The threat of flooding for people, property and the natural environment should be minimized.*

Goal 2: Erosion Protection – *Grading and erosion control practices, sediment control practices and waterway crossings should eliminate or reduce potential on site or downslope erosion.*

Goal 3: Vegetation Protection – *Vegetation should be protected and conserved as a means of preserving the diverse character of local plan communities.*

Goal 4: Wildlife Protection – *Large intact patches of native vegetation should be maintained to protect wildlife habitat.*

5.3.2 Baseline Area Master Plan

The Baseline Area Master Plan focuses on the corridor of Baseline road, extending approximately one mile to the north and south of the road (Figure 5-6). The primary purpose of the plan is to "preserve and build on the special rural character of the Baseline area." The design elements that may be applicable to the Hohokam ADMS/P include the provision of wide setbacks along Baseline Road to accommodate multi-use paths and additional landscape space along the arterial roadway. The landscape would include citrus trees to maintain the agricultural character of the area. Multi-use paths would have stabilized decomposed granite surfaces reinforce the rural character.

5.3.3 Target Area B Redevelopment Plan

This plan focuses on the redevelopment of a key area of the South Mountain Village and emphasizes the removal of substandard structures and blight (Figure 9X). There are no specific goals or objectives related to aesthetics except to create a sense of community and neighborhood character in the redevelopment area.

5.3.4 Rio Salado Beyond the Banks Area Plan

The vision of the Beyond the Banks is a revitalized area that is now realizing its potential and one of its key features is that it "connects to the restored Rio Salado as an attractive recreational and environmental amenity." There are no specific Goals or objectives related to aesthetics but there two objectives related to recreation that should be considered in the development of the ADMS/P.

- Objective B: Create attractive spaces for public enjoyment that extend and enhance the natural setting provided by the Rio Salado Habitat Restoration Project.
- Objective D: Utilize the North Branch San Francisco Canal as a linear recreation, non-motorized transportation corridor.

5.3.5 Rio Montana Area Plan

The Rio Montana Plan covers the western end of the study area and acknowledges that the area has a strong agricultural heritage as well as natural desert areas (Figure 5-6). In its vision statement the Rio Montana plan…"strives to be a community that maintains and enhances its current quality of life by:

- Preserving rural character
- Preserving natural desert areas through the development of transition zones that protect desert and open space
- Encouraging pedestrian and equestrian activity through a network of trails"

Goal 4 of the plan indicates that Rio Montana is an area that reflects and protects rural character, the Sonoran Desert and the riparian potential of the Rio Salado Habitat Restoration Project. The design section identifies three primary character area types Agriculture, Sonoran Desert and Mercado. General design approaches for each areas are provided including architectural and site planning and design approaches such as architectural elements, preserving washes and native vegetation and use of paving materials and building details that seek to preserve and enhance the existing character of those areas.

5.3.6 South Central Avenue Corridor Study

The primary focus of the South Central Avenue Corridor Study was a market analysis rather than a land use plan and the plan identified strategies to address specific economic market issues rather than identifying goals and objectives that would guide land use decisions. Design strategies focus on the rehabilitation of existing buildings and upgrading the quality of the retail experience in the planning area.

5.3.7 City of Tempe

Future land use patterns for the portion of the study area in Tempe are described in the Tempe General Plan 2030. The future land use indicated in the plan includes primarily industrial, commercial and open space north of Southern Avenue and residential and associated commercial south of Southern Avenue. The area contains the Double Buttes Cemetery which is of historical significance and Tempe Diablo Stadium, the spring training facility for the California Angels.

The ADMS/P area is not within a special planning area in Tempe and the Open Space Element indicates a general goal of preserving a variety of natural, landscaped and hardscaped open spaces to meet the needs of the community. The recreation element's goal is... " to provide social, recreational and economic benefits to the community by promoting physical fitness through passive and active recreational areas and programs serving a diverse range of abilities and interests."

No specific aesthetic goals and objectives were identified for the Hohokam ADMS area and continued coordination with City of the Tempe in the development of drainage and flood hazard mitigation solutions should assure consistency with the City's vision of the landscape character for this area of the city.

5.3.8 Results of Community Context Analysis

To determine the range of acceptable FHM solutions the planning team participated in a workshop to review the available character and aesthetic elements of the plans and identify the acceptability of the Structure Types, Structural Methods, and Landscape Themes within each specific planning area. Using GIS the District compiled the workshop information into datasets that combined the acceptability of each component for all of the planning areas into a single map for each component. The results of the analysis showing the range of acceptable FHM solutions for the Hohokam planning area are shown in Figure 5-7, Figure 5-8, and Figure 5-9.

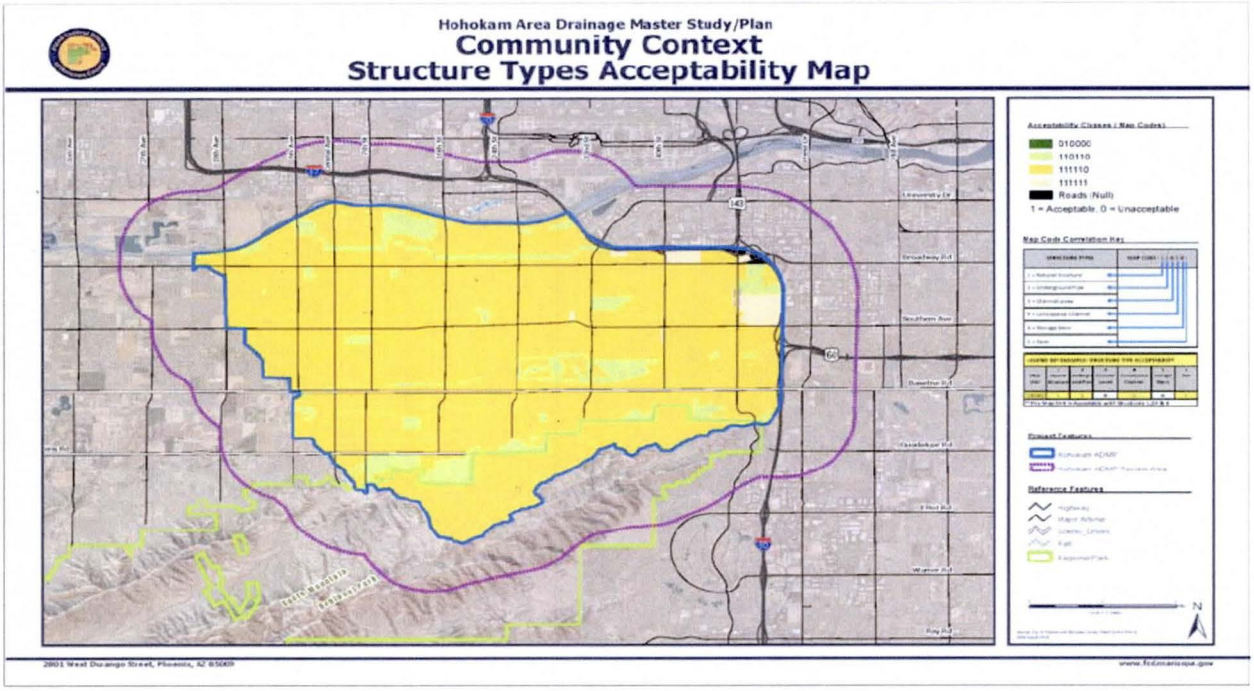


Figure 5-7: Structure Types Acceptability

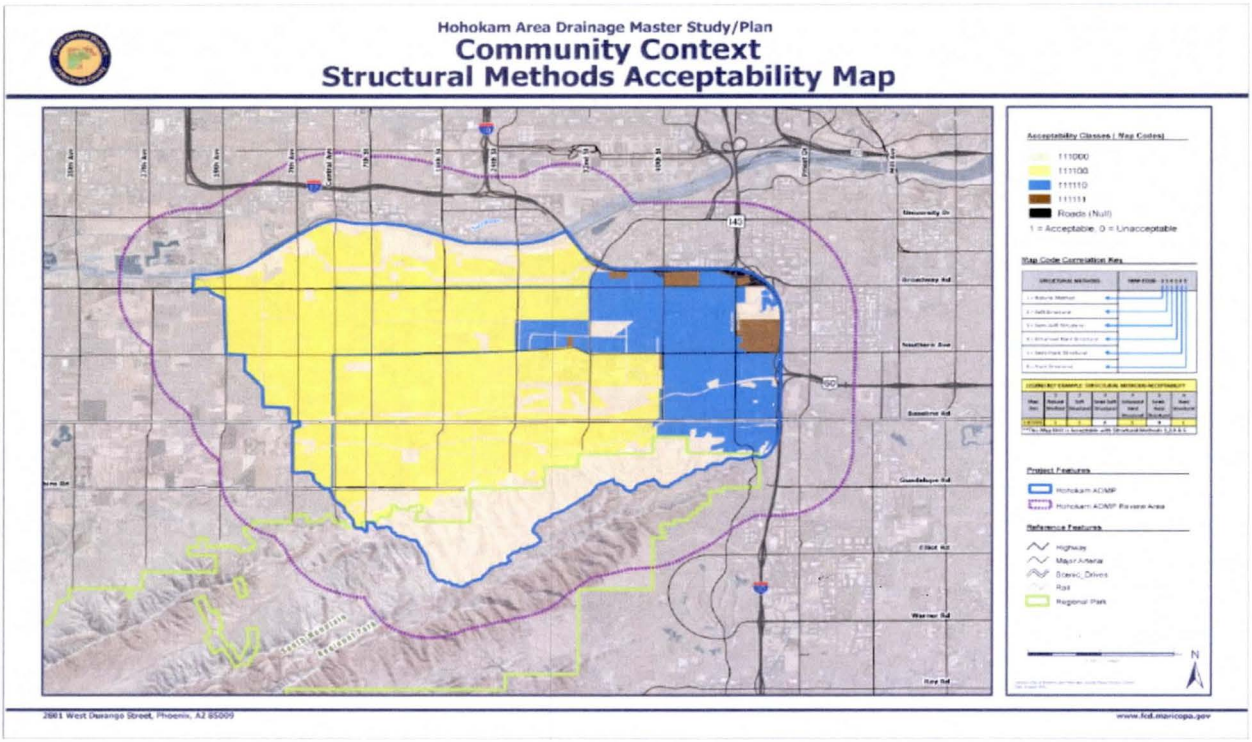


Figure 5-8: Structural Methods Acceptability

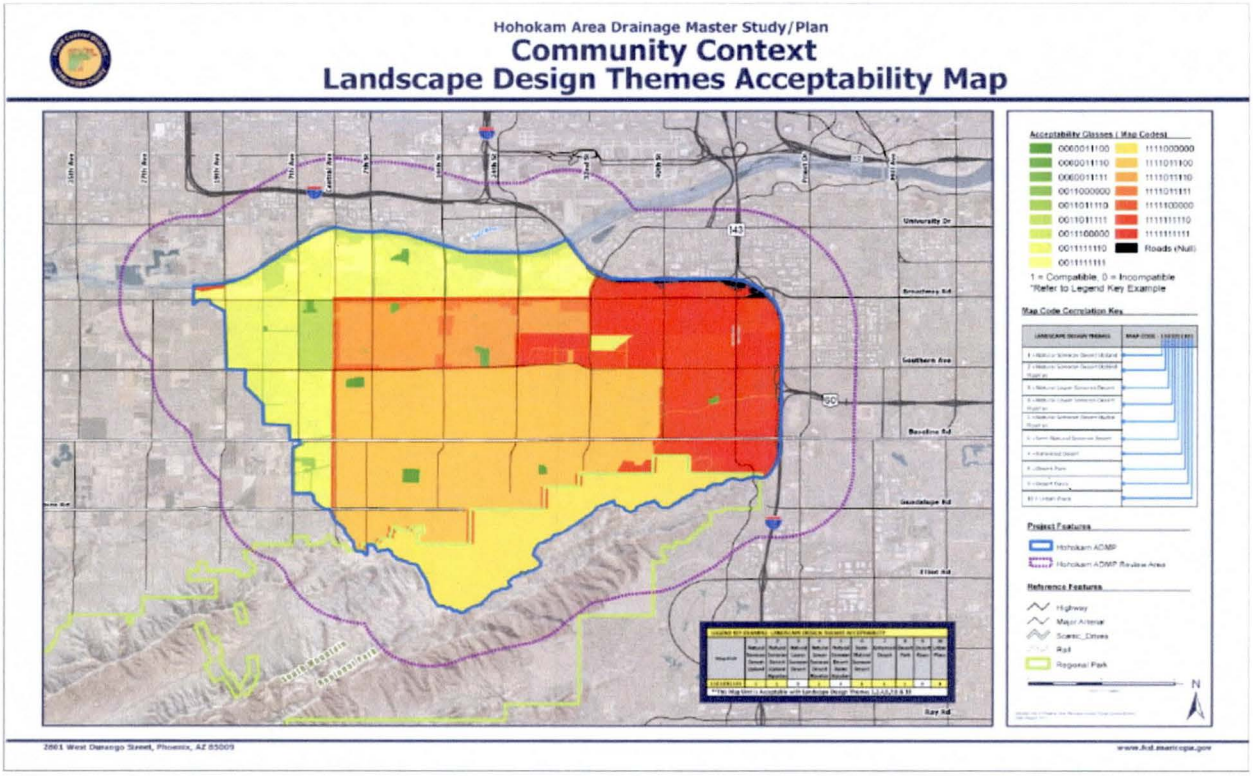


Figure 5-9: Landscape Design Theme Acceptability

5.4 FLOODING CONTEXT

The third element of the CSFHM methodology identifies the flood hazard mitigation measures that would be considered to be effective based on the initial data and hydrological modeling prepared for the project area.

Figure 5-10 shows the major types of flooding hazards identified in the project area. For identifying the effective approaches to mitigate flooding hazards, Stanley Consultants and District staff participated in an evaluation workshop to determine the Structure Types, Structural Methods and Landscape Themes for those elements that would be effective for each type of flooding hazard. The graphic results of the evaluation workshop are shown in Figure 5-11, Figure 5-12, and Figure 5-13.

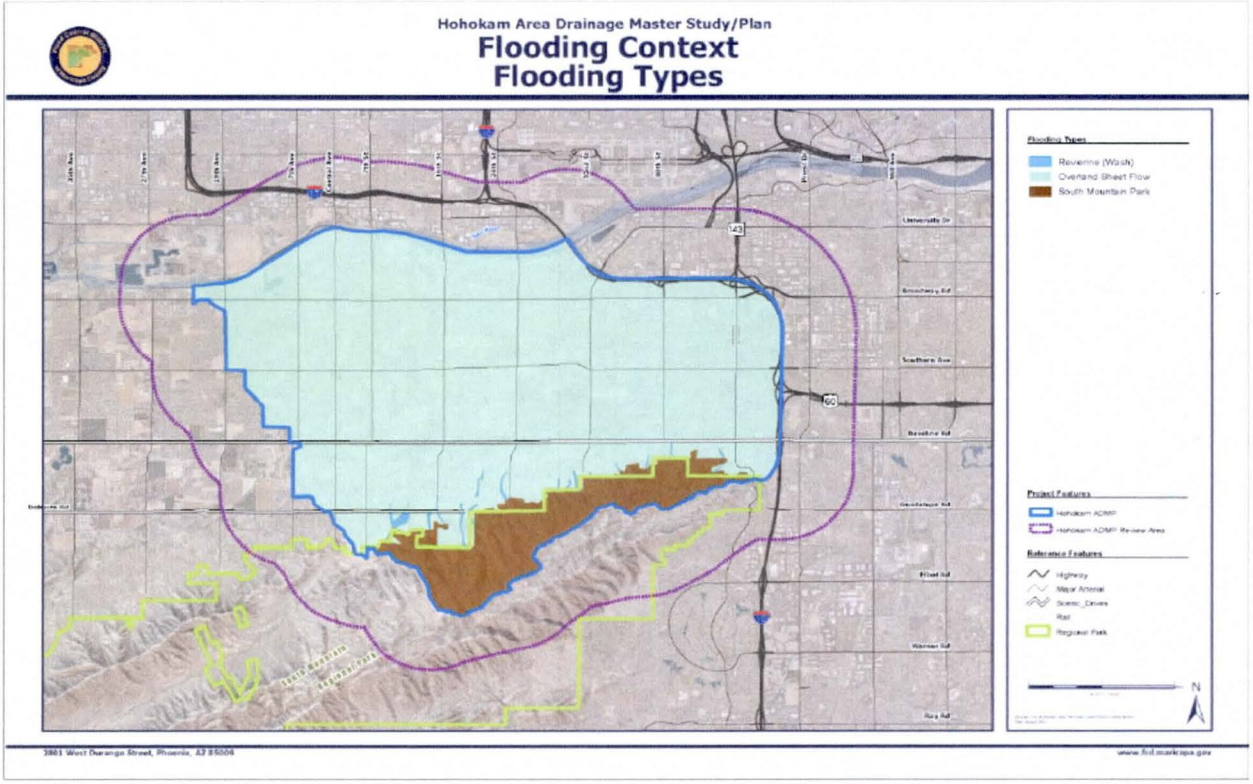


Figure 5-10: Study Area Flow Types

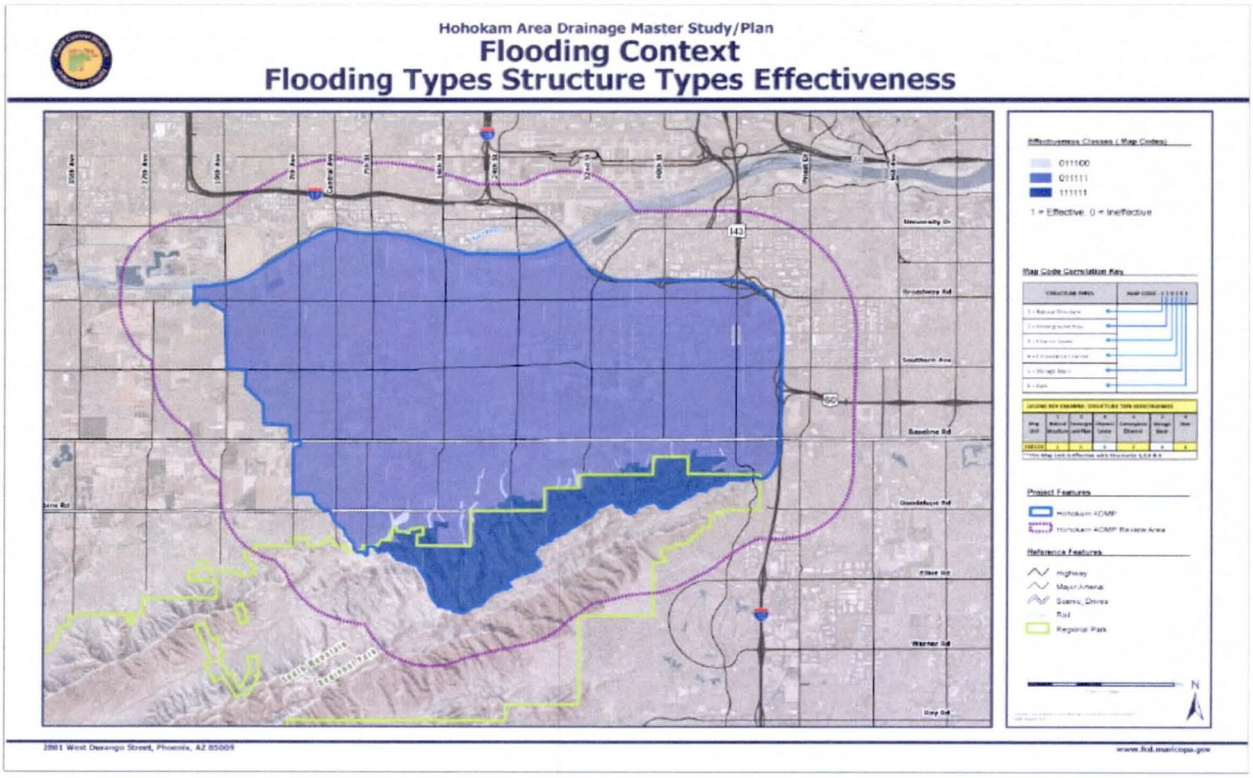


Figure 5-11: Structure Types Effectiveness

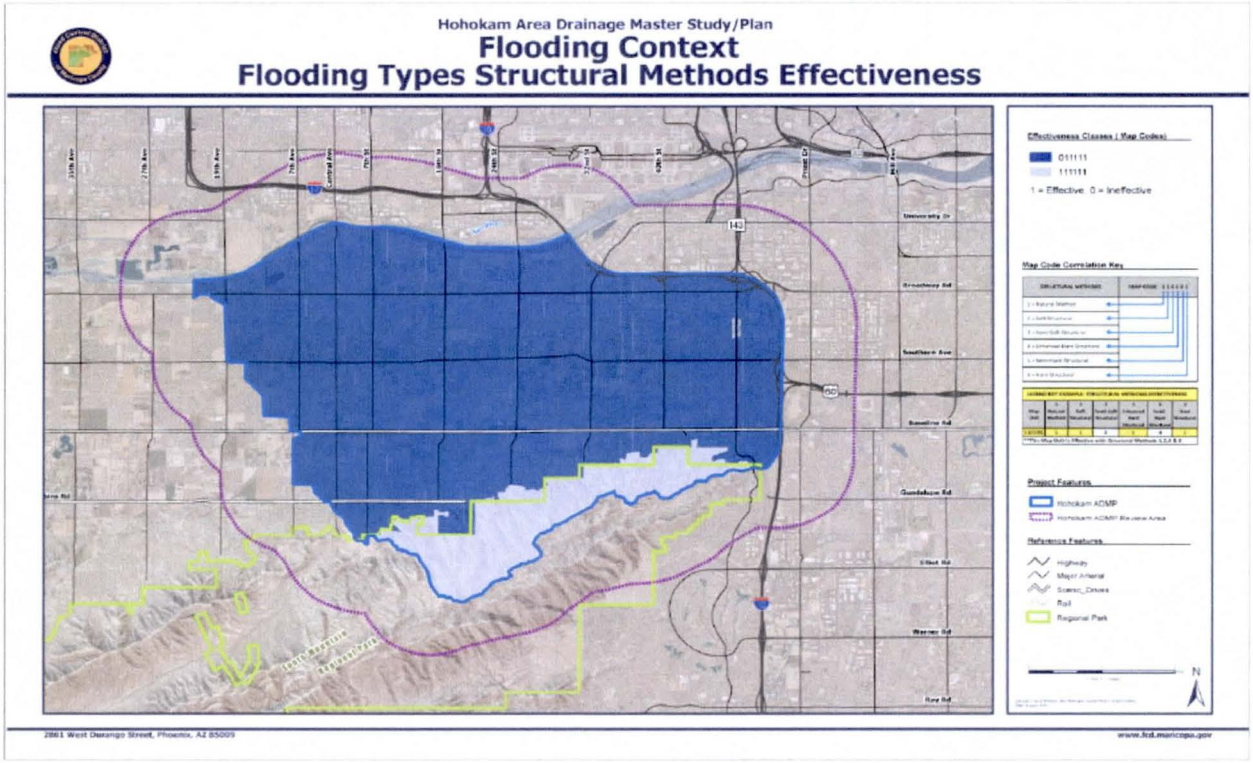


Figure 5-12: Structural Methods Effectiveness

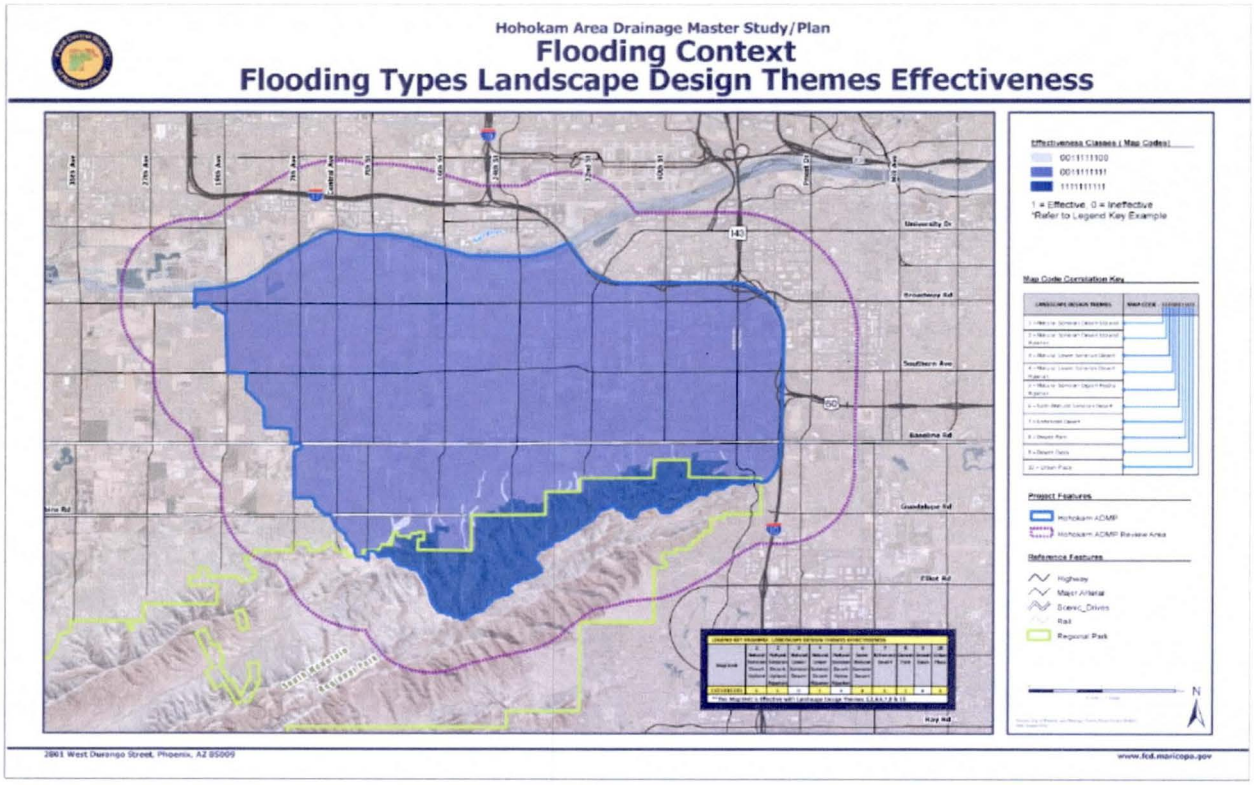


Figure 5-13: Landscape Design Themes Effectiveness

5.5 CSFHM ANALYSIS

In the final step of the analysis, the information from the analysis maps for the three contexts is compared to identify those FHM solutions that concurrently meet all three of the basic functional requirements for a CSFHM solution (ACE). The comparative analysis is carried out either manually or with GIS in the case of large or complex study areas. In either case, the comparative analysis begins with a comparison of the range of effective solutions with the range of compatible solutions to identify the set of solutions that is both effective and compatible (Figure 5-14). The effective/compatible set of solutions is then compared with the range of acceptable solutions to identify the set of solutions that meet all three of the required basic functions (ACE). The results of the CSFHM analysis showing the Structure Types, Structural Methods, and Landscape Design Themes that are context sensitive for the Hohokam study area are shown in Figure 5-15, Figure 5-16, and Figure 5-17.

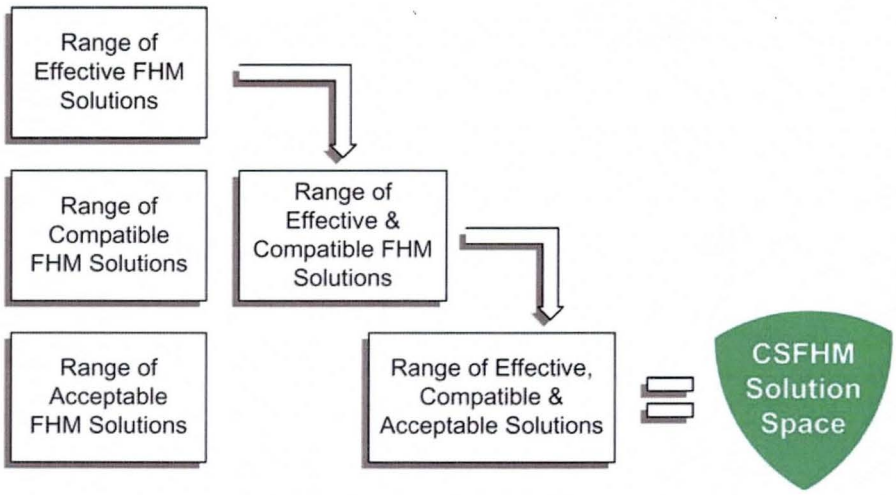


Figure 5-14: Comparative Analysis Process

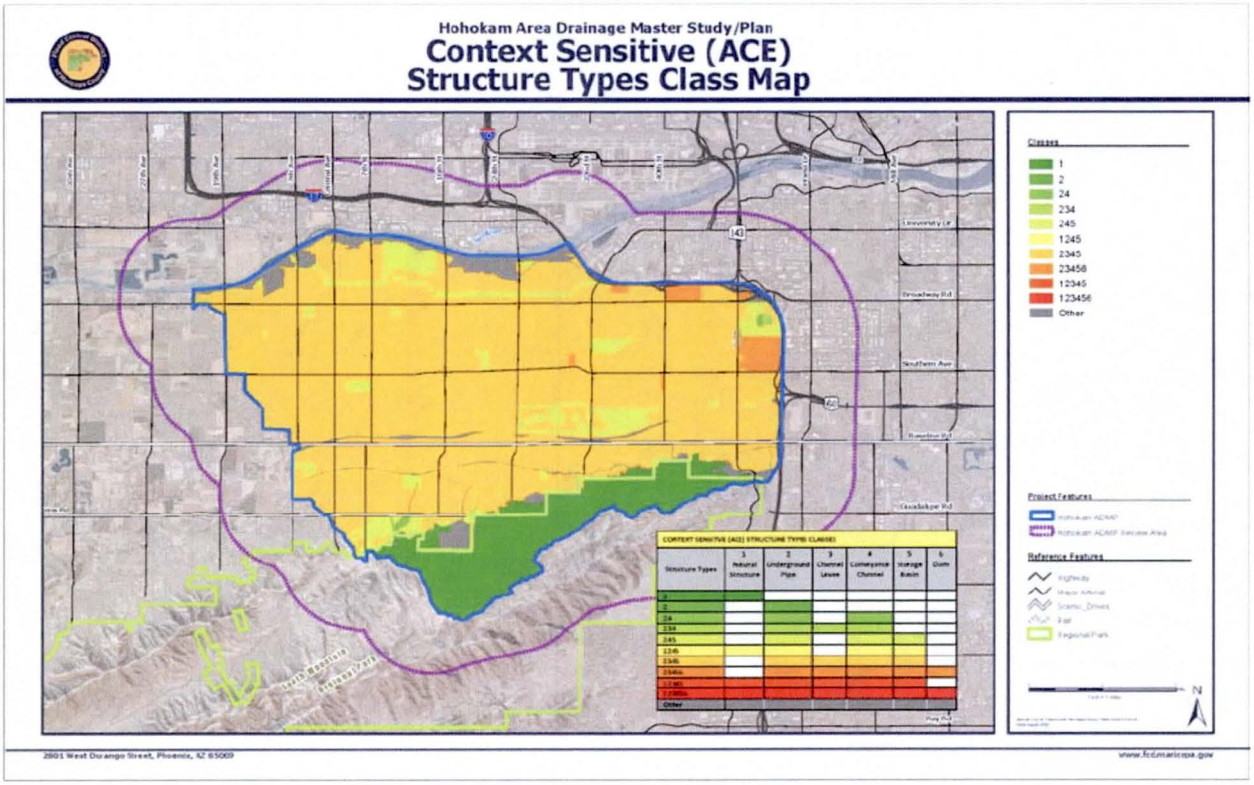


Figure 5-15: Structure Types Context Sensitive Classes

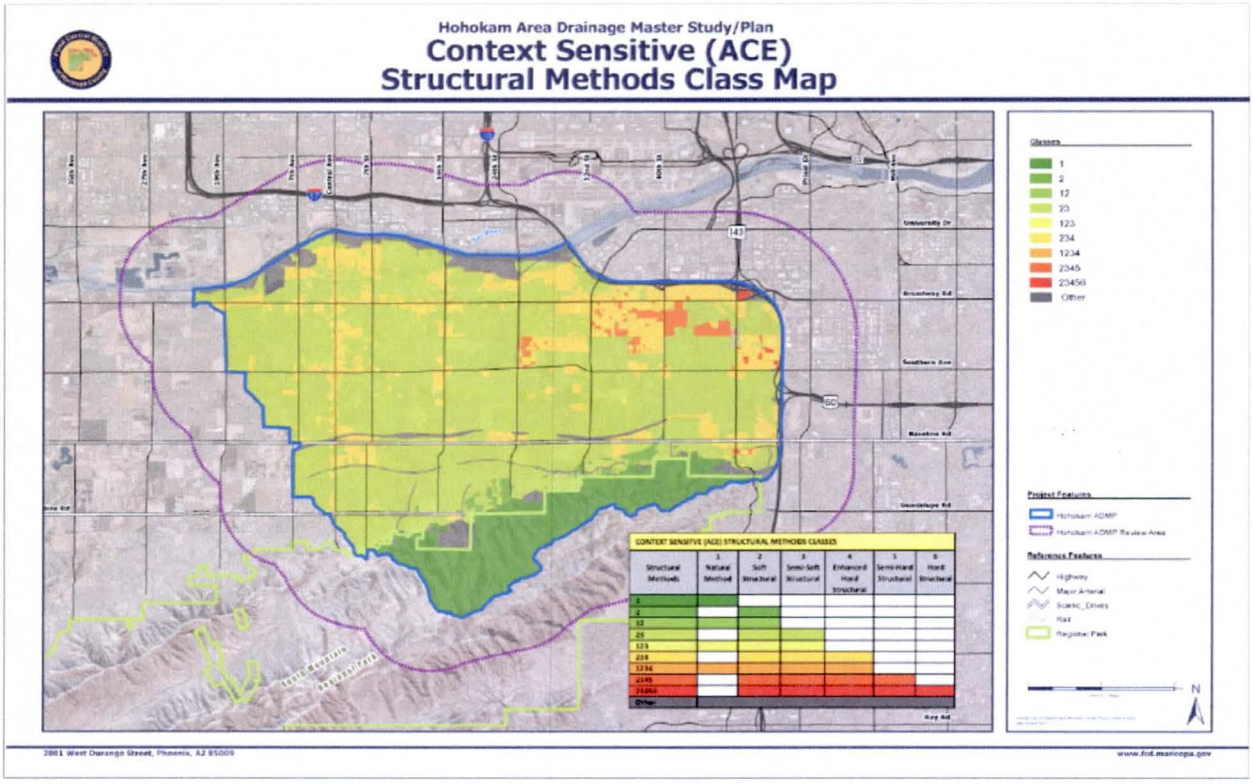


Figure 5-16: Structural Methods Context Sensitive Classes

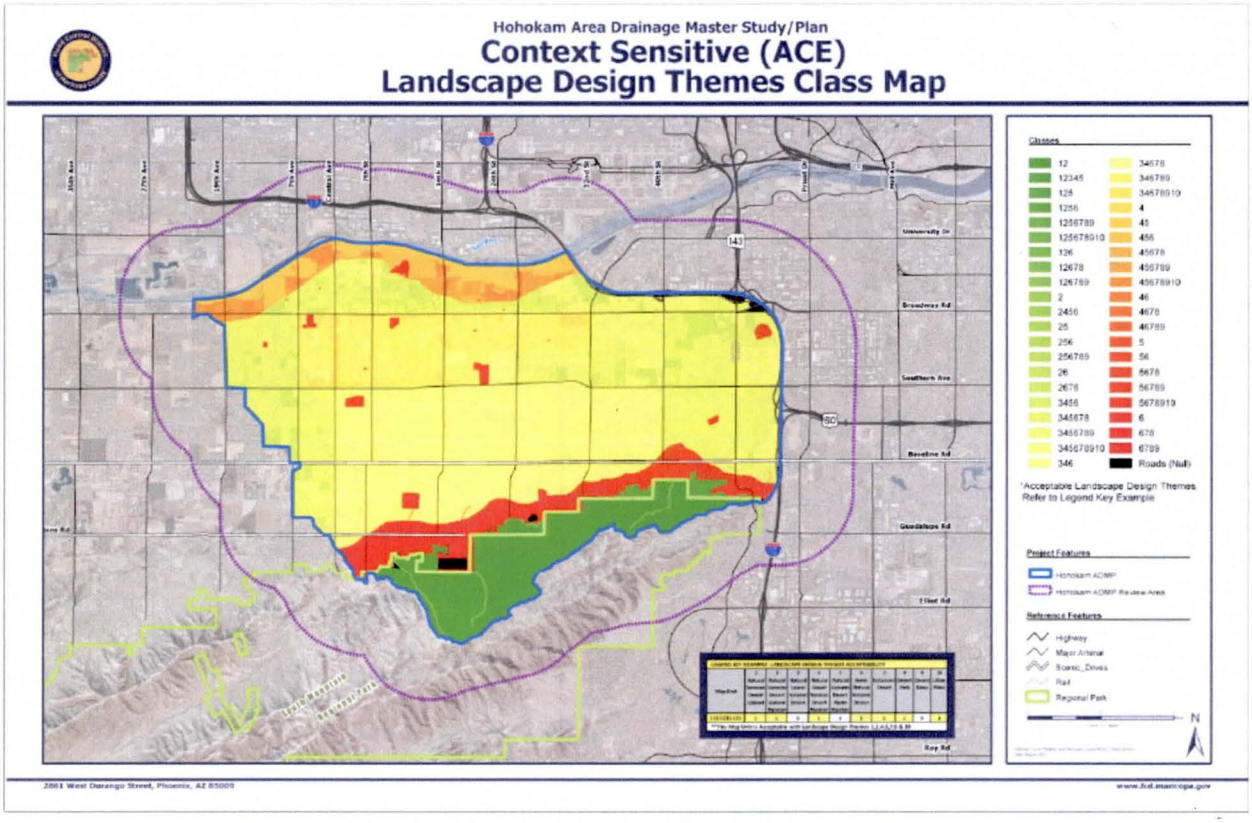


Figure 5-17: Landscape Design Themes Context Sensitive Classes

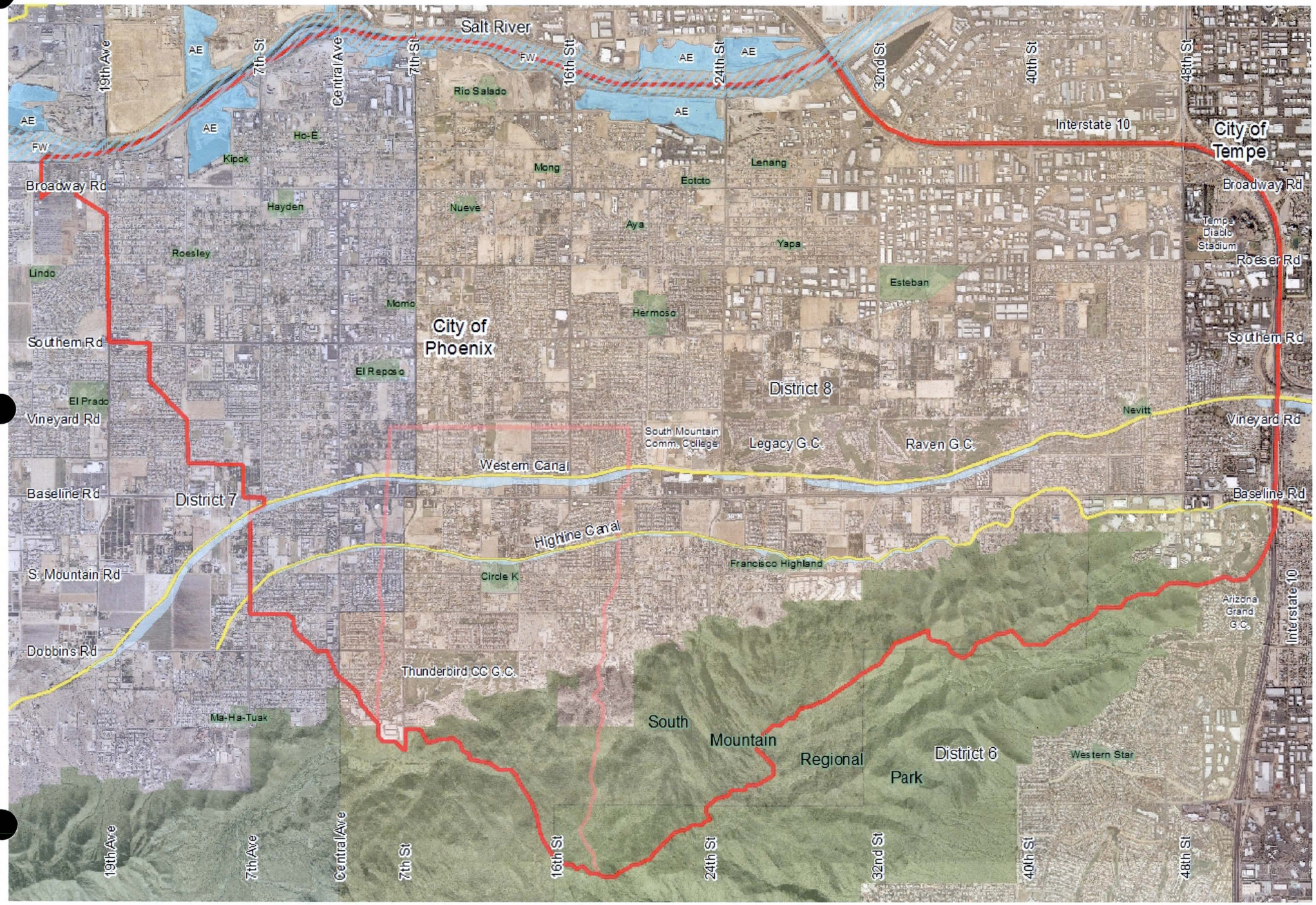
APPENDIX A

STUDY AREA EXHIBITS

Hohokam Area Drainage Master Study/Plan

Contract FCD209C029

Exhibit
Study Area



Legend

- ADMS_Bndry
- Pilot_Study
- S. Mtn Regional Park
- Park_Boundary
- Canals

Flood Hazard Zone

- A
- AE
- FW

N
W E
S

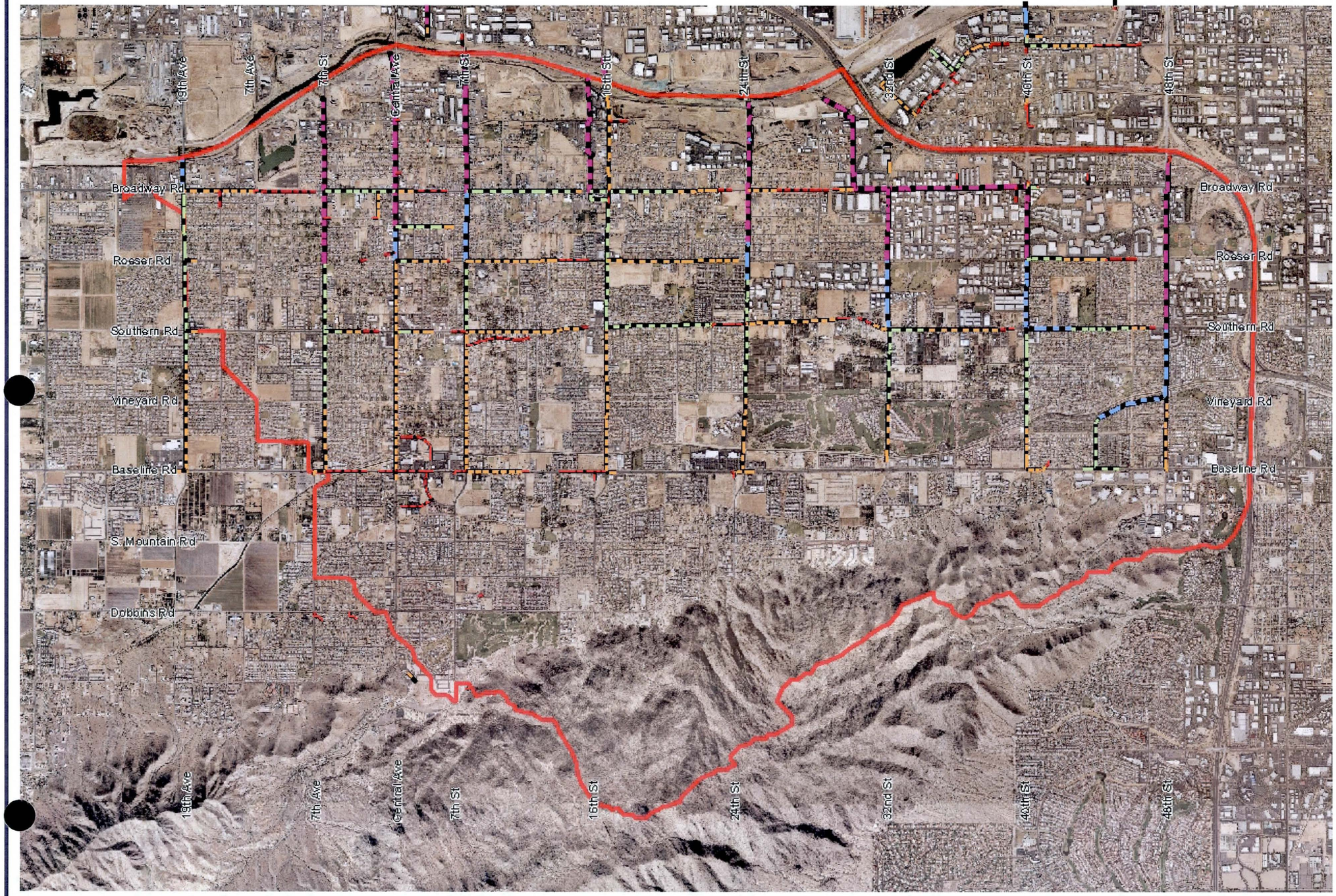
0 0.15 0.3 0.6 0.9
Miles

Stanley Consultants INC.

Hohokam Area Drainage Master Study/Plan

Contract FCD209C029

Exhibit
Existing Storm Drain



Legend

- 18 - 24
- 25 - 36
- 37 - 48
- 49 - 60
- 61 - 96
- ADMS_Bndry

N
W E
S

0 0.15 0.3 0.6 0.9
Miles

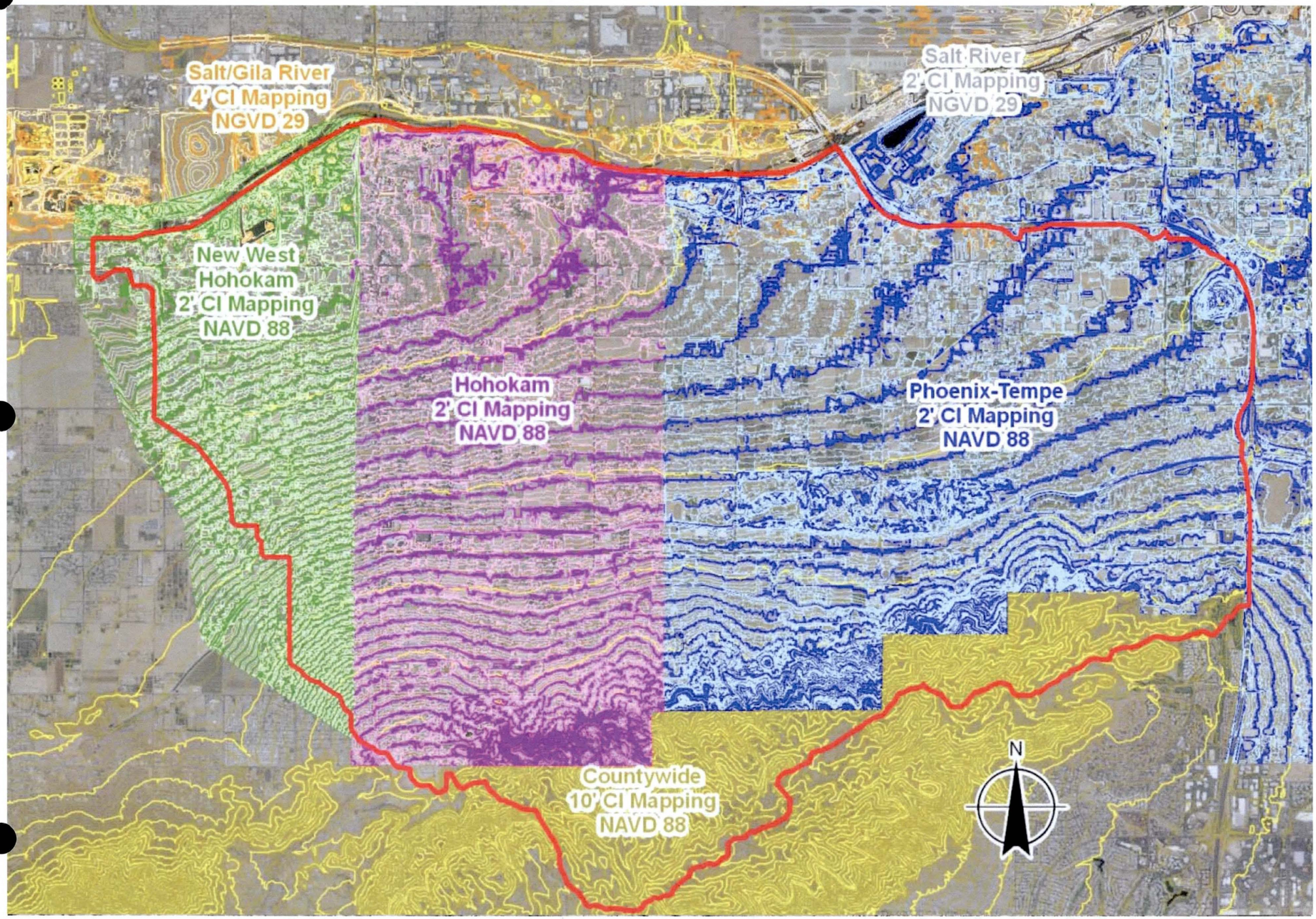
Stanley Consultants INC.

Hohokam Area Drainage Master Study/Plan

Contract FCD209C029

Exhibit

Topographic Mapping Sources and Datum



N
W E
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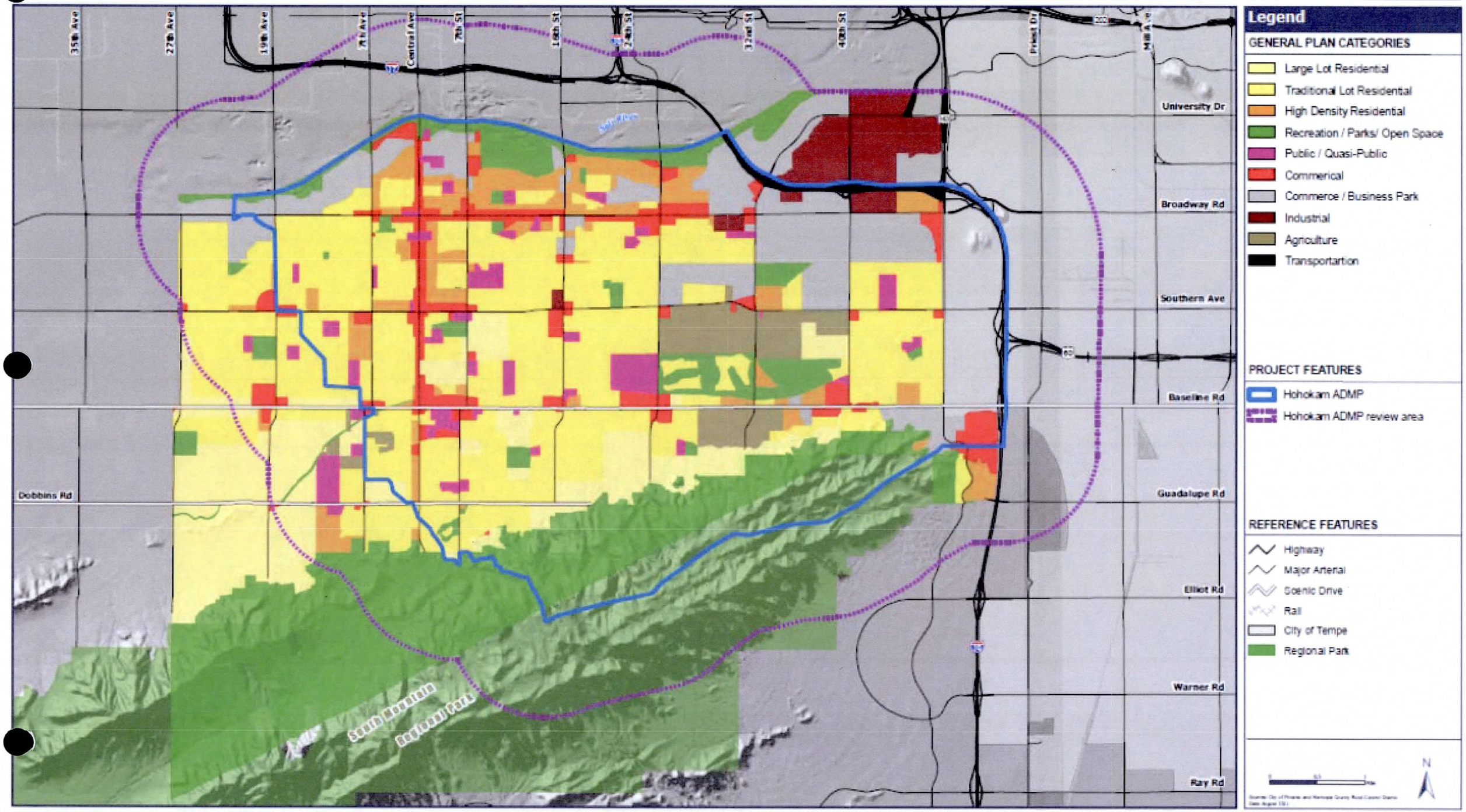
0 0.15 0.3 0.6 0.9
Miles

Stanley Consultants INC.

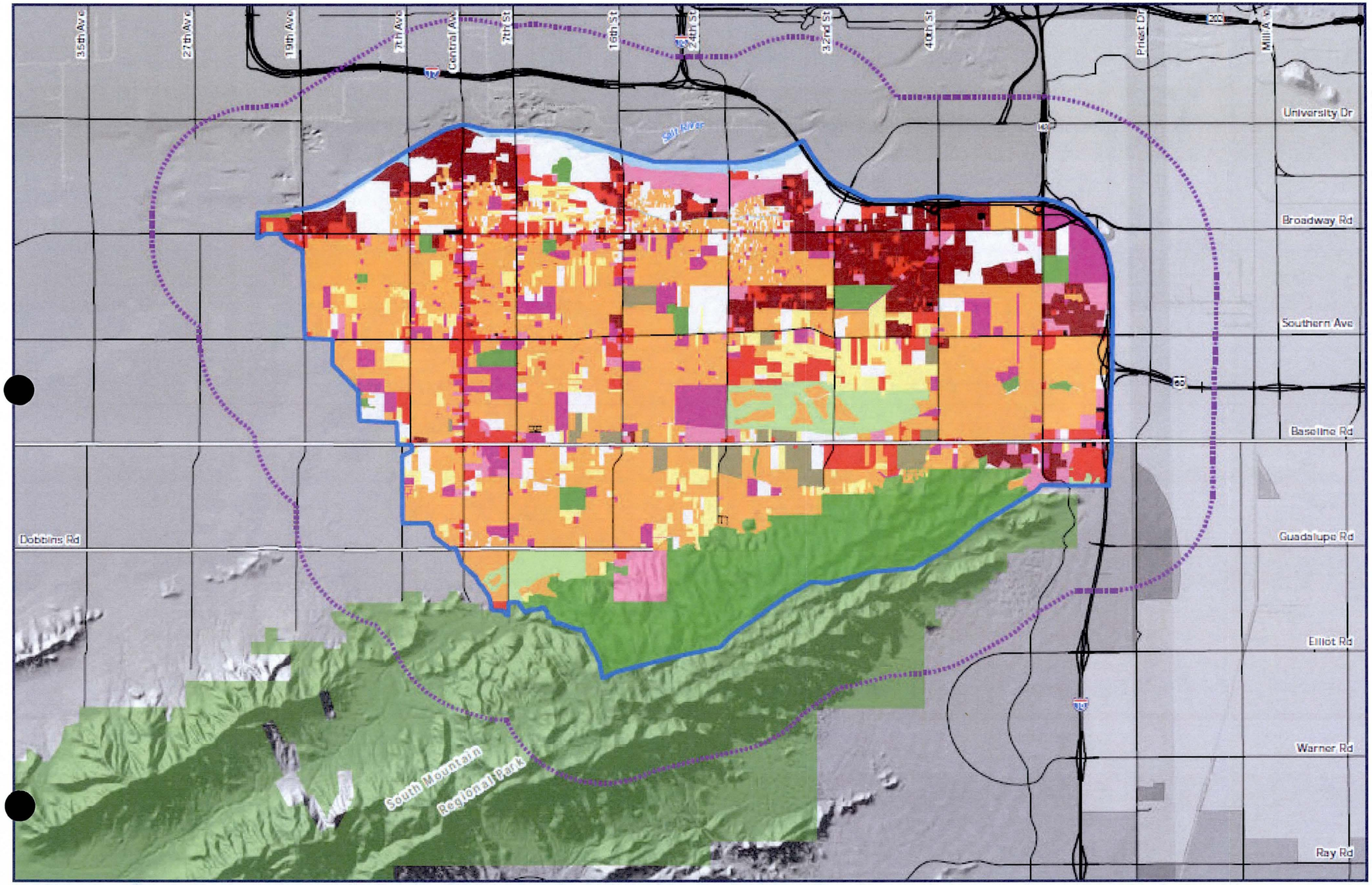
Hohokam Area Drainage Master Study/Plan

Community Context - General Plan Categories



Hohokam Area Drainage Master Study/Plan

Community Context - Land Use Categories



Legend

LAND USE CATEGORIES

- Low Density Residential
- Medium to High Density Residential
- Commercial
- Employmnet
- Industrial
- Agriculture
- Open Space
- Golf Course
- Public / Quasi-Public
- Transportation
- Water
- Vacant

PROJECT FEATURES

- Hohokam ADMP
- Hohokam ADMP review area

REFERENCE FEATURES

- Highway
- Major Arterial
- Scenic Drive
- Rail
- City of Tempe
- Regional Park

N

APPENDIX B

Flood Insurance Rate Maps (FIRMs)

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles, Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' National Geodetic Vertical Datum of 1929 (NGVD 29). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Arizona State Plane Zone 3179 (central Arizona). The **horizontal datum** was NAD83, GRS80 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the National Geodetic Vertical Datum of 1929. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

Spatial Reference System Division
National Geodetic Survey, NOAA
Silver Spring Metro Center
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from multiple sources. Base map files were provided in digital format by Maricopa County. Orthophoto images were produced at a scale of 1:6000 using NAPP for control. Aerial photography is dated December 2000 to December 2002.

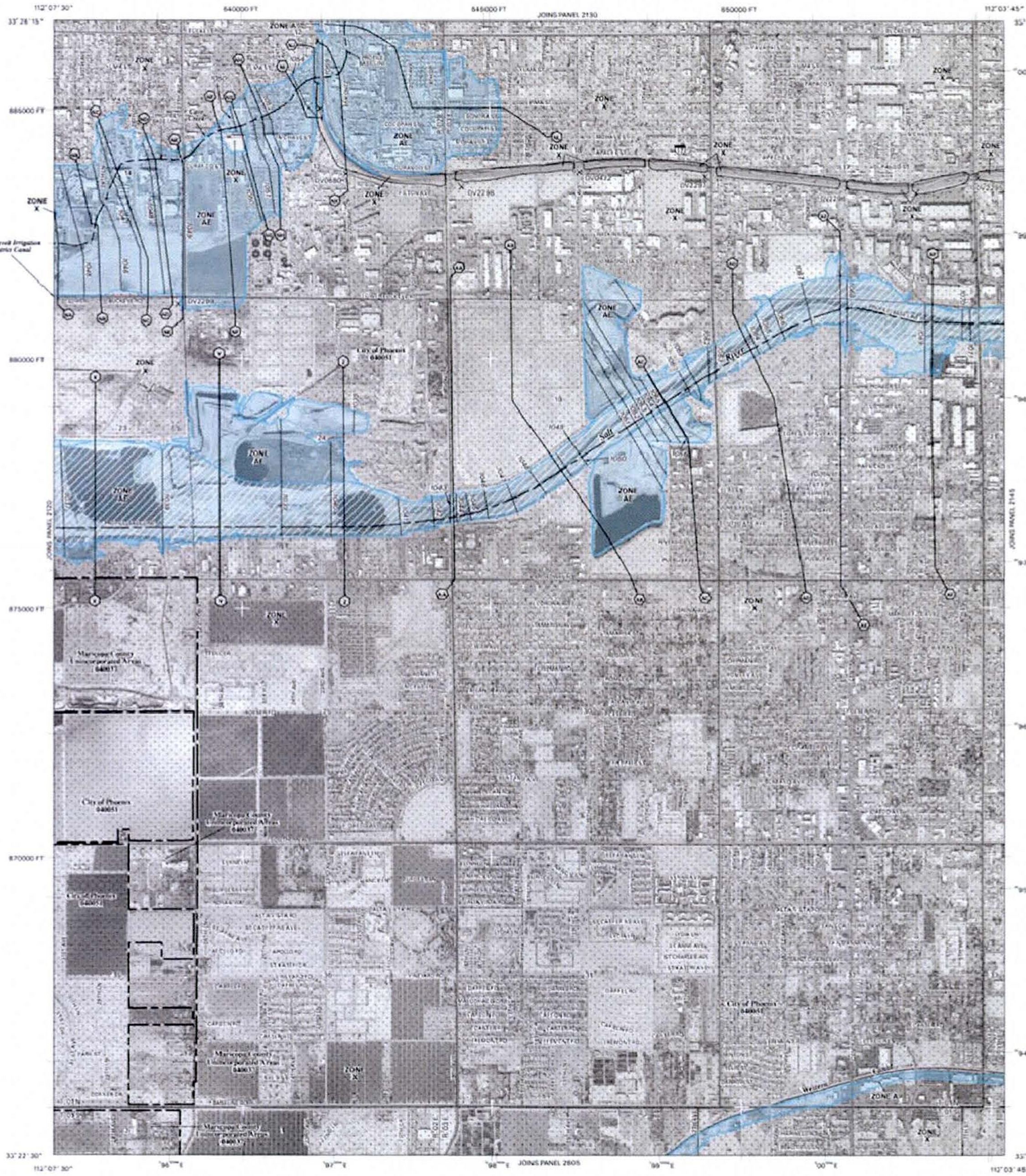
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels, community map repository addresses, and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

ZONE A No Base Flood Elevations determined.

ZONE AE Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

OTHER AREAS

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

MAP REPOSITORY

Refer to Repositories Listing on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP

April 15, 1988

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

September 4, 1991

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

300 0 300 600 METERS

NFIP

PANEL 2140G

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

PANEL 2140 OF 4350

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

MAP NUMBER
04013C2140G

MAP REVISED
SEPTEMBER 30, 2005

Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM

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Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was *Arizona State Plane Zone 3175 (central Arizona)*. The **horizontal datum** was NAD83, GRS80 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the National Geodetic Vertical Datum of 1929. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

Spatial Reference System Division
National Geodetic Survey, NOAA
Silver Spring Metro Center
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242** or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from multiple sources. Base map files were provided in digital format by Maricopa County. Orthophoto images were produced at a scale of 1:9000 using HARN for control. Aerial photography is dated December 2000 to December 2002.

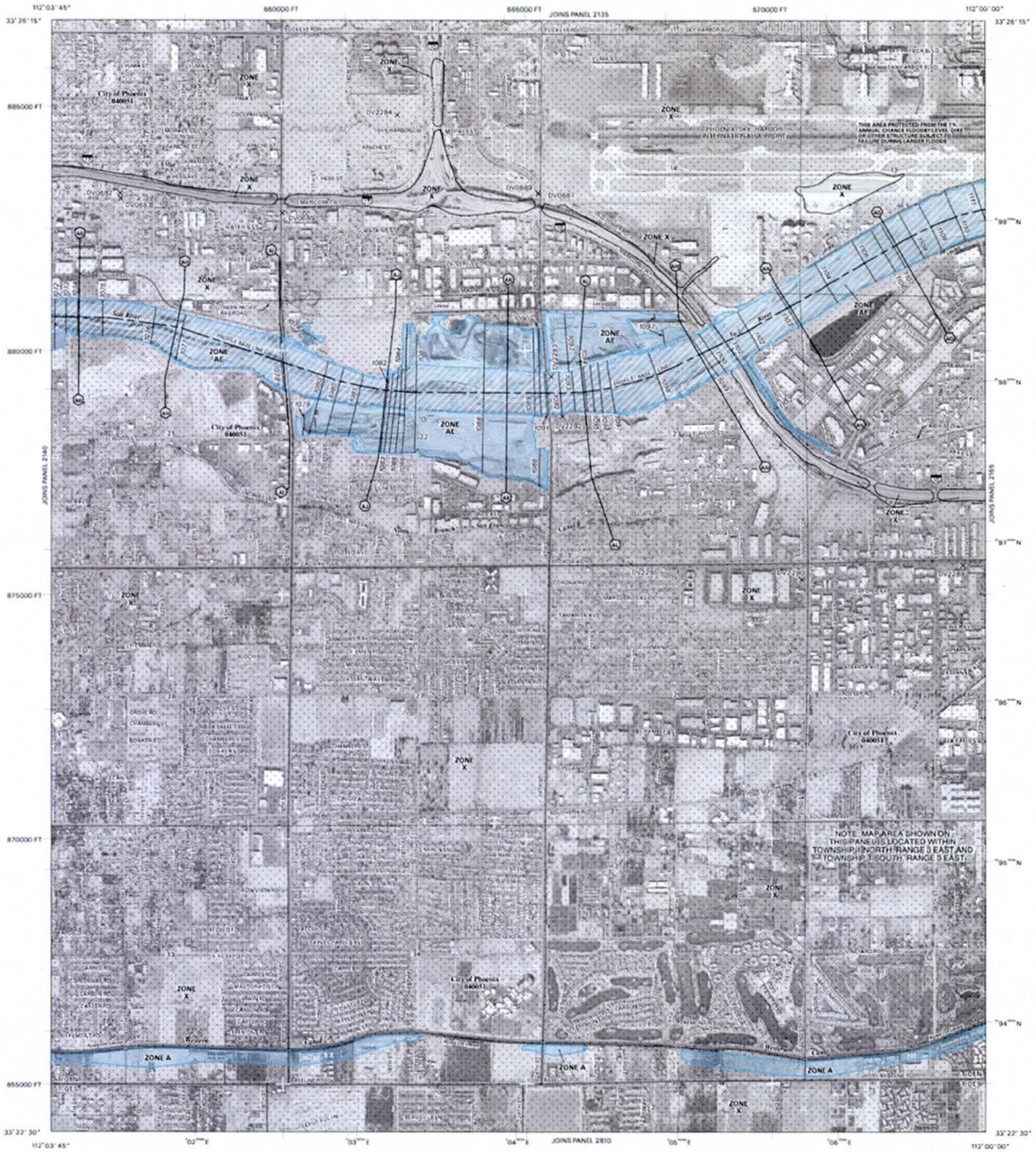
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov.

If you have **questions about this map**, or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMAMAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary

0.2% annual chance floodplain boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Area Zones, and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.

513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation varies where uniform within zone; elevation in feet*

* Referenced to the National Geodetic Vertical Datum of 1929

(A)———(A)	Cross section line
(P)———(P)	Transect line

112°07'08", 33°25'41"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
26000 m E	1000-meter Universal Transverse Mercator grid ticks, zone 12
875000 FT	5000-foot grid ticks: Arizona State Plane coordinate system, central zone (FIPSZONE 3175), NAD83 (Transverse Mercator)
OV2313	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORY
Refer to Repositories Listing on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
April 16, 1988

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
December 3, 1982; September 30, 1995; July 18, 2001

September 30, 2005 - to update corporate limits, to change Base Flood Elevations, to add Base Flood Elevations, to add Special Flood Hazard Areas, to change Special Flood Hazard Areas, to change zone designations, to add roads and road names, to incorporate previously issued Letters of Map Revision, and to incorporate previously issued Letters of Map Amendment.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

300 0 300 600 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 2145H

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

PANEL 2145 OF 4350

SEE MAP INDEX FOR FIRM PANEL LAYOUT

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
PHOENIX, CITY OF	040051	2145	H

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
04013C2145H

MAP REVISED
SEPTEMBER 30, 2005

Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles, Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' National Geodetic Vertical Datum of 1929 (NGVD 29). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was *Arizona State Plane Zone 3176 (central Arizona)*. The **horizontal datum** was *NAD83, GRS80 spheroid*. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the *National Geodetic Vertical Datum of 1929*. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

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This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

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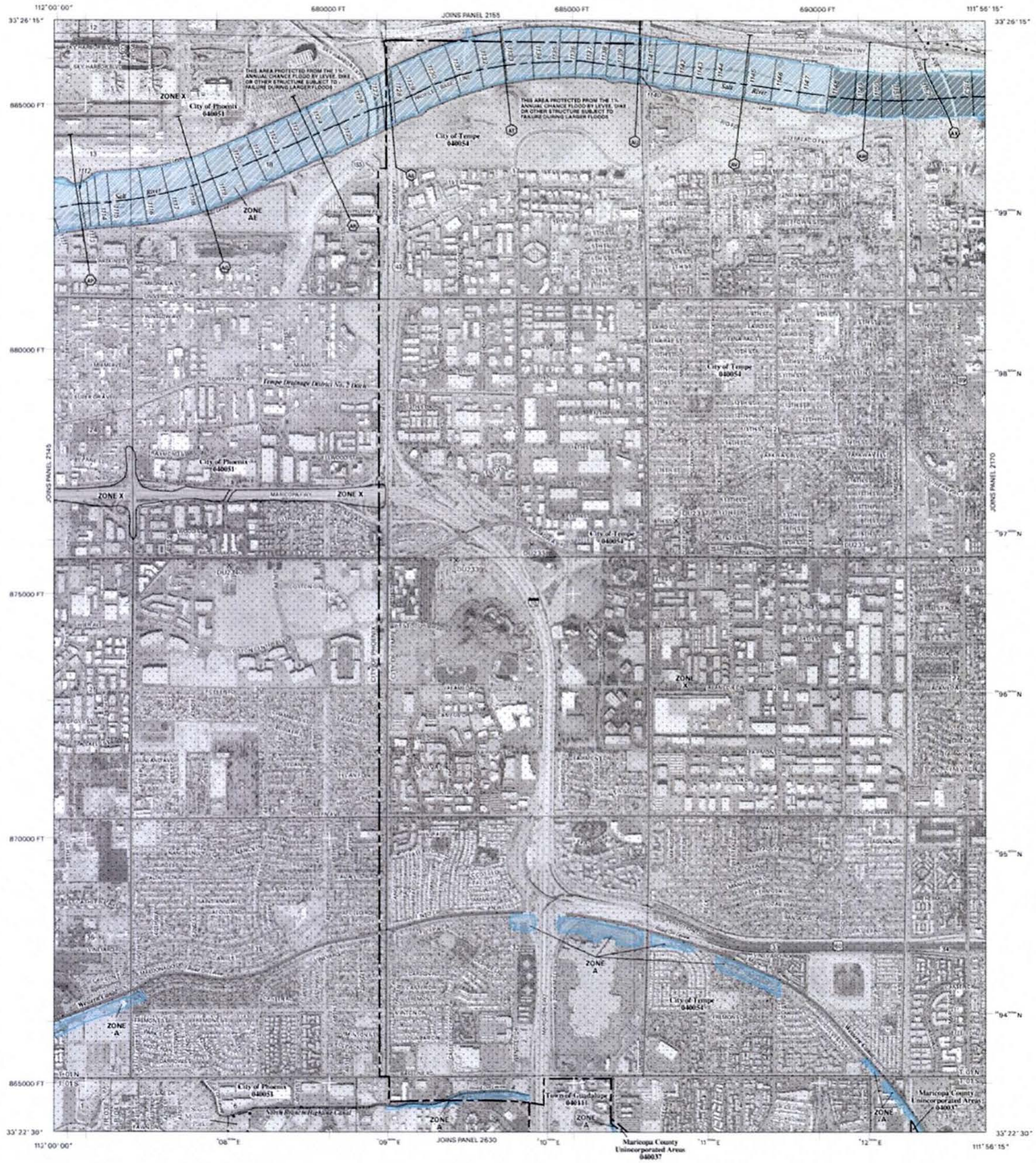

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the National Geodetic Vertical Datum of 1929

A — A	Cross section line
2 — 2	Transect line
112°07'08", 33°25'41"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
76 E	1000-meter Universal Transverse Mercator grid tick values, zone 12
875000 FT	5000-foot grid tick values; Arizona State Plane coordinate system, central zone (FIPSZONE 0202), NAD83 (Transverse Mercator)
× DV2313	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORY
Refer to Repositories Listing on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
April 15, 1988

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
December 3, 1993, September 30, 1995, July 19, 2001

September 30, 2005 - to update corporate limits, to change Base Flood Elevations, to add Base Flood Elevations, to add Special Flood Hazard Areas, to change Special Flood Hazard Areas, to change zone designations, to add roads and road names, to incorporate previously issued Letters of Map Revision, and to incorporate previously issued Letters of Map Amendment.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'
500 0 1000 2000 FEET
300 0 300 600 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 2165H

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

PANEL 2165 OF 4350
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
GUADALUPE, TOWN OF	040111	2165	H
MARICOPA COUNTY	040037	2165	H
PHOENIX, CITY OF	040051	2165	H
TEMPE, CITY OF	040054	2165	H

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
04013C2165H
MAP REVISED
SEPTEMBER 30, 2005

Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles, Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' National Geodetic Vertical Datum of 1929 (NGVD 29). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was *Arizona State Plane Zone 3176 (central Arizona)*. The **horizontal datum** was NAD83, GRS80 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

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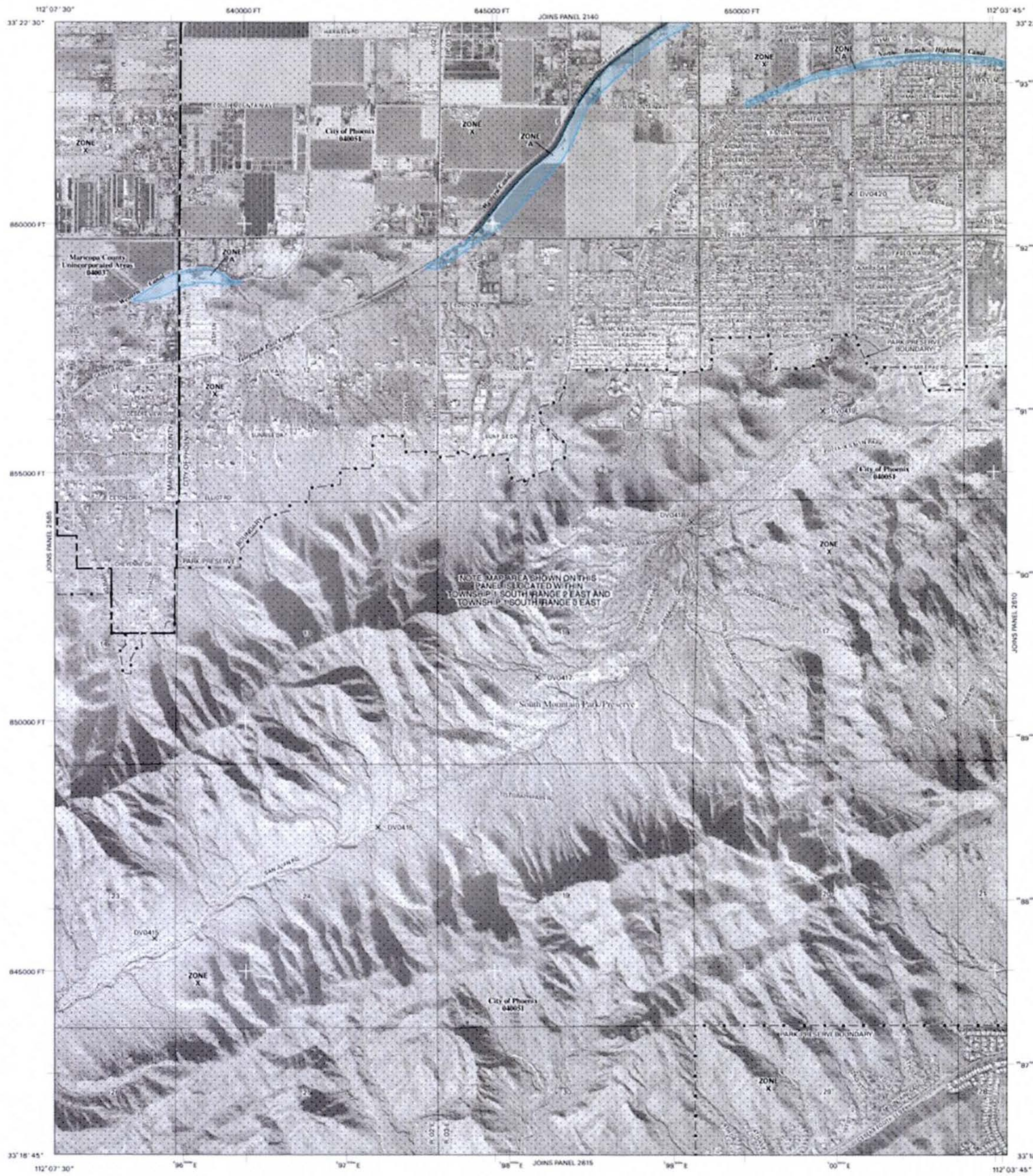

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
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ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
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ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the National Geodetic Vertical Datum of 1929

(A)——(A)	Cross section line
(2)——(2)	Transect line
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76 E	1000-meter Universal Transverse Mercator grid tick values, zone 12
875000 FT	5000-foot grid tick values: Arizona State Plane coordinate system, central zone (FIPSZONE 3176), NAD83 (Transverse Mercator)
×DV2313	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORY

Refer to Repositories Listing on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP

April 15, 1988

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

July 19, 2001

September 30, 2005 - to update corporate limits, to change Base Flood Elevations, to add Base Flood Elevations, to add Special Flood Hazard Areas, to change Special Flood Hazard Areas, to change zone designations, to add roads and road names, to incorporate previously issued Letters of Map Revision, and to incorporate previously issued Letters of Map Amendment.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

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MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

300 0 300 600 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 2605F

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

PANEL 2605 OF 4350

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY	040037	2605	F
PHOENIX, CITY OF	040051	2605	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
04013C2605F

MAP REVISED
SEPTEMBER 30, 2005

Federal Emergency Management Agency

NOTES TO USERS

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1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from multiple sources. Base map files were provided in digital format by Maricopa County. Orthophoto images were produced at a scale of 1:5000 using HARN for control. Aerial photography is dated December 2000 to December 2002.

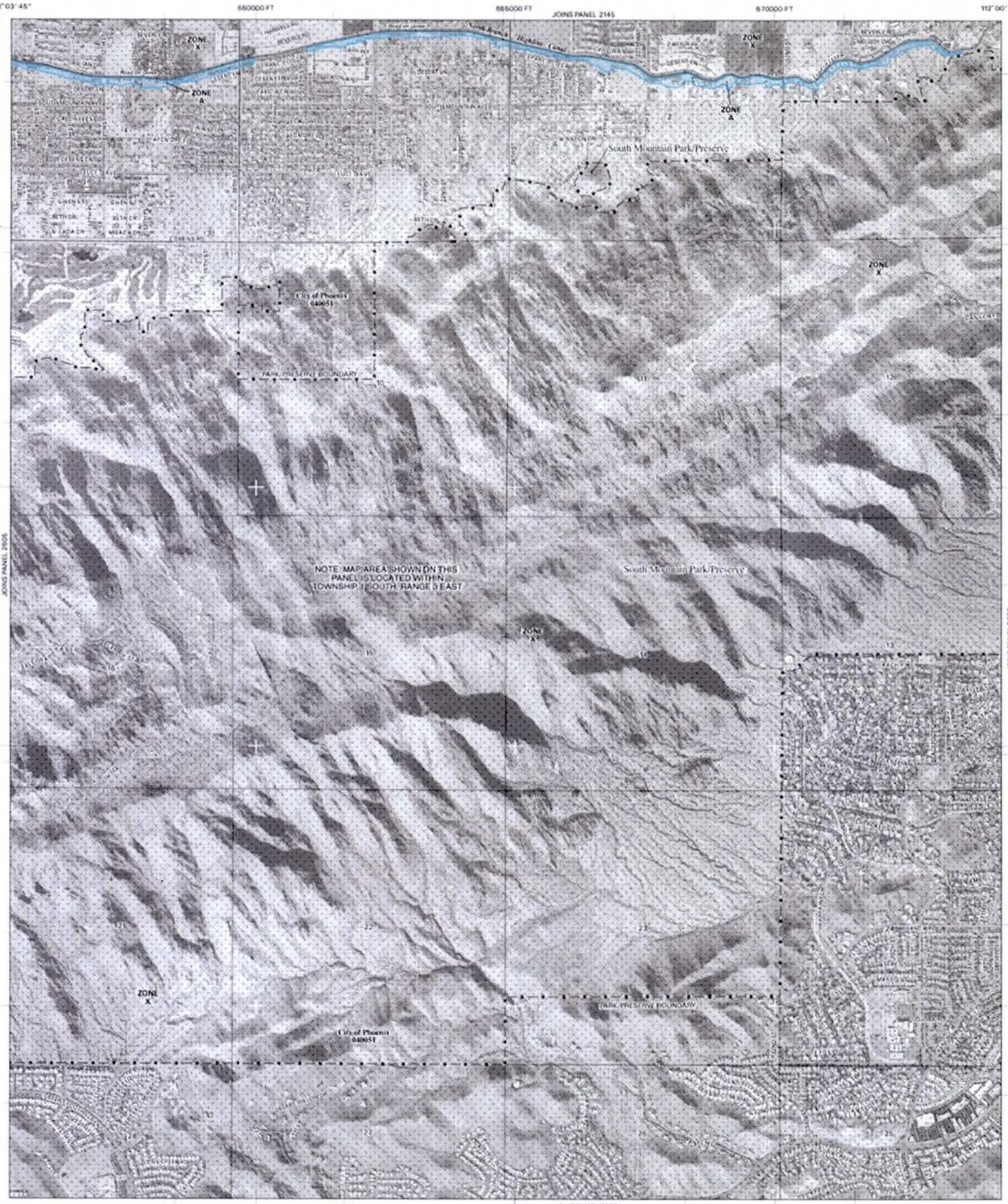
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMAMAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
••••••••••	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
~~ 513 ~~~	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the National Geodetic Vertical Datum of 1929

(A)——(A)	Cross section line
(2)——(2)	Transect line
112° 07' 08", 33° 25' 41"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
⁴70⁰⁰⁰ E	1000-meter Universal Transverse Mercator grid ticks, zone 12
875000 FT	5000-foot grid ticks: Arizona State Plane coordinate system, central zone (FIPSZONE 2176), NAD83 (Transverse Mercator)
×DV2313	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORY

Refer to Repositories Listing on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP

April 15, 1988

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

July 19, 2001

September 30, 2005 - to update corporate limits, to change Base Flood Elevations, to add Base Flood Elevations, to add Special Flood Hazard Areas, to change Special Flood Hazard Areas, to change zone designations, to add roads and road names, to incorporate previously issued Letters of Map Revision, and to incorporate previously issued Letters of Map Amendment.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

300 0 300 600 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 2610F

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

PANEL 2610 OF 4350

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
PHOENIX, CITY OF	040051	2610	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
04013C2610F

MAP REVISED
SEPTEMBER 30, 2005

Federal Emergency Management Agency

APPENDIX C

SUMMARY OF DRAINAGE REPORTS

Summary of Hohokam Area Drainage Reports (Not Inclusive of all Gathered Material)

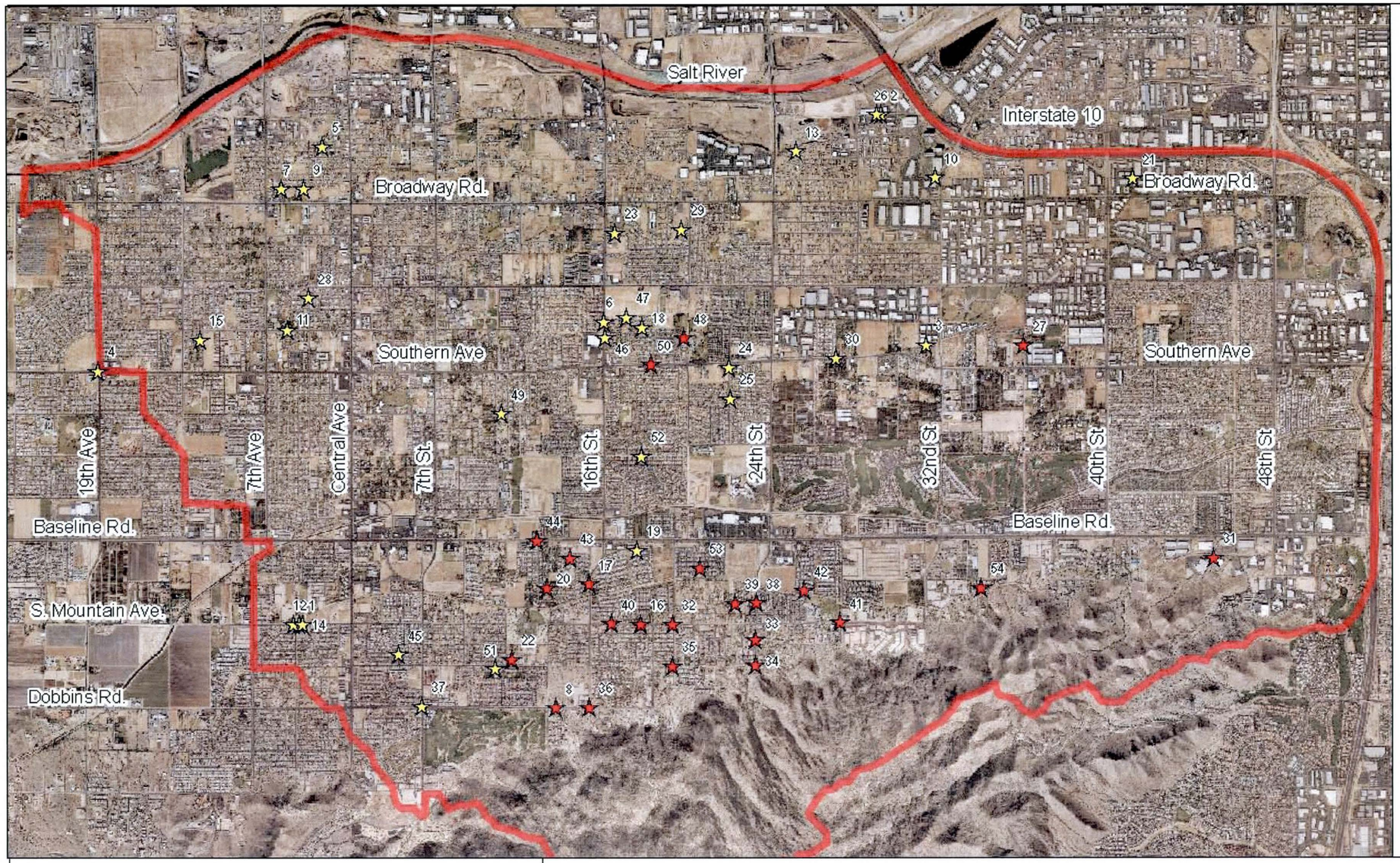
ID	Title	Date of Report	Prepared for	Prepared By	Summary	Comments
1	Southeast Phoenix Storm Drainage Study Project No. ST-71181.00	July 1, 1972	City of Phoenix	Yost & Gardner Engineers	Presents conceptual design to size and estimate construction costs for storm drain trunk lines from roughly the Western Canal to the Salt river for 7th St, 16th St. and 24th St..as well as a trunk line for the "30th St" Salt River Outfall and the associated laterals down 32n, 40th and 48th St. The hydrology was developed using the Rational Method.	Most comprehensive study for the COP storm drain system in the Hohokam Study Area and generally representative of the existing storm drain system layout in the Hohokam Study area but it is a concept study not a design report. Assume GIS data more accurately depicts what was built.
2	Storm Drain in 7th Ave from Southern Ave to Baseline Rd Hydrologic and Hydraulic Calculations	n/a (circa 1976)	City of Phoenix	Arthur Beard Engineers	Miscellaneous hydrologic and hydraulic calculations. Hydrology was developed using the Rational Method.	Little or no significance to study.
3	Gila Drain - Western Canal Alternatives Conceptual Design Study - Draft	Feb. 1, 1985	District	Dibble & Assoc.	Report to investigate conceptual alternatives to for regional improvements primarily within the Gila Drain watershed which does not appear to include the Hohokam ADMS study area. Methodology used to develop hydrology was not specified or documented.	Little or no significance to study.
4	Storm Drain Design Report for Broadway Road from 27th Ave to 19th Ave P7933810	April 1985	City of Phoenix	Evans, Kuhn & Assoc.	Design report for Broadway lateral to 27th Ave storm drain trunk line. Hydrology was developed using the Rational Method.	Drains to trunk line outside of study limits. No need to include in study analyses.
5	Drainage Study for 48th St Storm Sewer Baseline Rd to the Tempe Ditch COT 84072 / COP ST-833103	Sept , 1985	Tempe & Phoenix	Sverdrup & Parcel & Assoc.	Design report for the design of storm drain line on 48th St from the Tempe Ditch to Baseline Road. Hydrology was developed using the TR-20 methodology.	Hydraulic profile pipe sizes and alignments are consistent with GIS data.
6	Storm Drain Report for 40th St Baseline Road to Southern Avenue P-865881	Aug. 16, 1988	City of Phoenix	Project Engineering Consultants	Storm drain design report for roadway improvements project. Provides design of drainage and private irrigation facilities affected by project. Hydrology was developed using the Rational Method.	Improvements appear to be limited to pipe laterals and connections less than 36" in size. (not within the scope of Hohokam ADMS).
7	Supporting Calculation for Southern Ave Improvements (Between 24th St to 32nd St) P-824656	n/a (circa 1989)	City of Phoenix	Brooks, Hersey & Assoc.	Miscellaneous Calculations and exhibits. No report. Includes hydraulic profile of 32nd St east lateral on Southern and 24th St west lateral on Southern. Hydrology was developed using the Rational Method.	Hydraulic profile pipe sizes are consistent with GIS data.
8	Supporting Calculation for Southern Ave Improvements (Between 32nd St to 40th St) P-824607	n/a (circa 1989)	City of Phoenix	Brooks, Hersey & Assoc.	Miscellaneous Calculations and exhibits. No report. Includes hydraulic profile of 32nd St west lateral on Southern. Hydrology was developed using the Rational Method.	Hydraulic profile pipe sizes are smaller than shown in GIS data. Assumed GIS data is more current and valid.
9	Design Report for Preliminary Plan Submittal Baseline Road from 24th St to 32nd St. P-834903	Mar. 11, 1991	City of Phoenix	Evans, Kuhn & Assoc.	Miscellaneous Calculations and exhibits. No report. Includes some design documentation of Western Canal Bridge at 32nd St. Hydrology was developed using the Rational Method.	Little or no significance to study.
10	Final Drainage Report Central Avenue - South Mountain Park to Baseline Road Project No. P-900613 (separate report provided Drainage Calculations North of Highline Canal)	Aug, 1992	City of Phoenix	Parsons Brinckerhoff Quade & Douglas, Inc.	Drainage report for roadway improvements on Central Avenue. Improvements to include 24"-39" storm drain improvements on Central from Piedmont Road just outside of S. Mtn park to just south of the Highline Canal where it would discharge to a proposed detention basin at the SE corner of Highline Canal and Central Ave. 2-yr storm drain design. Hydrology was developed using the Rational Method.	Improvements not reflected in GIS data. Proposed retention basin does not exist at location or in vicinity.
11	Final Drainage Report 7th Ave Bridge Over Western Canal Project No. BR-PHX-0(17)P	Aug, 1999	City of Phoenix	Parsons Transportation Group	Design report to extend a 66" storm drain south of Baseline on 7th Avenue for 570 ft to just south of the Western Canal bridge. Extension includes catch basin inlets. Connection is to be to a proposed 66' storm drain on Baseline (coming from the west) which is to be a joint COP/District project. Hydrology was developed using the Rational Method.	Proposed 66" trunk line not reflected in GIS data. Project on the periphery or outside the study area. Not relevant to existing conditions modeling but may be relevant for future mitigation alternatives.
12	Drainage Report for Southern Avenue 19th Ave to 7th Ave.	Sept 17, 2001	City of Phoenix	Entellus	Storm drain improvements that connect to 36" stub out from the 19th Ave trunk line. 36" storm drain lateral extended down to short of 7th Ave (storm drain layout/plans not in report). 36" lateral does not achieve 2-yr design criteria but downstream stub out limits pipe size. Hydrology was developed using the Rational Method.	Drainage improvements not reflected in GIS data. Modeling in FLO-2D to be based upon 36" stub out. Inlets should be extended further east to achieve pipe capacity.
13	Storm Drain Report Baseline Road 16th St to 24th St ST85100054-D	July, 2002	City of Phoenix	Dibble & Assoc.	Storm drain design report for future widening of Baseline Rd. Drainage improvements include inlets and storm drain to tie into 16th St and 24th St trunk lines. 2-yr storm drain design. Hydrology was developed using the Rational Method.	Drainage improvements/trunk lines at connection are less than 36" in size (not within the scope of Hohokam ADMS).
14	Final Drainage Report Baseline Road 32nd St to 40th St ST85100047	Sept, 2003	City of Phoenix	Primatech	Drainage design report for widening of Baseline Rd from 4 to 6 lanes. Drainage improvements include inlets and storm drain to tie into 32nd St trunk line. 2-yr storm drain design. Hydrology was developed using the Rational Method.	Drainage improvements/trunk lines at connection are less than 36" in size (not within the scope of Hohokam ADMS).

Summary of Hohokam Area Drainage Reports (Not Inclusive of all Gathered material)

ID	Title	Date of Report	Prepared for	Prepared By	Summary	Comments
15	30% Plans for Avenida Rio Solado/Broadway Rd: 15th Ave to 7th St Paving & Storm Drain ST85100330	Nov, 2010	City of Phoenix	CK Group	Preliminary 30% plans and associated drainage reports for street improvements. Storm drain improvements limited to new catchbasins and connection pipes	Little or no significance to the Hohokam ADMS at this time.
16	30% Plans for Avenida Rio Solado/Broadway Rd: 27th Ave to 17th Ave Paving & Storm Drain ST85100331	Feb, 2011	City of Phoenix	Jacobs	Preliminary 30% plans and associated drainage reports for street improvements. Storm drain improvements limited to new catchbasins and connection pipes	Outside of study area. Little or no significance to the Hohokam ADMS at this time.
17	Final Design Report 23rd Ave & Roeser Rd Detention Basin & Outfall Storm Drain ST83120034	April 22, 2005	City of Phoenix & District	Coe & Van Loo	Presents preliminary design/conceptual flood control and drainage improvements in the Laveen Study Area to include large diameter storm drain and detention basins.	Outside of study area. Little or no significance to the Hohokam ADMS at this time.
18	Final Drainage Report 19th Avenue Improvements Baseline Road to Southern Avenue / ST85100066		City of Phoenix	Premier Engineering Corp.	Drainage report for roadway improvements on 19th Avenue from Southern to Baseline Road. Hydrology was developed using the Rational Method.	Outside of study area. Little or no significance to the Hohokam ADMS at this time.
19	COP Highline Survey	n/a (circa 2009-10)	City of Phoenix	Dibble & Assoc.	Survey data along the Highline Canal in the vicinity of specific locations identified by the COP (locations where homes are in flood hazard zones)	May be used to supplement grid element floodplain elevations along the Highline Canal in the FLO-2D analyses.
20	South Phoenix/Laveen Drainage Improvement Project - Various Reports	1997	District	HDR	Develops conceptual plans for a recommended alternative storm water collection and conveyance system which will minimize the flooding in the Laveen Study area. Hydrology was developed using HEC-1.	Outside of study area. May be of ancillary use during the course of the Hohokam ADMS.
21	Arizona Grand Resort - Guadalupe FRS Emergency Spillway Analysis Drainage Memorandum	May 8, 2008	District	CMX	Drainage memo concerning impact of proposed changes to the golf course in the Arizona Grand Resort on the performance of the Guadalupe FRS.	Outside of study area. May be of ancillary use for Hohokam ADMS.
22	Final Drainage Report for Papago Freeway Project I-10-3(156)PE Phoenix - Casa Grande Highway 24th St. to Salt River Bridge	Mar. 1985	ADOT	Evans, Kuhn & Assoc.	Drainage design report for I-10 from 24th St to the Salt River Bridge. Hydrology was developed using the Rational Method.	Outside of study area. May be of ancillary use during the course of the Hohokam ADMS.
23	Supplement No. 3 to Final Drainage Report Phoenix - Casa Grande Highway 32nd St Interchange Maricopa County Project I-10-3(222)PE	June 16, 1987	ADOT	DMJM	Drainage design report for I-10 for 32nd St interchange. Storm drain and drainage area layouts missing from report. Hydrology was developed using the Rational Method.	Generally I-10 facilities are outside of study limits, however report may provide useful information regarding and facilities crossing I-10.
24	Drainage Report I-10 Corridor Study 40th St to Baseline Road	June 12, 1988	ADOT	DMJM	Drainage design report for I-10 for 32nd St interchange. Storm drain and drainage area layouts not provided in report. Hydrology was developed using the Rational Method.	Generally I-10 facilities are outside of study limits, however report may provide useful information regarding and facilities crossing I-10.
25	Final Drainage Report Volume 1 44th St - Superstition TI / Project No. IR-10-3(315) 40th St. - Southern Ave (HOV Lanes) / Project No. I-10-3(309)	April, 1990	ADOT	DMJM	Drainage design report for I-10 for 44th St TI. Hydrology was developed using the Rational Method.	Generally I-10 facilities are outside of study limits, however report may provide useful information regarding and facilities crossing the I-10.
26	Final Drainage Report for State Highway Phoenix - Casa Grande Highway (I-10) Baseline Road - Chandler Blvd. Project No. NH-10-3(322)	Dec. 4 1995	ADOT	Kaminski Hubbard & Dibble & Assoc.	Drainage design report for I-10 from Baseline to Chandler Blvd.	While Baseline is indicated, project actually starts south of Baseline and outside of the Hohokam Study Area.
27	I-10 Drainage Design Report Ahwatukee Drainage Outlet Concrete Box Culvert Crossing Baseline Rd - Chandler Blvd Project No. 010 MA 156 H2382 01D / NH-10-3(322)	Jan 1994	ADOT	Ritoch-Powell & Assoc	Outside of study area.	Outside of study area.
28	Pump Station Equipment/Storage Analysis Tech Memo I-10/Southern Avenue Pump Station Contract No 94-48 TRACS No. 010 MA 155 H 3696 01 D	Dec. 1996	ADOT	Aztec Engineering	Analysis of freeway pump stations at I-10 and Southern Ave. Basis for hydrology not specified.	Little or no significance to study.
29	Design Plans Baseline Road 51st Ave to 7th Ave Project 68914 Phase I	July, 2000	MCDOT	URS Greiner Woodward Clyde	Design Plans for Baseline Road includes storm drain information. (Design plans in metric. Hydrology was developed using the Rational Method.	Outside of study area but does confirm a 66" diameter storm drain line turning south down 7th Ave from Baseline Road. (see Final Drainage Report 7th Ave Bridge Over Western Canal)
30	Hydrologic Analysis for South Mountain Distributary Flow Area	D3ec. 1996	District	District	Developed hydrology for the "South Mountain Distributary Flow Area" (SMDFA), a 2 sq. mi watershed located in the South Mountain Park area. Hydrology for multiple storm events and durations were developed using HEC-1.	Little or no significance to study.
31	Common Area Grading and Drainage & Offsite Drainage Inspection Report Following the Storm of July 31, 2010 for The Pines at South Mountain, Phoenix, Arizona	Aug. 2010	The Pines at South Mountain HOA	Desert Drainage Engineering, PLC	This report was initiated by the HOA after damage resulting from a storm on July 31, 2010. The purpose was to analyze offsite drainage conditions, assess the damage done, and provide recommendations for remediating on-site grading and drainage problems.	Report documents the damage resulting from the storm. It recommends onsite erosion protection and opines that the removal of a sluice gate in the Highline Canal would greatly reduce flooding to the development as would a larger berm on the north side of the canal.

APPENDIX D

FLOODING COMPLAINTS AND SITE INVESTIGATIONS



Location	Description
1	268 W. South Mountain Ave
2	2920 E. Elwood St.
3	3131 E Old Southern
4	20th Ave & Hidalgo Ave
5	3rd Ave: Illini St & Jones Ave
6	17th St & Chambers St
7	6th Ave & Pueblo Ave
8	Dobbins Rd: 7th St - 16th St
9	345 W Pueblo Ave
10	32nd St & Wood St
11	504 W Sunland Ave
12	S. Mountain Ave & 3rd Ave
13	29th ST & Illini
14	S. Mountain Ave: 7th Ave - Central
15	1324 W Pecan Rd
16	1838 E S. Mountain Ave
17	8015 S. 16th St
18	1727 E Bowker St
19	1814 E Valencia Dr
20	8050 S. 14th St
21	40th St & Broadway Rd
22	1229 E Desert Park
23	4602/4610 S. 16th Pl
24	22nd St & Southern Ave
25	2205 E Burgess Ln
26	2902 E Elwood St
27	5815 S 36th St
28	5227 S. Montezuma
29	1932 E Marguerite Ave
30	2702 E Southern Ave
31	7822 S 46th Street
32	20th Ave & S. Mountain Ave
33	24th St & Winston Dr
34	24th St: Dobbins Rd to Baseline Rd
35	20th St: Dobbins Rd to Baseline Rd
36	16th St: Dobbins Rd to Baseline Rd
37	7th St: Dobbins Rd to Baseline Rd
38	8045 S 24th St (no such address)
39	2308 E Desert Ln
40	S. Mountain Ave: 16th St to 24th St
41	S. Mountain Ave & 28th St
42	2615 E Gary Way
43	Branham Ln: 14th St to 16th St
44	13th Pl & Baseline Rd
45	502 E Desert Dr
46	1602 E Pecan Rd
47	1650 E Chambers Rd
48	20th St & Sunland Ave
49	10th St & Alta Vista Rd
50	18th St & Southern Ave
51	1122 E Pedro Dr
52	Vineyard Rd - 16th St to 18th St
53	The Pines at S. Mtn - 21st Way & Baseline Rd
54	Cortland Point - 36th St & Francisco Dr

N
W E
S

0 0.3 0.6 1.2 Miles

Legend

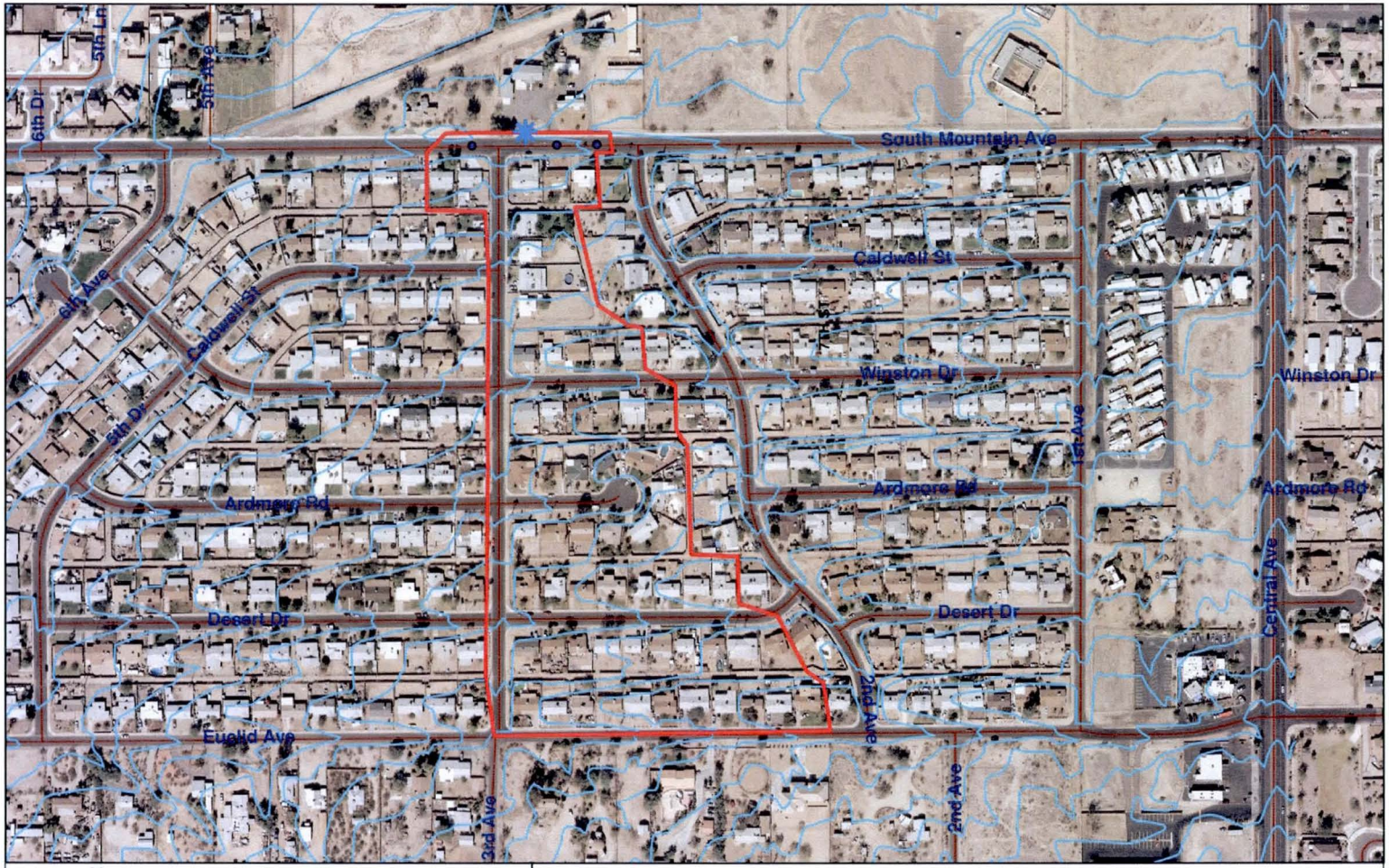
- Local Issue
- Potental Regional Issue
- 22 Location Number
- Study Area Limits

Drainage Complaint Locations
Hohokam Area Drainage Master Study/Plan
Contract FCD 2009C029

Stanley Consultants INC.
A Stanley Group Company
Engineering Environmental & Construction Services - Worldwide

Flood Control District of Maricopa County

Location 1: 258 W South Mountain Avenue



N
W E
S

Legend

- Drainage Problem Location
- Drainage Area
- Elevation Contour

0 130 260 520 Feet

Location 1: 258 W South Mountain Avenue, Phoenix
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

Date: 10/6/10

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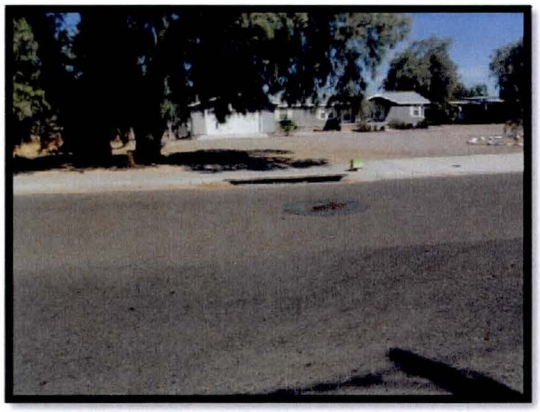
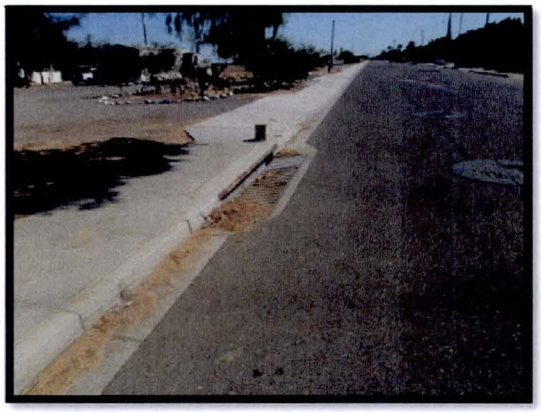
Location 1: 258 W South Mountain Avenue



Inlet along S Mountain Ave looking north



Inlet along S Mountain Ave looking east

Looking south from property

Looking NE along north limit of the property

Approx. Drainage Area:	14.5 acres
FEMA Flood Zone:	A
Complaint Date:	Unknown – "Dates of Flooding: Since 1975"
Description / Complaint:	Empty Field - Nuisance. Damages to house in SW corner. Two claims filed (both declined)
Actions Taken:	In past, shoulder graded to direct flow to field. Catch basin installed (dates unavailable)
Field Observations:	There is curb and gutter as well as a combination inlet on the north and south side of W South Mountain Ave. The two combination inlets are connected to a storm drain and receive flows from W South Mountain and S 3rd Ave. The finished floor appears to be approximately level with the street. Property to the west appears to be below the street elevation and may experience some ponding of water during storm events.
Conclusion:	**LOCAL ISSUE:** The property is susceptible to flooding when flow overtops the curb. It appears to be a local problem due to the size of watershed area.

Location 2 & 26: 2902 / 2920 E. Elwood Street

N
W E
S

Legend

- Drainage Problem Location
- Drainage Area
- Elevation Contour

0 150 300 600 Feet

Location 2 / 26: 2902 / 2920 E. Elwood Street, Phoenix
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

Date: 10/6/10

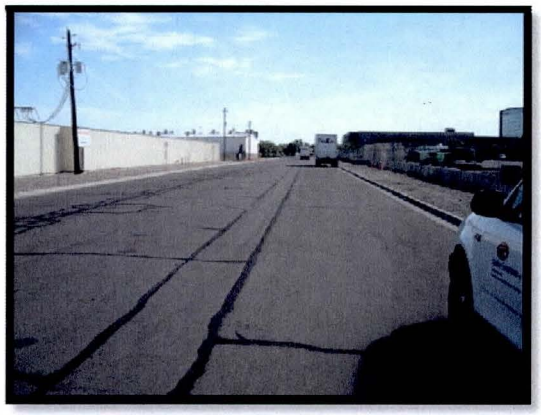
\\PHX-FS2\PHX-Projects-3\22877\GIS\Stanley\Drainage Problems\FID 1 25.mxd

Location 2 & 26: 2902 / 2920 E. Elwood Street

Elwood Street looking east

Elwood Street looking west

Elwood Street looking west



Elwood Street looking east

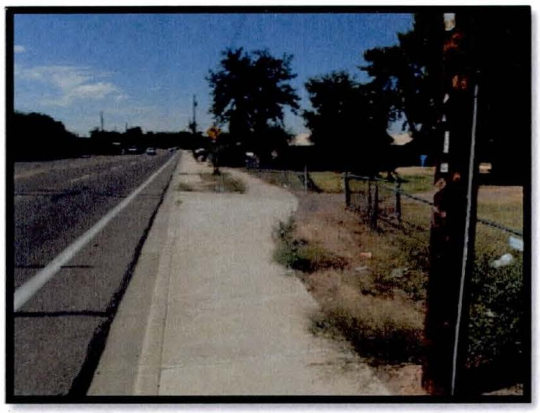
Approx. Drainage Area:	2.2 acres
FEMA Flood Zone:	X
Complaint Date:	Unknown
Description / Complaint:	Repetitive flooding of street, property and business (dates unavailable)
Actions Taken:	No known action taken.
Field Observations:	28th Street and 30th Street drain north to Elwood Street which has a low point with catch basins at approximately 2920 E. Elwood Street. The finish floor elevations appear to be elevated above the roadway elevations.
Conclusion:	**LOCAL ISSUE:** There does not appear to be an emergency outfall for the catch basins located along Elwood Street. If the catch basins receive flows in excess of their capacity, flooding could occur. Additional catch basins may help capture additional flow and improve conditions.

Location 3: 3131 E Old Southern Avenue

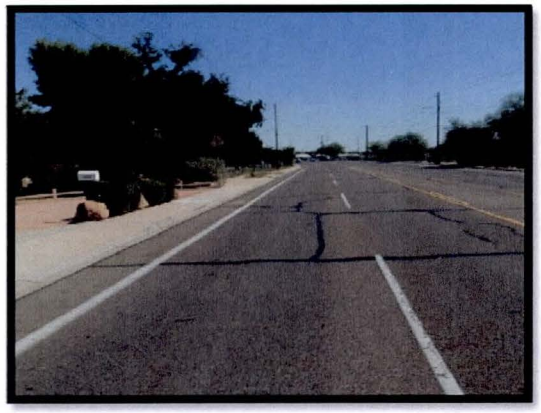
Location 3: 3131 E Old Southern Avenue

Inlet along Southern Ave looking north

Inlet along Southern Ave looking northwest



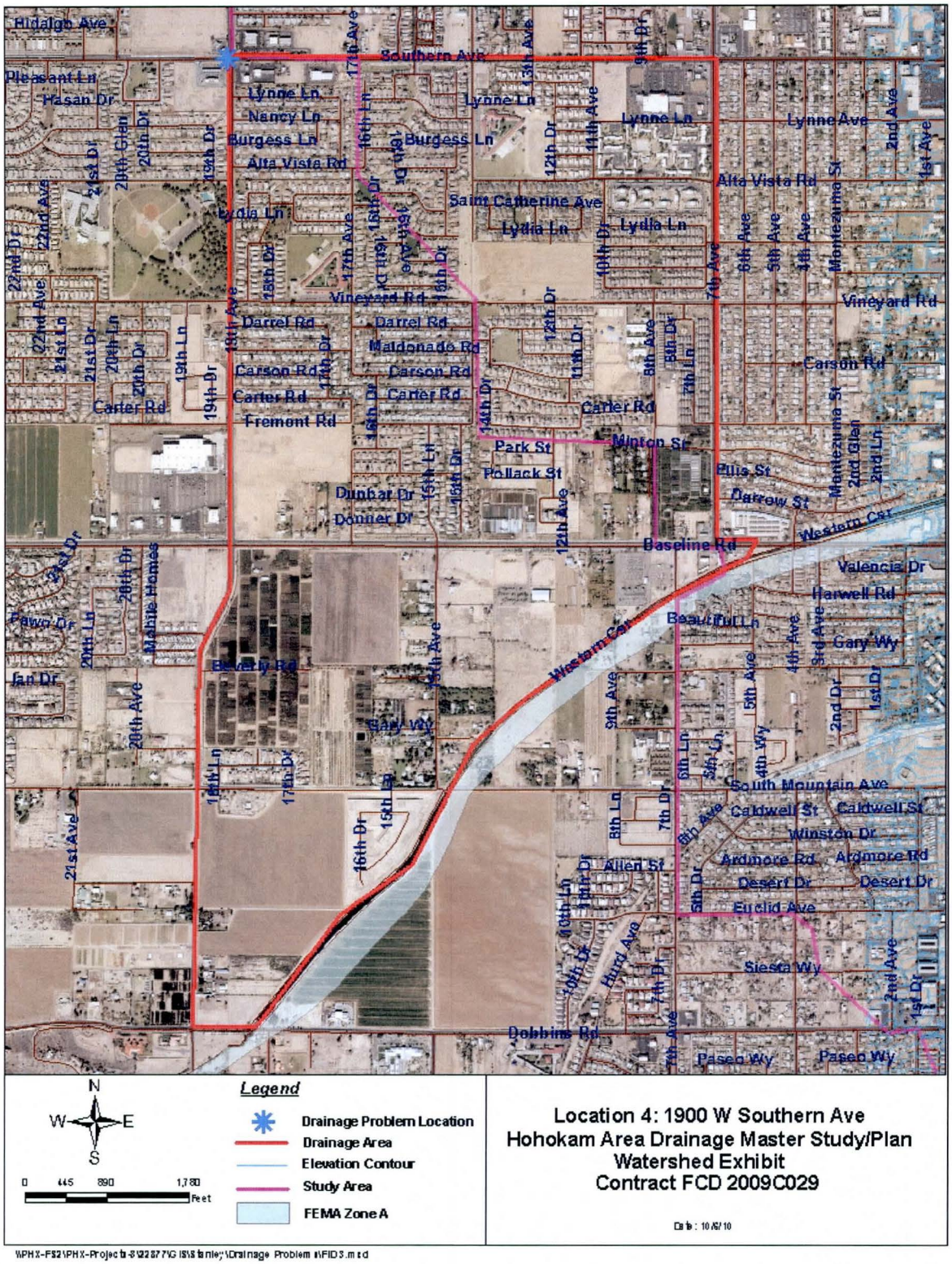
Southern Ave looking northwest



Southern Ave looking southeast

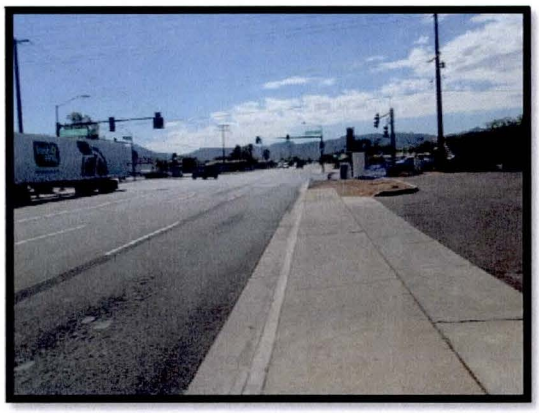
Approx. Drainage Area:	6.9 acres
FEMA Flood Zone:	X
Complaint Date:	2002
Description / Complaint:	Nuisance street water
Actions Taken:	Pre design study in 2002 & construction of storm drain and catch basin in 2004. Improvements supposedly improved conditions.
Field Observations:	Flow travels east on Southern Avenue. Finished floor elevation of properties on the north appears to be below street. There is curb and gutter along with curb inlet on the north side of the Southern Avenue. No catch basin was located along E. Old Southern Avenue. Based on visual observation Old Southern is fairly flat.
Conclusion:	**LOCAL ISSUE:** It appears that runoff along Old Southern is a local drainage issue due to the longitudinal slope of the road and a speed hump.

Location 4: 1900 W Southern Avenue



Location 4: 1900 W Southern Avenue

Southern Ave & 19th Ave Intersection looking SE



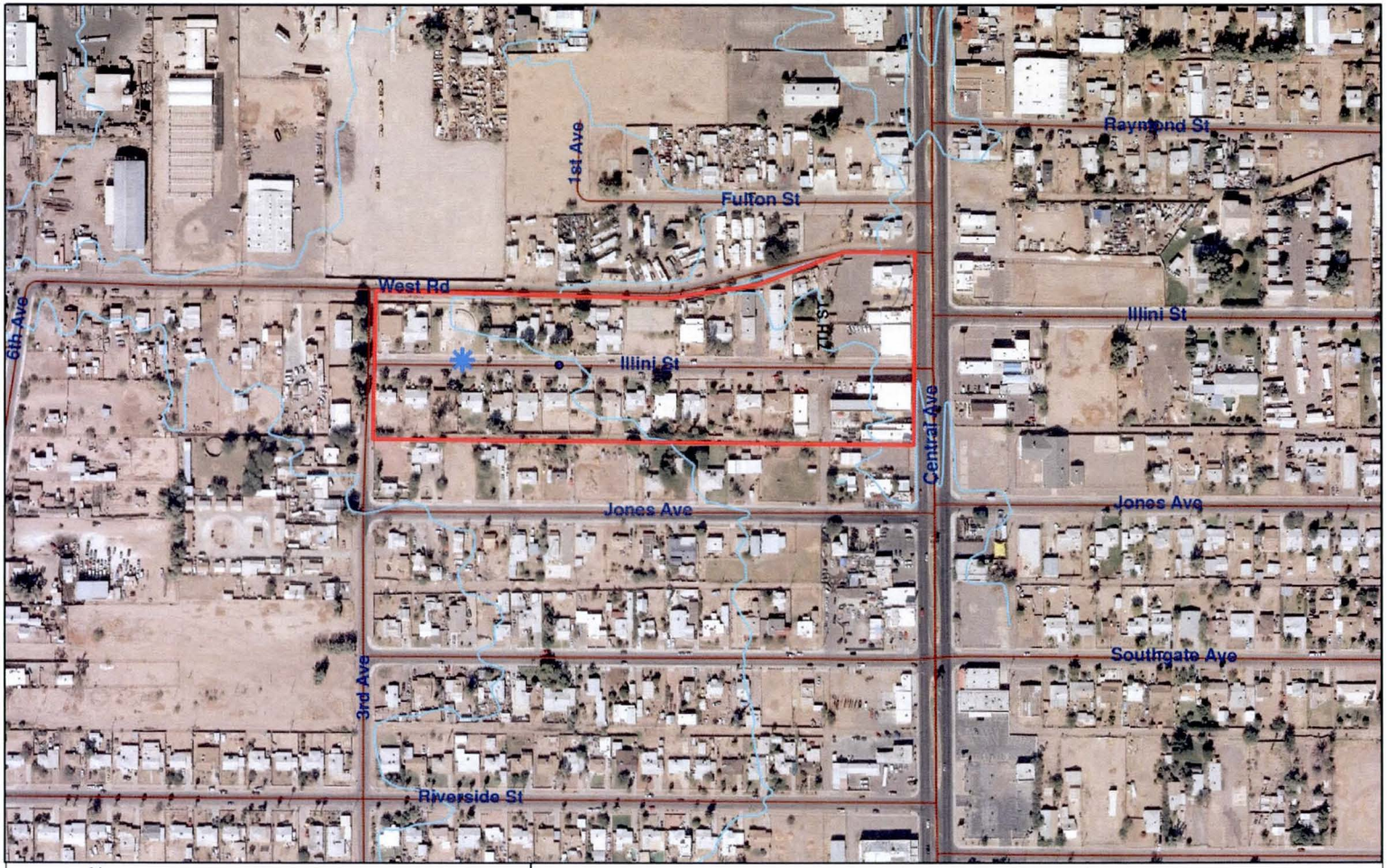
19th Ave looking south

Southern Ave looking east

Southern Ave looking east

Approx. Drainage Area:	998.9 acres
FEMA Flood Zone:	X
Complaint Date:	2002
Description / Complaint:	Occasional nuisance street water.
Actions Taken:	No known action taken.
Field Observations:	Based on visual observation flow travels south to north down 19th Avenue. Intersection of Southern Avenue and 19th Avenue has been recently improved and has not experienced storm water problems according to a Circle K employee.
Conclusion:	**LOCAL ISSUE:** Intersection improvements may have eliminated previous storm water problems; hence, this appears to be a localized flooding issue.

Location 5: 200 W. Illini Street



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Legend

- Drainage Problem Location
- Drainage Area
- Elevation Contour

0 150 300 600 Feet

Location 5: 200 W. Illini Street, Phoenix
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

Date: 10/6/10

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Location 5: 200 W. Illini Street

Illini Street looking west

Illini Street looking west

Catch basin along Illini Street

3rd Avenue looking south

Approx. Drainage Area:	10.1 acres
FEMA Flood Zone:	X
Complaint Date:	Unknown
Description / Complaint:	Complaint not described.
Actions Taken:	No known action taken.
Field Observations:	Illini Street drains west and 3rd Avenue drains south. It appears catch basins have been installed at the intersection of 3rd Avenue along Illini Street in response to flooding problems.
Conclusion:	**LOCAL ISSUE:** Notes for the area date 2002 and the catch basins appear to be installed more recently than 2002. The catch basins may have alleviated flooding issues in the area. It appears to be a localized issue.

Location 6: 1600 E. Chambers Street

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0 150 300 600 Feet

Legend

- Drainage Problem Location
- Drainage Area
- Elevation Contour

Location 6: 1600 E. Chambers Street, Phoenix
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

Date: 10/6/10

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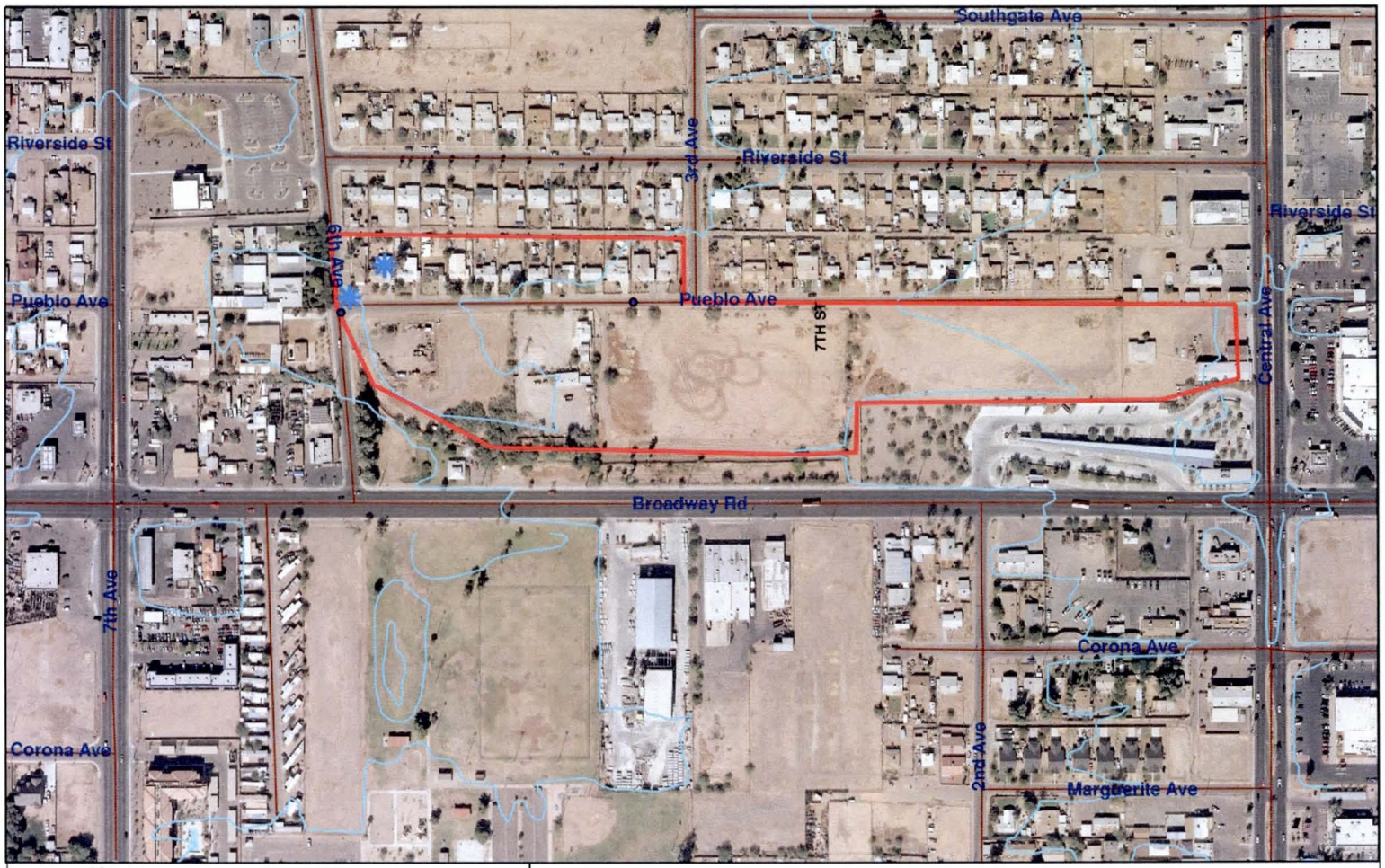
Location 6: 1600 E. Chambers Street

Chambers Street looking west

Chambers Street looking east

Approx. Drainage Area:	2.5 acres
FEMA Flood Zone:	X
Complaint Date:	1995
Description / Complaint:	Flooding during heavy rains.
Actions Taken:	Installed catch basin in 1998. Improvements supposedly improved conditions.
Field Observations:	Chambers Street drains west. A storm drain system has been installed within Chambers Street that has inlets at 17th Street, 16th Street, and half way between 16th Street and 17th Street.
Conclusion:	**LOCAL ISSUE:** Based on the date of the complaint and the action of placing the storm drain system within Chambers Street, the issues may have been corrected. This appears to be a localized problem. **HOWEVER,** this location is in the general vicinity of several other complaints. Flooding conditions may be exacerbated by flows from 16th St, 18th St and 20th St, depending upon the ability of flow to cross Southern Ave and drain to the problem location. Consequently the drainage area could be larger and regional drainage conditions may contribute to the problem.

Location 7 & 9: 346 W. Pueblo Avenue / 4300 S. 6th Avenue



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Legend

- Drainage Problem Location
- Drainage Area
- Elevation Contour

Location 7 & 9: 346 W. Pueblo Ave / 4300 S 6th Ave, Phoenix
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

Date: 10/6/10

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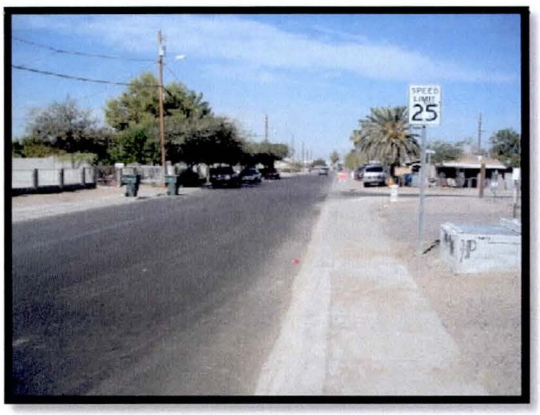
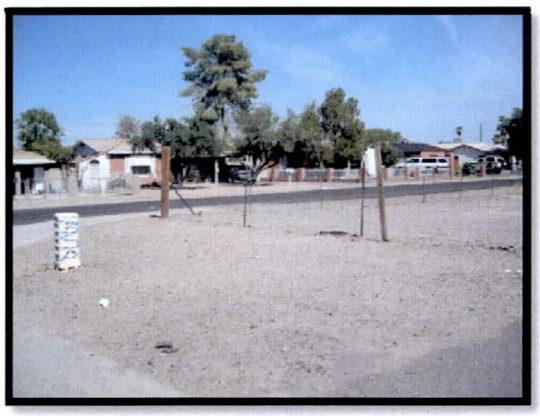
Location 7 & 9: 346 W. Pueblo Avenue / 4300 S. 6th Avenue



6th Avenue looking north

6th Avenue looking south

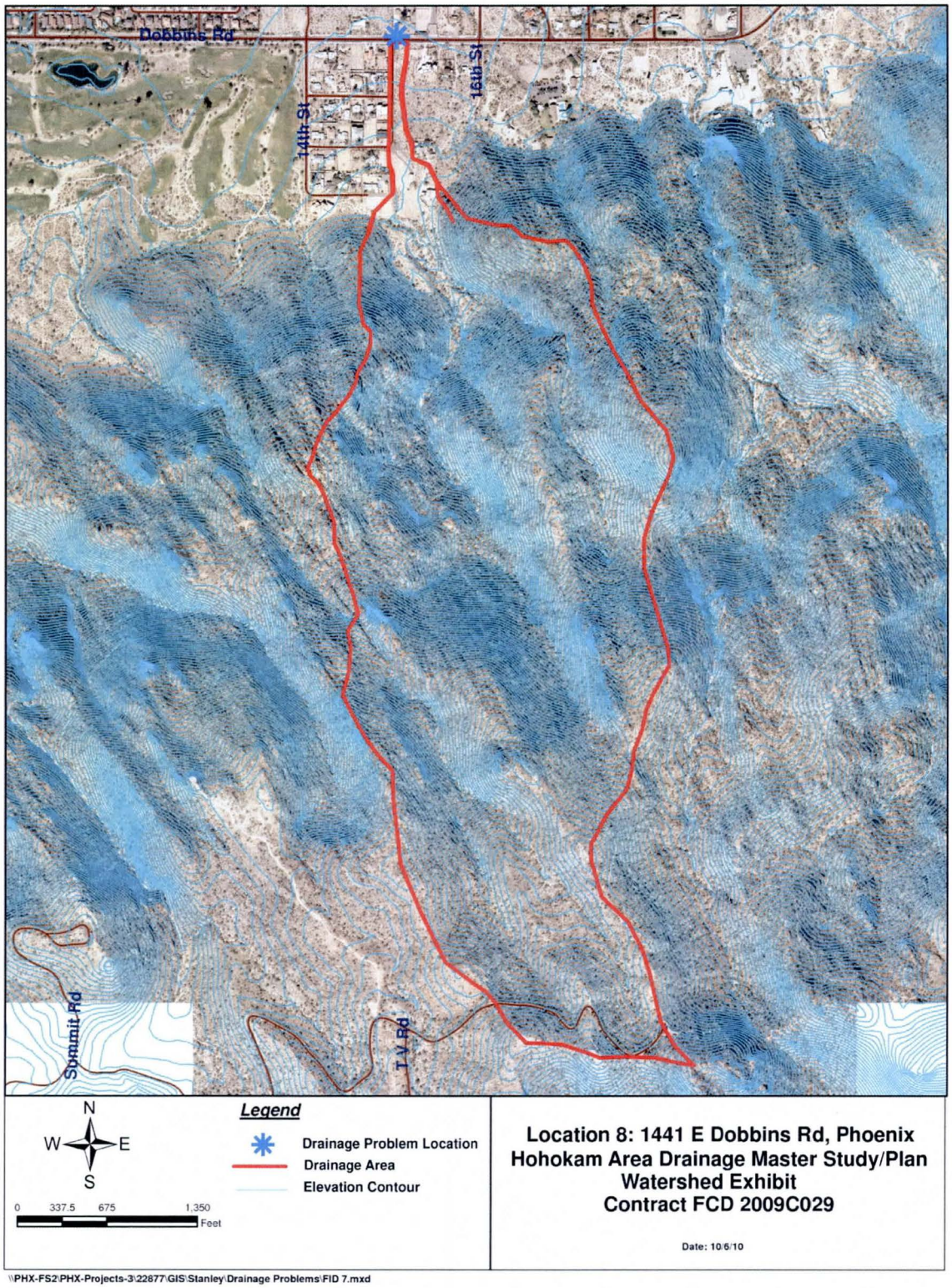


Homes along Pueblo Avenue east of 6th Ave

Catch basin along 6th Avenue

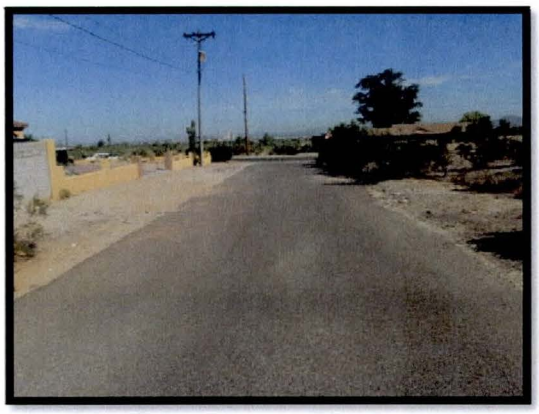
Approx. Drainage Area:	15.5 acres
FEMA Flood Zone:	X
Complaint Date:	Unknown
Description / Complaint:	Flooding every time it rains.
Actions Taken:	Installed new curb and gutter and catch basin (date unknown). Improve supposedly improved conditions.
Field Observations:	6th Avenue drains north and Pueblo Avenue drains west. There are catch basins north of Pueblo Avenue at Riverside Street. It appears that the pavement along 6th Avenue has been recently improved from Broadway Road to Riverside Street. Homes along Pueblo Avenue appear to be low with elevations at or below top of curb elevations.
Conclusion:	**LOCAL ISSUE:** Dates of complaints from the mid 1990's. Catch basins and street improvements appear to be more recent than the complaints. No deficiencies were noted that could be contributing to flooding within the area. It appears to be a localized issue.

Location 8: 1441 E Dobbins Road



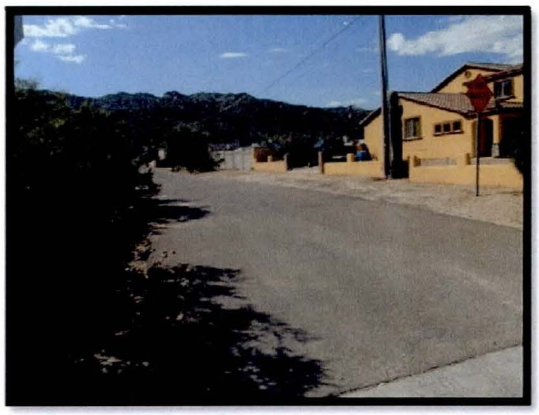
Location 8: 1441 E Dobbins Road

S 15th Street looking south



S 15th Street looking north

E Dobbins Road looking east



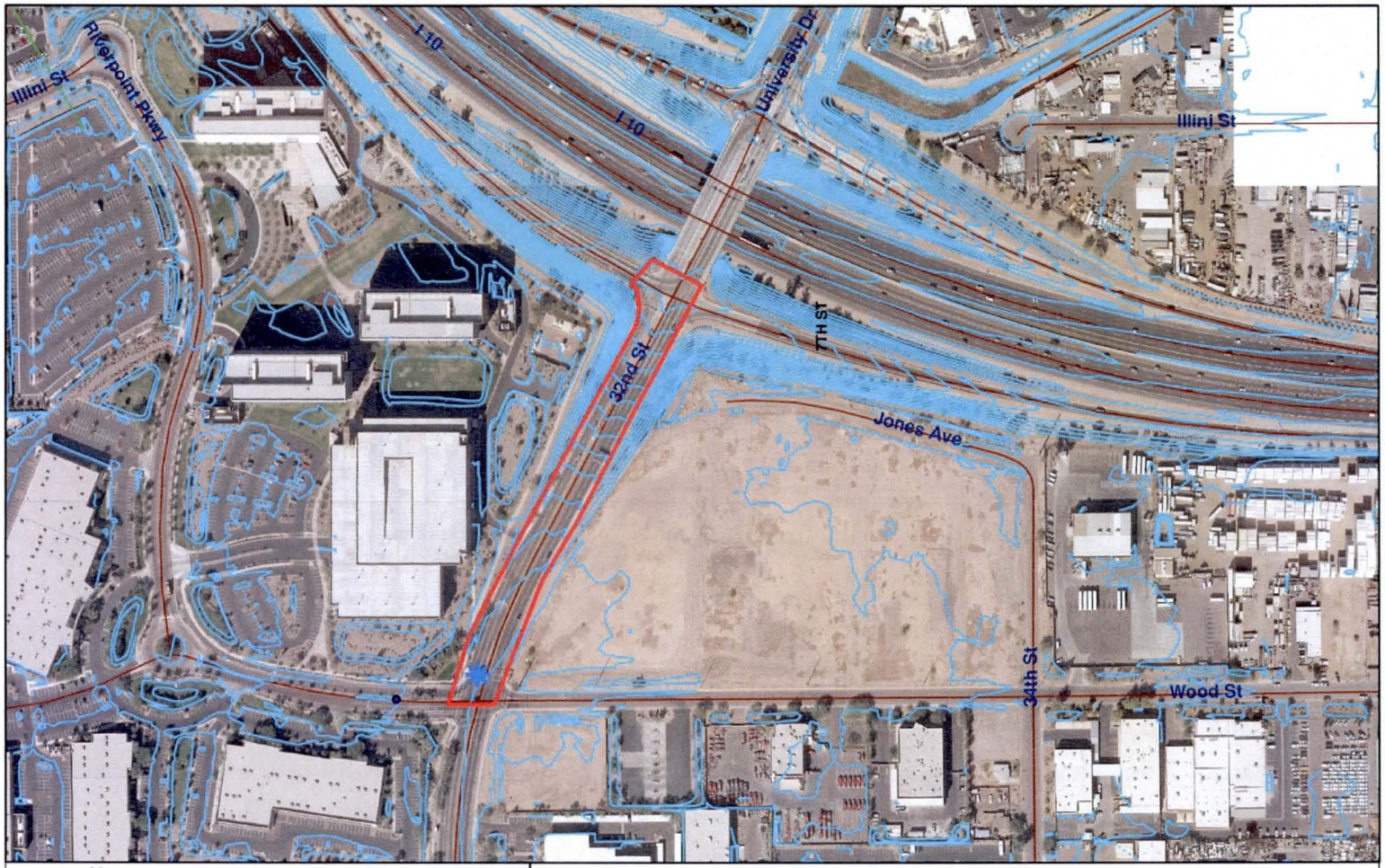
Looking SW at property

Approx. Drainage Area:	281 acres
FEMA Flood Zone:	X
Complaint Date:	Unknown
Description / Complaint:	Unknown
Actions Taken:	Upon development, contractor installed curb & gutter, sidewalks and culverts to maintain flow line.
Field Observations:	Based on visual observation the finished floor is higher than 15th Street. Flow originates in the South Mountain area and travels north via 15th Street until it intersects Dobbins Road and continues east. Due to steep slopes, high water velocities cause scour on east and west shoulders, refer to the picture above. There is curb and gutter on the south and north sides of Dobbins Road conveying storm water east. Culvert mentioned in "actions taken" was not located. It is possible the culverts were an interim measure removed upon further development of the area.
Conclusion:	**POTENTIAL REGIONAL ISSUE:** This could be a regional problem if flow depth coming north down 15th Street would reach the finished floor elevation.

Location 7 & 9: 346 W. Pueblo Avenue / 4300 S. 6th Avenue

Refer to Drainage Location 7.

Location 10: 3149 E. Wood Street



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Legend

- Drainage Problem Location
- Drainage Area
- Elevation Contour

0 150 300 600 Feet

Location 10: 3149 E. Wood Street, Phoenix
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

Date: 10/6/10

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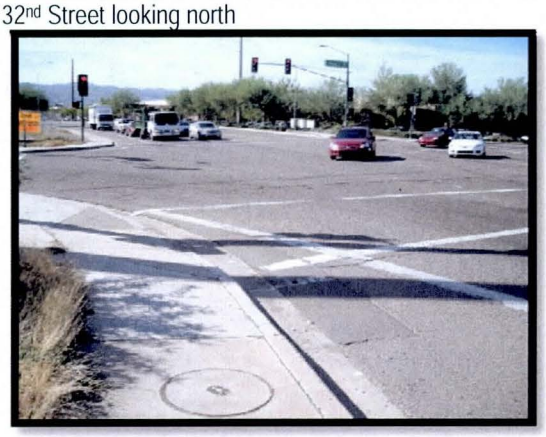
Location 10: 3149 E. Wood Street

Wood Street looking east

32nd Street looking north

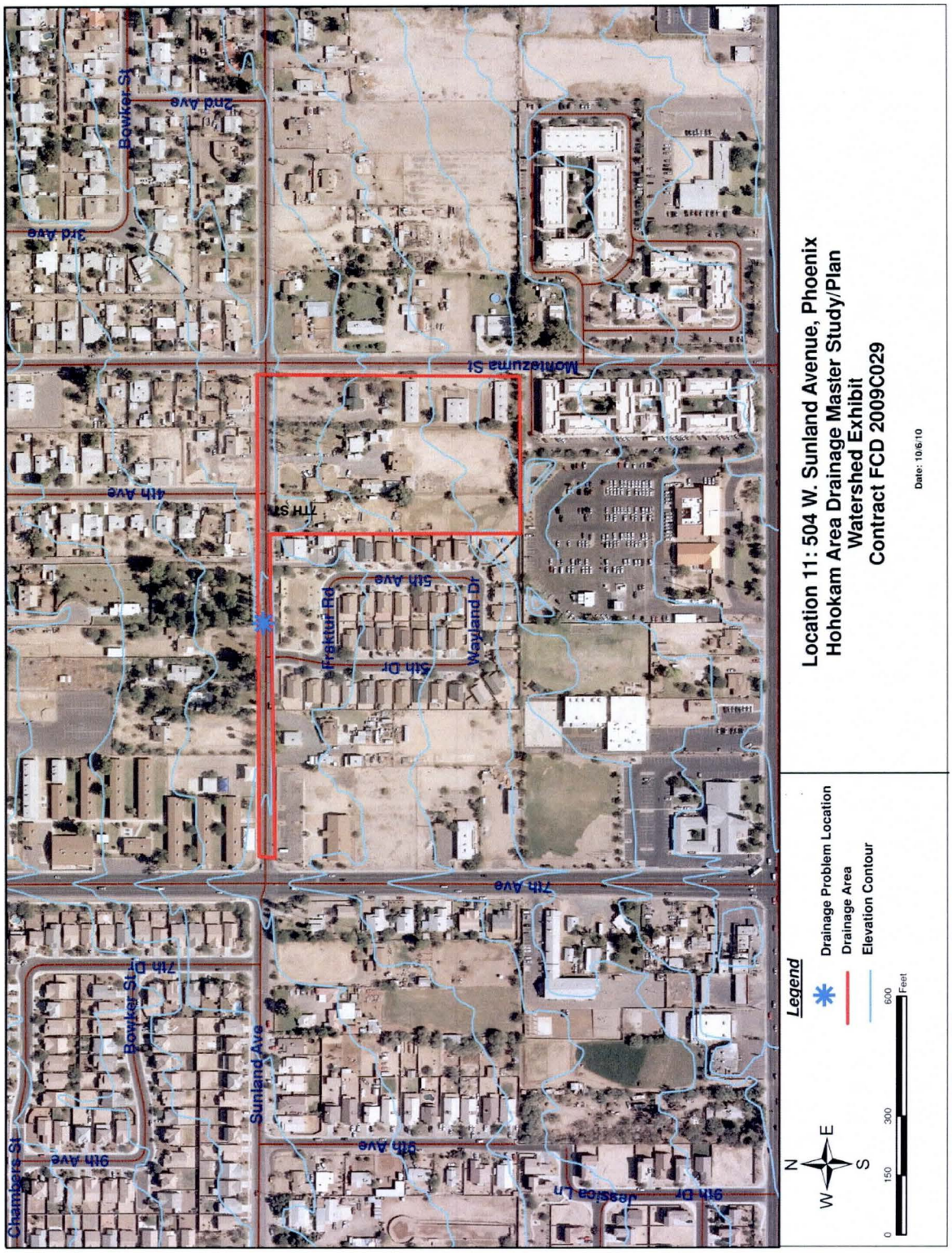
32nd Street looking south



32nd Street looking south

Approx. Drainage Area:	2.5 acres
FEMA Flood Zone:	X
Complaint Date:	2002
Description / Complaint:	Intersection south of I-10 ponds heavily after every rain.
Actions Taken:	Kitchell regarded the ditch & riverpoint design the runoff to the north under I-10 to Tempe drain. Drainage condition was improved.
Field Observations:	32nd Street drains south from the I-10 TI and is super-elevated from west to east through the intersection. Wood Street has a high point west of 32nd Street that prevents flows from 32nd Street from draining west along Wood Street. South of the intersection, 32nd Street transitions back to a normal crown. There is a catch basin at the northeast corner of the intersection.
Conclusion:	**LOCAL ISSUE:** The 32nd Street longitudinal slope is in a high transition point at the intersection. South of the intersection the longitudinal slope is shallow and the road transitions back to a normal crown from a super-elevated section north of the intersection. This transition along with the rapid slope change can create a localized low point along the west side 32nd Street that may be contributing to the ponding. Additional catch basins along the roadway may be necessary to alleviate ponding issues. This appears to be a localized issue.

Location 11: 504 W. Sunland Avenue



Location 11: 504 W. Sunland Avenue

Sunland Ave looking west

S. 5th Dr looking south

Sunland Ave looking east

Catch basin along Sunland Ave

Approx. Drainage Area:	6.8 acres
FEMA Flood Zone:	X
Complaint Date:	Unknown
Description / Complaint:	Unknown
Actions Taken:	New storm drain installed in area – all homes are low.
Field Observations:	Homes along Sunland Avenue have low finish floor elevations in relation to the street elevations. Homes within the area receive irrigation. The subdivision to the south of Sunland Avenue has drainage infrastructure including catch basins along S. 5th Drive immediately south of Sunland Avenue. There is a catch basin on Sunland Avenue at the complaint address. It was also noted that debris from ponding was noted above the catch basin on the sidewalk and along the fence of the property behind the catch basin.
Conclusion:	**LOCAL ISSUE:** The complaints date from the 1990's. The catch basin and storm drain system was reported to be installed after the complaints. Based on the debris above the catch basin it appears that flooding could still occur in the area. Additional inlets may be required to increase capacity. This appears to be a localized issue.

Location 12: 318 W South Mountain Avenue

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0 75 150 300 feet

Legend

- Drainage Problem Location
- Drainage Area
- Elevation Contour
- Study Area
- FEMA Zone A

Location 12: 318 W South Mountain Ave, Phoenix
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

Date : 10/6/10

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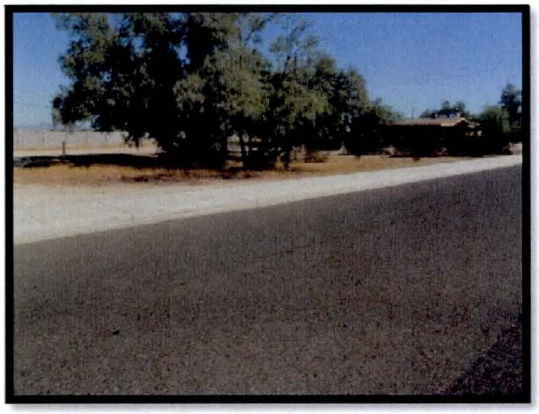
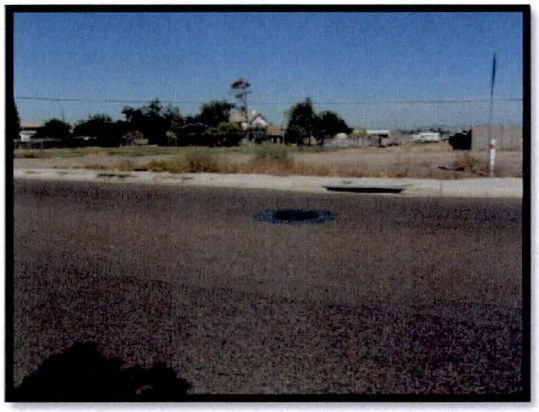
Location 12: 318 W South Mountain Avenue

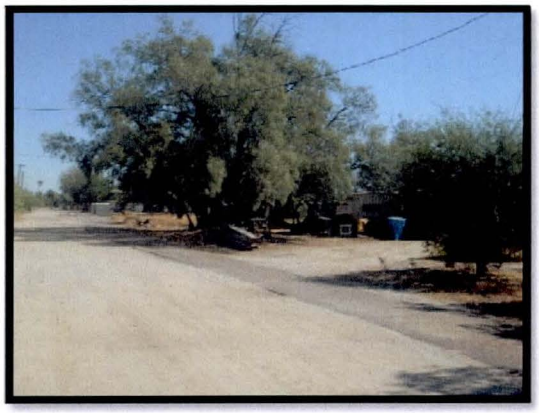


Looking northeast at the property

Inlet along W South Mountain looking east



Inlet along W South Mountain looking north



Looking NE along north limit of the property

Approx. Drainage Area:	1.5 acres
FEMA Flood Zone:	A
Complaint Date:	Unknown, "Dates of Flooding: Since 1975"
Description / Complaint:	House flooding
Actions Taken:	Graded shoulder to direct water to field and catch basin installed. Catch basin installed (no dates available)
Field Observations:	There is curb and gutter as well as a combination inlet on the north side of the W South Mountain Avenue. The combination inlet is connected to a storm drain and receives flows traveling east on South Mountain Avenue. The finished floor appears to be below the street elevation.
Conclusion:	**LOCAL ISSUE:** In small storm events, the issue appears to be ponded water and in the large storm events, there is a potential for flooding. It is a small drainage area; therefore, it is a localized drainage issue.

Location 13: 2501 E. Illini Street

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0 150 300 600 Feet

Legend

- Drainage Problem Location
- Drainage Area
- Elevation Contour

Location 13: 2501 E. Illini Street, Phoenix
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

Date: 10/6/10

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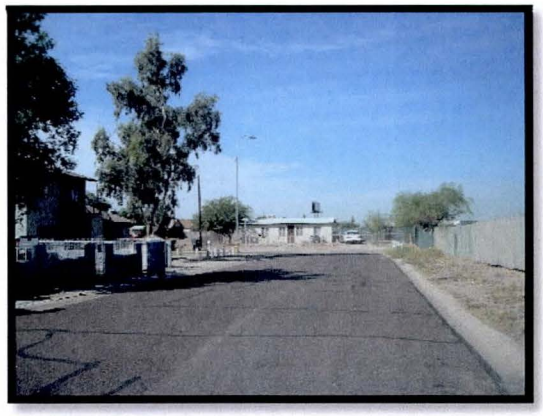
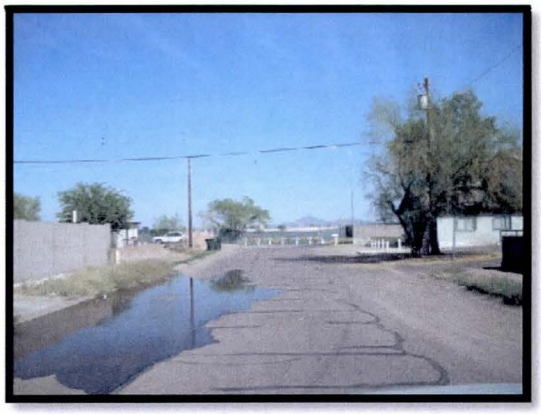
Location 13: 2501 E. Illini Street

Illini Street looking west



Illini Street looking west

25th Street looking south



25th Street looking north

Approx. Drainage Area:	22.2 acres
FEMA Flood Zone:	X
Complaint Date:	Unknown (prior to 2003)
Description / Complaint:	This location is on routine pump maintenance after rain storms
Actions Taken:	Pre-design Study in 2005. GIS indicates inlet installed, however, no inlet was found in the field.
Field Observations:	25th Street drains north to Illini Street and Illini Street drains west to the intersection with 25th Street. 25th Street ends at an open barricade that drains north to the Salt River.
Conclusion:	**LOCAL ISSUE:** Based on the observed slopes, it appears flows from 25th Street and Illini Street would combine at the intersection. The barricade at the end of 25th Street is open and would not restrict runoff. During the field investigation, a fire hydrant was open along Jones Avenue that drains to 25th Street and south towards Illini Street. The water ponded along 25th Street half way between Illini Street and Jones Avenue. This appears to be a localized issue that could be corrected with a catch basin inlet.

Location 14: 228 W South Mountain Avenue

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0 125 250 500 Feet

Legend

- Drainage Problem Location
- Drainage Area
- Elevation Contour
- Study Area
- FEMA Zone A

Location 14: 228 W South Mountain Ave, Phoenix
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

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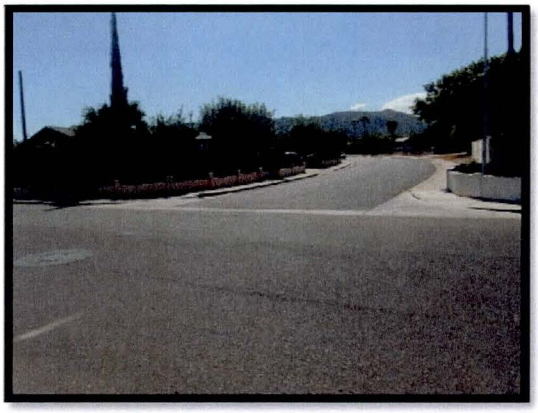
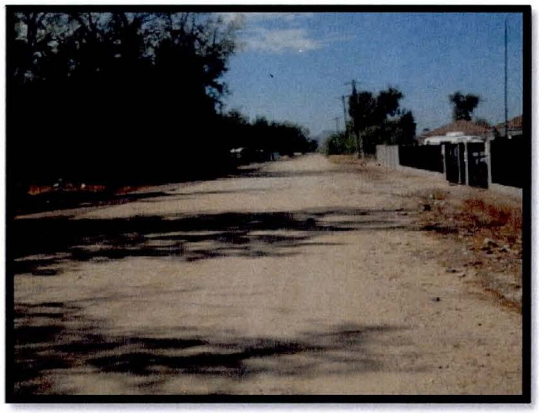
Location 14: 228 W South Mountain Avenue

Inlet along S Mountain Ave looking east

Inlet along S Mountain Ave looking east



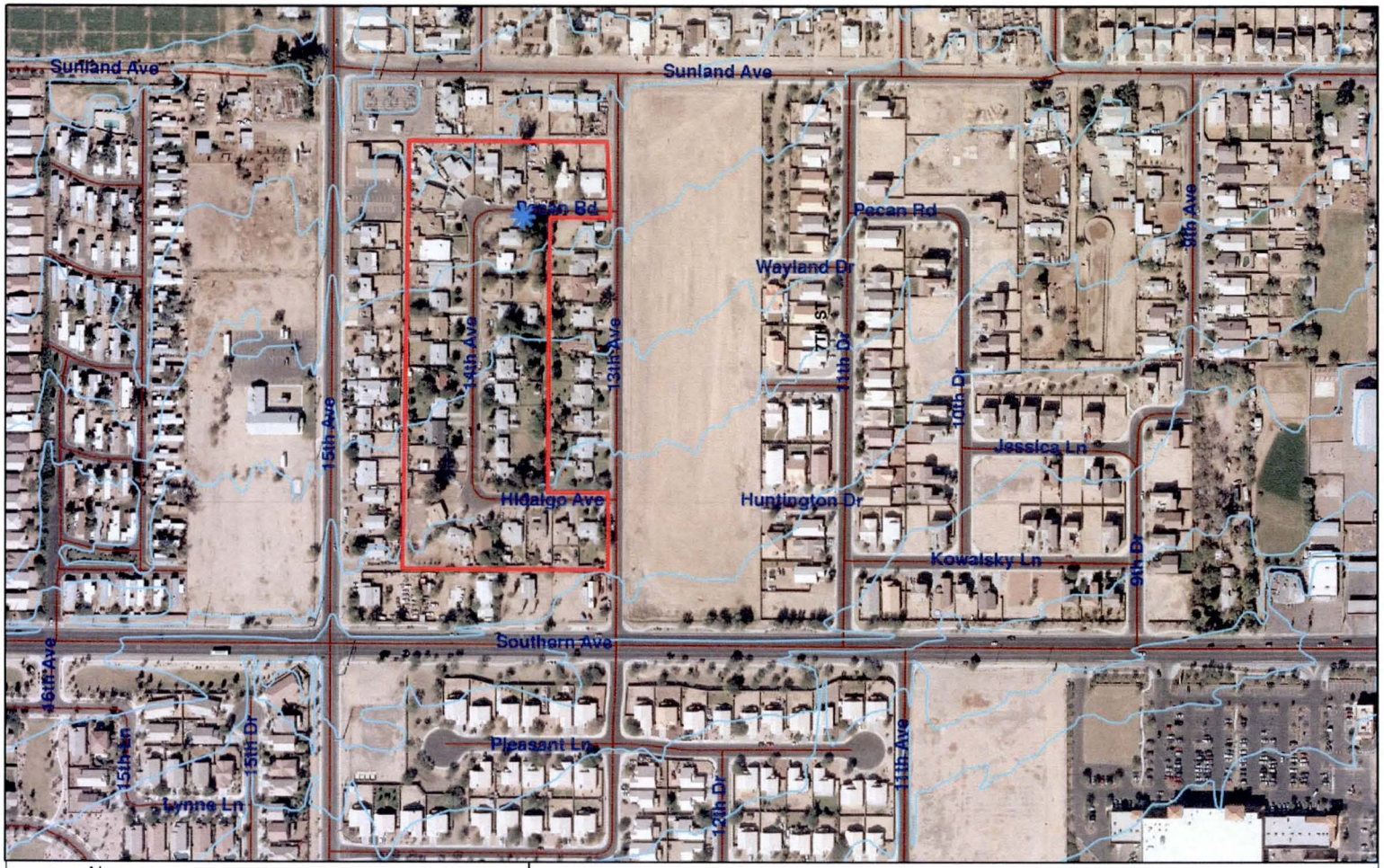
Looking south from property



Looking southwest along north limit of property

Approx. Drainage Area:	39.0 acres
FEMA Flood Zone:	A
Complaint Date:	Unknown, "Dates of Flooding: Since 1975"
Description / Complaint:	House flooding
Actions Taken:	Graded shoulder to direct water to field and catch basin installed. Catch basin installed (no dates available)
Field Observations:	There is curb and gutter as well as a combination inlet on the north and south side of the W South Mountain Avenue. The two combination inlets are connected to a storm drain and receive flows from W. South Mountain and S. 2nd Avenue. The finished floor appears to be approximately level with the street.
Conclusion:	**LOCAL ISSUE:** The property is susceptible to flooding during large storm events overtopping the curb. It appears to be a local problem due to limited inflow from the south side of the property.

Location 15: 1324 W. Pecan Road



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Legend

- Drainage Problem Location
- Drainage Area
- Elevation Contour

0 150 300 600 Feet

Location 15: 1324 W. Pecan Road, Phoenix
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

Date: 10/6/10

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Location 15: 1324 W. Pecan Road

14th Ave looking north

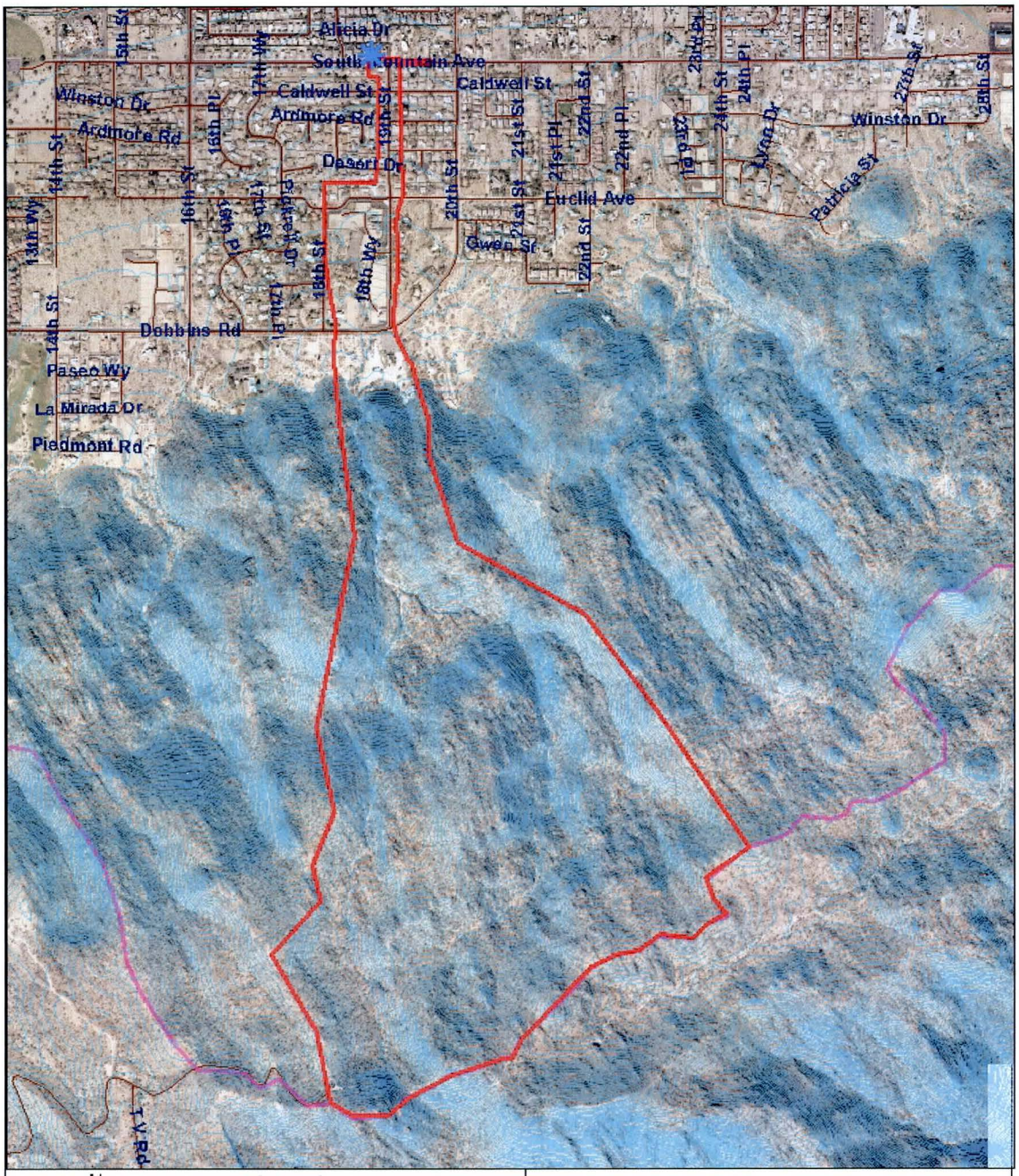
Pecan Road looking west

Pecan Road looking east

Valley gutter across 14th Ave

Approx. Drainage Area:	8.4 acres
FEMA Flood Zone:	X
Complaint Date:	1999
Description / Complaint:	Nuisance street water every time it rains.
Actions Taken:	Sunken street and gutter supposedly fixed "in-house".
Field Observations:	14th Avenue drains north to Pecan Road. There is curb and gutter along both 14th Avenue and Pecan Road. A valley gutter is present across 14th Avenue sloping from west to east.
Conclusion:	**LOCAL ISSUE:** According to documents from the City of Phoenix, road improvements were done in the area to fix the sunken area. No catch basin inlets were noted in the area. It should also be noted that debris from ponded water is along Pecan Road. If flooding is still an issue within the area, catch basin inlets could alleviate flooding issues. It appears to be a localized issue.

Location 16: 1838 E South Mountain Avenue



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Legend

- Drainage Problem Location
- Drainage Area
- Elevation Contour
- Study Area
- FEMA Zone A

Location 16:
1838 E South Mountain Ave, Phoenix
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

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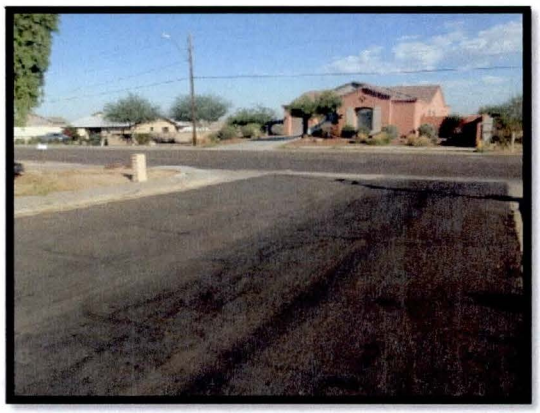
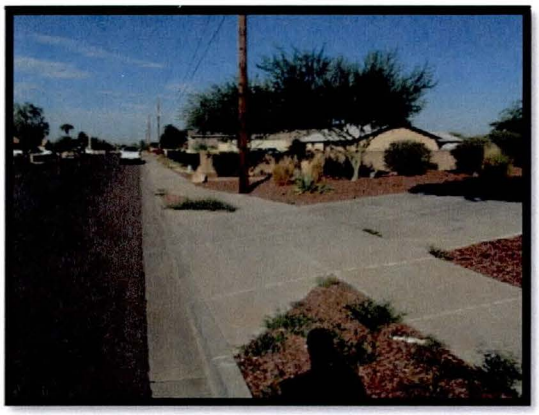
Location 16: 1838 E South Mountain Avenue

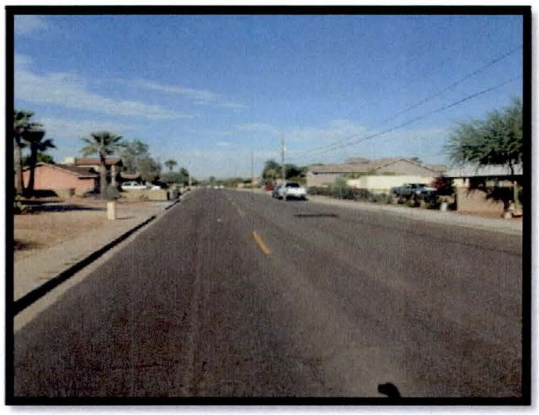
19th Street looking north



19th Street looking northwest



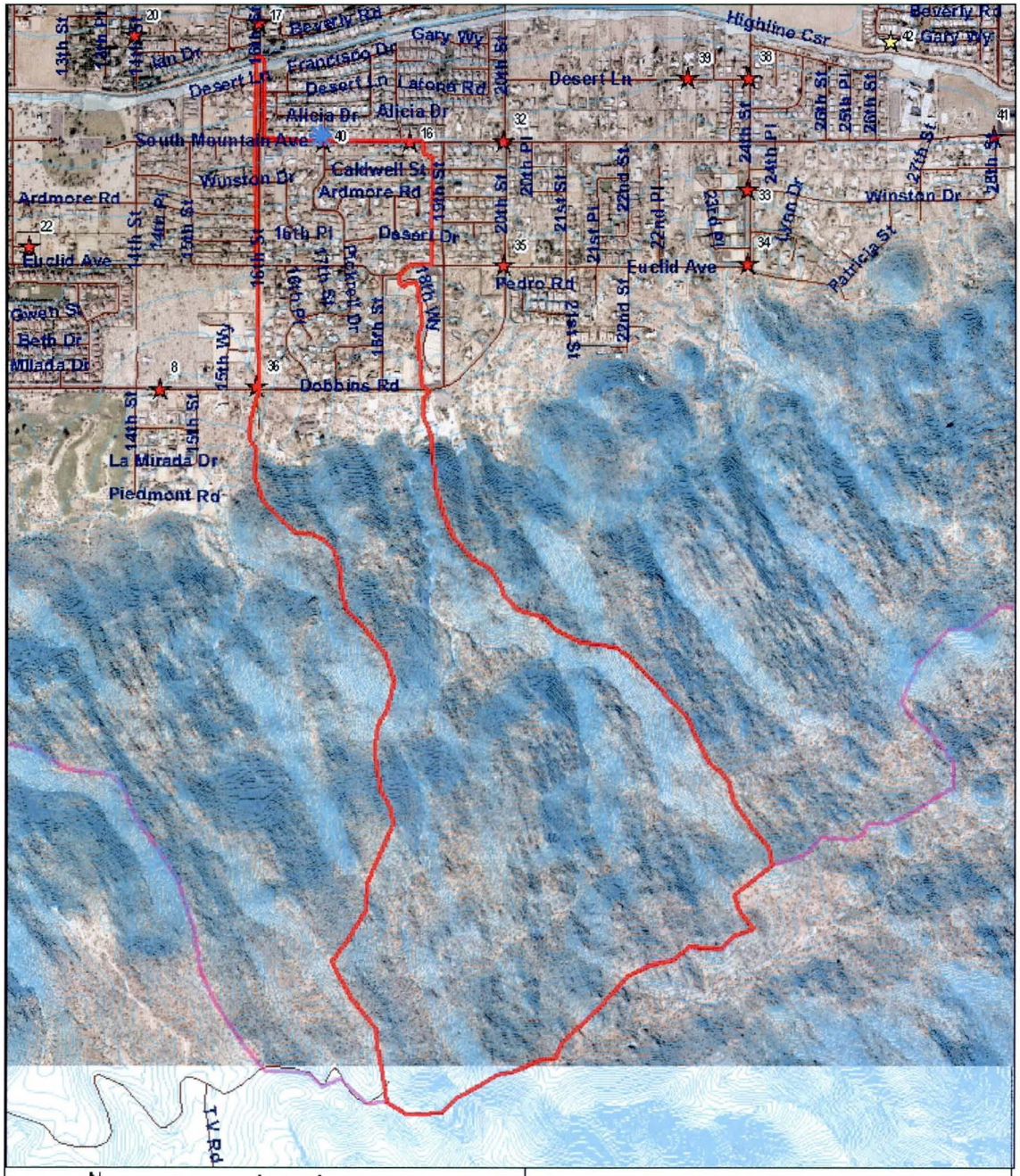
South Mountain Ave looking northwest



South Mountain Ave looking west

Approx. Drainage Area:	443 acres
FEMA Flood Zone:	X
Complaint Date:	2000
Description / Complaint:	"Seldom" street and landscape flooding.
Actions Taken:	Installed berms & pre-design study in 2001.
Field Observations:	Based on visual observation the finished floor appears to be lower than the street elevation. There is curb and gutter on north and south sides of the South Mountain Ave. A dirt berm is located along the south limit of the property to divert flows to the northeast. 19th Street flows north and potentially conveys flows from South Mountain. Flows intercepted by South Mountain Avenue flow west.
Conclusion:	**POTENTIAL REGIONAL ISSUE:** The house is susceptible to flooding once the curb is overtopped which could occur simply from local street drainage however, due to the size of the potential contributing watershed this is considered a potential regional issue.

Location 17: 8015 S 16th Street



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Legend

- Drainage Problem Location
- Drainage Area
- Elevation Contour
- Study Area
- Flood Hazard Zone A

Location 17: 8015 S 16th St, Phoenix
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

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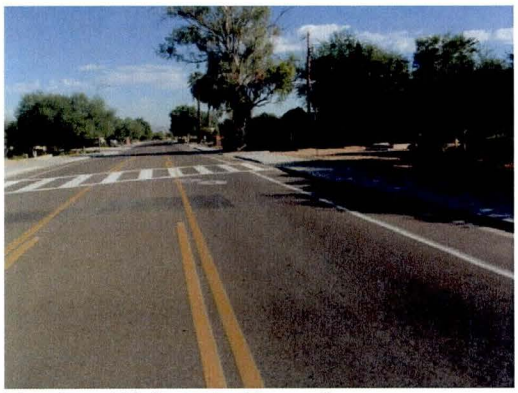
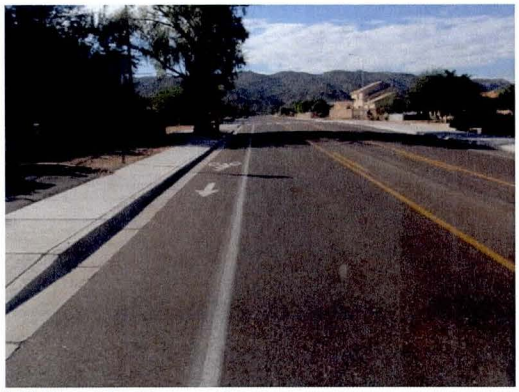
Location 17: 8015 S 16th Street



Inlet along 16th Street looking north



16th Street looking south

Looking north at SW corner of the property

Looking northeast at SW corner of the property

Approx. Drainage Area:	578 acres
Complaint Date:	February 2007
FEMA Flood Zone:	X
Description / Complaint:	House and landscape flooding during heavy rains.
Actions Taken:	Catch basin was cleaned out by Street Maintenance. The subdivision was given a letter to clean out the outlet structure to prevent flooding at 8015 S. 16th Street.
Field Observations:	There is curb and gutter on the east and west sides of 16th Street. A curb opening inlet is located on the east side of 16th Street south of the intersection with the Highline Canal. 16th Street flow travels north and will overtop the crest in the road once the curb opening inlet capacity is exceeded. Scour is present at the southwest corner of the property due to flows from 16th Street.
Conclusion:	**POTENTIAL REGIONAL ISSUE:** This could be a regional problem if flow coming north down 16th St exceeds the curb opening inlet capacity and overtops the curb. Once the curb is overtopped flow travels along the block fence on the west side of the property. This problem may be alleviated to some degree by proper curb opening outlet maintenance and potentially increasing inlet capacity.

Location 18: 1727 E. Bowker Street

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Legend

- Drainage Problem Location
- Drainage Area
- Elevation Contour

0 150 300 600 Feet

Location 18: 1727 E. Bowker Street, Phoenix
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

Date: 10/6/10

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Location 18: 1727 E. Bowker Street

Bowker Street looking west

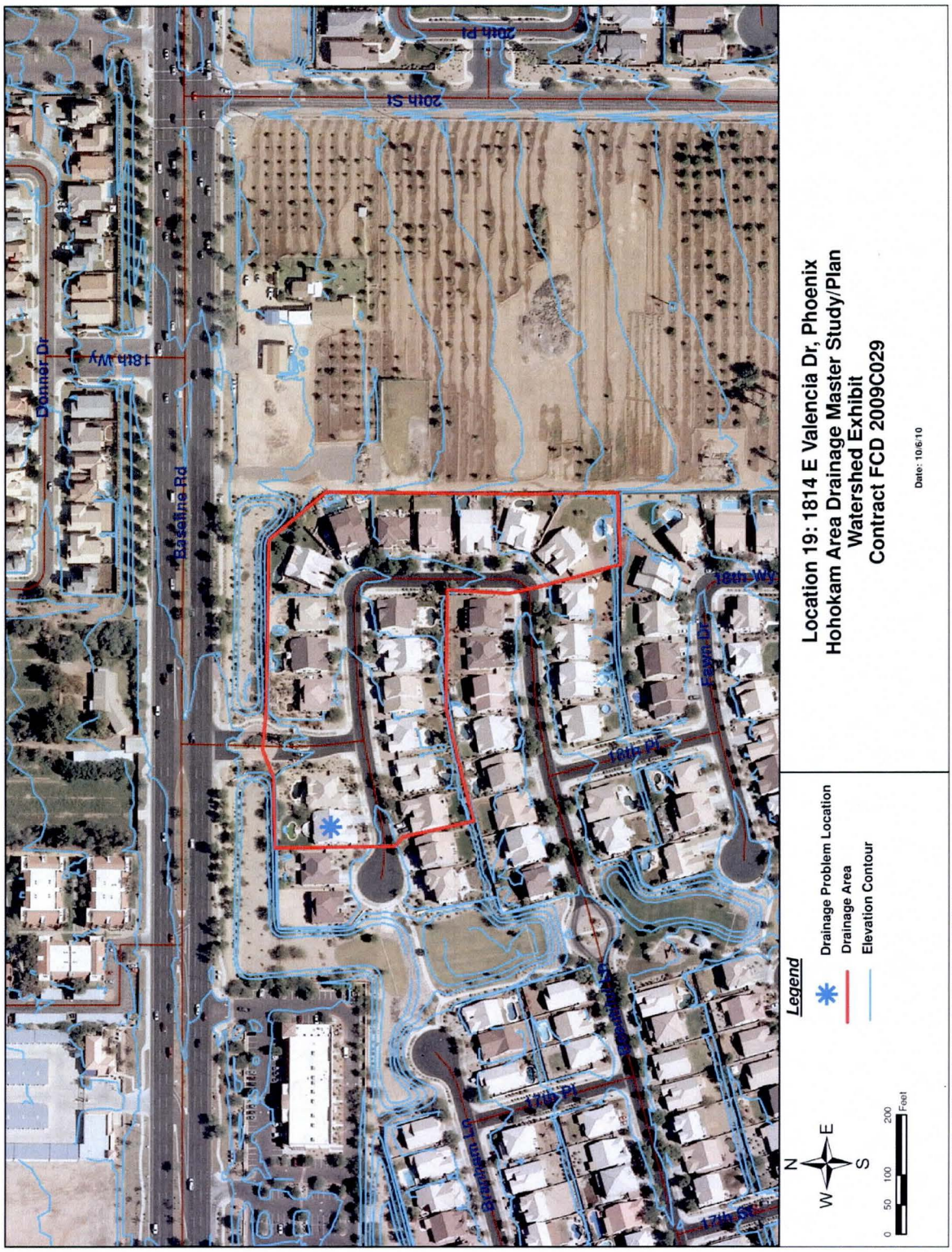
Bowker Street looking east

17th Place looking north

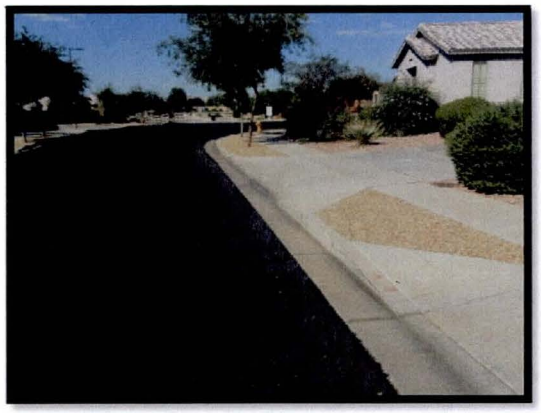
Drywell along Bowker Street

Approx. Drainage Area:	4.7 acres
FEMA Flood Zone:	X
Complaint Date:	2005
Description / Complaint:	Street flooding every time it rains.
Actions Taken:	New sidewalk, valley gutter and dry well installed (date unknown)
Field Observations:	17th Place drains north. Bowker Street drains west. There is a valley gutter across Bowker Street and a drywell east of the valley gutter. Lot elevations appear to be elevated above the street elevations.
Conclusion:	**LOCAL ISSUE:** The drywell appears to be the only method for removal of storm water. The grate is small and could be clogged easily. There doesn't appear to be an overflow outfall for the area. It is generally a local problem. HOWEVER, This location is in the general vicinity of several other complaints. Conditions may be exacerbated by flows from 18th St and 20th St, depending upon the ability of flow to cross Southern Ave and drain to the problem location. Consequently the drainage area could be larger and regional drainage conditions may contribute to the problem.

Location 19: 1814 E Valencia Drive

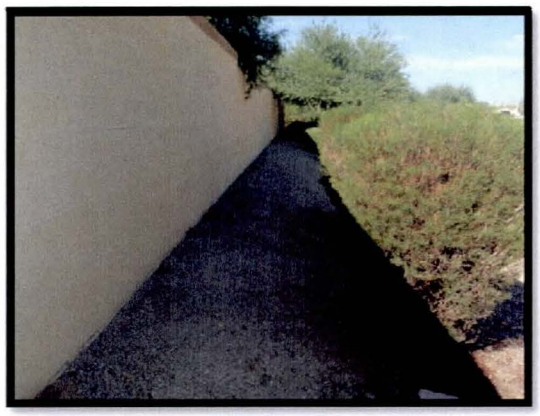


Location 19: 1814 E Valencia Drive



Valencia Dr looking west

Outlet for Valencia Dr looking west

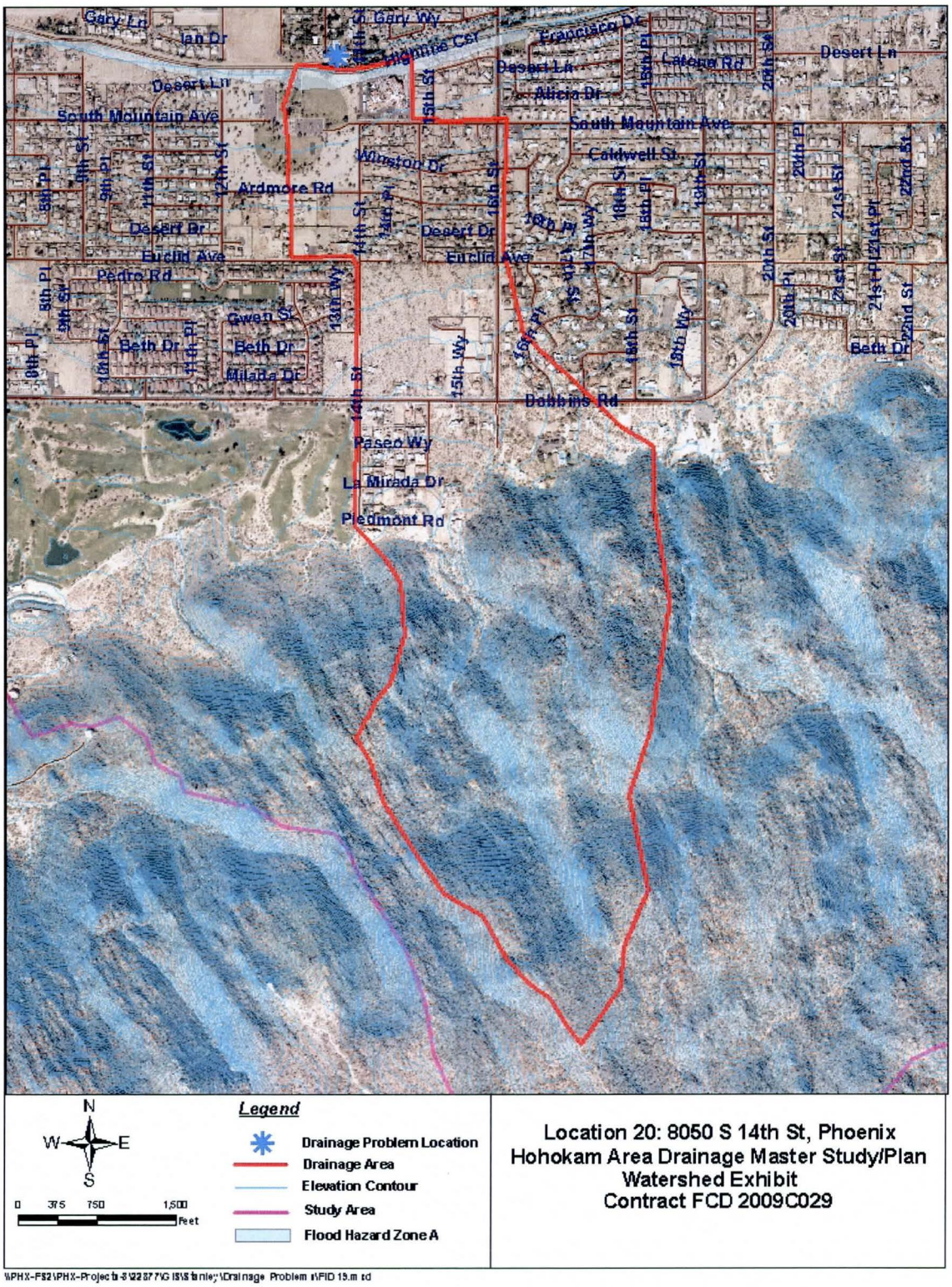


North wall of the property looking west

Weep hole outlet looking south

Approx. Drainage Area:	5.1 acres
FEMA Flood Zone:	X
Complaint Date:	August 21, 2006
Description / Complaint:	Occasional landscape damage.
Actions Taken:	Unknown
Field Observations:	The finished floor elevation appears to be above the street. There is curb and gutter on the north and south side of the street. Runoff is directed west on Valencia Drive and outlets to a subdivision retention basin via a scupper. A number of partially buried weep holes are located in the north side of the block fence.
Conclusion:	**LOCAL ISSUE:** The complaint does not specify location of the landscape damage. There is a possible water accumulation in the backyard due to clogged weep holes. If damage is in the front of the property, flow would have to overtop curb. Based on the contours there is 0.0074 ft/ft slope from east to west, which may limit street flow capacity during large storm events. Due to the size and location of the watershed this appears to be a local flooding problem.

Location 20: 8050 S 14th Street



Location 20: 8050 S 14th St, Phoenix
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

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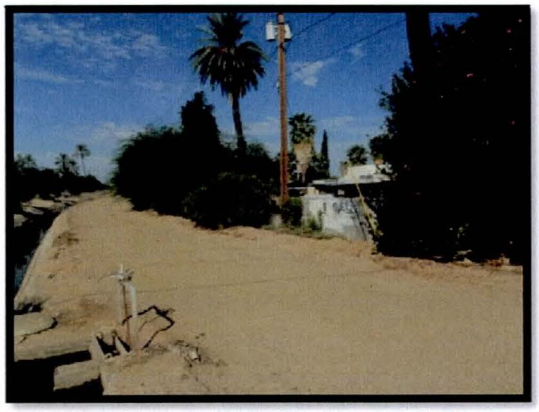
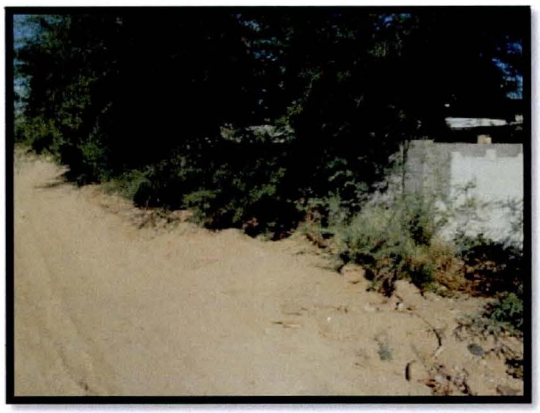
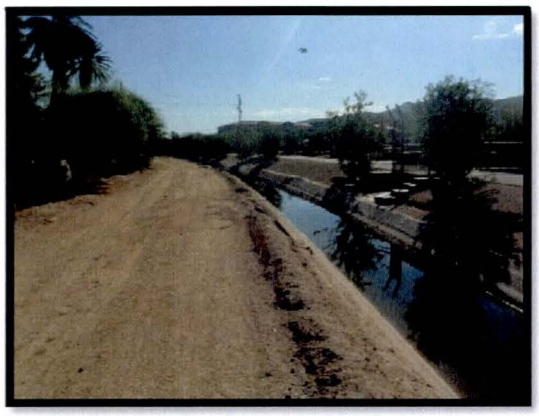
Location 20: 8050 S 14th Street



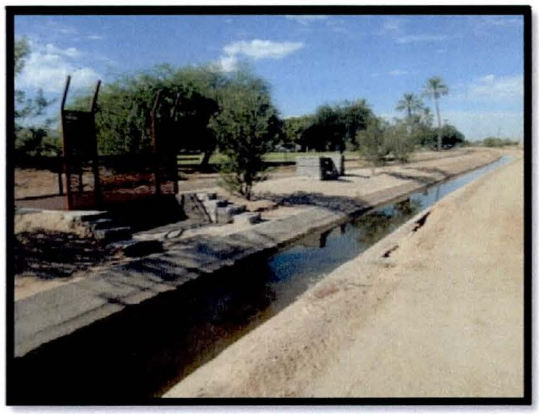
South wall of property looking west



South wall of property looking northwest



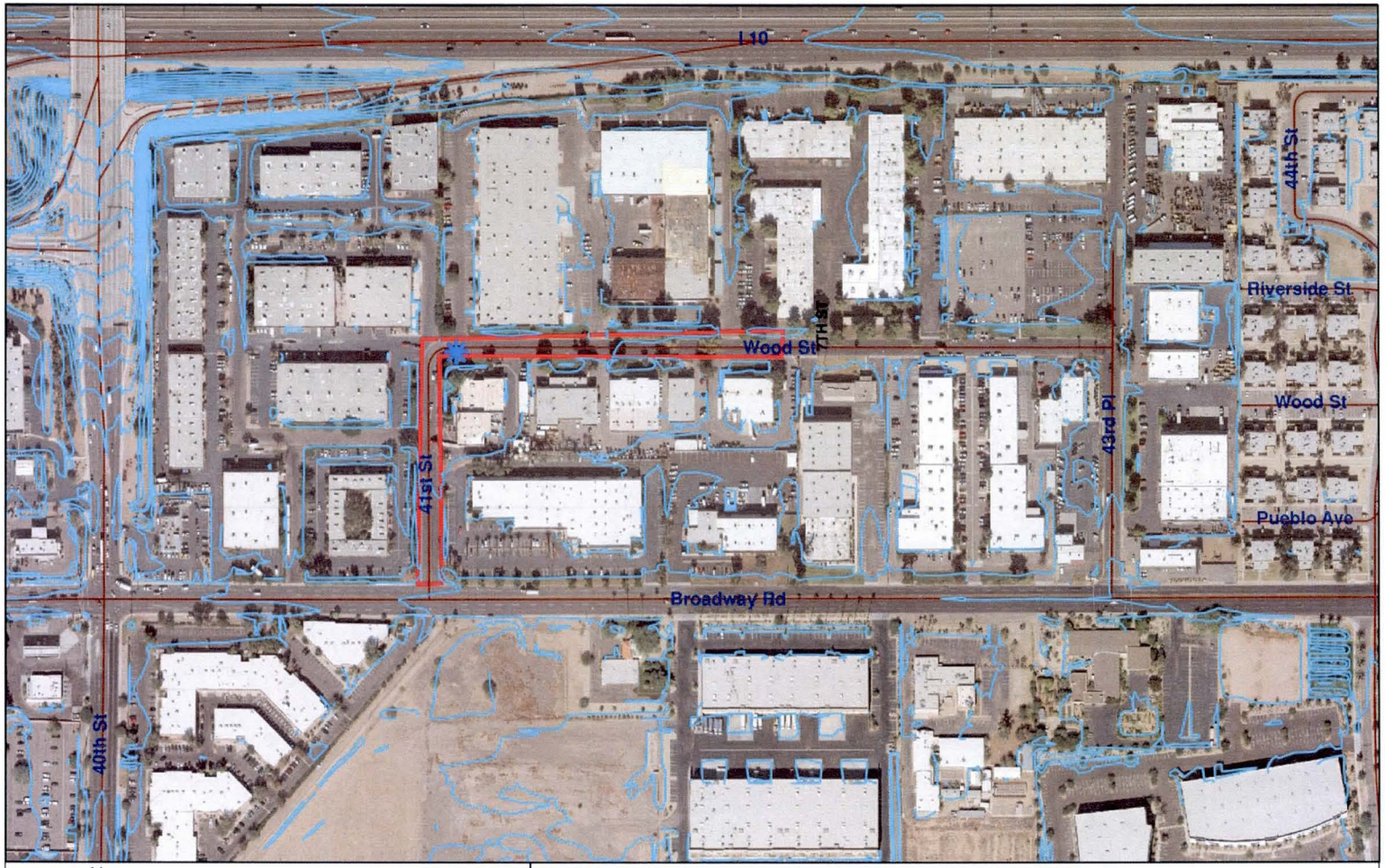
Highline canal adjacent to property looking east



Highline canal behind to property looking west

Approx. Drainage Area:	432 acres
FEMA Flood Zone:	X
Complaint Date:	7/26/2006, 8/16/2006, 8/21/2006, and 8/4/2010
Description / Complaint:	In most recent event, block wall undermined and property flooded.
Actions Taken:	Arts Commission doing project @ Circle K Park. Property owner replaced wood fence with block wall.
Field Observations:	Overland flows drain north and concentrate at this general location, overtopping the canal and flooding downstream property. New block wall inadequate to block flow and undermined in recent storm event. The finished floor elevation of the property north of the canal is below the bank elevation.
Conclusion:	**REGIONAL ISSUE:** Location is a focal point for large upstream watershed. The problem is a regional issue due to the size of watershed and the concentration of flow at this location.

Location 21: 4101 E. Wood Street



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Legend

- Drainage Problem Location
- Drainage Area
- Elevation Contour

0 150 300 600 Feet

Location 21: 4101 E. Wood Street, Phoenix
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

Date: 10/6/10

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Location 21: 4101 E. Wood Street

41st Street looking south

41st Street looking north

Wood Street looking east

Wood Street looking west

Approx. Drainage Area:	1.5 acres
FEMA Flood Zone:	X
Complaint Date:	Unknown
Description / Complaint:	Standing water only flooding in near location
Actions Taken:	
Field Observations:	41st Street drains south to Wood Street where there is a valley gutter across Wood Street to the northeast corner of the intersection. The gutter outfalls into a landscaped area that is heavily vegetated. It appears Wood Street drains west to the intersection as well.
Conclusion:	**LOCAL ISSUE:** Drainage issues appear to be a localized issue that could be alleviated by maintenance of the landscape tract that the valley gutter discharges at the northeast corner of the intersection.

Location 22: 1229 E Desert Park (1229 E Desert Drive?)

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Legend

- Drainage Problem Location
- Drainage Area
- Elevation Contour

0 100 200 400 Feet

1 inch = 200 feet

Location 22: 1229 E Desert Dr, Phoenix
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

Date: 10/6/10

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Location 22: 1229 E Desert Park (1229 E Desert Drive?)

Euclid Ave looking east

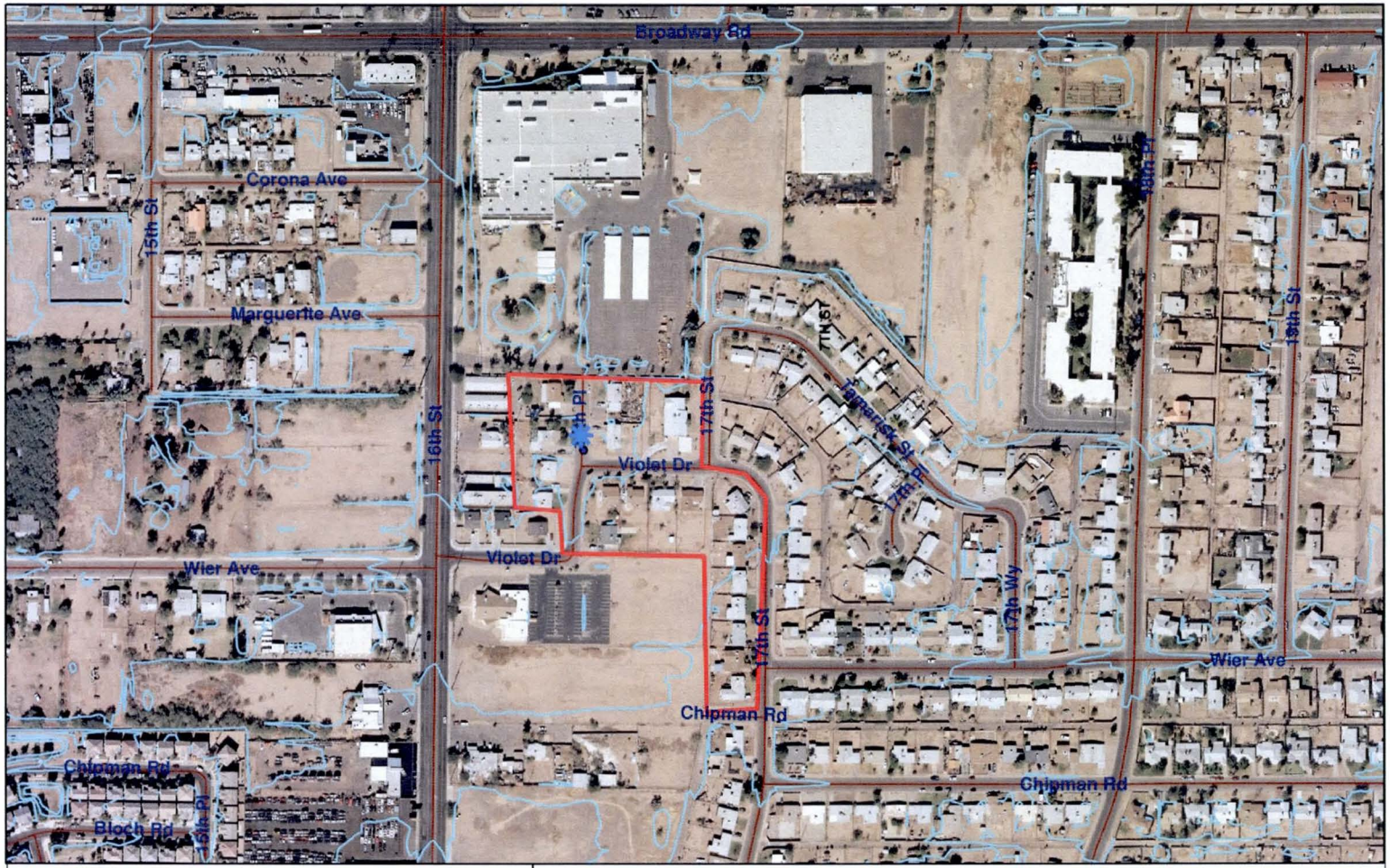
Euclid Ave looking west

Euclid Ave looking west

12th Street looking south

Approx. Drainage Area:	2.0 acres
FEMA Flood Zone:	X
Complaint Date:	2005
Description / Complaint:	It is unknown if this is the proper address/location and whether a complaint was indeed filed at this location. The complaint for the address is: *"Location floods whenever it rains. Water currently flows through a man made ditch to the alley to the south."*
Actions Taken:	Indications are that a pre-design study was performed in 2005. The nature of the study and results are not known.
Field Observations:	Complaint address of 1229 E Desert Park is not in the Hohokam Area. Address may be 1229 E Desert Dr., however the description of the complaint (alley etc..) does not fit location either. Site investigation was performed for 1229 E Desert Dr. There is curb and gutter on the north side of Euclid Avenue and east side of 12th Street. A retention/detention basin is located along the south side of the development. It appears that flow enters the basin from Euclid Avenue and outflows to 12th Street. Euclid Ave also receives direct flow/overflow from the outlets of two large subdivision retention basins located south of Euclid Avenue.
Conclusion:	**POTENTIAL REGION ISSUE:** Euclid directly receives flow from the outlet of the Dobbins Creek subdivision basins and also is impacted by sheet flow from the mountains. While the local drainage area shown is only ~2 acres, a significantly larger area can contribute drainage runoff from the mountains to this location in larger storm events.

Location 23: 4602 / 4610 S 16th Place



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0 150 300 600 Feet

Legend

- Drainage Problem Location
- Drainage Area
- Elevation Contour

Location 23: 4602 / 4610 S. 16th Place, Phoenix
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

Date: 10/6/10

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Location 23: 4602 / 4610 S 16th Place

16th Place looking north

16th Place looking north

16th Place looking north

Drainage ditch along 16th Place looking west

Approx. Drainage Area:	5.4 acres
FEMA Flood Zone:	X
Complaint Date:	7/13/2008 & 8/28/2008
Description / Complaint:	Area received above average storm exceeding a 50-year storm. Residents making risk management claims due to flooding. Claims paid on complaints.
Actions Taken:	Indicated that a pre-design study was conducted in 2010.
Field Observations:	Weir Avenue drains east to 16th Place which drains north. There is a wall across 16th Place at its terminus that prevents runoff from continuing north. There is a small ditch that drains west to a wall opening along 16th Street.
Conclusion:	**LOCAL ISSUE:** The small ditch that drains west does not appear to have much capacity or an outfall. Drainage problems within the area may be alleviated by placing a wall opening in the wall that is located at the north end of 16th Place. Another option would be to increase the ditch capacities along with increasing the size of the opening in the fence along 16th Street. This appears to be a localized issue.

Location 24: 6011 S 22nd Street

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0 125 250 500 Feet

Legend

- Drainage Problem Location
- Drainage Area
- Elevation Contour

Location 24: 6011 S 22nd St, Phoenix
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

Date: 10/6/10

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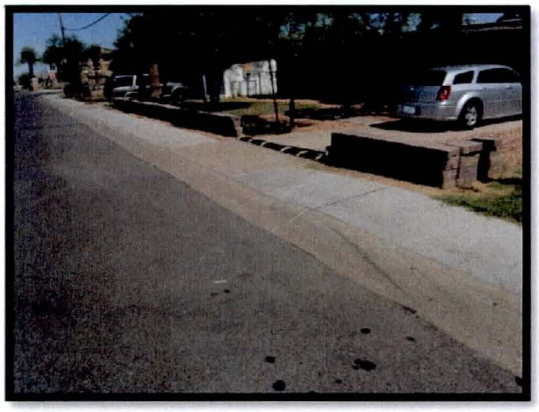
Location 24: 6011 S 22nd Street



Subject property looking northeast

Subject property looking southeast

22nd St looking south

22nd St looking north

Approx. Drainage Area:	55.0 acres
FEMA Flood Zone:	X
Complaint Date:	Unknown
Description / Complaint:	Three homes along 22nd Street flooded. 2008 storms were above average monsoon.
Actions Taken:	
Field Observations:	The finished floor elevations appear to be lower than the street elevation. There is 4" roll curb on the west and east side of 22nd Street.
Conclusion:	**LOCAL ISSUE:** The properties are susceptible to flooding in large storm events when curb is overtopped. Finished floor elevation is below street level. It appears to be a local problem. HOWEVER, 22nd St appears to collect and convey street runoff from a larger area and conditions are likely exacerbated by contributing flow from a larger more regional drainage area. Generally, the issue is a local issue since the finish floors of the homes are so low.

Location 25: 2205 E Burgess Lane

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Legend

- Drainage Problem Location
- Drainage Area
- Elevation Contour

0 230 460 920 Feet

Location 25: 2205 E Burgess Ln, Phoenix
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

Date: 10/6/10

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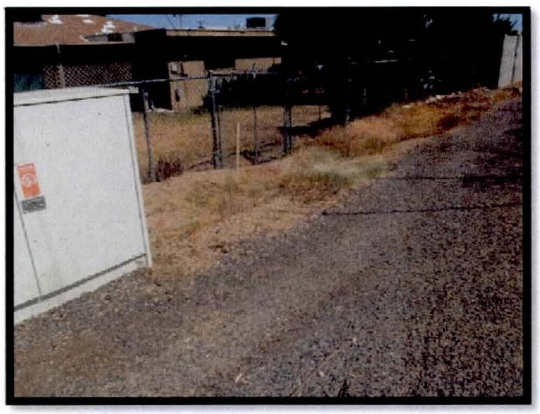
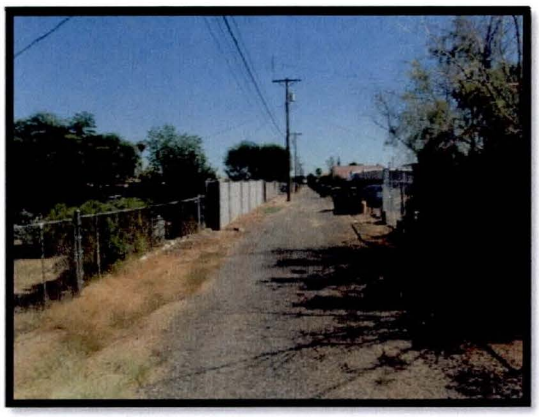
Location 25: 2205 E Burgess Lane

Alley looking east



Subject property backyard looking northeast



Alley looking east

22nd St looking southeast

Approx. Drainage Area:	23 acres
FEMA Flood Zone:	X
Complaint Date:	7/13/2008
Description / Complaint:	Neighbors east of complainant have built block fences reportedly diverting water to her property
Actions Taken:	Installed gravel/rock berm against fence in alley. Berm has since washed away.
Field Observations:	The finished floor elevation appears to be lower than the alley elevation. Neighbors to the east have a block fence and it appears that it could divert runoff from the alley to the subject property backyard.
Conclusion:	**LOCAL ISSUE:** The property is susceptible to flooding in large storm events. It appears to be a local flooding issue.

Location 2 & 26: 2902 / 2920 E. Elwood Street

Refer to Drainage Location 2..

Location 27: 5815 S 36th Street

N
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S

0 162.5 325 650 Feet

Legend

- Drainage Problem Location
- Drainage Area
- Elevation Contour

Location 27: 5815 S 36th St , Phoenix
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

Date: 10/6/10

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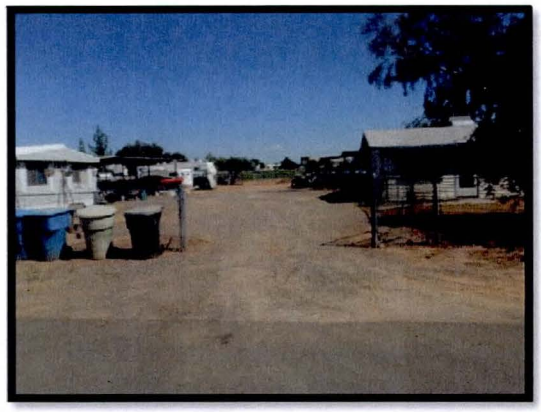
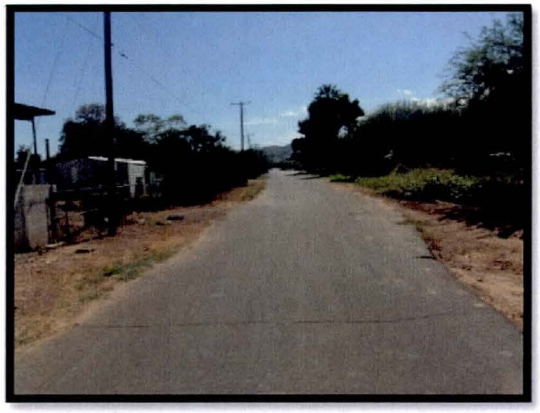
Location 27: 5815 S 36th Street

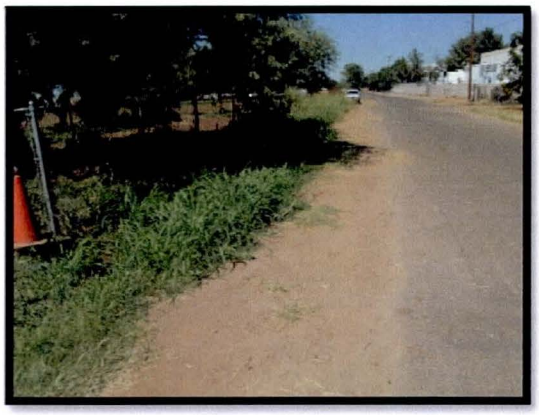
36th St. looking north



Property looking east



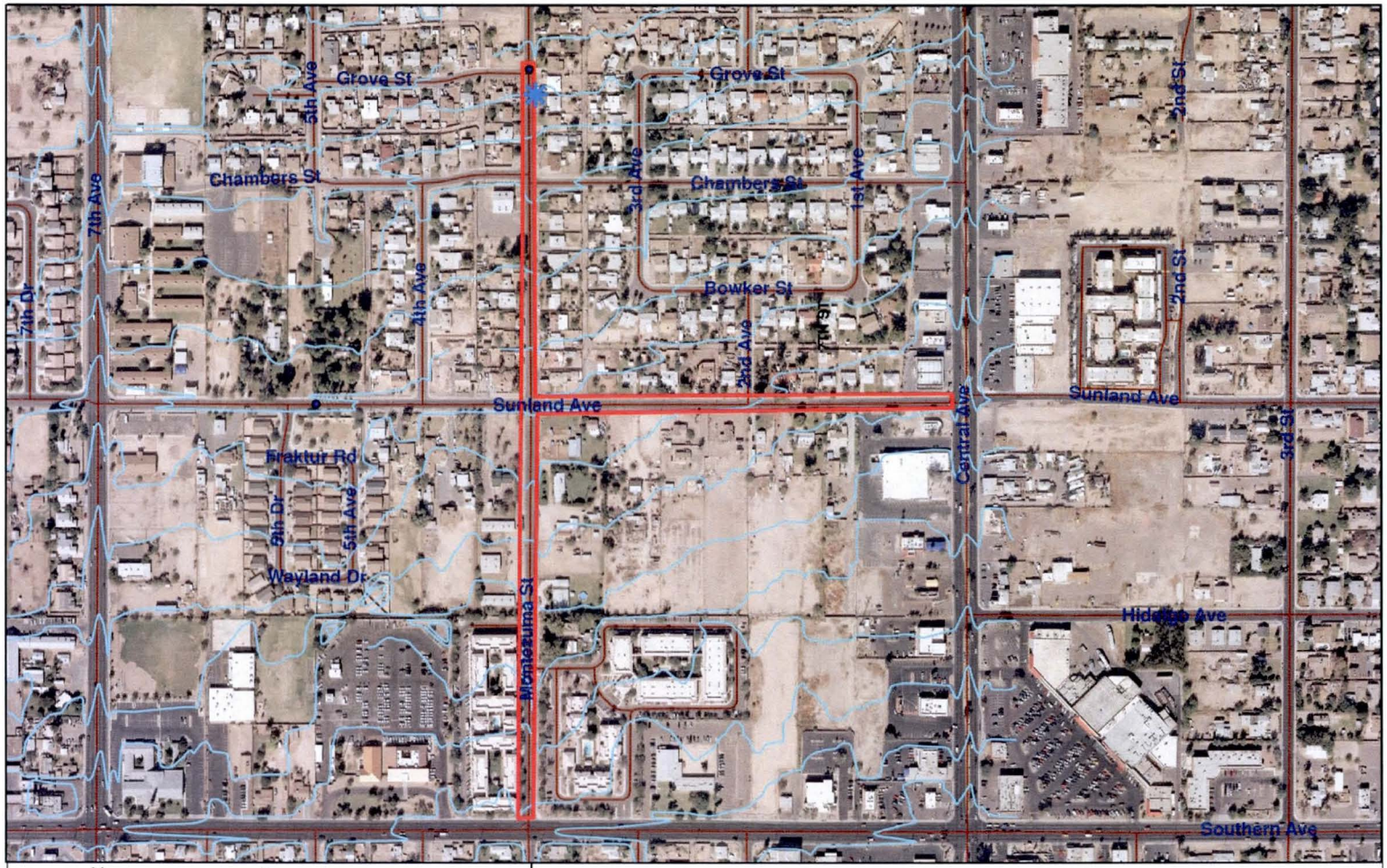
36th St. looking south



Irrigation canal adjacent to 36th St looking north

Approx. Drainage Area:	164.4 acres
FEMA Flood Zone:	X
Complaint Date:	7/13/08
Description / Complaint:	300 yr storm on 7/13/08, property was flooded and claim made.
Actions Taken:	No known actions taken.
Field Observations:	The finished floor elevation appears to be approximately at the same level as street. Property borders 36th Street to the west and farm land to the east. There is a berm between property and farm land. An irrigation ditch runs along west side of 36th Street. Based on a conversation with the property owner flooding has occurred during the storm event which received 4 inches of rainfall in 2008. Water traveled south down 36th Street and 38th Street from Southern Avenue. Since that event, the owner has not reported flooding problems.
Conclusion:	**POTENTIAL REGIONAL ISSUE:** This property is susceptible to flooding during large storm events. However 4 inches of rainfall exceeds the predicted precipitation for 100-yr design storm event. This could be a regional problem if flooding of 36th Street also occurs during 100-yr storm event.

Location 28: 5227 W. Montezuma Street



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0 195 390 780 Feet

Legend

- Drainage Problem Location
- Drainage Area
- Elevation Contour

Location 28: 5227 S. Montezuma Street, Phoenix
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

Date: 10/6/10

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Location 28: 5227 W. Montezuma Street

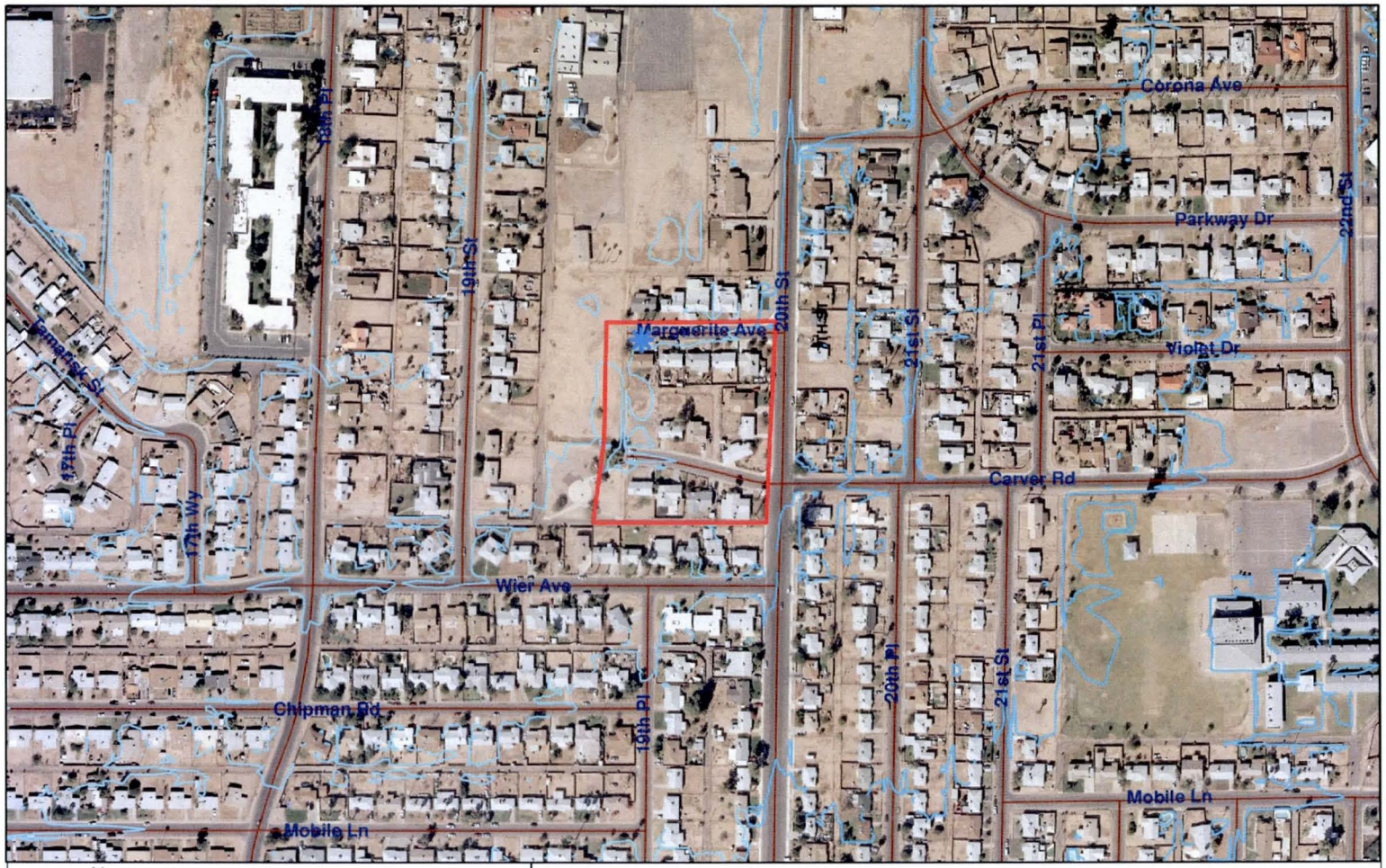
Montezuma Street looking south

Grove Street looking west

Montezuma Street looking north

Approx. Drainage Area:	3.7 acres
FEMA Flood Zone:	X
Complaint Date:	7/13/08
Description / Complaint:	Flooding during heavy rains.
Actions Taken:	No known actions taken.
Field Observations:	There appears to be a low point in Montezuma Street near the intersection of Grove Street. Lots within the area receive flood irrigation; therefore, the finish floors appear to be low. No catch basins were noted along Montezuma Street.
Conclusion:	**LOCAL ISSUE:** It appears to be a localized problem with no drainage outfall for the low point. Finish floor elevations are low within the area. The extension of storm drain and addition of catch basins would help alleviate the problem.

Location 29: 1932 E. Marguerite Avenue



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0 150 300 600 Feet

Legend

- Drainage Problem Location
- Drainage Area
- Elevation Contour

Location 29: 1932 E. Marguerite Avenue, Phoenix
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

Date: 10/6/10

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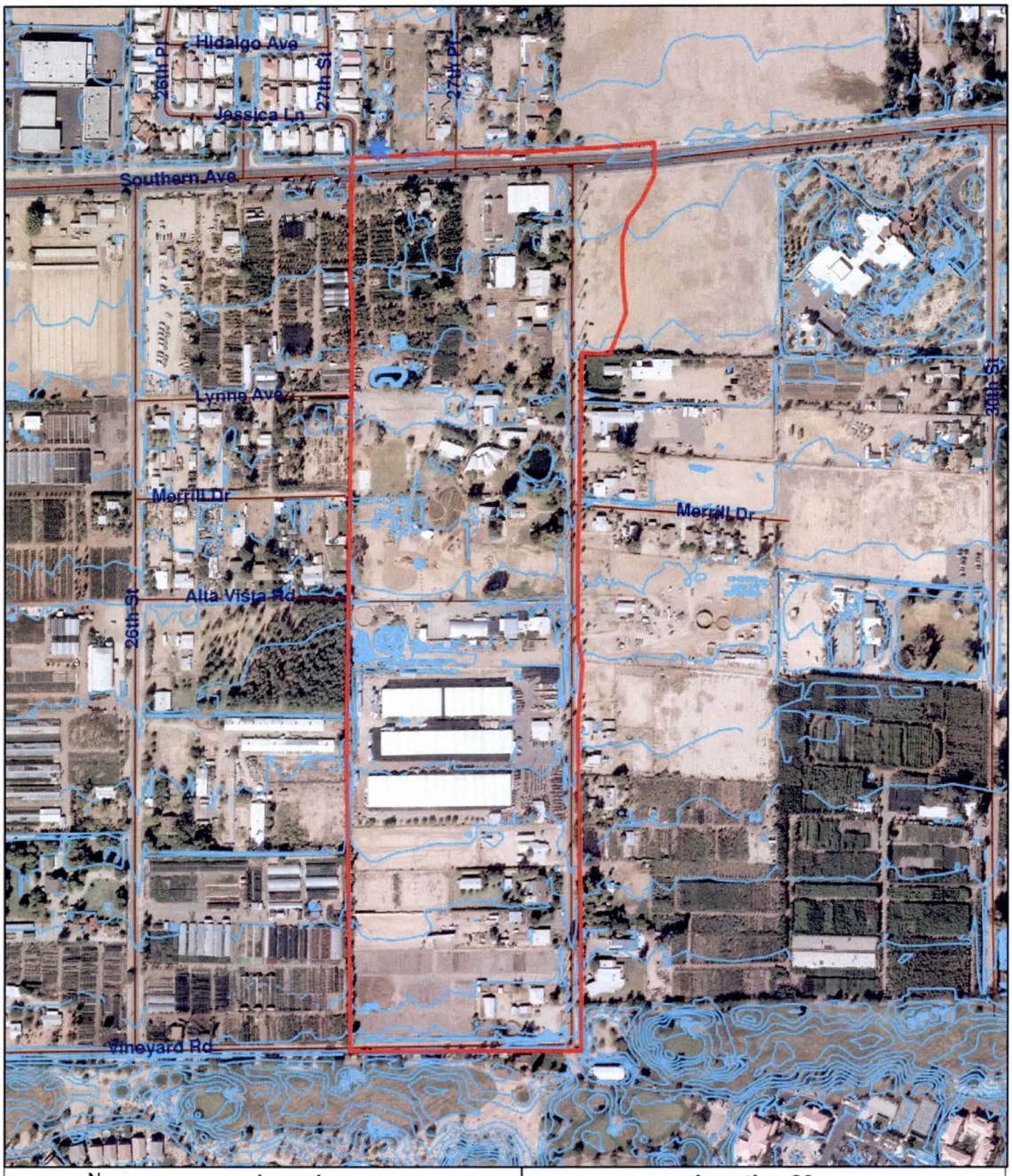
Location 29: 1932 E. Marguerite Avenue

Marguerite Avenue looking west

Ditch along west edge of Marguerite looking south

Approx. Drainage Area:	4.0 acres
FEMA Flood Zone:	X
Complaint Date:	Unknown (prior to 5/09)
Description / Complaint:	Property being flooded
Actions Taken:	Ditch regraded.
Field Observations:	A large vacant lot border Marguerite Avenue at the west end of the street. The field slopes to the north and it appears Marguerite Avenue slopes west. There is a small earthen ditch along the eastern side of the field adjacent Marguerite Avenue.
Conclusion:	**LOCAL ISSUE:** There are not any catch basins or drainage structures along Marguerite Avenue. It appears that the major flooding source is the open field west of Marguerite Avenue. The ditch graded along the eastern edge of the field will help alleviate some of the flooding issues at this area. The size of the ditch may need to be increased to improve flood protection for Marguerite Avenue. This appears to be a localized issue.

Location 30: 2702 E Southern Avenue



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0 145 290 580 Feet

Legend

Drainage Problem Location
Drainage Area
Elevation Contour

Location 30:
2702 E Southern Ave, Phoenix
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

Date: 10/6/10

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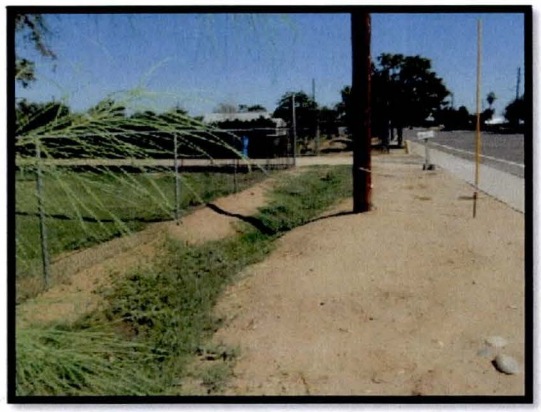
Location 30: 2702 E Southern Avenue

Southern Ave. looking west



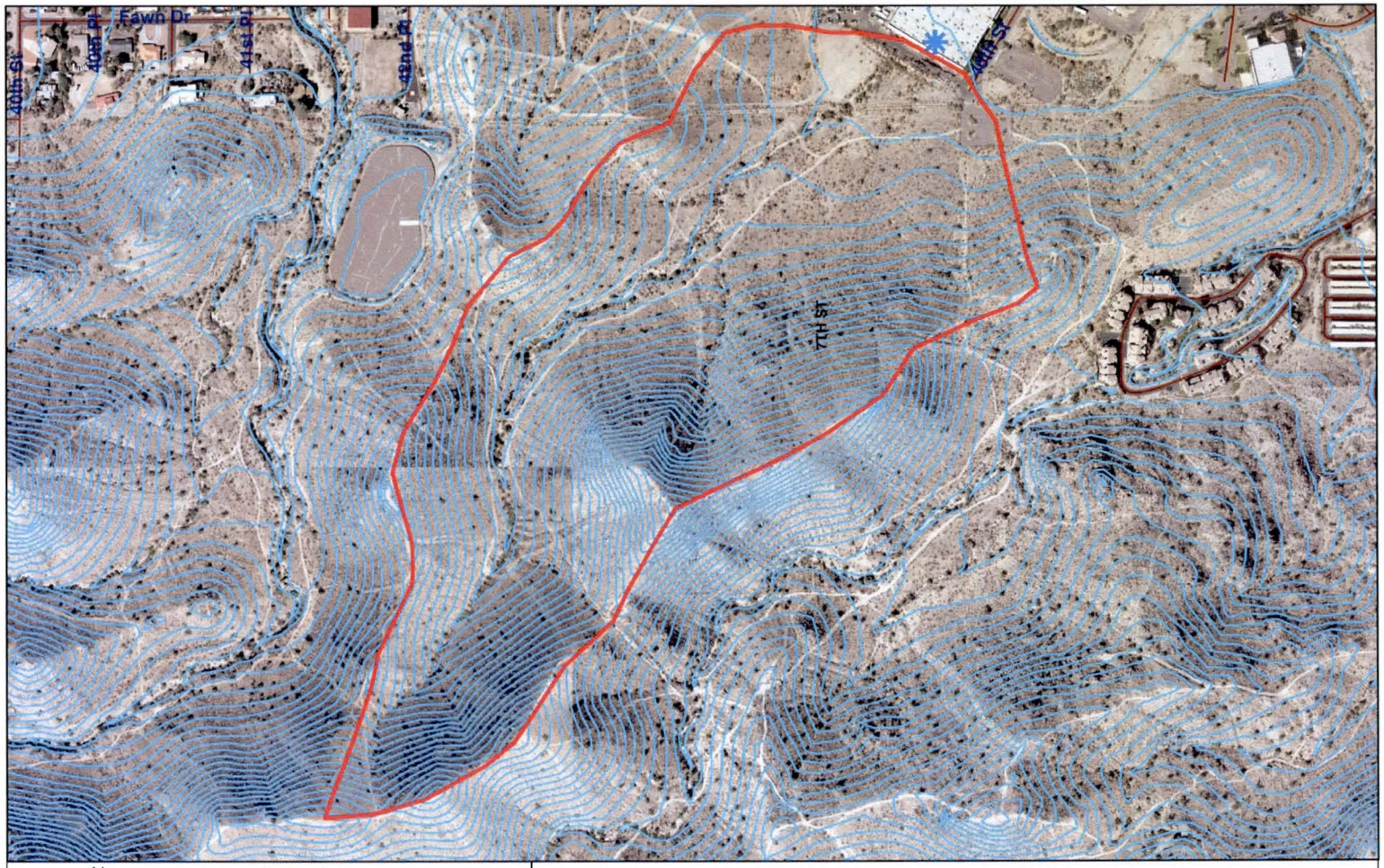
Southern looking east

Property looking northeast

Property looking south

Approx. Drainage Area:	47.1
FEMA Flood Zone:	X
Complaint Date:	7/13/2008
Description / Complaint:	Day Care – flooded. Requested funding for study in 7/09.
Actions Taken:	Currently under pre-design study.
Field Observations:	Based on a visual inspection, the finished floor elevation is below the street elevation. Southern Avenue is nearly flat, which results in limited flow capacity. According to the property owner the water surface elevation was approximately 2 feet above the finished floor elevation during the flooding event in 2009.
Conclusion:	**LOCAL ISSUE:** The flatness of the road translates to a limited capacity. The property is susceptible to flooding once the street capacity is exceeded. This may be a local issue due to the flatness of the road and low finished floor elevation. This problem could be alleviated by increased storm drain capacity.

Location 31: 7822 S 46th Street



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Legend

- Drainage Problem Location
- Drainage Area
- Elevation Contour

0 225 450 900 Feet

Location 31: 7822 S 46th St, Phoenix
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

Date: 10/6/10

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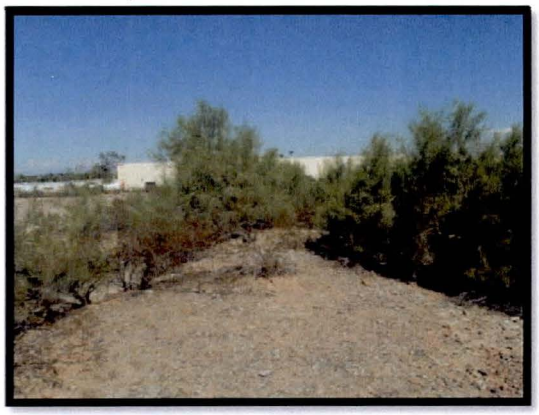
Location 31: 7822 S 46th Street

Natural wash looking northeast

Natural wash looking northeast

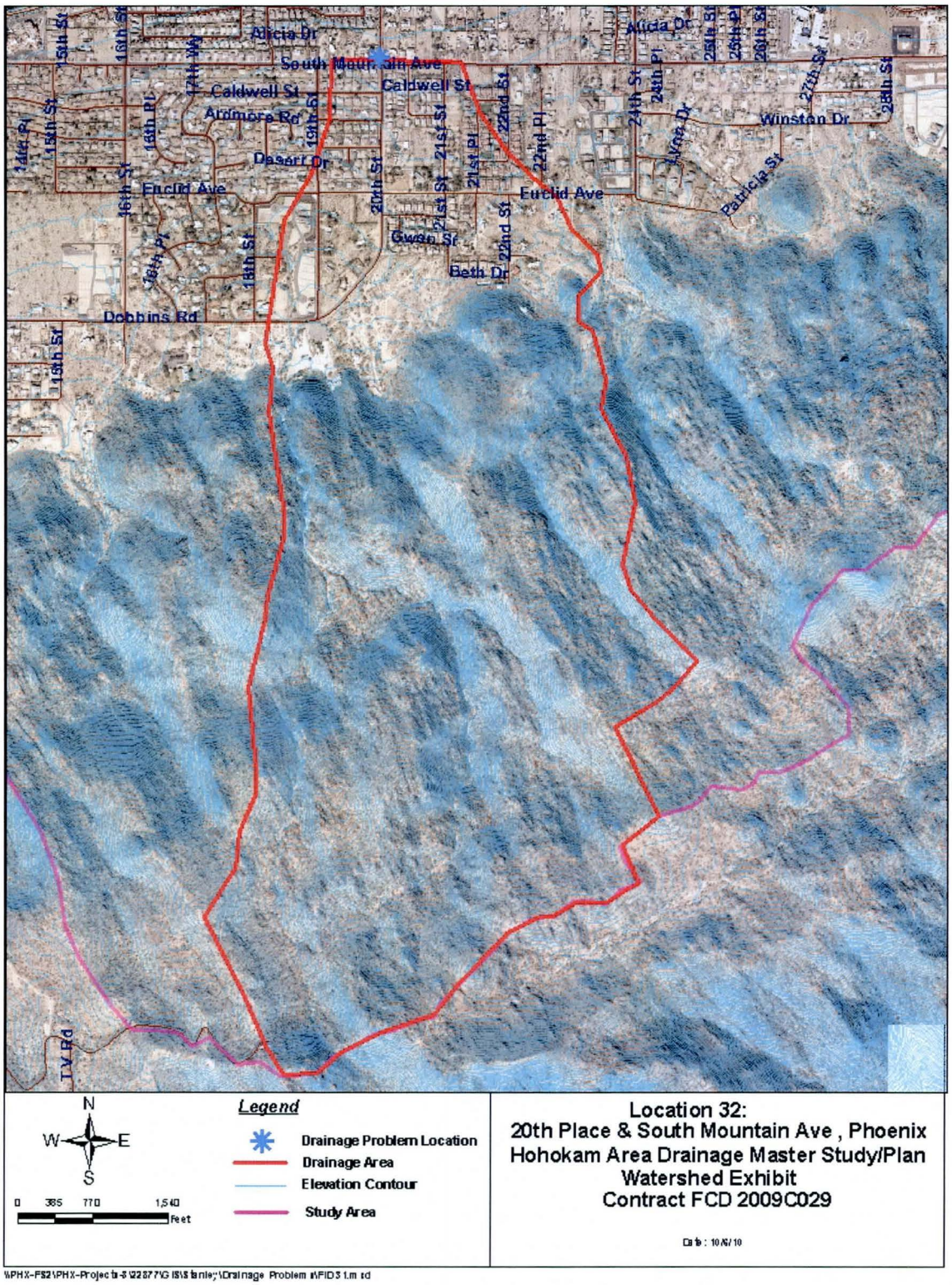
Natural wash looking northeast



Natural wash looking northeast

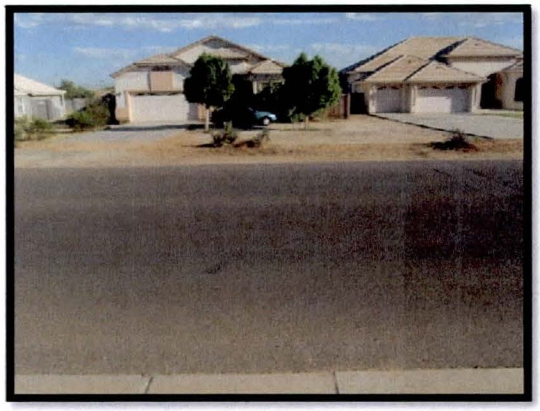
Approx. Drainage Area:	74.2
FEMA Flood Zone:	X
Complaint Date:	7/13/2008
Description / Complaint:	BAE Systems facility under military contract flooded due to estimated 330 year storm event.
Actions Taken:	No known actions taken.
Field Observations:	There are three large natural washes that convey runoff from South Mountain directly to the southwest wall of the building. The property is located directly in the flow path of a natural wash.
Conclusion:	**POTENTIAL REGIONAL ISSUE:** The location of the building is directly in the path of a historic wash and has resulted in the flooding potential of this property. The problem may be eased by design and implementation of flow diversions to bypass the building. While the immediate flooding issue might be local, the lack of a downstream conveyance for the wash flow likely contributes to other drainage and flooding issues in the general area and could therefore be also be considered a potential regional problem as well.

Location 32: 20th Place & South Mountain Avenue



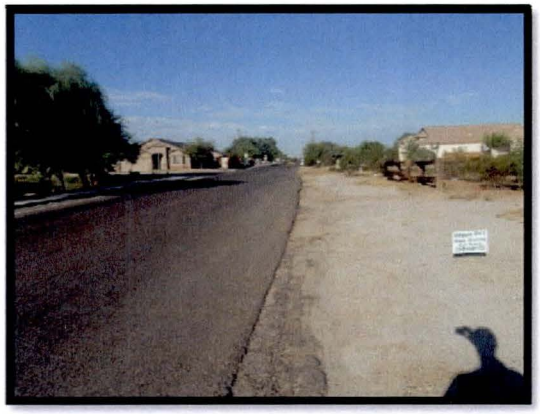
Location 32: 20th Pl & South Mountain Ave. (8004 S. 20th Ave?)

20th Place looking north



Looking north at property

South Mountain Ave looking east



South Mountain Ave looking west

Approx. Drainage Area:	756 acres
FEMA Flood Zone:	X
Complaint Date:	Many times since July 2008
Description / Complaint:	20th Avenue drains onto this property through a scupper
Actions Taken:	Property owner has constructed a detention basin to try to protect property. Effort apparently not effective and still floods as does the neighbor to the north.
Field Observations:	The address 8004 S 20th Ave is outside the study area but the address and GIS location do not agree. GIS places the complaint at 20th Pl and S. Mountain (within the study area). Investigated vicinity of 20th Pl and S. Mountain Ave. There is no curb or gutter on the north side of South Mountain Ave. Flow travels north down 20th Place and continues east upon intersecting with South Mountain Ave.
Conclusion:	**POTENTIAL REGIONAL ISSUE:** The finished floor elevation appears to be slightly higher than the street but water could flood the property located north intersection. For small events, the drainage area would likely be limited to the immediately area and problems would be more local in nature. However, 20th St. could also receive runoff from S. Mountain park either directly down 20th St. or indirectly by being downstream of a channel that conveys flow from a large culvert at the Boy Scout Facility near Dobbins & 20th St. The culvert crosses Dobbins and flow drains north to a culvert that diverts flow under a local road, along a new development and ultimately back to 20th St. Consequently, issues at this intersection could also be regional in nature.

24th St Drainage Issues

Location 33: 24th St & Windsor
Location 34: 24th St - Dobbins to Baseline
Location 38: 24th St & Desert Lane (8046 N 24th St not valid address)
Location 39: 2308 E Desert Lane

N
W E
S
0 400 800 1,600 Feet

Legend

- Drainage Problem Location
- Drainage Area
- Elevation Contour
- Study Area
- Flood Hazard Zone A

Location 33: 24th St & Windsor, Phoenix
Location 34: 24th St: Dobbins to Baseline
Location 38: 24th St & Desert Lane
Location 39: 2308 E Desert Lane
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

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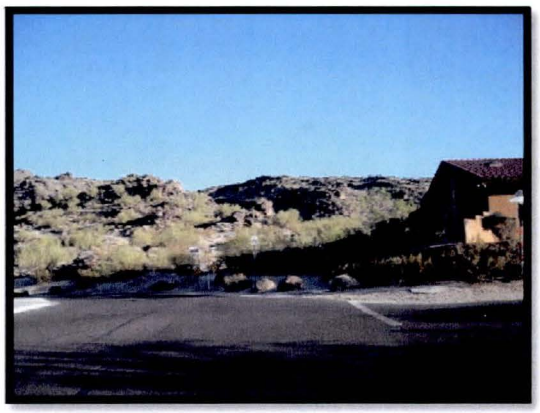
24th Street Drainage Issues

Location 33: 24th St & Winston Dr.
Location 34: 24th St - Dobbins to Baseline
Location 38: 24th St & Desert Lane (8046 N 24th St not valid address)
Location 39: 2308 E Desert Lane

Looking north on 24th St



Looking north at end of 24th St. 24th St. Runoff from the mountains contributes to drainage problems as well as sediment and debris deposition in the street.

Looking south on 24th St. just north of Winston Dr. House on 24th & Winston Dr in distance on right. Small wash in foreground on right.

Small wash on east side of rode and south of Winston Dr. Wash continues across Winston and is directed at house.

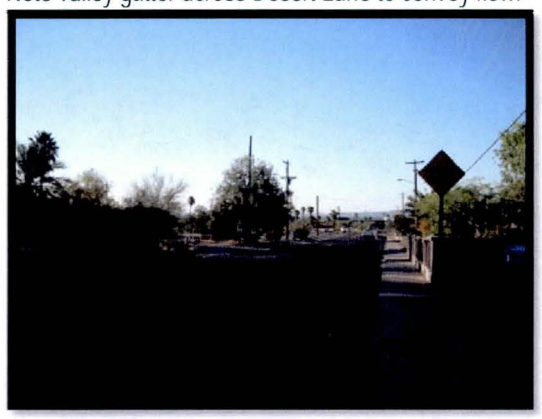
Small wash crossing Winston Dr.

House a NE corner of 24th St and Winston Dr.

Looking west on Desert Lane from 24th St

Looking SW at intersection of Desert Lane & 24th St
Note valley gutter across Desert Lane to convey flow.

House at corner of 24th St and Desert Lane



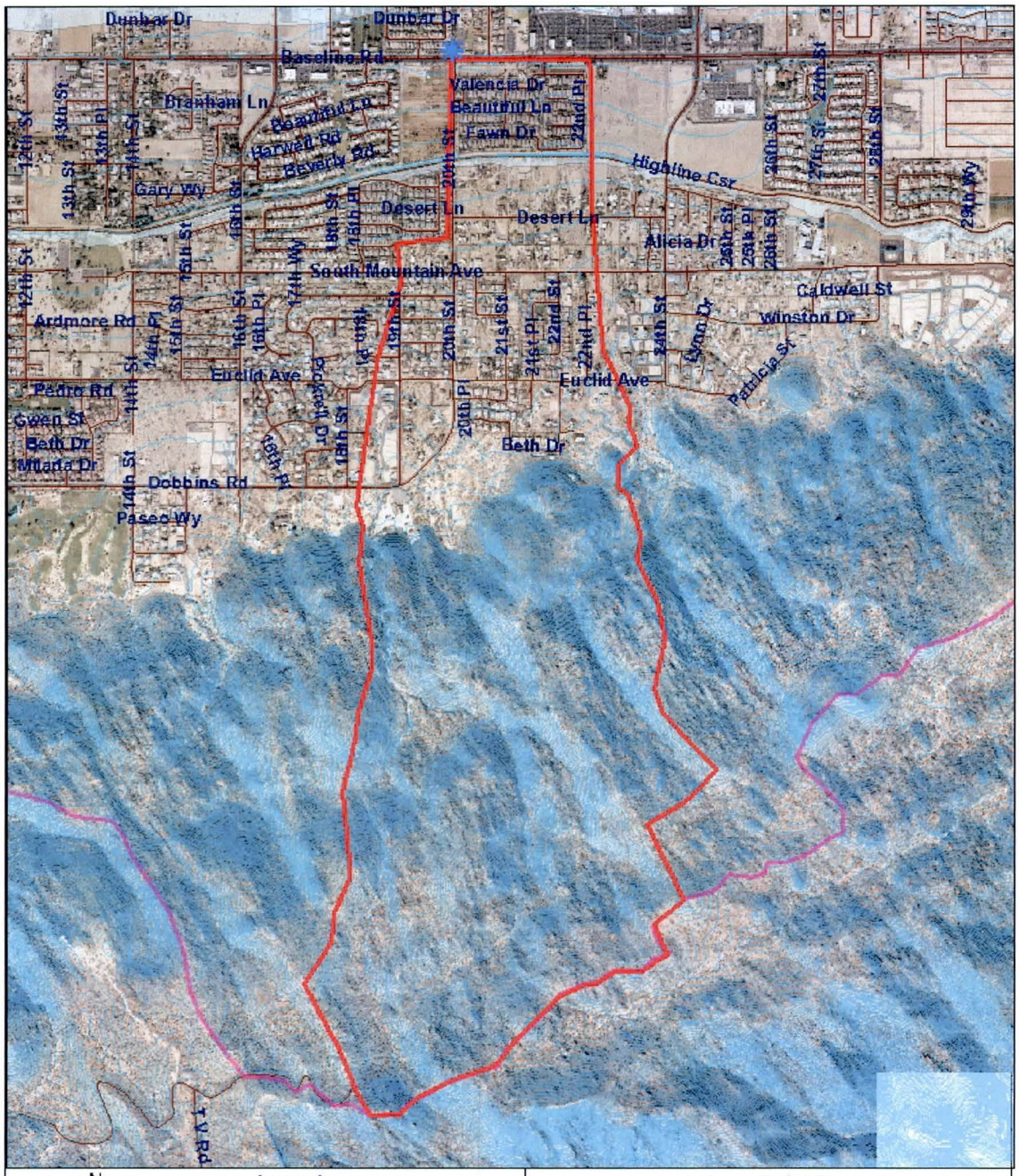
Looking south on 24th St from Desert Lane.

Approx. Drainage Area:	289 acres
FEMA Flood Zone:	n/a
Complaint Date:	Storm Date July 31 2010
Description / Complaint:	24th St & Windsor (should be Winston) – Storm related flooding. 24th St: Dobbins to Baseline Road – Mud, sand and gravel in ROW. 24th St & Desert Lane - Storm related flooding
Actions Taken:	24th St & Windsor (should be Winston) – Vactor 24th St: Dobbins to Baseline Road – Swept street 24th St & Desert Lane – Vactor
Field Observations:	The drainage area for 24th St extends into the South Mountains. The roadway is curbed in locations and uncurbed in others. The road is steeply sloped. High flow velocities and dirt shoulders results in a signfi9cant amount of sediment and debris being carried downstream and deposited. House at 24th St and Winston has a small wash/roadside ditch that discharges flow towards the house. The house does not appear to be raised far above the adjacent grade and potentially could experience flooding. The house(s) on 24th St are along an uncurbed section of road and large discharges could potentially produce flooding.
Conclusion:	**REGIONAL ISSUE:** The drainage area for 24th St extends into the South Mountains. 24th St serves as a conveyance for a lot of flow from the mountains in addition to street drainage from 24th St and adjacent streets. Runoff from the mountains not only contribute to drainage problems but also deposit debris in the streets after significant rainfall events.

Location 34: 24th St - Dobbins to Baseline

Refer to 24th Street Drainage Issues under Drainage Location 33.

Locations 35: 20th St - Dobbins to Baseline



Legend

- Drainage Problem Location
- Drainage Area
- Elevation Contour
- Study Area
- Flood Hazard Zone A

N W E S

0 500 1,000 2,000 Feet

Location 35:
20th St: Dobbins to Baseline, Phoenix
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

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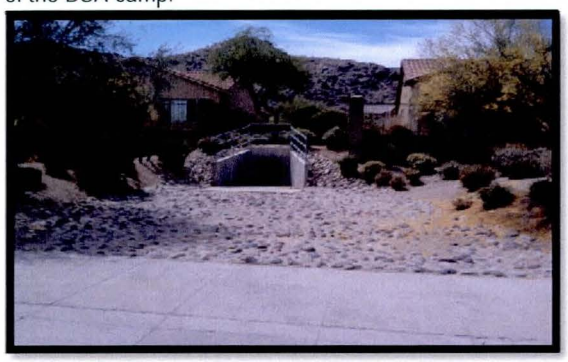
Locations 35: 20th St - Dobbins to Baseline

CMP and CMPA culvert across Dobbins Road downstream of the BSA camp.

Weirs/drops along 20th St. Significant flows flank the drops and drain down 20th St

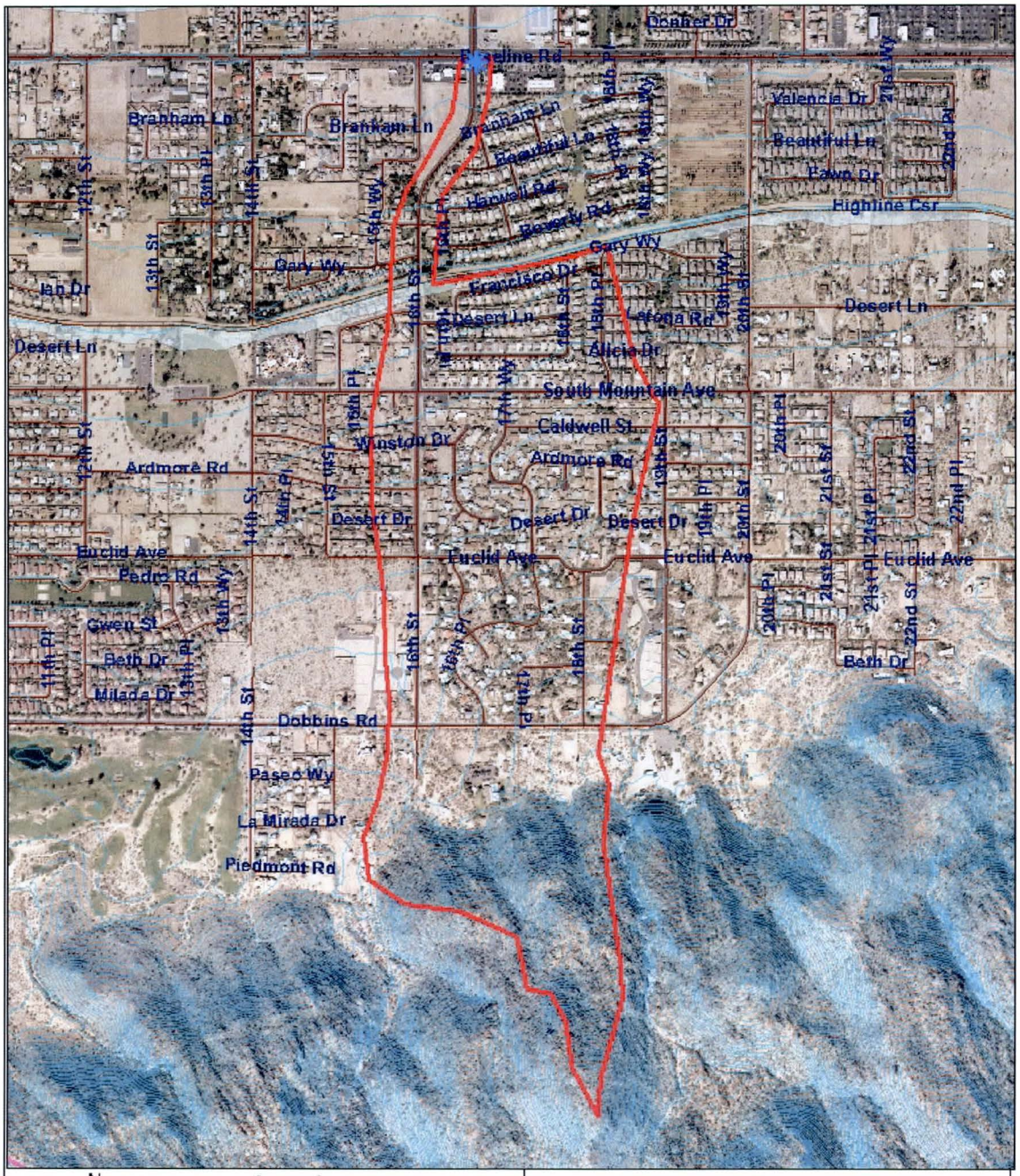


48" outlet located east of 20th St on Euclid Ave. The pipe pipe that conveys offsite flows though development

Washes and openings in block walls convey flows through properties east of 20th St and downstream of new development.

Approx. Drainage Area:	896 acres
FEMA Flood Zone:	n/a
Complaint Date:	Storm Date July 31 2010
Description / Complaint:	Mud, sand and gravel in ROW. From Public Meetings, areas residents in the vicinity of Euclid and 20th St have complained of new development exacerbating drainage and flooding conditions and they are being flooded more frequently and more severely than prior to upstream development. Other residents of the Pines at S. Mountain (NE or 20th St & Highline Canal) have complaints about erosion damage from recent storms resulting from water overtopping the canal.
Actions Taken:	Swept street
Field Observations:	New developments have constructed culverts, inlets, storm drain and outlets to convey offsite flows through their developments. A wash crosses Dobbins at 19th St through a large 84" CMP pipe culvert/arch CMP culvert. This flow is conveyed NE to a 2-6'x4' RCBC that discharges to a series of weirs/drop structures along 20th St. From erosion around the weirs, it appears they can only pass low flow. During significant events flow flanks the weirs and flow into 20th St. Ultimately the weirs discharge to the corner of 20th St and Euclid Ave anyway. East of 20th St on Euclid, a new development has a 48" pipe outlet and a grated bubble-up drain to pass flow through the site. Downstream previous houses have some historic drainage that passes through their properties along small washes and openings through block walls.
Conclusion:	**REGIONAL ISSUE:** The flooding problems along 20th St extend beyond the road alignment. Historic washes, and natural drainage patterns have been contained, and concentrated by new development that may have gotten worse. Due to the watershed extent, the concentration of flows, the lack of drainage facilities and the nature of complaints, this is a regional issue.

Locations 36: 16th St - Dobbins to Baseline



Location 36:
16th St: Dobbins to Baseline, Phoenix
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

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Locations 36: 16th St - Dobbins to Baseline

Sediment deposited on road after storm at 16th St & Ardmore St

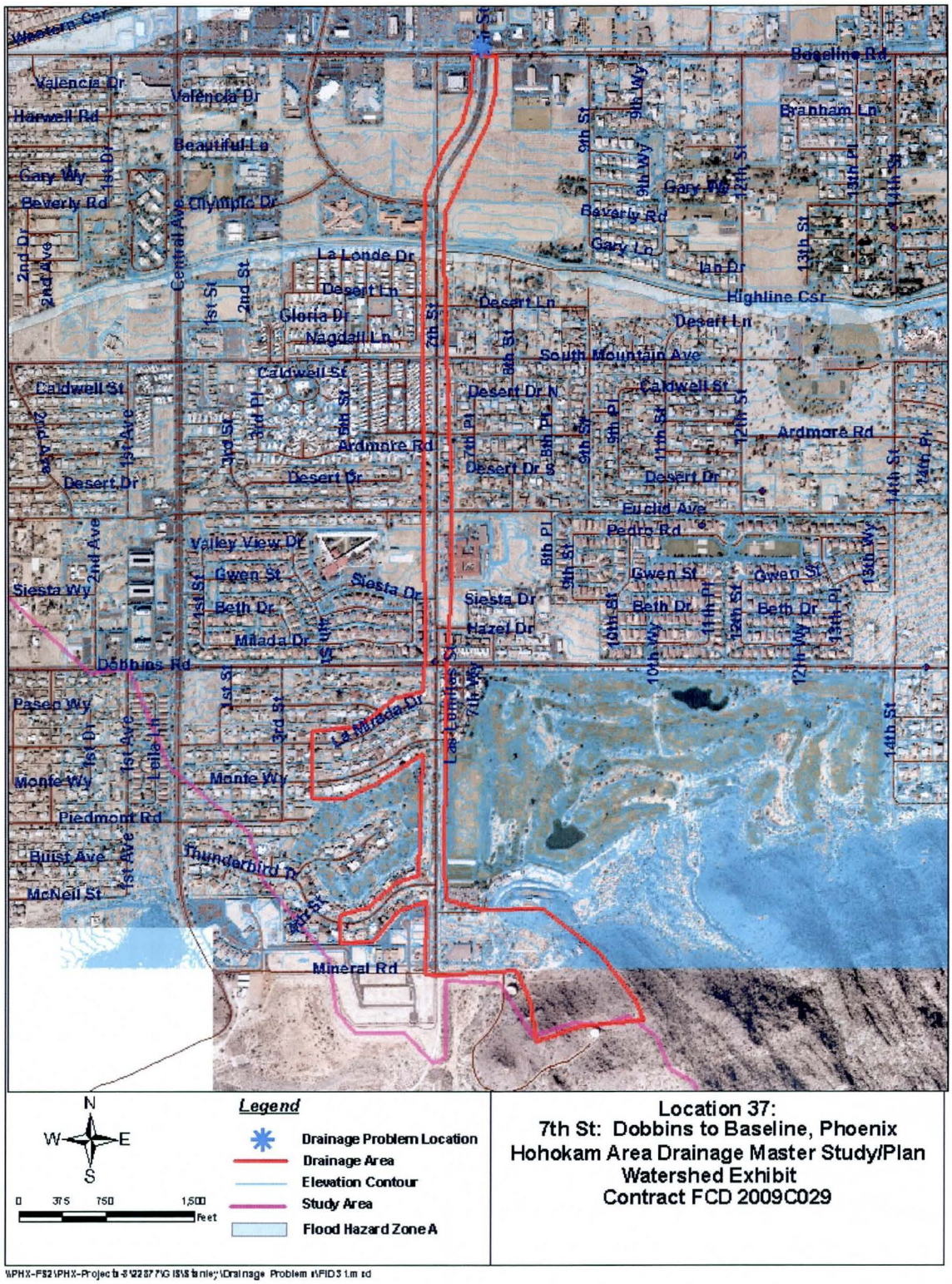
Looking north along 16th St from Euclid Ave.

Culvert at NW corner of 16th St and Dobbins Road.
Culvert in new subdivision and clogged with debris.

Sediment filled catchbasin inlet at 16th St & highline Canal.
Inlet discharged to a retention basin (see complaint below).

Approx. Drainage Area:	253 acres
FEMA Flood Zone:	n/a
Complaint Date:	Storm Date July 31 2010
Description / Complaint:	Mud, sand and gravel in ROW, At a Public Meeting, a resident in the immediate vicinity SE of 16th St and Highline Canal (1600 Block of Desert Ln) indicated that their community had been flooded 3 times in the last 5 years. A recent storm event saw water 8 ft deep in the community retention area and 3-4 ft of sediment accumulating in the common area (basin) .Similarly, a resident just north of Highline on 16th also had complaints of recent flow overtopping the Highline up to 2-3 ft on the sidewalk and flooding/sediment in the pool, irrigation ditch and laundry room. They also noted 6 other events in the last 5 years which created significant flooding/drainage problems in the area and provided photos flooding events both during and after.
Actions Taken:	Swept street
Field Observations:	A wash crosses the intersection of 16th St and Dobbins Road and is routed through a new subdivision located at the NW corner of the intersection through a box culvert and rectangular channel. The culvert access barrier was clogged with debris. The site developed has been postponed (indefinitely?) so the culvert is not maintained. Hence, water can overtop the culvert, flood subdivision streets and collect in a retention basin (NW corner of the development) or back up and flow around the development and down 16th St. 16th St is the flow path for a significant amount of runoff from a watershed that extends into the S. Mountains. Flow, sediment and debris are carried down 16th St as shown in pictures after a recent storm event.
Conclusion:	**REGIONAL ISSUE:** Due to the extent of the watershed, the magnitude of flow draining down 16th St from the mountains and the significant amount of debris that accumulates in the streets.

Location 37: 7th St - Dobbins to Baseline



Location 37: 7th St - Dobbins to Baseline

Looking south on 7th St from Mineral Road.

Looking south on 7th St.

Approx. Drainage Area:	81 acres
FEMA Flood Zone:	n/a
Complaint Date:	Storm Date July 31 2010
Description / Complaint:	Mud, sand and gravel in ROW
Actions Taken:	Swept street
Field Observations:	
Conclusion:	LOCAL ISSUE: 7th St does not have as much runoff from the mountains that other N-S streets have such as 16th, 20th or 24th St. The street, however, appears to collect some drainage from intersecting local streets but it does have a small drainage area that extends into the mountains of S. Mountain Park. Runoff from this area appears to deposit sediment and debris in the road after appreciable storm events requiring nuisance cleanup. It is not evident from complaints that there is significant flooding due to the amount of runoff. HOWEVER, this area could be considered a REGIONAL ISSUE if runoff and debris in the mountains is problematic in large events particularly since 7th St lacks any surface drainage or subsurface drainage facilities to address street drainage. A small basin at the upstream end of 7th St may help reduce the amount of sediment and debris deposited in the road.

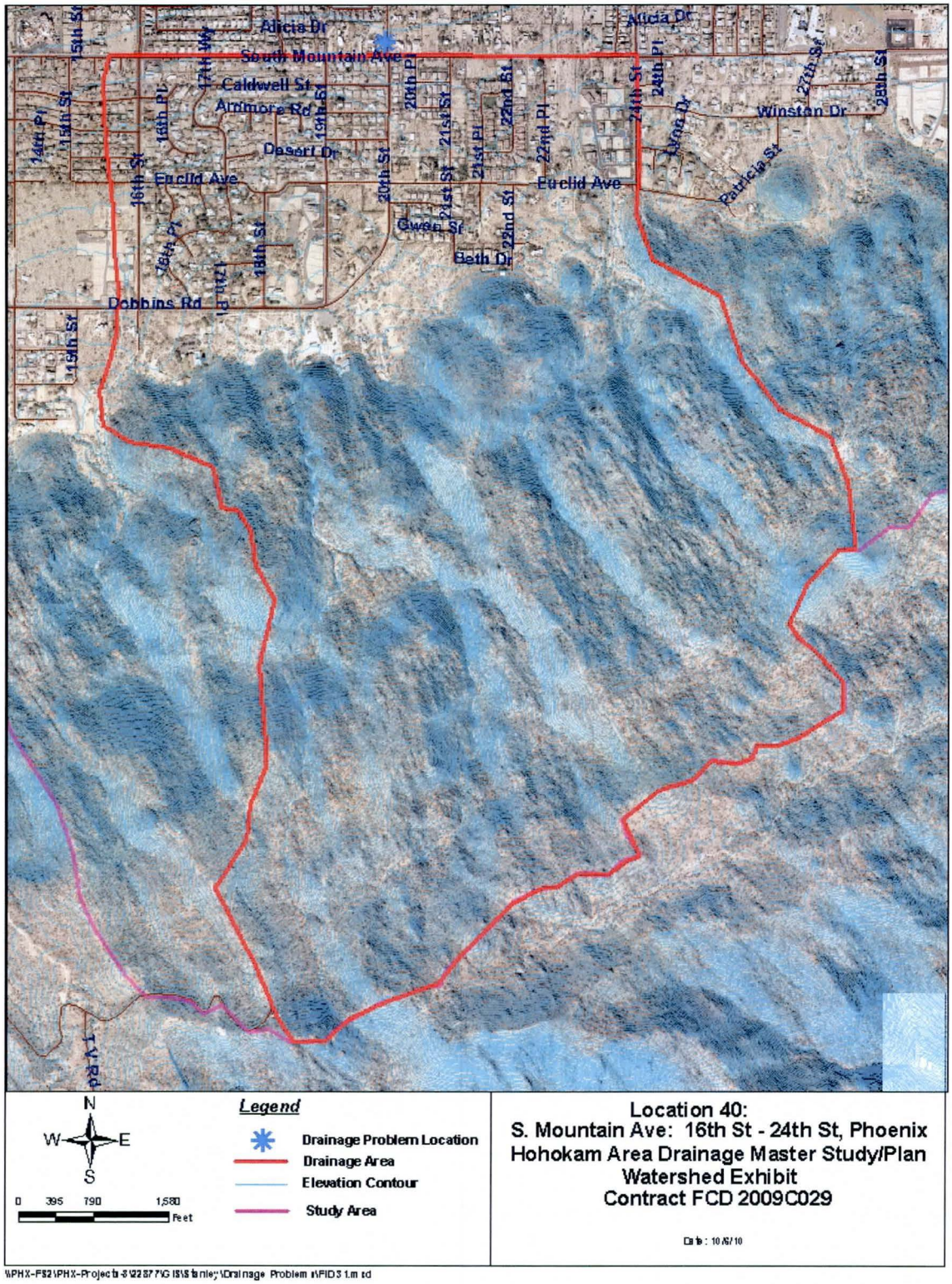
Location 38: 24th St & Desert Lane (8046 N 24th St not valid address)

Refer to 24th Street Drainage Issues under Drainage Location 33.

Location 39: 2308 E Desert Lane

Refer to 24th Street Drainage Issues under Drainage Location 33.

Location 40: S. Mountain Ave – 16th St to 24th St.



Location 40: S. Mountain Ave – 16th St to 24th St.

S Mountain Ave looking east from 16th St

S. Mountain Ave looking east from 19th St

Looking north on 19th St from S Mountain Ave. 19th St has an inverted crown that conveys significant flow to S. Mountain Ave.

Looking west on S. Mountain Ave near 24th St. No curb and gutter on south side of street.

Approx. Drainage Area:	1236 acres
FEMA Flood Zone:	n/a
Complaint Date:	Storm Date July 31 2010
Description / Complaint:	Storm related flooding.
Actions Taken:	Vactor
Field Observations:	
Conclusion:	**REGIONAL ISSUE:** S. Mountain Ave crosses several significant roads that convey runoff from the mountains: 16th St, 20th St and 24th St. The roads themselves are problem areas and contribute to flooding along S. Mountain Ave. Similarly, other roads such as 25th Pl, which is an inverted crown road, conveys street drainage to S. Mountain Ave. Given that other regional problems contribute to flooding conditions along S. Mountain Ave., this appears to be a regional problem.

Location 41: S. Mountain Ave & 28th St.

N
W E
S
0 250 500 1,000 Feet

Legend

- Drainage Problem Location
- Drainage Area
- Elevation Contour
- Study Area
- Flood Hazard Zone A

Location 41:
S. Mountain Ave & 28th St, Phoenix
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

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Location 41: S. Mountain Ave & 28th St.

S Mountain Ave looking east towards 25th St

S. Mtn Ave looking west from 28th St. Long basins north and parallel to S. Mtn Ave. retain mountain runoff passed through the upstream Desert Rose Subdivision.

Looking NE from S Mountain Ave and 28th St.

Looking north along steeply sloped 28th St from S Mtn. Ave.

Approx. Drainage Area:	158 acres
FEMA Flood Zone:	n/a
Complaint Date:	Storm Date July 31 2010
Description / Complaint:	Storm related flooding.
Actions Taken:	Vactor
Field Observations:	28th St extends terminates at the base of the South Mountains. It receives flows from the mountain and also lateral streets to some extent. In addition, a large and long retention basin that is parallel to South receives significant drainage from the mountains that is passed through the Desert Rose subdivision. Flow overtopping the retention basins would sheet flow over South Mountain Ave and continue south towards the Highline Canal.
Conclusion:	**REGIONAL ISSUE:** Primarily due the direct impact of runoff from the mountains, the magnitude of flow, velocity and transport of sediment and debris, the issue is considered a regional issue.

Location 42: 2615 E Gary Way

N
W E
S
0 250 500 1,000 Feet

Legend

- Drainage Problem Location
- Drainage Area
- Elevation Contour
- Study Area
- Flood Hazard Zone A

Location 42:
2615 E Gary Way, Phoenix
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

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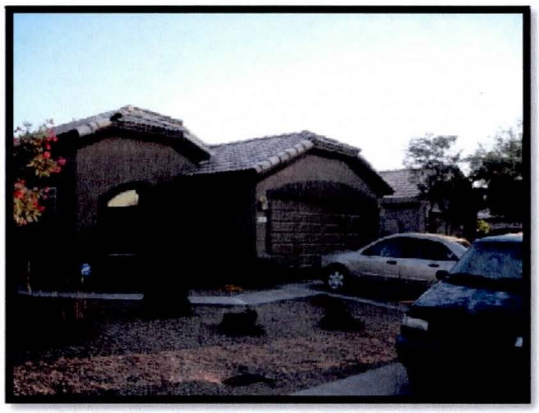
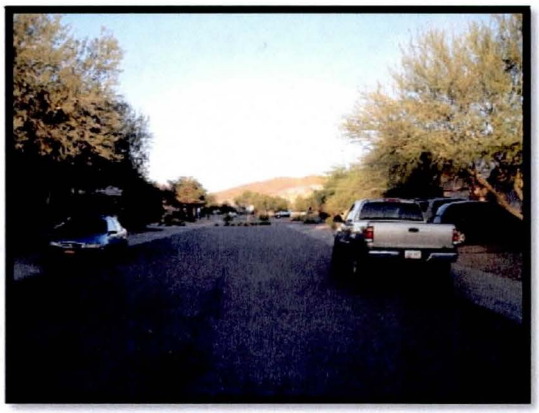
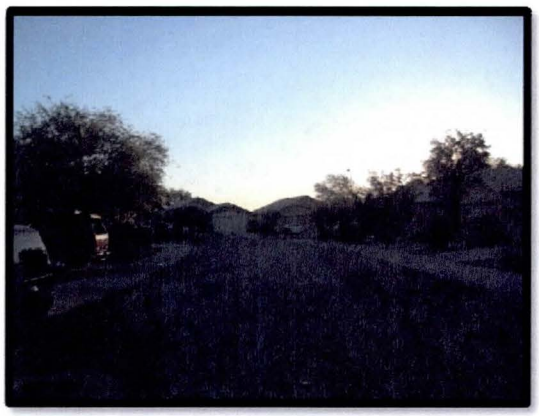
Location 42: 2615 E Gary Way



2615 E Gary Way



Looking east on Gary Way from 2615 address

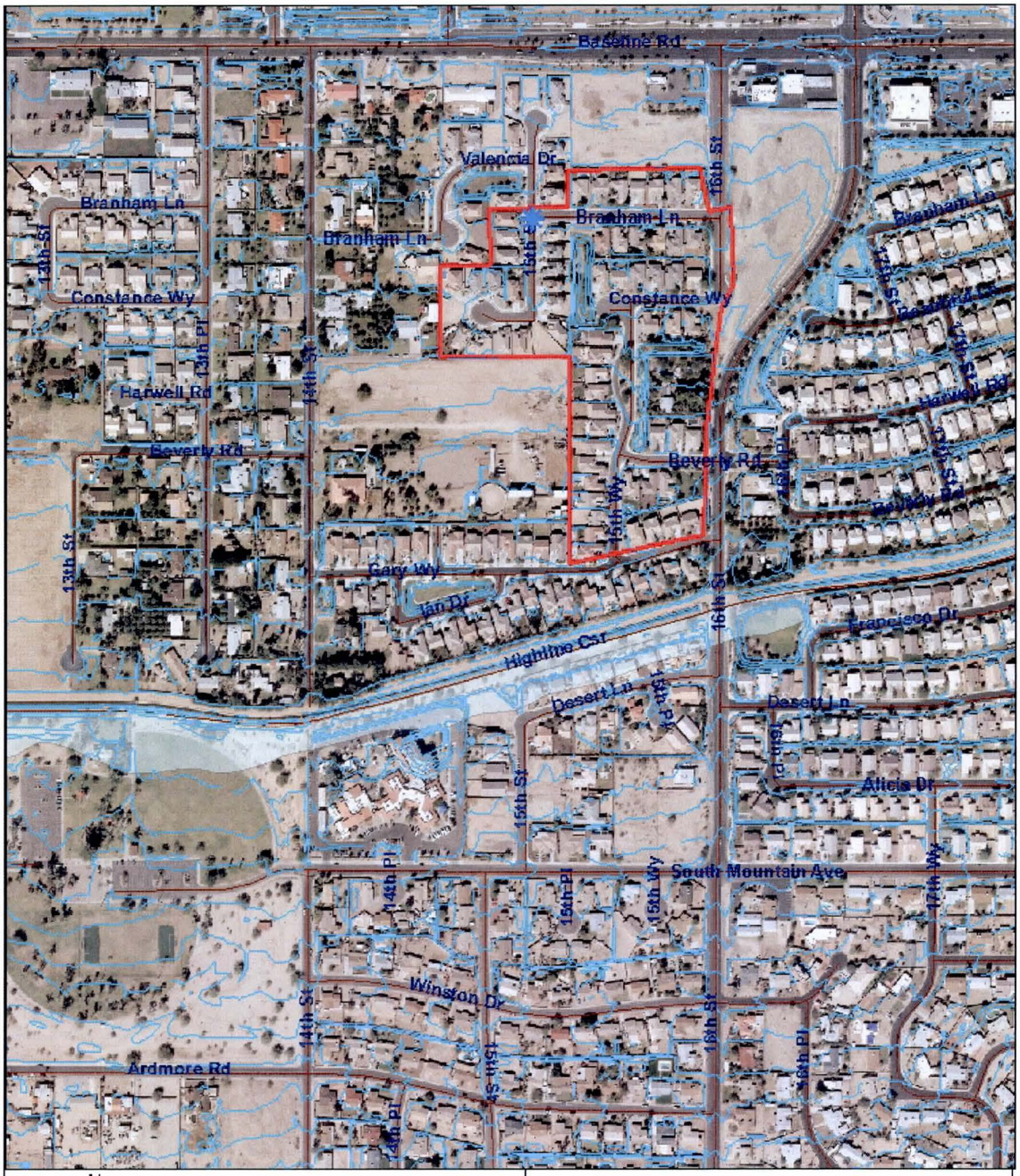


Looking west on Gary Way from 2615 address.

Series of retention basins that handle subdivision drainage. No apparent openings in perimeter block wall for offsite flows that might overtop Highline Canal except for a small pedestrian gate.

Approx. Drainage Area:	271 acres
FEMA Flood Zone:	n/a at complaint locations (Zone A south of the Highline Canal)
Complaint Date:	Storm Date July 31 2010
Description / Complaint:	Storm related flooding.
Actions Taken:	Vactor
Field Observations:	No detailed information is provided on the complaint. In the field it appear s the location should have no significant drainage problems. Very little street drainage drains to or by the address. Most is directed to an interior drainage system and a series of detention basins. The address does back up to the Highline Canal. It is possible that flow overtopping the canal may impact the sight but without information on the complaint it is difficult to tell.
Conclusion:	**UNKNOWN – CONSIDER AS POTENTIAL REGIONAL ISSUE:** Given that the address has no significant local drainage and should not potentially have any significant local drainage problems. It is assumed that the sight might have been impacted by flow overtopping the canal. Given the drainage area and the magnitude of flow that could potential overtop the canal, this is tentative considered a regional drainage issue.

Location 43: Branham Lane – 14th St to 16th St



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0 125 250 500 Feet

Legend

- Drainage Problem Location
- Drainage Area
- Elevation Contour
- Study Area
- FEMA Zone A

Location 43:
Branham Lane: 14th St.-16th St., Phoenix
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

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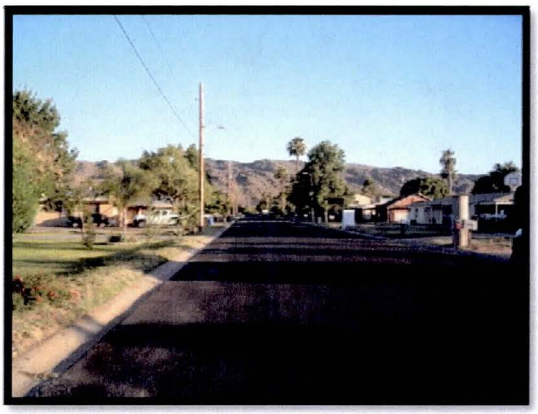
Location 43: Branham Lane – 14th St to 16th St

Looking west along Branham Land from 15th St.

Looking east on Branham Lane from 14th St.



Looking north along 14th St from Branham Lane.

14th St terminates at problem area in Circle K Park where flow crosses the Highline Canal..

Approx. Drainage Area:	17 acres
FEMA Flood Zone:	n/a
Complaint Date:	Storm Date July 31 2010
Description / Complaint:	Storm related flooding.
Actions Taken:	Vactor
Field Observations:	Branham at 15th St. and between the new development between 15th St and 14th St does not appear to be problematic. There is interior drainage to retention basins. It is believe the complaint is likely at 14th St and Branham since 14th St receives significant flow from overtopping of the Highline Canal during large rainfall events.
Conclusion:	**REGIONAL ISSUE:** Issue related to problems at Circle K park (Location 20)

Location 44: 13th Place & Baseline

N
W E
S
0 125 250 500 Feet

Legend

- Drainage Problem Location
- Drainage Area
- Elevation Contour
- Study Area
- Flood Hazard Zone A

Location 44:
13th Place & Baseline, Phoenix
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

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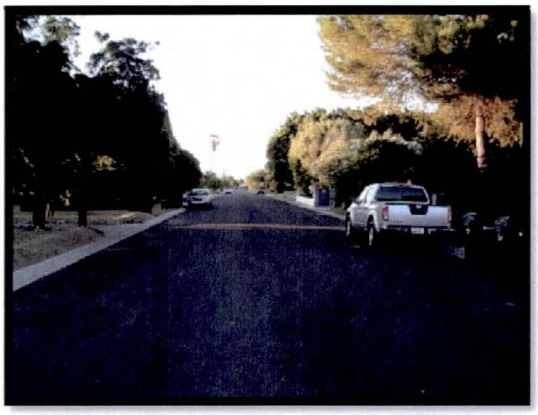
Location 44: 13th Place & Baseline

Looking NW at house at end of 13th Pl. Just downstream of Circle K park/Highline Canal problem area.

Looking West at north perimeter of wall of house. Wall Would divert flow to 13th Pl.



Looking south down 13th Pl from south end.

Looking south on 13th Pl closer to Baseline Road.

Approx. Drainage Area:	25 acres
FEMA Flood Zone:	n/a
Complaint Date:	Storm Date July 31 2010
Description / Complaint:	Storm related flooding.
Actions Taken:	Vactor
Field Observations:	13th Pl is immediately downstream of Circle K Park, an area with known flooding issues (see Location 20) and is a flow path for runoff from the mountains that overtops the Highline Canal.
Conclusion:	**REGIONAL ISSUE:** Flooding in this vicinity is related to flooding issues at Circle K Park and in the flow path for runoff from the mountains. This is a regional issue

Location 45: 502 E Desert Drive

N
W E
S

0 125 250 500 Feet

Legend

- Drainage Problem Location
- Drainage Area
- Elevation Contour
- Study Area
- Flood Hazard Zone A

Location 45:
502 E Desert Drive, Phoenix
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

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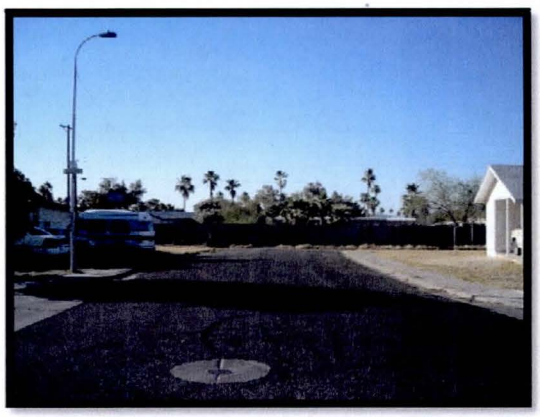
Location 45: 502 E Desert Drive

Looking northeast at 502 E Desert Drive.



Looking north on 5th St. at dead end and opening in wall. 502 E Desert Drive on right.

Looking north on 5th St. from Dobbins Road

Looking west on Dobbins Road from 5th St.

Approx. Drainage Area:	4 acres
FEMA Flood Zone:	n/a
Complaint Date:	Storm Date July 31 2010
Description / Complaint:	Storm related flooding.
Actions Taken:	Vactor
Field Observations:	The house is located adjacent to a dead-end street. A block wall with a small opening in the bottom provides some drainage but the openings could be readily blocked with debris and it is possible that the discharge to the location exceeds the ability of the opening to drain it resulting in ponding and/or flooding. The drainage area is relatively small. The home appears to be raised above the adjacent top of curb by perhaps as much as 1ft.
Conclusion:	**LOCAL ISSUE:** Details of the complaint are not known. It would appear that the issue might simply be related to ponding at the location of the dead-end street, the inability of the opening in the block wall to provide adequate drainage. It may be that the issue is not related to any flooding of structures but just a ponding of water. Providing a larger opening may greatly improve conditions.

Location 46: 1602 E Pecan Road

N
W E
S
0 125 250 500 Feet

Legend

- Drainage Problem Location
- Drainage Area
- Elevation Contour
- Study Area
- Flood Hazard Zone A

Location 46:
1602 E Pecan Road, Phoenix
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

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Location 46: 1602 E Pecan Road

Looking south on 16th St at Pecan Road intersection.

Looking east on Pecan Rd from 16th St (1602 on left).

Looking east on Pecan Rd. Pecan at this location actually a small cul de sac off of 16th St.

Looking west on Pecan towards 16th St.

Approx. Drainage Area:	3 acres
FEMA Flood Zone:	n/a
Complaint Date:	Storm Date July 31 2010
Description / Complaint:	Storm related flooding.
Actions Taken:	Vactor
Field Observations:	Pecan Rd at this location is actually a small cul de sac. The cul de sac has some grated inlets at 16th St but flow bypassing the inlets would likely create drainage problems in the cul de sac. The roadway grading is such that flow from 16th St can readily create problems in the cul de sac.
Conclusion:	**LOCAL ISSUE:** This is considered a local issue primarily due to the fact that any significant flow in 16th St could create adverse conditions in the cul de sac. This problem appears to be that 16th St does not have adequate drainage in the location and the most effective solution appears to be adding catch basins.

Location 47: 1650 E Chambers Road

N
W E
S
0 125 250 500 Feet

Legend

- Drainage Problem Location
- Drainage Area
- Elevation Contour
- Study Area
- Flood Hazard Zone A

Location 47:
1650 E Chambers Road, Phoenix
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

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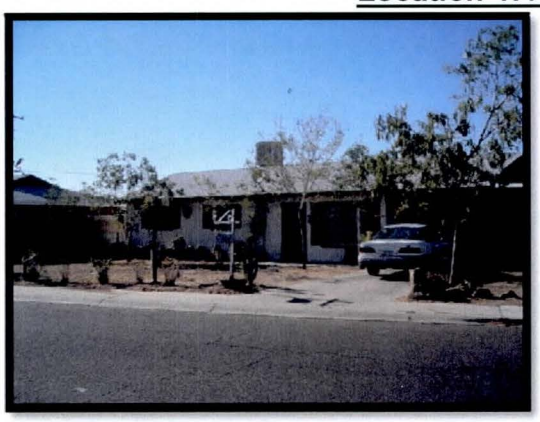
Location 47: 1650 E Chambers Road



1650 E Chambers Rd.

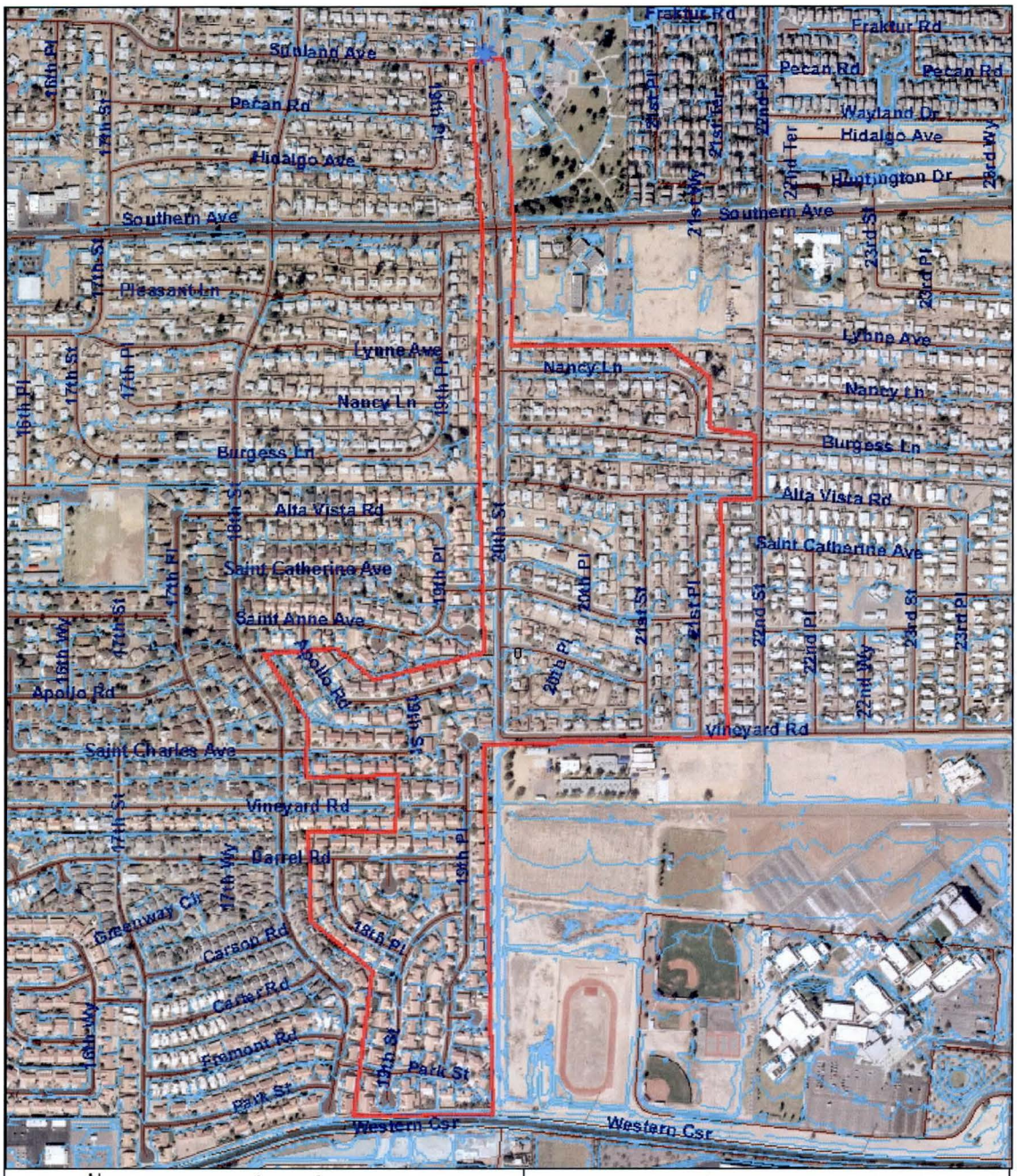
Chambers & 17th St (adjacent to 1650 address) looking south at debris and berm that obstructs flow to south.

Looking at debris and berm that obstruct flow. Catchbasins such as the one on the lefts are located along Chambers and 17th St to capture street flow.

Looking west on Chambers from 17th St intersection.

Approx. Drainage Area:	6 acres
FEMA Flood Zone:	n/a
Complaint Date:	Storm Date July 31 2010
Description / Complaint:	Storm related flooding.
Actions Taken:	Vactor
Field Observations:	The address is located on the NW corner of 17th St and Chambers. 17th St terminates at this location and the end is block by a mound of dirt and dumped debris. There are several catch basins in the vicinity on 17th and on Chambers so there is a known concentration of flow in this location.
Conclusion:	**LOCAL ISSUE/POTENTIAL REGIONAL:** There are catch basins in the location so the area likely is known to be a point of concentration for local flow. The catch basins are inadequate and/or the berm at the end of 17th St does not allow flow to continue on its natural path resulting in ponding. HOWEVER, the problem could also be a POTENTIAL REGIONAL ISSUE if flows to this location are increased by flow from 18th and 20th Streets.

Location 48: 20th St & Sunland Ave



N
W E
S

0 237.5 475 950 Feet

Legend

- Drainage Problem Location
- Drainage Area
- Elevation Contour
- Study Area
- Flood Hazard Zone A

Location 48:
20th St & Sunland Ave, Phoenix
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

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Location 48: 20th St & Sunland Ave

20th St looking north at 20th St & Sunland intersection.

From 20th St looking west on Sunland Ave

Looking east at drainage easement from 19th Pl that discharges to the intersection of 20th St and Vineyard Rd.

Large irrigation ditch along 20th St alignment (north of intersection of Vineyard Rd.) than may also contribute runoff to 20th St from further upstream (south).

Approx. Drainage Area:	99 acres
FEMA Flood Zone:	n/a
Complaint Date:	Storm Date July 31 2010
Description / Complaint:	Storm related flooding.
Actions Taken:	Vactor
Field Observations:	20th St at Southern is the concentration point for a significant amount of street drainage. 20th St serves a collector conveying flow and discharging to Southern. There is no retention basin for subdivision drainage nor is there any drainage infrastructure in the form of catch basins or storm drain until Southern Avenue. In addition, drainage from the adjacent subdivision discharges flows to 20th St. at Vineyard and a small cul de sac. The inlet at Vineyard is large and it is apparent receives a significant amount of street runoff. Consequently, 20th St serves as the conveyance for a much larger drainage area than shown.
Conclusion:	**REGIONAL ISSUE:** Because of the size and magnitude of the drainage being conveyed along 20th St, this would appear to be a regional issue.

Location 49: 10th St & Alta Vista Road

N
W E
S
0 160 320 640 Feet

Legend

- Drainage Problem Location
- Drainage Area
- Elevation Contour
- Study Area
- Flood Hazard Zone A

Location 49:
10th St & Alta Vista Rd, Phoenix
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

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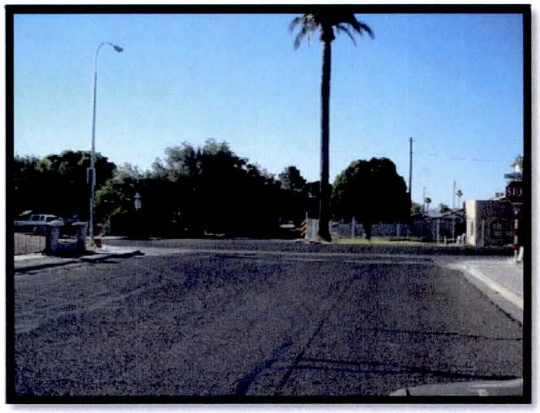
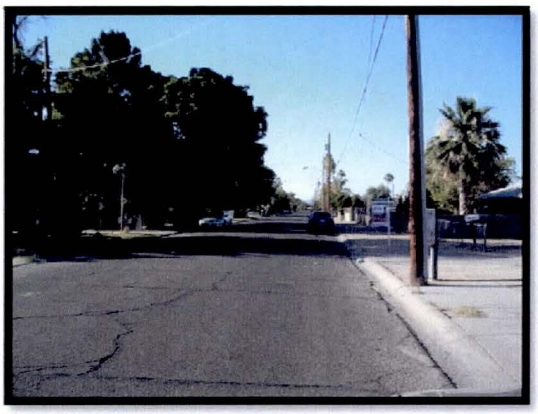
Location 49: 10th St & Alta Vista Road

Looking south down 10th St from Western Canal.



Looking south down 10th St at crossing of Vineyard Rd.



Looking south down 10th St in the proximity of where an Intersection of Alta Vista might be located

Approx. Drainage Area:	17 acres
FEMA Flood Zone:	n/a
Complaint Date:	Storm Date July 31 2010
Description / Complaint:	Storm related flooding. No other specifics provided
Actions Taken:	Vactor
Field Observations:	10th St does not intersect Alta Vista Road. 10th St has 4" roll curb along much if not all its length between Southern Ave and Vineyard Rd. The finish floor elevations of many homes appear to be at or below the top of curb elevations. There is not storm drain system in this area or any other drainage facilities.
Conclusion:	**LOCAL ISSUE:** The street is a small residential street and with 4" roll curbs, the street has little conveyance capacity. During heavy rains it is likely water overtops the curb. This is likely exacerbated by vehicular travel spraying water over the curb and onto adjacent properties. Depending on the FF elevations of the structures, it is possible that some experience flooding during large storm events simply from local drainage in the street itself however offsite flows from Vineyard or further to the south cannot be ruled out. Not knowing the specifics of the complaint, it would appear to be a local issue primarily resulting from low curbs and low building elevations.

Location 50: 18th St & Southern Ave

N
W E
S
0 125 250 500 Feet

Legend

- Drainage Problem Location
- Drainage Area
- Elevation Contour
- Study Area
- Flood Hazard Zone A

Location 50:
18th St & Southern Ave, Phoenix
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

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Location 50: 18th St & Southern Ave

Looking east on Southern Ave at 18th St.

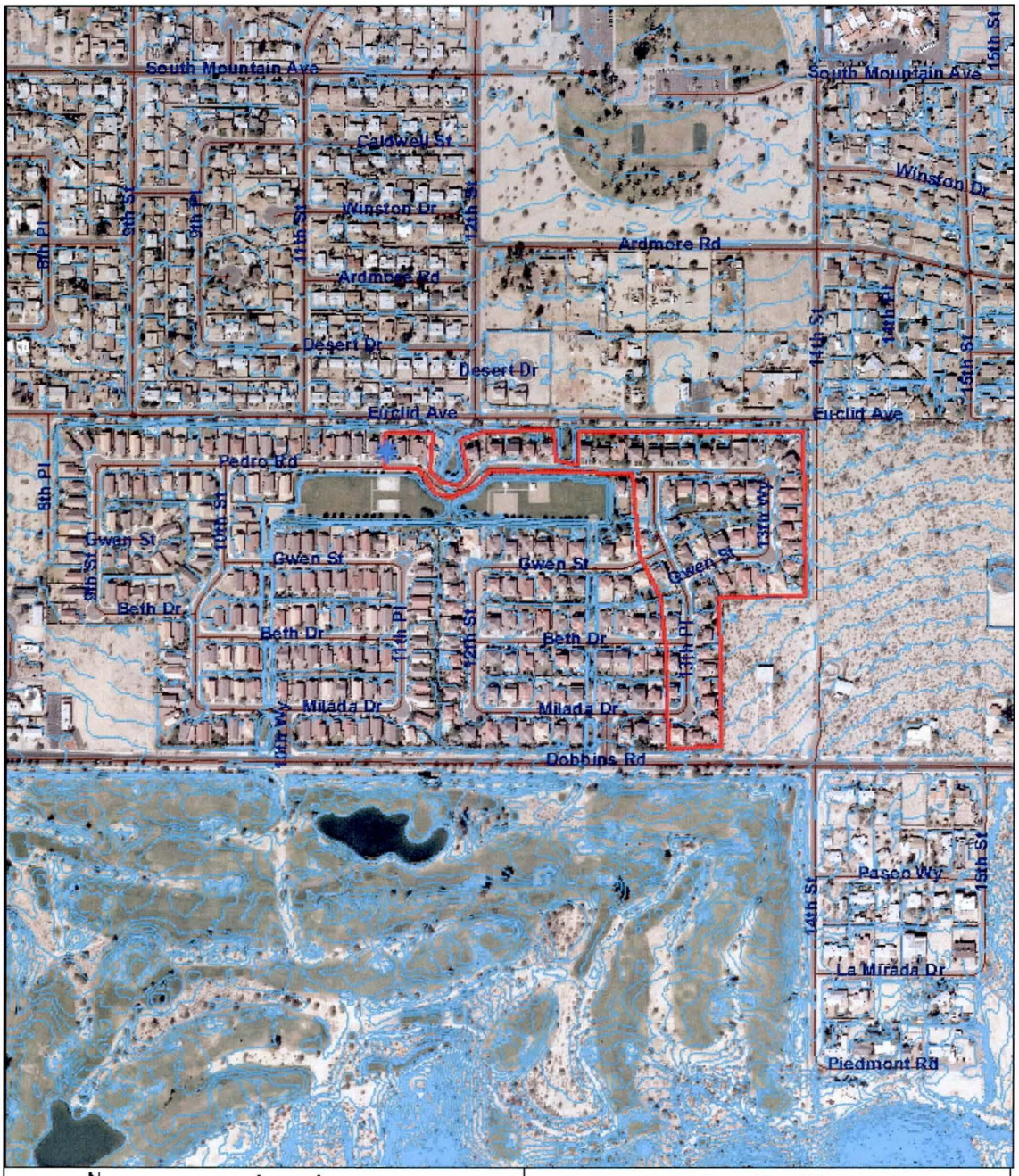
Looking south on 18th St at Southern Ave.

Looking north along 18th St.

Looking south on 18th St from Vineyard Road, generally the 1'-2' hump across 18th St diverts flow down Vineyard.

Approx. Drainage Area:	47 acres
FEMA Flood Zone:	n/a
Complaint Date:	Storm Date July 31 2010
Description / Complaint:	Storm related flooding.
Actions Taken:	Vactor
Field Observations:	18th St at Southern is the concentration point for a significant amount of street drainage. 18th St serves a collector conveying flow and discharging to Southern. There is no retention basin for subdivision drainage nor is there any drainage infrastructure in the form of catch basins or storm drain until Southern Avenue.
Conclusion:	**REGIONAL ISSUE:** The street likely does not have adequate capacity to convey street drainage from such a large area large storm events. Inlets along Southern are likely inadequate to capture flow from the adjacent collector streets as well as Southern Avenue itself. Lacking any means to capture and divert drainage within the subdivision, An extension of a storm drain lateral down 18th St would likely improve conditions.

Location 51: 1122 E Pedro Road



N
W E
S

0 175 350 700 Feet

Legend

- Drainage Problem Location
- Drainage Area
- Elevation Contour
- Study Area
- Flood Hazard Zone A

Location 51:
1122 E Pedro Road, Phoenix
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

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Location 51: 1122 E Pedro Road

Opening in perimeter block wall at SE corner of subdivision.

Looking east along Pedro Rod at valley gutter across road.

Approx. Drainage Area:	15 acres
FEMA Flood Zone:	n/a
Complaint Date:	Storm Date July 31 2010
Description / Complaint:	Storm related flooding.. Resident complaint states that water was coming into the front door every time a car would drive by. The comment infers has occurred in the past after heavy rains.
Actions Taken:	Vactor
Field Observations:	Difficult to determine the elevation of the home in relation to adjacent homes and properties. Two houses west of the home appears to be the low point of the street and as a valley gutter across the street drains drainage from the north side of the street to the south side to a scupper/inlet to a large retention basin. This is the only inlet to the basin on Pedro and there are not other catch basins or inlets to the east until you get to a small catch basin at 13th Pl.
Conclusion:	**LOCAL ISSUE:** The street lacks sufficient drainage and conditions could be improved by constructing additional inlets and/or catch basins along Pedro Road to drain into the retention basins. Drainage appears to be derived locally from subdivision streets and not come from the retention basins which help retain runoff from the mountains to the south. However, some offsite flows may contribute to drainage in the subdivision streets through an opening in the subdivision perimeter block wall located at the southeast corner of the subdivision.

Location 52: Vineyard Rd – 16th St to 18th St

N
W E
S
0 100 200 400 Feet

Legend

- Drainage Problem Location
- Drainage Area
- Elevation Contour
- Study Area
- Flood Hazard Zone A

Location 52:
Vineyard Road - 16th St to 18th St, Phoenix
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

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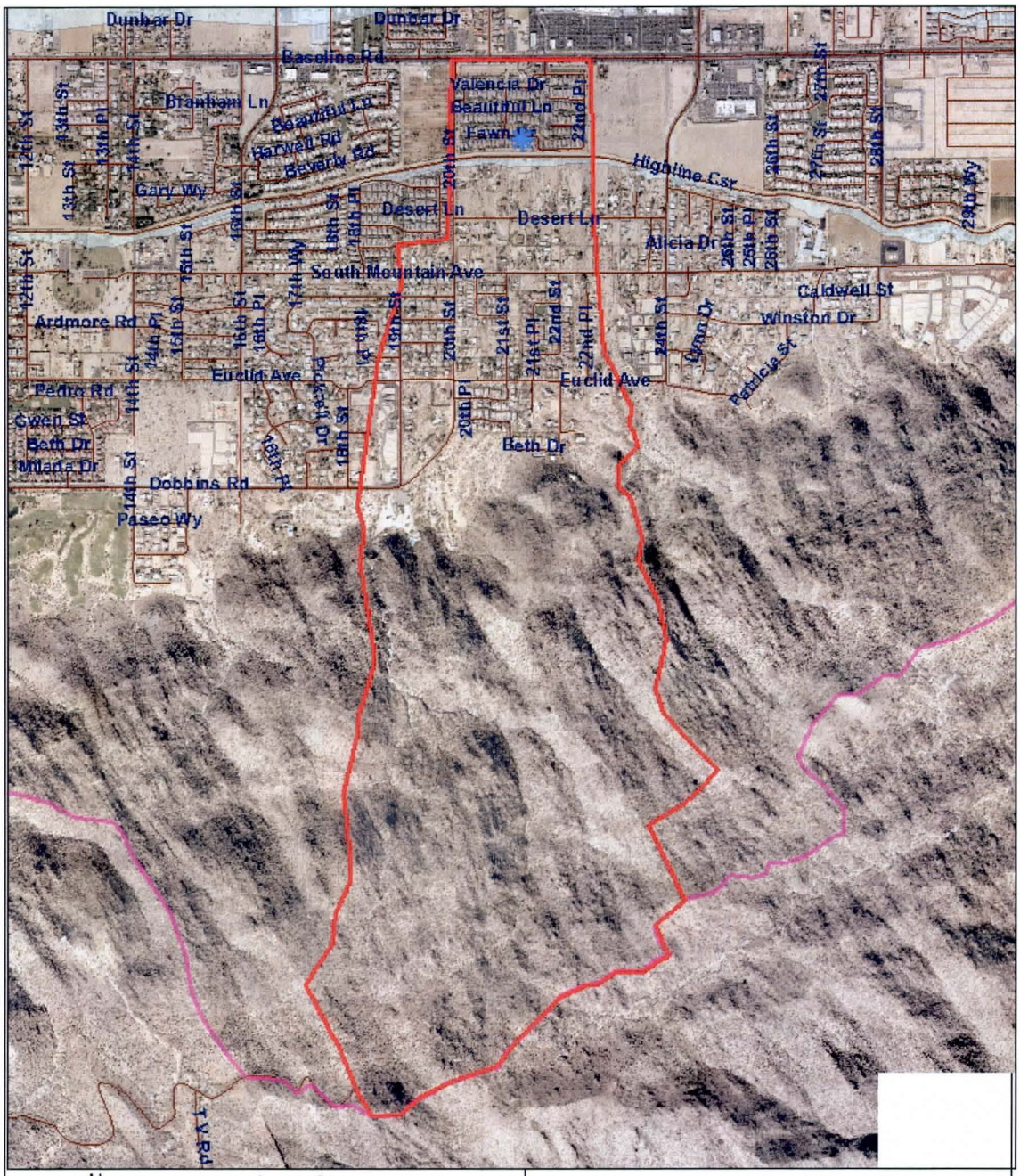
Location 52: Vineyard Rd. – 16th St to 18th St

Vineyard & 18th St on night of 1-19-10. South half of road was blocked off with barricades due to ponded water.

Corner Vineyard and 18th St on night of 1-19-10.

Approx. Drainage Area:	54 acres
FEMA Flood Zone:	n/a
Complaint Date:	No complaint received. Identified problem area from field recon during storm event on Storm Date January 19, 2010
Description / Complaint:	South half of road from approximately 16th St to 18th St was barricaded to prevent vehicular travel due to excessive ponding. Did not receive any formal complaints from the COP regarding this area nor was any storm report received.
Actions Taken:	Barricaded street
Field Observations:	Vineyard Rd receives most if not all street drainage from the local streets to the south of Vineyard between 16th and 18th St. until the Western Canal. Vineyard is a wide street (~40+ ft) that itself would result in lot of runoff. At the time of arrival after the storm event, the south half of the road was barricaded to prevent vehicular travel. Water was ponded >0.5' and there was evidence that the depth/extent of water at some time extended into the yards of houses along 16th St. Vineyard does not appear to have adequate slope to drain east to 16th St or to 19th Place. Water simply ponds in the street.
Conclusion:	**PRIMARILY A LOCAL ISSUE:** The problem could be considered both a regional and local issue. If Vineyard was adequately sloped to drain, the issue may not be significant. The nature of the problem is primarily street flooding and there does not seem to be a danger of significant property flooding since most home are raised >1' above the adjacent top of curb. However, THE ISSUE COULD ALSO BE A POTENTIAL REGIONAL ISSUE, based upon the drainage area contributing to the problem and the lack of any drainage infrastructure that could address the problem.

Location 53: Pines at S. Mountain – 21st Way & Baseline Rd



N
W E
S
0 500 1,000 2,000 Feet

Legend

- Drainage Problem Location
- Drainage Area
- Elevation Contour
- Study Area
- Flood Hazard Zone A

Location 53:
The Pines at South Mountain:
21st Way & Baseline Rd, Phoenix
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

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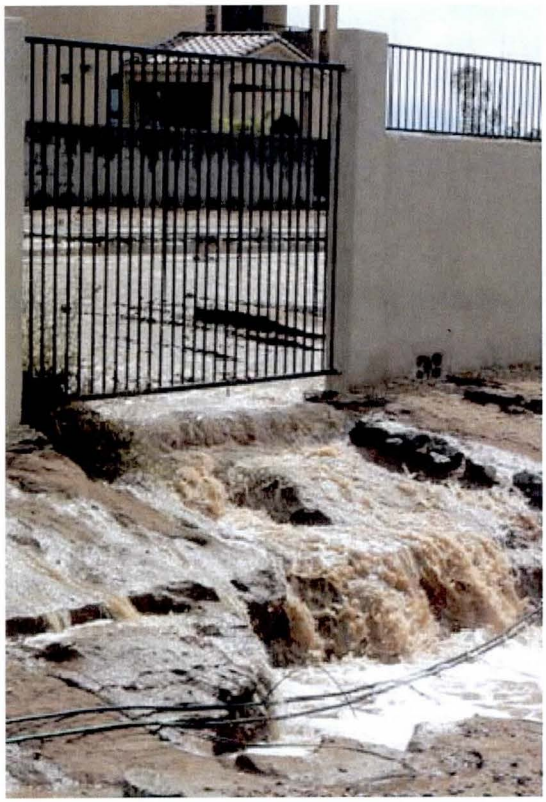
Location 53: Pines at S. Mountain – 21st Way & Baseline Rd

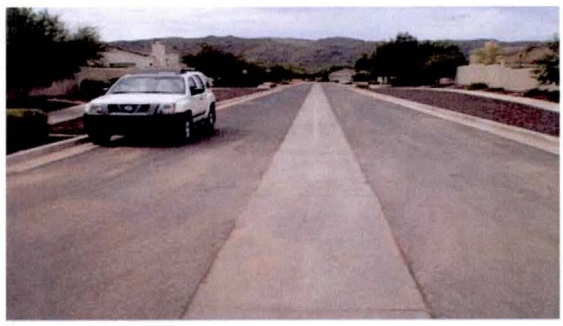


Flow pouring through opening in perimeter block wall along the Highline Canal (south development boundary)..

Severe erosion within the development along drainageway.

Erosion from drainage through small wall openings along south side of development (adjacent ot Highline Canal.

Grated inlet that captures offsite flows into storm drain.



Looking south along valley gutter in 21st St that conveys onsite and offsite flows through subdivision.

Location 53: Pines at S. Mountain – 21st Way & Baseline Rd

End of 21st St were sediment is deposited.

Retention basin along Baseline full to near capacity. Note The water level and erosion.

NOTE: Photos obtained from the Pines at South Mountain HOA drainage study: *"Common Area Grading and Drainage & Off-Site Drainage Inspection Report Following the Storm of July 31, 2010 for The Pines at South Mountain Phoenix, Arizona"* by Desert Drainage Engineering, PLC / 7813 E. Dallas St / Mesa AZ 85207.

Approx. Drainage Area:	896 acres
FEMA Flood Zone:	n/a
Complaint Date:	Complaints received during the public involvement process. Complaints focused on a storm event on July 31, 2010.
Description / Complaint:	In the July 31, 2010 event, there was significant floodwater related damage in the development in the form or excessive erosion, undermining of wall foundations and landscaping and deposition of debris in the retention basins and streets. There was no indication that there was flooding of any residential structures.
Actions Taken:	No actions were taken by the COP. Actions taken by the HOA included cleanup and repair of erosion damage caused by flow overtopping the Highline Canal. The HOA also hired Desert Drainage Engineering, PLC to perform its own investigation into the July 31, 2010 events and make recommendations.
Field Observations:	The development is immediately downstream of the Highline Canal. The perimeter wall disrupts the natural drainage of water to the north (as does the Highline Canal). There is a perimeter wall between the Highline Canal and the development. Sections of the perimeter wall are left open and have metal fencing to pass flow overtopping the Highline Canal. There are also drainage block openings along the bottom of the block wall for drainage. Flow is passed through the development either overland (some streets have an inverted crown to serve as a conveyance) or in storm drain pipes that capture flow in two large grated inlets located in the detention/drainage ditch parallel to the canal and inside the development. The storm drain lines discharge flow into a large retention basin along Baseline Road.
Conclusion:	**REGIONAL ISSUE:** The development is located in the historic natural drainage path of a drainage area that extends into the mountains. The Highline Canal is not designed and is inadequate to convey the magnitude of flow that concentrates in this general area laterally. The perimeter block wall interrupts flow to the north that overtops the canal. The development design appears to have underestimated and/or inadequately addressed potential offsite flows and the potential erosion issues. The drainage area and problem is related to other identified problem areas upstream (Locations 35, 40 and 41).

Location 54: Cortland Point – 36th St & Francisco Dr.

N
W E
S

0 125 250 500 Feet

Legend

- Drainage Problem Location
- Drainage Area
- Elevation Contour
- Study Area
- Flood Hazard Zone A

Location 54:
Cortland Point Subdivison, Phoenix
Hohokam Area Drainage Master Study/Plan
Watershed Exhibit
Contract FCD 2009C029

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Location 54: Cortland Point – 36th St & Francisco Dr.

July 31, 2010 event. Looking at Highline Canal.

July 31, 2010 event. Flooding at residence.

July 31, 2010 event. Ponding of water against block wall. Note the bowing of wall.

July 31, 2010 event. Seepage of water through wall.

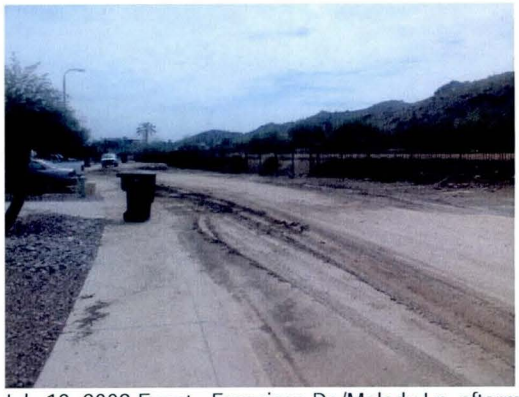
July 13, 2008 Event. "Where it came from" is photo title. Likely location of collapsed wall.

July 13, 2008 Event. Looking east down Francisco Drive.

Location 54: Cortland Point – 36th St & Francisco Dr.

July 13, 2008 Event. Francisco Dr.

July 13, 2008 Event. Francisco Dr. aftermath



July 13, 2008 Event. Francisco Dr./Melody Ln. aftermath

July 13, 2008 Event. Erosion of cemententacious embankcment along Francisco Dr./Melody Ln.

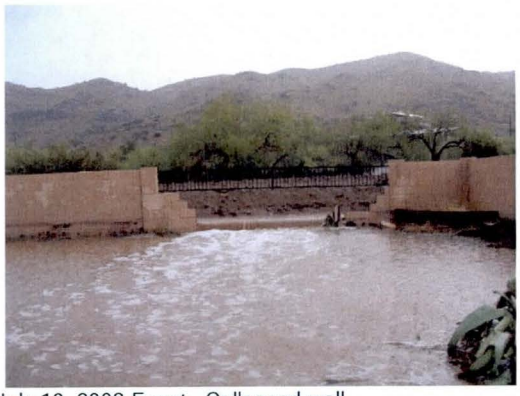
July 13, 2008 Event. Flooded parking at Shadow Mountains Villa Condos located just north of Cortland Point Subdivision.

Location 54: Cortland Point – 36th St & Francisco Dr.

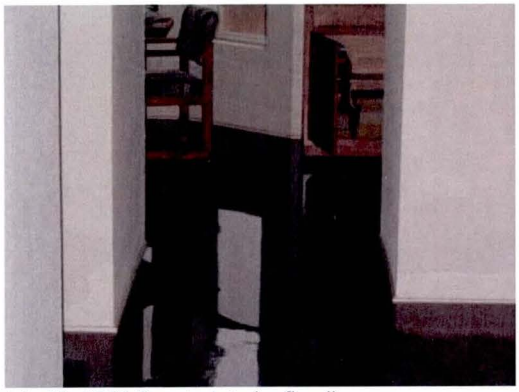
July 13, 2008 Event. Flooded parking at SM Villas Condos.

Location of wall collapse during July 13, 2008 event.

July 13, 2008 Event. Collapsed wall



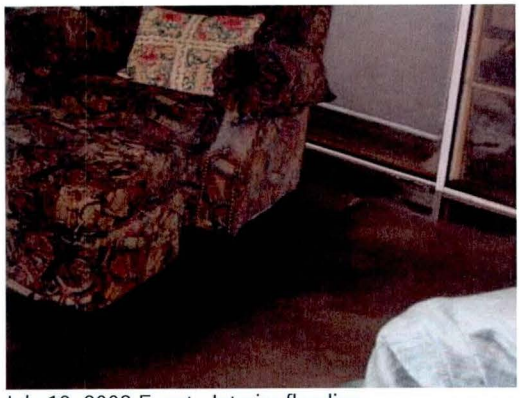
July 13, 2008 Event. Collapsed wall.



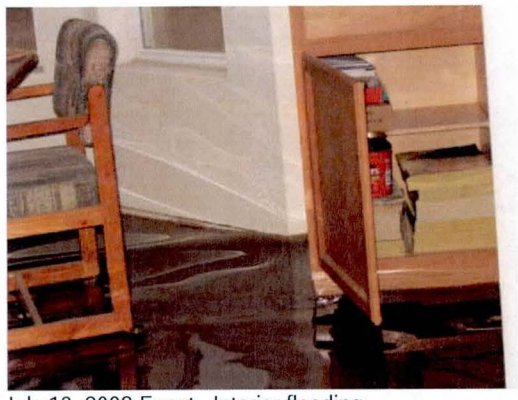
July 13, 2008 Event. Interior flooding

July 13, 2008 Event. Interior flooding

Location 54: Cortland Point – 36th St & Francisco Dr.



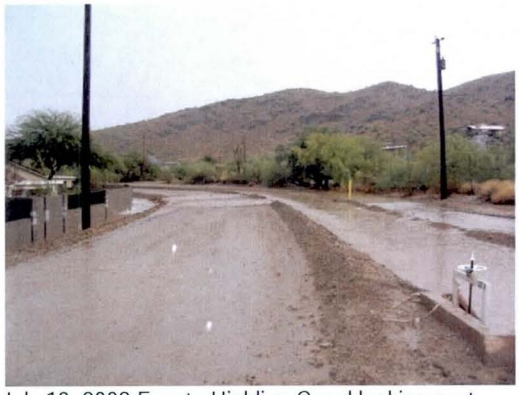
July 13, 2008 Event. Interior flooding



July 13, 2008 Event. Interior flooding

July 13, 2008 Event. Highline Canal looking west.

July 13, 2008 Event. Highline Canal looking west.



July 13, 2008 Event. Highline Canal looking east.

July 13, 2008 Event. Highline Canal looking west.

Location 54: Cortland Point – 36th St & Francisco Dr.

July 13, 2008 Event. Highline Canal looking upstream towards mountains. Specific location unknown.

July 13, 2008 Event. Street flooding along Francisco Drive and Melody Lane during the event.

July 13, 2008 Event. Erosion of embankment.

July 13 2008 Event. Flow overtopping Highline Canal.

Location 54: Cortland Point – 36th St & Francisco Dr.

NOTE: Photos obtained SRP personnel and provided by local residences.

Approx. Drainage Area:	127 acres
FEMA Flood Zone:	n/a at location (Zone A upstream of Hihglin Canal)
Complaint Date:	No known complaints received by the COP or documented in the COP database. Informationi obtained from SRP and provided by local residents. No complaints were received regardin this area during the public involvement process. Data of events are July 13, 2008 and July 31, 2010.
Description / Complaint:	*As deduced from the provided photos:* In the July 13, 2008 event, a block wall along the canal apparently collapsed and provided an opening for floodwater that overtopped the canal. The resident had not only exterior property damage but the house interior itself was flooded several inches as well. The flow overtopping the canal also flowed through a fenced area. The embankment along the fenced area appears to have been hardened cementatious material of some sort that resisted erosion but eventually was undermined and much was eroded away. The resulting water flooded Francisco Dr/Melody Dr and the parking lot of the Shadow Mountains Villa Condos located just north of the Cortland subdivision
Actions Taken:	No known actions were taken by the COP. Very likely the street were cleaned of debris however.
Field Observations:	Upstream are a couple of drainages that concentration flow in this general location. The subdivision walls are generally several feet below the canal elevation. Flow overtopping the canal likely ponds behind the walls (and does based upon photos) if there is no ready means of drainage. The block walls appear to have minimal structural integrity and can be expected to collapse or leak excessively under the pressure of water.
Conclusion:	**REGIONAL ISSUE:** Based upon the extent and severity of flooding and the potential safety issues related to the collapse of block walls. This is considered a regional issue.

APPENDIX E

PUBLIC MEETING COMMENTS

Summary of Public Meeting Response Sheets

Flood Protection Method	Preference Ranking (1=most desirable, 5=least desirable)					Number of Responses	Average Ranking
	1	2	3	4	5		
Hard Structural			1		1	2	4
Hard Structural w/Aesthetics	1		1	1		3	2.5
Semi-Hard Structural		2		1		2	3
Semi-Soft Structural	2	1				2	1.5
Soft Structural		1			1	2	3.5
Non-Structural					2	2	5

Note:
One response provided no ranking but the comment of "Depends" and an indication that the favored means of flood protection was storm drains. Another response provided rankings for only some methods

Relative Importance in Developing Flood Control Projects	Very Important	Important	Somewhat Important	Not Important	Number of Responses
Minimize project cost	1	1	2	3	6
Eliminate local flooding	5	2			7
Maximize travel on streets during storm events	2	2	2	1	7
Maximize greenbelt / open space	3	1	1	1	6
Provide pedestrian/equestrian/bicycle trail system	2	1	2	1	6
Preserve or enhance wildlife habitat and corridors	3	1	1		5
Provide passive recreation opportunities (e.g. open basins)	2	1	2		5
Preservation of significant archeological and historic cultural resources	4		1	1	6
Provide active recreation opportunities (e.g. sports fields)	1	1	2	2	6
Preserve and enhance scenic quality and aesthetic appearance	2	3			5
Provide underground/hidden drainage system (e.g. storm drains)	3	1	1	1	6
Other: *Require SRP to do a better job of maintaining the Highline Canal.* *Greater supervision of building developers*	2				2

Note;
One response indicated some items were N/A to storm drainage issues and provided no responses. Another also provided only partial responses.

Other Comments Provided:

- Thank you. It was very helpful.
- It's good to finally be heard – but the absence of representation from the City of Phoenix or SRP seems to indicate a lack of engagement from parties that need to be accountable.
- *Copied on the comment page was the front page of an engineering report commissioned by the HOA regarding flooding issues in their development The referenced report is entitled:* "Common Area Grading and Drainage & Offsite Drainage Inspection Report Following the Storm of July 31, 2010 for the Pines at South Mountain, Phoenix, Arizona", August 12, 2010 by Desert Drainage Engineering, PLC.
- Would like to have follow-up information on this study.
- Believe the City/County was negligent in monitoring development in our area. A 36" storm sewer empties onto local properties. Development was raised above local properties. The flooding has become dangerous to properties and animals and pedestrians. Speedy resolution is necessary. Our neighbors.....were also flooded and would like to be contacted.... With every heavy rain our horses are left standing in 2-3 ft of water. The bubble up sewer contains standing rancid water which breeds mosquitoes. Requiring Siesta Foothills to re-direct the storm sewer into current catch basins would eliminate flooding.

Question & Answer Session
Public Meeting, May 17, 2011
Hohokam Area Drainage Master Study/Plan

Question from Audience: 1) How soon will there be flood protection in this area?

Answer from Project Team: 1) There currently is no schedule for any flood control structure construction. We are working on the study right now to determine the areas which are prone to flooding. Once we have this data, we can move into the stage where we will develop a "blueprint" for flood control measures. Whether or not we built flood control structures will depending on the amount of funding available at that time. We cannot foretell available funding at this point.

Q2) How long until this blueprint is in place?

A2) The ADMS started in May 2010. We plan to conclude the study later this year. Following that will be a one-year evaluation period in which alternatives will be developed. We should have these alternatives finalized in mid- to late 2012.

Q3) What can be done to protect low-lying areas?

A3) We will develop a plan for these areas after we look at the data we are currently collecting.

Other questions during the open house period:

Q) Does the water flow from north to south?

A) No. Stormwater collects on South Mountain and flows down the slopes in a northerly direction toward the Salt River. Because of this, flooding can occur at the southern banks of the canals, where the stormwater is held back by the canal banks.

Q) What are the most cost-effective flood control structures? What do you plan to build in this area?

A) What is considered the most cost-effective structure has to do with many factors, including: context sensitivity (the relationship of the flood control measure to the surrounding area), engineering considerations, maximizing flood protection for the least cost, availability of land, rights-of-way, city partners, overall funding, the preferences of area residents, and more. We do not know right now what types of structures could be constructed in the future.

Question & Answer Session
Public Meeting, May 24, 2011
Hohokam Area Drainage Master Study/Plan

Question from Audience: 1) I live on a dirt road that was raised too high when it was paved. Now the road backs up water and causes flooding. Who monitors road construction to prevent flooding like that?

Answer from Project Team: 1) The city performs maintenance on roads. Contact the City of Phoenix Street Transportation Department with your concerns. Sometimes road maintenance is conducted based on cost considerations which don't take into account potential flooding issues.

Q2) Can't you [Flood Control District] force SRP to provide proper maintenance and follow certain guidelines to prevent flooding?

A2) SRP has their own rules which they follow for the maintenance of their canals and other structures. If the Flood Control District recommends non-structural flood control alternatives in an area, however, the District's guidelines would apply to SRP and their operations.

Q3) This is a large project. Large projects can be expensive. I pay taxes but nothing seems to happen in my area. Why can't something be done in local areas for less money?

A3) You have received a Comment Sheet tonight. In the survey section, please choose "Cost Not Important" showing that you believe need is more important than cost when planning future projects.

Q4) Who approves development?

A4) The cities have their own development managers.

Q5) Do you have any "recommended alternatives" in mind now?

A5) We have already studied several alternatives. We are determining the depth and rate of stormwater flow. We are looking at basins along South Mountain. Extending existing storm drains is another idea. Plans will be made on a neighborhood basis.

Q6) What are the project timelines?

A6) The Phase I study will be completed by December 2011. Phase II will occur during 2012.

Q7) Do you have the ability to record flooding events when they happen in real time? How do you collect data?

A7) We use computer modeling supplemented by examinations in the field, sometimes during rain events. We use data from the District's ALERT weather/rainfall/streamflow gages. We rely on information from residents and data from city officials. Unfortunately, we cannot record every single piece of water flow data in the entire study area.

Q8) Were SRP and city council members invited to these meetings?

A8) Yes, SRP was informed, and councilmen Nowakowski and Johnson were invited.

Question from Audience: 1) You referred to the downtown storm drain construction project which was built after a flood control study. In whose jurisdiction is the storm drain and who decided to build the storm drains?

Answer from Project Team: 1) It is the jurisdiction of the City of Phoenix. When funding is available, the city builds the project.

Q2) Who pays for the projects?

A2) The city will fully fund a small project, such as a storm drain catch basin. The Flood Control District will provide funds to the city in a cost-sharing arrangement for larger, more regional projects, such as storm drains or detention basins.

Q3) Does the city closely follow your flood control recommendations?

A3) The city has its own jurisdiction and its own drainage management. The Flood Control District addresses regional issues involving multiple locations.

Q4) How does the city develop if there is no drainage study in an area?

A4) Development must not alter the existing flow of stormwater, such as an existing wash. Development and permitting must be site-specific.

Question & Answer Session
Target B Neighborhood Association Meeting, May 25, 2011
Hohokam Area Drainage Master Study/Plan

Question from Audience: 1) What type of storm drains are along Baseline Road? They seem undersized.

Answer from Project Team: 1) They are concrete. We are aware they are undersized.

Q2) Can retention basins be used as parks?

A2) Yes, if designed as such. When dry, basins can be used for a variety of recreational uses, such as open space, walking, biking and sports fields.

Hohokam Area Drainage Master Study/Plan

Comment Sheet

May 2011

Please provide comments on the Hohokam Area Drainage Master Study/Plan. Submit this comment sheet at the public meeting or **send by June 17, 2011** via:

Mail: Afshin Ahouraiyan
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E-mail: afa@mail.maricopa.gov

Fax: (602) 506-4601

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Are you aware of any flooding problems? If yes, please describe below. ☐ Yes ☑ No

When did the flooding occur? _____

Frequency of flooding (how often): _____

Do you have a photograph of the flooding? ☐ Yes ☑ No

If yes, can we contact you for this photograph? ☐ Yes ☑ No

Describe the flooding: _____

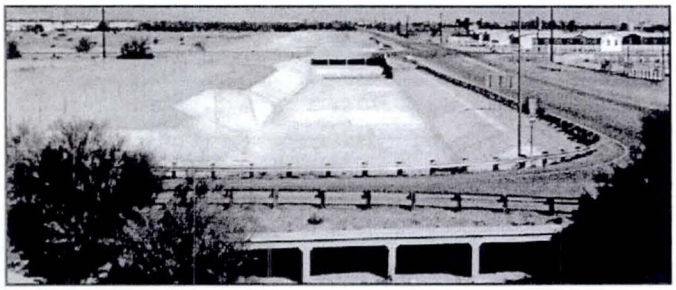
Defining Landscape Character

Recreation, protection, preservation, and enhancement of landscape character, such as naturally appearing washes or grass-lined channels, are factors considered in determining how to develop flood control features.

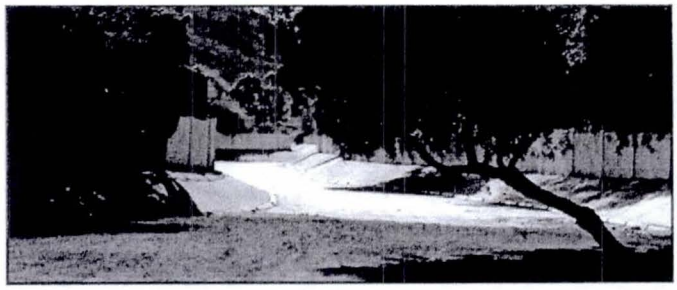
The visual character of the study area is predominantly suburban and rural residential mixed with commercial and industrial areas. New master planned, residential subdivisions and commercial areas are also being developed in some areas.

Please circle the number below each scene which most closely matches your preference for the flood protection method which might be used in the development of the flood control design alternative.

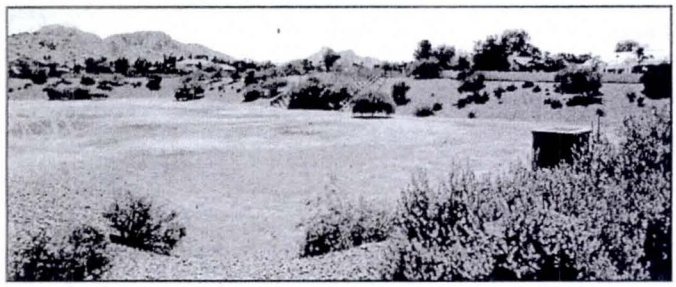
1=most desirable and 5=least desirable



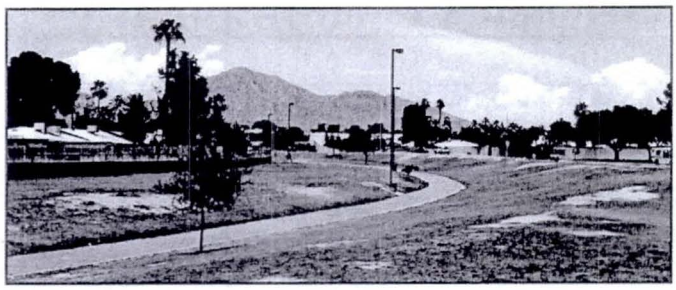
Hard Structural 1 2 3 4 5
White Tanks Flood Retarding Structure No.4
Inlet Channel



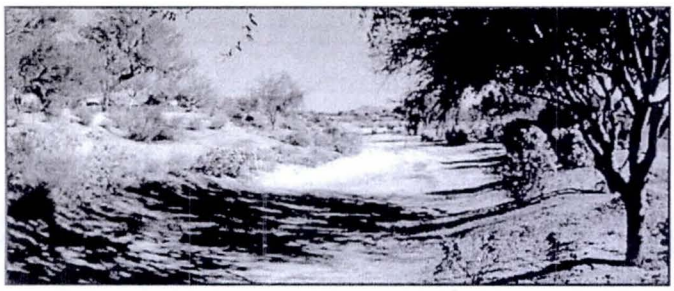
Hard Structural w/Aesthetic 1 2 3 4 5
Private Development in Paradise Valley



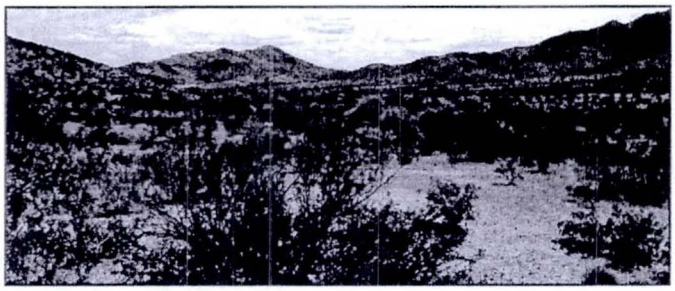
Semi-Hard Structural 1 2 3 4 5
Tatum Wash Basin (Approximately Shea & Tatum Blvds.)



Semi-Soft Structural 1 2 3 4 5
Old Cross Cut Canal Storm Drain



Soft Structural 1 2 3 4 5
Wildfire Golf Course (City of Phoenix)



Nonstructural 1 2 3 4 5
Estrella Mountain Development in Goodyear

We would like your assistance in establishing the relative importance of certain aspects in developing flood control projects. Please check the level of importance you feel applies to each of the items listed below.

	Very Important	Important	Somewhat Important	Not Important
Minimize project cost	☑	☐	☐	☐
Eliminate local flooding	☑	☐	☐	☐
Maximize travel on streets during storm events	☑	☐	☐	☐
Maximize greenbelt/open space	☑	☐	☐	☐
Provide pedestrian/equestrian/bicycle trail system	☑	☐	☐	☐
Preserve or enhance wildlife habitat and corridors	☑	☐	☐	☐
Provide passive recreation opportunities (e.g. open basins)	☑	☐	☐	☐
Preservation of significant archeological and historic cultural resources	☑	☐	☐	☐
Provide active recreation opportunities (e.g. sports fields)	☑	☐	☐	☐
Preserve and enhance scenic quality and aesthetic appearance	☑	☐	☐	☐
Provide underground/hidden drainage system (e.g. storm drains)	☑	☐	☐	☐
Other: _____	☐	☐	☐	☐

Meeting Survey

Please check the appropriate box.

How did you learn about this meeting?

☐ *Arizona Informant* ☐ *Prensa Hispana* ☑ Post Card ☐ Other _____

Was the project information presented in an understandable manner?

☑ Yes ☐ No If no, why not? _____

Please circle your selection (0=Not Satisfied, 5=Satisfied, 10=Very Satisfied).

How satisfied were you with the **helpfulness** of the staff members?

1 2 3 4 5 6 7 8 9 10

How satisfied were you with the **knowledge** of the staff members on the topic of the meeting?

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How satisfied were you with the **professionalism** of the staff members?

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Notes/General Comments

THANK YOU IT WAS VERRY helpfull

Hohokam Area Drainage Master Study/Plan

Comment Sheet

May 2011

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Fax: (602) 506-4601

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As the District studies flood hazards in this project area, we would like to know what flooding you have experienced.

Are you aware of any flooding problems? If yes, please describe below. ☒ Yes ☐ No

When did the flooding occur? 1 to 2 years ago (see the Tretbar Report on back page)

Frequency of flooding (how often): once in ten years

Do you have a photograph of the flooding? ☒ Yes ☐ No

If yes, can we contact you for this photograph? ☒ Yes ☐ No

Describe the flooding: Our community, the Pines @ South Mtn., commissioned a professional engineer to report on the damage and its likley cause.

Defining Landscape Character

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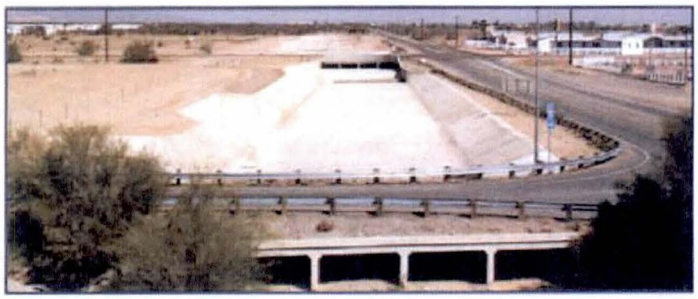

Hard Structural 1 2 3 4 5
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	Very Important	Important	Somewhat Important	Not Important
Minimize project cost	☐	☐	☐	☒
Eliminate local flooding	☒	☐	☐	☐
Maximize travel on streets during storm events	☐	☒	☐	☐
Maximize greenbelt/open space	☒	☐	☐	☐
Provide pedestrian/equestrian/bicycle trail system	☐	☐	☒	☐
Preserve or enhance wildlife habitat and corridors	☒	☐	☐	☐
Provide passive recreation opportunities (e.g. open basins)	☐	☐	☒	☐
Preservation of significant archeological and historic cultural resources	☒	☐	☐	☐
Provide active recreation opportunities (e.g. sports fields)	☐	☐	☐	☒
Preserve and enhance scenic quality and aesthetic appearance	☒	☐	☐	☐
Provide underground/hidden drainage system (e.g. storm drains)	☐	☐	☒	☐
Other: Require SRP to do a better job of maintaining the Highline canal.	☒	☐	☐	☐

Meeting Survey

Please check the appropriate box.

How did you learn about this meeting?

☐ *Arizona Informant* ☐ *Prensa Hispana* ☐ Post Card ☒ Other HOA Property MGR.

Was the project information presented in an understandable manner?

☒ Yes ☐ No If no, why not? _____

Please circle your selection (0=Not Satisfied, 5=Satisfied, 10=Very Satisfied).

How satisfied were you with the **helpfulness** of the staff members?

1 2 3 4 5 (6) 7 8 9 10

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COMMON AREA GRADING AND DRAINAGE & OFF-SITE DRAINAGE INSPECTION REPORT FOLLOWING THE STORM OF JULY 31, 2010 FOR THE PINES AT SOUTH MOUNTAIN PHOENIX, ARIZONA

Prepared For:

The Pines at South Mountain HOA
C/O Rossmar & Graham
1801 S. Extension Suite 124
Mesa, AZ 85210

Prepared By:

Desert Drainage Engineering, PLC
7813 E. Dallas Street
Mesa, AZ 85207

Registered Professional Engineer (Civil)
CERTIFICATE NO.
41018
BRIAN C.
TRETBAR
Date Signed 8/12/10
ARIZONA, U.S.A.
Expires on 6/30/13

DDE Project #10133
August 12, 2010

Hohokam Area Drainage Master Study/Plan

Comment Sheet

May 2011

Please provide comments on the Hohokam Area Drainage Master Study/Plan. Submit this comment sheet at the public meeting or **send by June 17, 2011** via:

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2801 W. Durango St., Phoenix, AZ 85009

E-mail: afa@mail.maricopa.gov

Fax: (602) 506-4601

Please print the following information:

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As the District studies flood hazards in this project area, we would like to know what flooding you have experienced.

Are you aware of any flooding problems? If yes, please describe below. ☒ Yes ☐ No

When did the flooding occur? (1) August 11, 2006

Frequency of flooding (how often): (2) August 21, 2006; (3) July 13, 2008; (5) Jul, 31, 2010; (6) Oct 5, 2010 also (4) Aug. 25, 2008 based are most severe

Do you have a photograph of the flooding? ☒ Yes ☐ No

If yes, can we contact you for this photograph? ☒ Yes ☐ No

Describe the flooding: Highline Canal overflow at 16th St., ~~[illegible]~~ depths up to 2-3 ft, on sidewalk, erosion under sidewalks, sediment sent into my irrigation ditch, uphill and into my swimming pool and laundry room

(many photos by date at http://www.discord.org/~lippard/flooding/)

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Inlet Channel

Hard Structural w/Aesthetic 1 2 3 4 5
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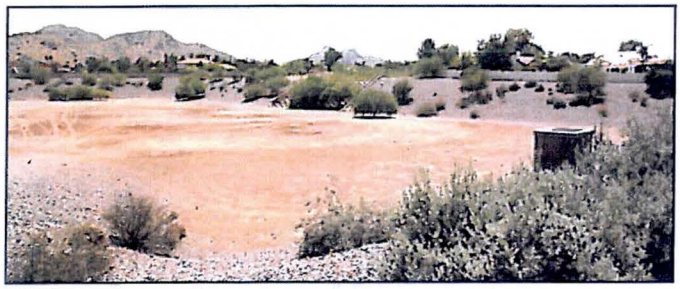

Semi-Hard Structural 1 2 3 4 5
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Maximize greenbelt/open space	☐	☐	☒	☐
Provide pedestrian/equestrian/bicycle trail system	☐	☐	☒	☐
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Provide underground/hidden drainage system (e.g. storm drains)	☐	☒	☐	☐
Other: _____	☐	☐	☐	☐

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1 2 3 4 5 6 7 8 9 10

Notes/General Comments

It's good to finally be heard — but the absence of representation from the City of Phoenix or SRP seems to indicate a lack of engagement from parties that need to be accountable.

Hohokam Area Drainage Master Study/Plan

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May 2011

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When did the flooding occur? 3 times in the last 5 years

Frequency of flooding (how often): _____

Do you have a photograph of the flooding? ☒ Yes ☐ No

If yes, can we contact you for this photograph? ☒ Yes ☐ No

Describe the flooding: 8 feet deep in my Community's retention area. Water running 3 to 4 feet deep down 16th Street. Debris + Sand off South Mountain that has buried my common area four feet deep. See the file from Vista

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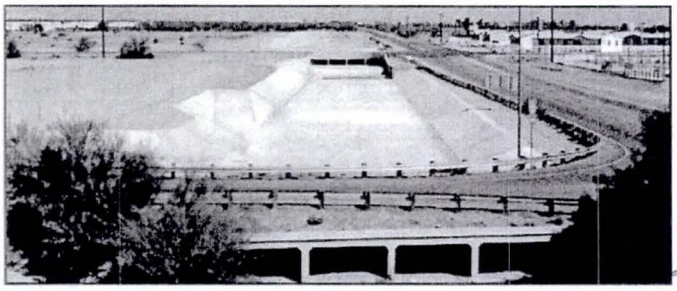
Storm drains



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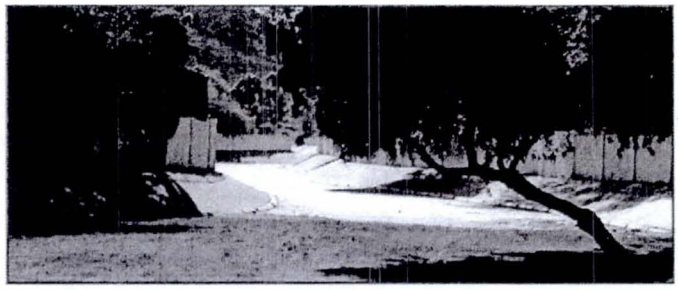
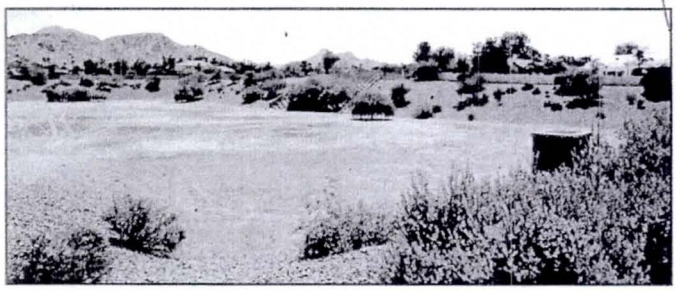


Hard Structural w/Aesthetic 1 2 3 4 5
Private Development in Paradise Valley

Defends



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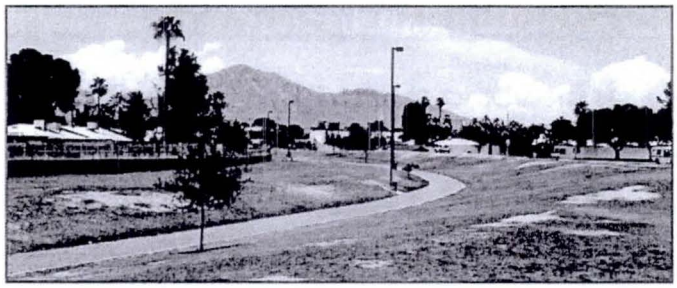
Tatum Wash Basin (Approximately Shea & Tatum Blvds.)



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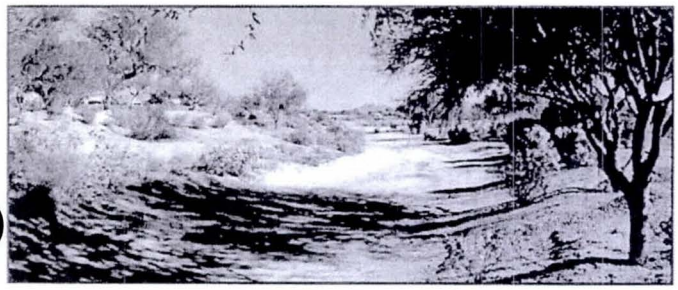

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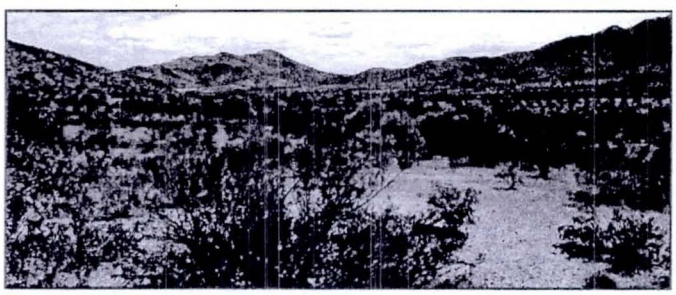

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Eliminate local flooding	☒	☐	☐	☐
Maximize travel on streets during storm events	☐	☐	☒	☐
Maximize greenbelt/open space N/A to Storm drainage issue	☐	☐	☐	☐
Provide pedestrian/equestrian/bicycle trail system	☐	☐	☐	☒
Preserve or enhance wildlife habitat and corridors Some	☐	☐	☐	☐
Provide passive recreation opportunities (e.g. open basins) Some	☐	☐	☐	☐
Preservation of significant archeological and historic cultural resources	☐	☐	☐	☒
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Other: _____	☐	☐	☐	☐

Meeting Survey

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When did the flooding occur? N/A

Frequency of flooding (how often): N/A

Do you have a photograph of the flooding? ☐ Yes ☑ No

If yes, can we contact you for this photograph? ☐ Yes ☑ No

Describe the flooding: N/A

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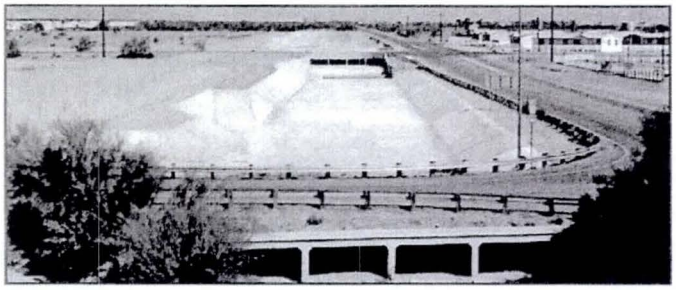

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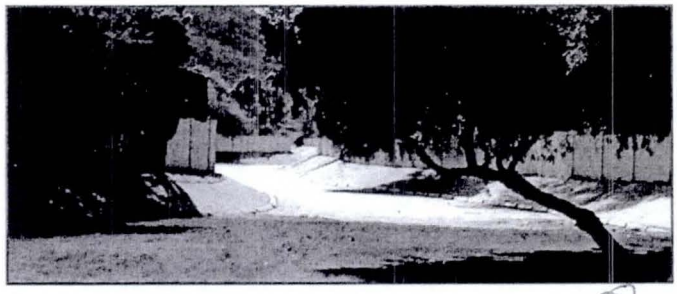
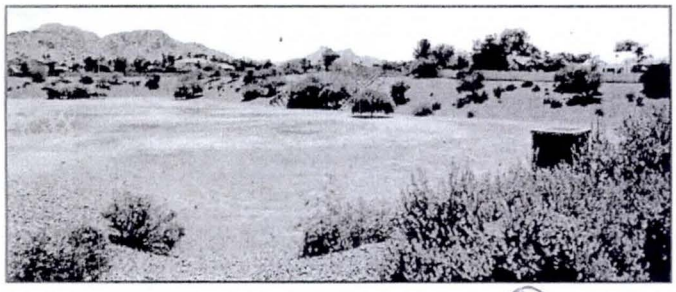


Hard Structural w/Aesthetic 1 2 3 4 5
Private Development in Paradise Valley



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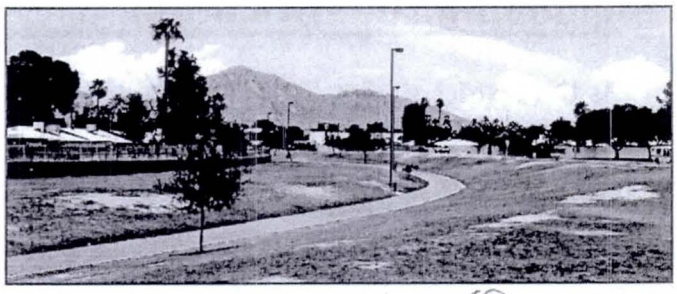

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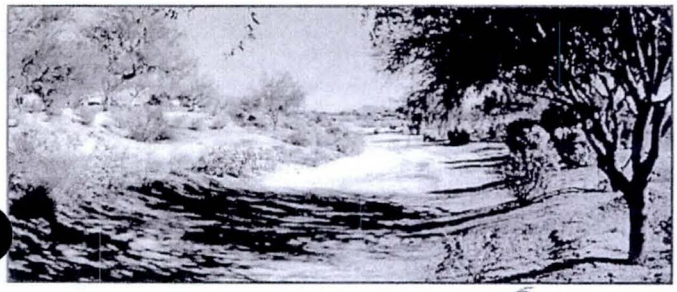

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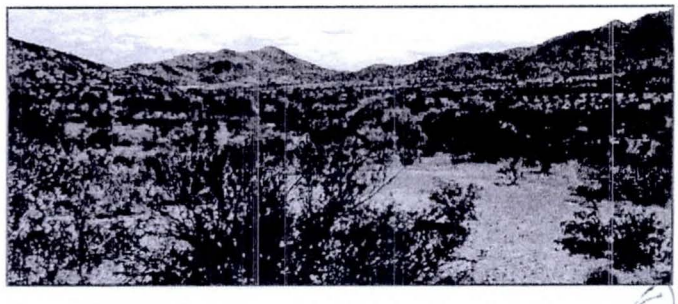


Nonstructural 1 2 3 4 5
Estrella Mountain Development in Goodyear

We would like your assistance in establishing the relative importance of certain aspects in developing flood control projects. Please check the level of importance you feel applies to each of the items listed below.

	Very Important	Important	Somewhat Important	Not Important
Minimize project cost	☐	☐	✓	☐
Eliminate local flooding	☐	✓	☐	☐
Maximize travel on streets during storm events	☐	✓	☐	☐
Maximize greenbelt/open space	☐	✓	☐	☐
Provide pedestrian/equestrian/bicycle trail system	☐	✓	☐	☐
Preserve or enhance wildlife habitat and corridors	☐	☐	✓	☐
Provide passive recreation opportunities (e.g. open basins)	☐	✓	☐	☐
Preservation of significant archeological and historic cultural resources	☐	☐	✓	☐
Provide active recreation opportunities (e.g. sports fields)	☐	☐	✓	☐
Preserve and enhance scenic quality and aesthetic appearance	☐	✓	☐	☐
Provide underground/hidden drainage system (e.g. storm drains)	☐	☐	☐	✓
Other: _____	☐	☐	☐	☐

Meeting Survey

Please check the appropriate box.

How did you learn about this meeting?

☐ *Arizona Informant* ☐ *Prensa Hispana* ☐ Post Card ✓ Other REGULAR ATTENDEE

Was the project information presented in an understandable manner?

✓ Yes ☐ No If no, why not? _____

Please circle your selection (0=Not Satisfied, 5=Satisfied, 10=Very Satisfied).

How satisfied were you with the **helpfulness** of the staff members?

1 2 3 4 5 6 7 8 9 (10)

How satisfied were you with the **knowledge** of the staff members on the topic of the meeting?

1 2 3 4 5 6 7 8 9 (10)

How satisfied were you with the **professionalism** of the staff members?

1 2 3 4 5 6 7 8 9 (10)

How satisfied were you with the **information** you received?

1 2 3 4 5 6 7 8 9 (10)

Hohokam Area Drainage Master Study/Plan

Comment Sheet

May 2011

Please provide comments on the Hohokam Area Drainage Master Study/Plan. Submit this comment sheet at the public meeting or **send by June 17, 2011** via:

Mail: Afshin Ahouraiyan
Flood Control District of Maricopa County
2801 W. Durango St., Phoenix, AZ 85009

E-mail: afa@mail.maricopa.gov

Fax: (602) 506-4601

Please print the following information:

Flooding Identification

As the District studies flood hazards in this project area, we would like to know what flooding you have experienced.

Are you aware of any flooding problems? If yes, please describe below. ☑ Yes ☐ No

When did the flooding occur? 16th Between Baseline & Southern Baseline from 24 to 7th st 18th st South of Park st Canal Bank, Vineyard 16th st

Frequency of flooding (how often): during medium to heavy rain

Do you have a photograph of the flooding? The media has pictures of Baseline & 16th st ☑ Yes ☑ No

If yes, can we contact you for this photograph? ☐ Yes ☐ No

Describe the flooding: (1) 18th st Park st at the canal if rains and the mud runs down the canal Bank into (2) Vineyard 16th st - 18th street South side of street floods (3) 18th st Southern along 18th street south of Southern floods 16th at Baseline floods heavy rain 16th & Southern Heavy rains

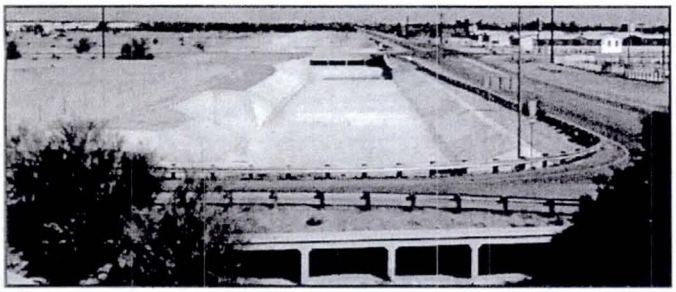
Defining Landscape Character

Recreation, protection, preservation, and enhancement of landscape character, such as naturally appearing washes or grass-lined channels, are factors considered in determining how to develop flood control features.

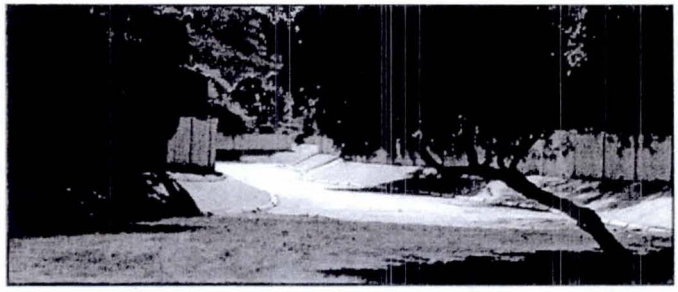
The visual character of the study area is predominantly suburban and rural residential mixed with commercial and industrial areas. New master planned, residential subdivisions and commercial areas are also being developed in some areas.

Please circle the number below each scene which most closely matches your preference for the flood protection method which might be used in the development of the flood control design alternative.

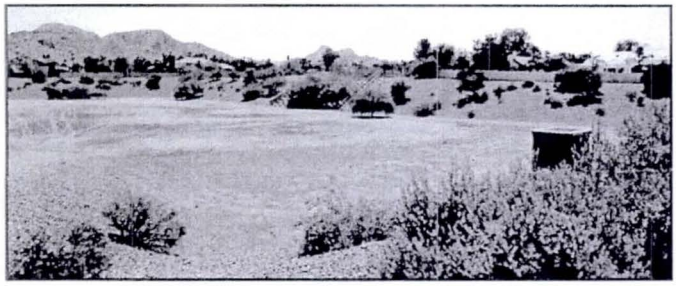
1=most desirable and 5=least desirable



Hard Structural 1 2 3 4 5
White Tanks Flood Retarding Structure No.4
Inlet Channel



Hard Structural w/Aesthetic 1 2 3 4 5
Private Development in Paradise Valley



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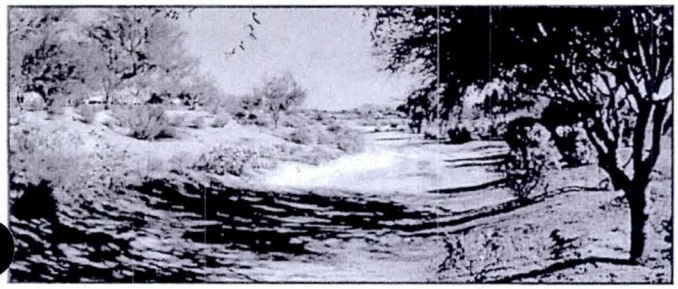
Old Cross Cut Canal Storm Drain



Soft Structural 1 2 3 4 5
Wildfire Golf Course (City of Phoenix)

Nonstructural 1 2 3 4 5
Estrella Mountain Development in Goodyear

We would like your assistance in establishing the relative importance of certain aspects in developing flood control projects. Please check the level of importance you feel applies to each of the items listed below.

	Very Important	Important	Somewhat Important	Not Important
Minimize project cost	☐	☑	☐	☐
Eliminate local flooding	☑	☐	☐	☐
Maximize travel on streets during storm events	☑	☐	☐	☐
Maximize greenbelt/open space	☐	☐	☐	☑
Provide pedestrian/equestrian/bicycle trail system	☐	☐	☐	☐
Preserve or enhance wildlife habitat and corridors	☐	☐	☐	☐
Provide passive recreation opportunities (e.g. open basins)	☐	☐	☐	☐
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Provide underground/hidden drainage system (e.g. storm drains)	☐	☐	☐	☐
Other: _____	☐	☐	☐	☐

Meeting Survey

Please check the appropriate box.

How did you learn about this meeting?

☐ *Arizona Informant* ☐ *Prensa Hispana* ☑ Post Card ☐ Other _____

Was the project information presented in an understandable manner?

☑ Yes ☐ No If no, why not? _____

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How satisfied were you with the **helpfulness** of the staff members?

1 2 3 4 5 6 7 (8) 9 10

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How satisfied were you with the **professionalism** of the staff members?

1 2 3 4 5 6 7 (8) 9 10

How satisfied were you with the **information** you received?

1 2 3 4 5 6 7 8 (9) 10

Notes/General Comments

Would like to have follow-up information of this study.

Hohokam Area Drainage Master Study/Plan

Comment Sheet

May 2011

Please provide comments on the Hohokam Area Drainage Master Study/Plan. Submit this comment sheet at the public meeting or **send by June 17, 2011** via:

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Please print the following information:

Flooding Identification

As the District studies flood hazards in this project area, we would like to know what flooding you have experienced.

Are you aware of any flooding problems? If yes, please describe below. ■ Yes ☐ No

When did the flooding occur? Last Time 08-2010

Frequency of flooding (how often): 2-4 x/year

Do you have a photograph of the flooding? ■ Yes ☐ No

If yes, can we contact you for this photograph? – Myesha Harris given to city ■ Yes ☐ No

Describe the flooding: Storm sewer from new development empties onto street + on to our property + our neighbors. Runs 2-3 feet deep. Damage upwards of $3,000 last year. New development drainage does not drain into catchment basin. Development property was raised 15' above surroundings.

Defining Landscape Character

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The visual character of the study area is predominantly suburban and rural residential mixed with commercial and industrial areas. New master planned, residential subdivisions and commercial areas are also being developed in some areas.

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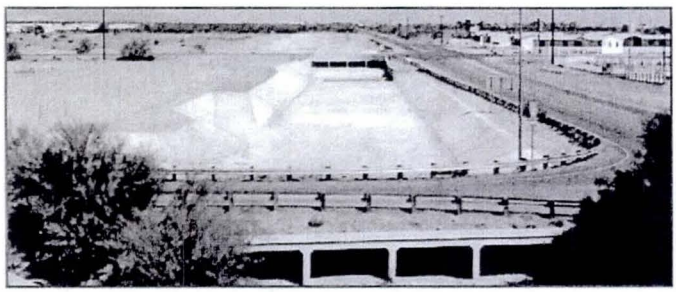

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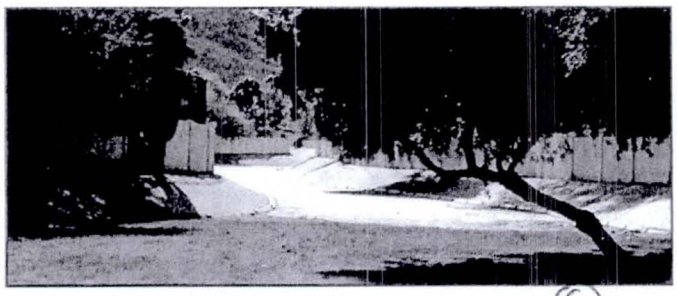

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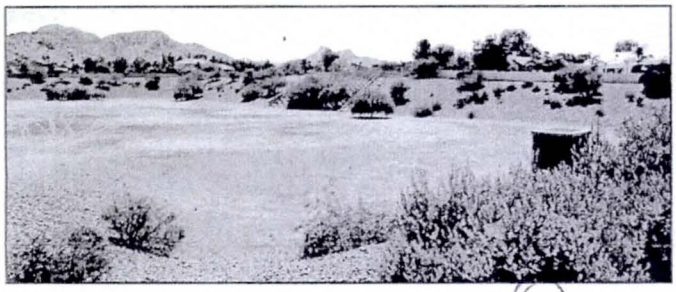

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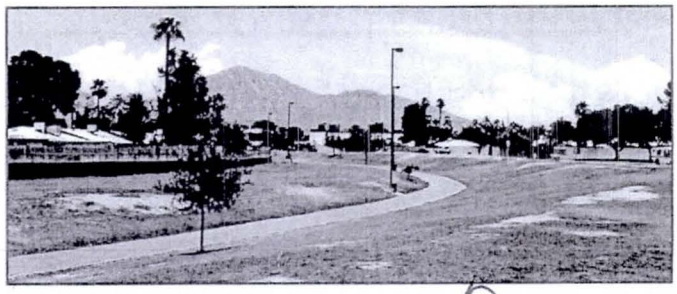

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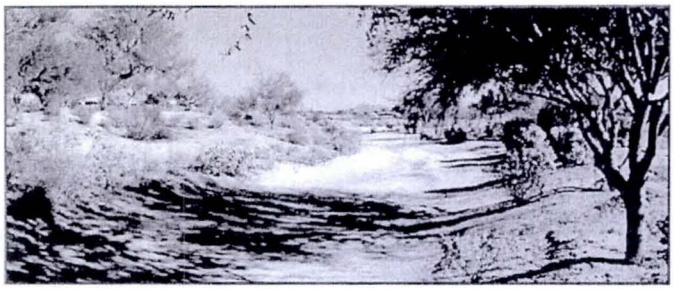
Old Cross Cut Canal Storm Drain



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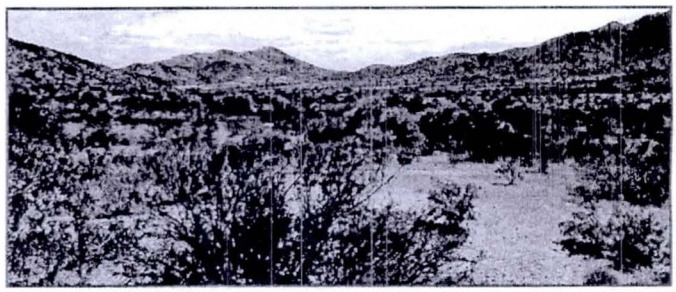

Nonstructural 1 2 3 4 5
Estrella Mountain Development in Goodyear

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Maximize travel on streets during storm events	☐	☐	☐	☒
Maximize greenbelt/open space	☒	☐	☐	☐
Provide pedestrian/equestrian/bicycle trail system	☒	☐	☐	☐
Preserve or enhance wildlife habitat and corridors	☒	☐	☐	☐
Provide passive recreation opportunities (e.g. open basins)	☒	☐	☐	☐
Preservation of significant archeological and historic cultural resources	☒	☐	☐	☐
Provide active recreation opportunities (e.g. sports fields)	☐	☒	☐	☐
Preserve and enhance scenic quality and aesthetic appearance	☐	☒	☐	☐
Provide underground/hidden drainage system (e.g. storm drains)	☒	☐	☐	☐
Other: Greater supervision of building by developers	☒	☐	☐	☐

Meeting Survey

Please check the appropriate box.

How did you learn about this meeting?

☐ *Arizona Informant* ☐ *Prensa Hispana* ☒ Post Card ☐ Other _____

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1 2 3 4 5 6 7 8 9 (10)

How satisfied were you with the **professionalism** of the staff members?

1 2 3 4 5 6 7 8 9 (10)

How satisfied were you with the **information** you received?

1 2 3 4 5 6 7 (8) 9 10

Notes/General Comments

We believe the City/County was negligent in monitoring development in our area. A 36" storm sewer empties onto local properties. Development was raised above local properties.

This flooding has become destructive to property + dangerous to animals + pedestrians.

Speedy resolution is necessary. Our neighbors O.C. + Rosella Hector were also flooded + would like to be contacted 602-276-3527.

With every heavy rain our horses are left standing in 2-3 feet of water. The "bubble up" sewer contains standing rancid water which breeds mosquitoes.

Requiring Siesta Foothills to re-direct the storm sewer outlet into current catchment basins would eliminate our flooding.

APPENDIX F

SPECIFIC PLAN REVIEW SUMMARY

BY LOGAN SIMPSON DESIGN

Hohokam ADMS

Existing Planning Document Review

This report summarizes the review of relevant planning documents that guide the future planning and development of Phoenix and Tempe within the Hohokam ADMS. The plans provide information on the acceptability of various flood protection methods within the context of the community's vision of its future development. The plans reviewed for each community are listed and a brief summary is provided. In addition, goals, objectives and policies deemed pertinent to the aesthetic and multiuse aspects of the District's flood hazard mitigation planning efforts are provided as included in the plans.

City of Phoenix

The following plans developed by the City of Phoenix cover the Hohokam ADMS planning area (Figure 1). The City of Phoenix is currently updating the General Plan and the new plan is expected to be completed by the end of 2012. Updates of the specific areas plans are not currently planned but changes within the new General Plan the revise land uses within the area plan boundaries would take precedence over the existing area plans.

- Phoenix General Plan 2002
    - Open Space Element
    - Recreation Element
    - Neighborhood Element
- Baseline Area Master Plan (1996)
- Target Area B Redevelopment Plan (1998)
- Rio Salado Beyond the banks Area Plan (2003)
- Rio Montana Area Plan (2000)
- South Central Avenue Corridor Study (1993)

General Plan – Open Space Element

The City of Phoenix has a long History in the preservation of Natural Open Space and currently manages more than 29,000 acres of mountain preserves and desert parks. The Salt River runs for 24 miles through Phoenix and as the northern boundary of the study area is a key element of the City's open space planning. The City's Sonoran Preserve Master Plan of 1999 reinforced the City's commitment to preserving natural open space and key principles included maintaining hydrologic processes and the connectivity of desert patches.

In addition to its planned active parks and recreation areas The City is committed to working with other agencies and landowners to achieve the planned goals of providing natural open space for its residents. These recreation areas would provide a natural

desert landscape character to the vicinity of the open space that could be extended into the surrounding development. The following goals and policies are from the current General Plan 2002.

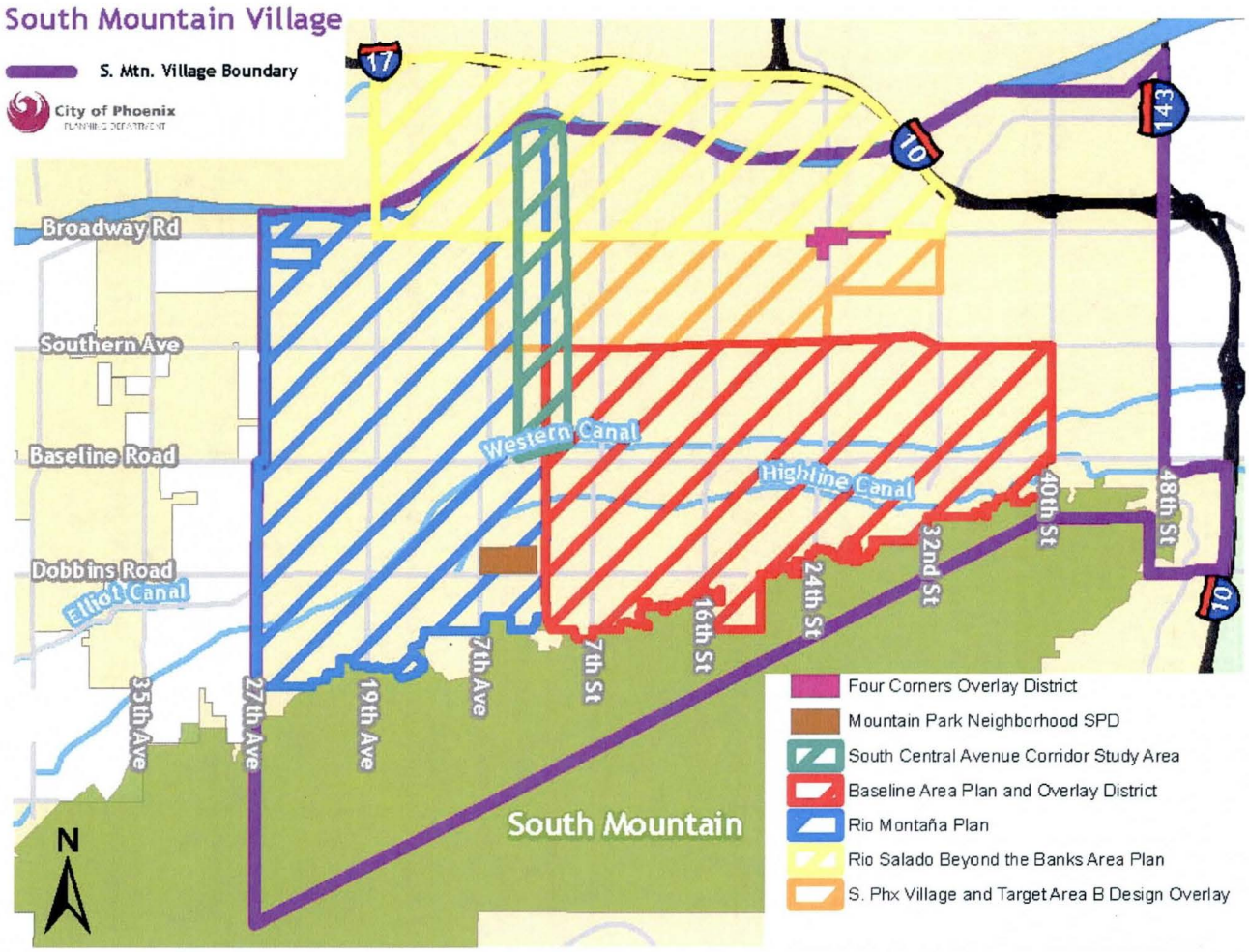


Figure 1. South Mountain Village Area Plans

Goal 1 UNIQUE OR SIGNIFICANT NATURAL OPEN SPACES SHOULD BE PRESERVED AND PROTECTED.

Policies

4. Preserve wildlife corridors and significant desert ecology along drainage ways, by encouraging drainage systems that preserve the undisturbed natural desert wash characteristics such as low-velocity flows, sedimentation, and dispersed flows. Nonstructural flood control measures are preferred and, where possible, should be employed in new developments. Coordinate with developers and Maricopa County Flood Control District personnel to plan nonstructural wash corridors, and where appropriate, establish links with preserve areas.

5. Provide resource-based recreational opportunities such as bird watching, nature study, picnicking, interpretation, and environmental education.

7. Preserve significant views and defined public access to cultural and visual landmarks such as large tree bosques (groves), viewsheds, washes, rock outcroppings, historic sites, and archaeological sites through rezoning stipulations and site plan reviews in accord with adopted plans.

Goal 2 – Linear Open Space - LINEAR SYSTEMS OF OPEN SPACE SUCH AS CANALS, WASHES, DRAINAGE CORRIDORS, AND RIVERS SHOULD CONTRIBUTE TO A CONTINUOUS NONMOTORIZED TRAIL SYSTEM THAT SERVES AS AN ALTERNATIVE TRANSPORTATION SYSTEM, PROVIDES A POSITIVE RECREATIONAL EXPERIENCE, AND FORMS A NEIGHBORHOOD AMENITY (SEE FIGURE 10: TRAIL SYSTEM).

Policies

1. Promote the development of a continuously enhanced canal bank system linked to other trails, parks, and urban services and amenities.

2. Provide open space and recreation-oriented development in the Rio Salado, Tres Rios, and West Valley Recreation Corridors.

3. Provide continuous trail systems and recreation amenities as part of flood control conveyance channel projects (e.g., Laveen Area Conveyance Channel), in cooperation with private property owners, Salt River
Project and Maricopa County Flood Control District.

General Plan – Recreation Element

Parks System: provide a parks and recreation system that meets the needs of the resident and visitor population and is convenient, accessible and diverse in programs, locations and facilities.

Parks and preserve interface: develop design guidelines for private development adjacent to preserves, washes and open space to promote visibility and access to all park facilities.

Trails and pathways: link multi-purpose trails from parks to major open spaces and village cores.

The parks system consists of a variety of park types to provide a range of recreation opportunities both close to neighborhoods and on a regional basis. The following is a general description of the levels of parks and associated facilities that the City identifies in its parks a recreation planning.
Urban Parks

- Special parks that are small, pedestrian-oriented and feature green open spaces in the midst of the more densely-developed urban areas.
- Serve the distinct purpose of providing, for daytime use and pedestrian respite, small areas that beautify the streetscapes of buildings and concrete with trees, plants, seating and art.

Neighborhood Parks

- Designed to serve an area within a radius of one-half mile or a population from 4,000 to 7,000 people;
- Within walking or bicycling distance of residences and typically 15 acres in size.
- Local or collector streets typically border them. Most neighborhood parks include children's playground and picnic areas, open play turf areas, parking, lighted volleyball and basketball courts, and restroom facilities.

Community Parks

- Serve an area of one and one-half miles and a population of 20,000 to 50,000 people.
- These parks are typically 40 acres or larger, with active recreation improvements, and are located on collector or arterial streets.
- Organized team sports, leagues, and large-activity facilities are located in these parks.
- Existing community parks include lighted basketball, volleyball, soccer and softball facilities; playgrounds; picnic areas; and restroom facilities. Pools, lighted tennis courts, and ramadas also may be included.
- Turf areas that are unprogrammed open spaces, which can be used for a variety of activities and events.

District Parks

- Draw from several communities and are 200 acres or larger, serving 100,000 to 200,000 people
- Provide for active and passive recreation and serve a five-mile service radius.
- May include specialized activities such as a golf course, festival area, or an amphitheater
- Located on arterial streets, or in areas where the size and function will have minimum impact, i.e., commercial or industrial areas.
- Serve the immediate local communities as neighborhood parks or community parks and contain these features: playgrounds and picnic areas, lighted basketball and volleyball courts, lighted racquetball courts, lighted softball and soccer facilities, restroom facilities, lighted tennis courts, and picnic ramadas.

Goal 2 - Preserve Interface - THE INTERFACE OF PRIVATE DEVELOPMENT AND PARKS, PRESERVES, AND NATURAL AREAS IS CRITICAL TO THE NATURAL FUNCTIONS AND PUBLIC ENJOYMENT OF THESE AREAS.

Policies

1. Establish design and management standards for natural washes and connected open spaces that will preserve the natural ecological and hydrological systems while allowing for appropriate public use, such as multi-use trails.

Recommendation

A. Implement any design guidelines adopted by the City Council that preserve natural washes by encouraging nonstructural flood control, and include wide, natural wash corridors that are substantially undisturbed and allow for the growth of natural vegetation for controlling erosion and sustaining ecological systems.

2. Propose new design standards that address drainage, use of native plants, edge effect, and access both visual and physical for private development adjacent to public preserves, parks, washes and open spaces.

Goal 3 - Trails and Pathways - A FUNCTIONAL NETWORK OF SHARED URBAN TRAILS THAT ARE ACCESSIBLE, CONVENIENT, AND CONNECTED TO PARKS, MAJOR OPEN SPACES, AND VILLAGE CORES, SHOULD BE DEVELOPED THROUGHOUT THE CITY. THE TRAILS SHOULD CONNECT WITH FUTURE REGIONAL TRAIL SYSTEMS WHEREVER POSSIBLE.

Policies

2. Work with other agencies to assure the availability and accessibility of canal banks for trail usage.

6. Encourage the widest possible range of opportunities for non-motorized recreation and multi-modal transportation systems.

8. Create linear open space with multi-use paths and offer recreational elements such as ramadas, playground equipment and landscaping to attract urban wildlife.

General Plan – Natural Resources Conservation Element

GOAL 1 FLOODING PROTECTION: THE THREAT OF FLOODING FOR PEOPLE, PROPERTY, AND THE NATURAL ENVIRONMENT SHOULD BE MINIMIZED.

Policies

2. Provide drainage facilities in areas where the natural topography has been disturbed or cannot reasonably be restored to predevelopment conditions.

3. Support flood control planning and coordinate with other entities in that planning (e.g. Maricopa County Flood Control District, and U.S. Army Corps of Engineers).

Recommendations

B. Work cooperatively with the Planning/Design Branch of the U.S. Army Corps of Engineers, to seek engineering solutions in our larger ephemeral wash systems (that run only in response to rain), which are more sensitive to the existing environment and provide a quality recreation space and habitat for flora and fauna. Comprehensively maintain existing washes to prevent excessive erosion.

C. Continue working with the Arizona Game and Fish Department, the Arizona Department of Water Resources, the Arizona Department of Environmental Quality, the U.S. Army Corp of Engineers, and other agencies whose mission is to preserve and protect riparian areas and water quality, in order to address shoreline stabilization and habitat restoration needs at municipal lakes and parks.

8. Improve water quality, habitat preservation, and storm water management through compliance with the regulations of the Clean Water Act, Section 404.

Recommendations

A. Choose non-structural solutions to flood control problems that will provide storm water quality benefits and support the city's efforts to comply with the federal Clean Water Act, Section 404.

11. Preserve and restore the natural systems of ephemeral desert washes to manage nonstructural storm water and control flooding where feasible.

12. Preserve the unimpeded flow of washes as part of a larger hydrologic system.

Recommendations

A. Limit the obstacles, crossings, and obstructions to all washes, both on-site and through a site, as part of a larger interconnected wash network.

B. Coordinate with AFMA to develop nonstructural flood control solutions.

GOAL 2 EROSION PROTECTION: GRADING AND EROSION CONTROL PRACTICES, SEDIMENT CONTROL PRACTICES AND WATERWAY CROSSINGS SHOULD ELIMINATE OR REDUCE POTENTIAL ON SITE ORDOWN SLOPE EROSION.

Policies

2. Encourage the reduction of clearing and grading entire sites. Explore methods to preserve contiguous areas of natural vegetation such as those listed on the State of Arizona Native Plant Law threatened and endangered (T&E) list.

3. Use vegetation with native plant species as the principal method of erosion control.

Recommendation

A. Promote using vegetation instead of artificial means as a method of permanent erosion control.

GOAL 3 VEGETATION PROTECTION: VEGETATION SHOULD BE PROTECTED AND CONSERVED AS A MEANS OF PRESERVING THE DIVERSE CHARACTER OF LOCAL PLANT COMMUNITIES.

Policies

2. Promote re-vegetation using native plant species.

Recommendations

A. Promote the use of native plant species, especially those listed in the State of Arizona Native Plant Law as highly safeguarded and salvage-restricted.

B. Promote replanting native trees versus exotic species in the event of mortality of existing vegetation, unless out of character with historic or predominant vegetation.

4. Continue to endorse area plans and design guidelines that promote using a plant list or plant pallet to promote a specific landscape character or quality.

Recommendations

A. Promote in all development the xeriscape landscape, which uses predominantly native Sonoran vegetation, as well as the fundamental principles of landscape design for greatest water efficiency.

B. Promote relocating versus destroying non-mature native species on the State of Arizona Native Plant Law list.

C. Promote preserving vegetation in the urban areas where the vegetative character of the area is established.

GOAL 4 WILDLIFE PROTECTION: LARGE INTACT PATCHES OF NATIVE VEGETATION SHOULD BE MAINTAINED TO PROTECT WILDLIFE HABITAT.

Policies

1.Prevent fragmentation of continuous areas of habitat, by maintaining large, intact areas of native vegetation and/or encourage planting of native vegetation in areas of new development.

Recommendations

A. Identify existing areas of natural vegetation and prioritize importance based on predetermined criteria, such as the presence of native vegetation, existing wildlife habitat, potential for wildlife habitat or threat of local extinction of a wildlife population.

B. Maintain existing isolated fragments of native habitat within the urban environment and develop wildlife corridors connecting the fragments or, in the case where the corridor remains, provide land management that will preserve the corridor in the future. Encourage the use of native plant materials in development, which can help provide connections to isolated fragments of habitat.

2. Limit land use, and intensity of use, around intact areas of native vegetation to those uses with the least impact.

Recommendations

A. Explore and strongly consider revising on the General Plan map, the adjacent land use for any critical habitat to reflect the land use most compatible with the continuance of that patch, such as a low intensity use verses a high-intensity use such as commercial or industrial.

B. Explore and strongly consider buffers of low-intensity use that surround areas of natural vegetation functioning as wildlife habitat.

3. Maintain connections among wildlife habitat.

Recommendation

A. Investigate processes, based on the biological characteristics of the specie or species involved, for preserving or developing wildlife corridors that connect areas of natural vegetation.

4. Identify and protect existing wildlife corridors, and identify and develop new corridors for wildlife movement.

Recommendation

A. Maintain pockets of open areas with connecting corridors where feasible. Dense clusters of development may be required for this. Work with private entities to allow for maintenance of open space and natural areas so that fire hazard situations do not develop.

5. Discourage all exotic species, especially those that are or have the potential for invasiveness, for areas of special Sonoran Desert significance, such as areas adjacent or close to:

- Desert foothills and mountainous areas
- Desert preserves
- Streams and rivers, particularly the Rio Salado
- Desert wash areas
- Riparian zones
- Xeroriparian areas

Recommendation

A. Investigate funding to re-vegetate areas of important and significant habitat, such as desert foothills areas, from the inclusion of exotic species to replicate and replace native species.

6. Explore methods to preserve existing habitat and biotic communities.

Recommendation

A. Work with other agencies to educate the general public and development community on the importance of native vegetation and the reciprocal relationship to wildlife.

7. Segregate areas of higher impact recreational uses, such as mountain biking, from areas of wildlife habitat and conservation.

Baseline Area Master Plan

The Baseline Area Master Plan focuses on the corridor of Baseline road, extending approximately one mile to the north and south of the road. The primary purpose of the plan is to "preserve and build on the special rural character of the Baseline area." The design elements that may be applicable to the Hohokam ADMS include the provision of wide setbacks along Baseline Road to accommodate multi-use paths and additional landscape space along the arterial roadway. The landscape would include citrus trees to maintain the agricultural character of the area. Multi-use paths would have stabilized decomposed granite surfaces reinforce the rural character.

Target Area B Redevelopment Plan

This plan focuses on the redevelopment of a key area of the South Mountain Village and emphasizes the removal of substandard structures and blight. There are no specific goals or objectives related to aesthetics except to create a sense of community and neighborhood character in the redevelopment area.

Rio Salado Beyond the Banks Area Plan

The vision of the Beyond the Banks is a revitalized area that is now realizing its potential and one of its key features is that it "connects to the restored Rio Salado as an attractive recreational and environmental amenity." There are no specific Goals or objectives related to aesthetics but there two objectives related to recreation that should be considered in the development of the ADMS. The objectives support Goal 2: Community Recreation and are:
Objective B: Create attractive spaces for public enjoyment that extend and enhance the natural setting provided by the Rio Salado Habitat Restoration Project.
Objective D: Utilize the North Branch San Francisco Canal as a linear recreation, non-motorized transportation corridor.

Rio Montana Area Plan

The Rio Montana Plan covers the western end of the study area and the plan acknowledges that the area has a strong agricultural heritage as well as natural desert areas. In its vision statement the Rio Montana plan…"strives to be a community that maintains and enhances its current quality of life by:

- Preserving rural character
- Preserving natural desert areas through the development of transition zones that protect desert and open space
- Encouraging pedestrian and equestrian activity through a network of trails"

Goal 4: Rio Montana is an area that reflects and protects rural character, the Sonoran Desert and the riparian potential of the Rio Salado Habitat Restoration Project.

A. Develop criteria for evaluating environmental transition zones between the Sonoran Desert areas of South Mountain Park and urban development.
   a) Identify areas for preservation that are environmentally, culturally or historically significant.
   b) Identify areas of a predominant vegetation type such as natural desert, agriculture and urban ornamental vegetation.
   c) Preserve and restore desert habitat by limiting development in sensitive areas such as hillside areas and drainage corridors and washes.

In its design guideline section the plan identifies general approaches to developing site plans that remain sensitive to the surrounding areas. Specifically relating to drainage corridors, site plans should respond to the natural drainage pattern and be designed to standards identified by FCD.

The design section also identifies three primary character area types Agriculture, Sonoran Desert and Mercado. General design approaches for each areas are provided including architectural and site planning and design approaches such as architectural elements, preserving washes and native vegetation and use of paving materials and building details that seek to preserve and enhance the existing character of those areas.

South Central Avenue Corridor Study

The primary focus of the South Central Avenue Corridor Study was a market analysis rather than a land use plan and the plan identified strategies to address specific economic market issues rather than identifying goals and objectives that would guide land use decisions. Design strategies focus on the rehabilitation of existing buildings and upgrading the quality of the retail experience in the planning area. Flood hazard mitigation solutions along south Central Avenue will need to consider the urban character and movement of pedestrians throughout the area.

City of Tempe

Future land use patterns for the portion of the study area in Tempe are described in the Tempe General Plan 2030, adopted in 2003. The future land use indicated in the pan includes primarily industrial, commercial and open space north of Southern Avenue and residential and associated commercial south of Southern Avenue. The area contains the Double Buttes Cemetery which is of historical significance and Tempe Diablo Stadium, the spring training facility for the California Angels.

The ADMS area is not within a special planning area in Tempe and the Open Space Element indicates a general goal of preserving a variety of natural, landscaped and hardscaped open spaces to meet the needs of the community. The recreation element's goal is… " to provide social, recreational and economic benefits to the community by promoting physical fitness through passive and active recreational areas and programs serving a divers range of abilities and interests."

No specific aesthetic goals and objectives were identified for the Hohokam ADMS area and continued coordination with City of the Tempe in the development of drainage and flood hazard mitigation solutions should assure consistency with the City's vision of the landscape character for this area of the city and support the open space and recreation opportunities for the residents of Tempe.

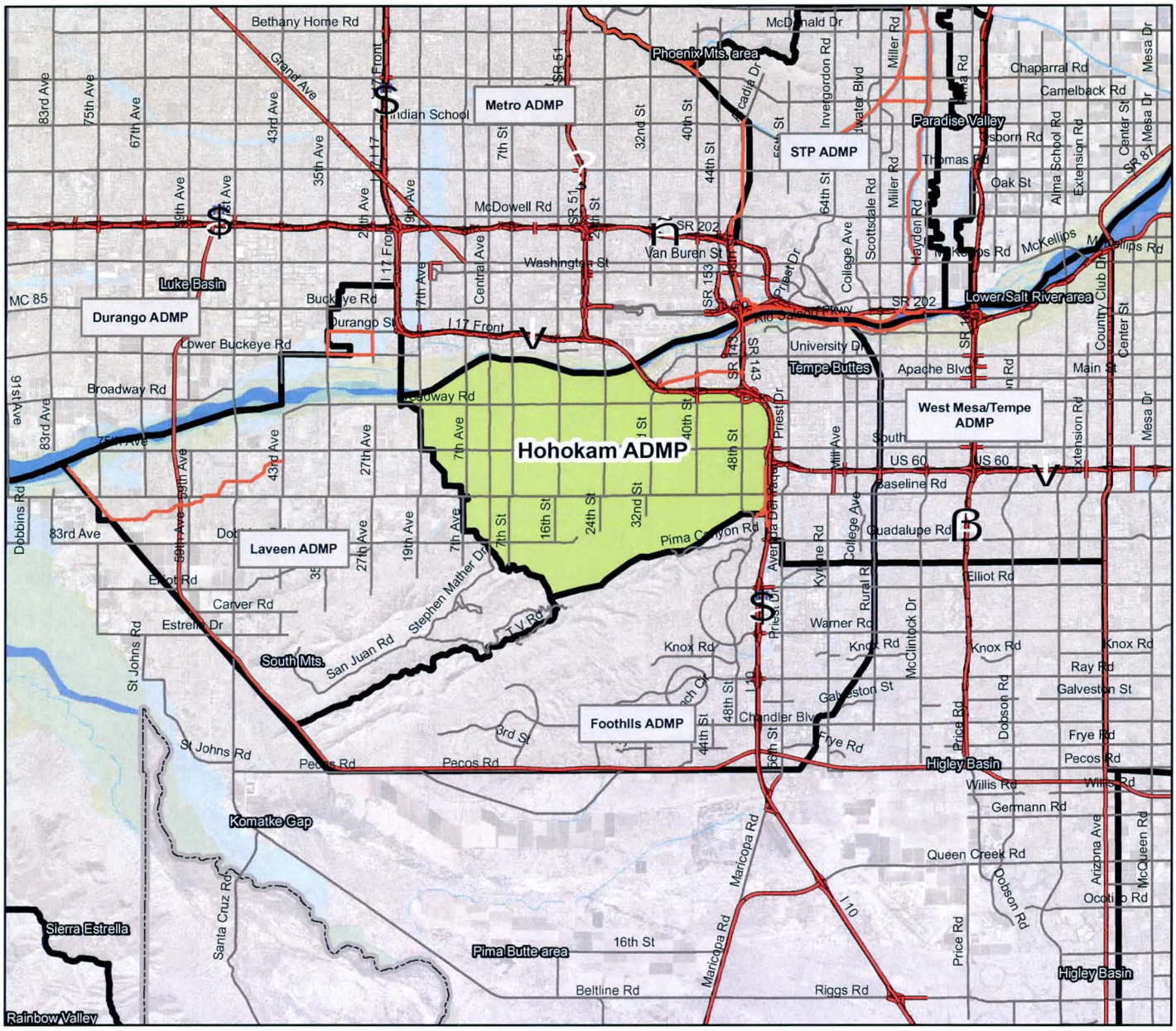
APPENDIX G

LANDSCAPE INVENTORY AND ANALYSIS

BY DISTRICT

Hohokam Area Drainage Master Plan

Landscape Inventory & Analysis (LIA)



Prepared by
Flood Control District of Maricopa County
May 2010

Hohokam ADMP
FCDMC Project Landscape Inventory & Analysis

Prepared by
Dennis Holcomb & Pedro Melo-Rodriguez
May 26, 2010

Purpose
The purpose of this document is to provide a brief summary of the information contained in the Hohokam Area Drainage Master Plan (ADMP) project landscape inventory and analysis (LIA) provided by the Flood Control District of Maricopa County (District).

Purpose of the Project LIA
The purpose of the project LIA is to provide: 1) a basic understanding of the land and resource context of the project study area; 2) an analysis of the compatibility of the range of possible flood hazard mitigation solutions with the inventoried landscape resources; and 3) guidelines and recommendations for development of context sensitive flood hazard mitigation alternatives. The District provided project LIA is intended to serve as a framework and the starting point for any additional inventories and analyses of the land and resource context that may be required as a part of the ADMP.

Scope of the Project LIA
The District provided project LIA contains inventory and analysis maps from the District's Landscape Inventory and Analysis for Maricopa County that have been clipped to the boundary of the project study area. Mapped information is provided at two scales: the regional scale and the local project scale. The regional scale inventory maps typically encompass an area extending approximately 10 miles beyond the project study area boundary. The local project scale inventory and analysis maps typically encompass an area extending approximately 1 mile beyond the project study area boundary. Additionally, the project LIA contains process diagrams and other information to assist the reader in understanding the information contained on the LIA maps.

Project Study Area
The Hohokam Area Drainage Master Plan study area includes an approximately 27 square mile portion of the Southern Phoenix metropolitan area that is bounded by the summit of South Mountain on the south, the Salt River on the North, Interstate Highway 10 on the East and a line running roughly from 23rd Ave to 16th Street on the West.

Project Goals and Objectives for the Land & Resource Context
District goals and objectives for development of context sensitive flood hazard mitigation solutions for District planning studies and project designs are outlined in the document titled: *Flood Control District Land & Resource Goals & Objectives for Planning Studies and Project Design*, FCDMC, November 13, 2008

Hohokam ADMP Landscape Inventory
The landscape inventory includes assessments of existing and planned future landscape character, existing parks and recreation resources and existing open space resources within the regional and local context of the Hohokam ADMP study area.

Regional Context
The purpose of the regional scale landscape inventory is to identify landscape resources of regional significance that are situated within the project study area and its regional context.

Scenery Resources
The project study area is situated entirely within the Sonoran Desert Landscape Character Type. All three of the landscape character subtypes of the Sonoran Desert Character Type are represented within the project study area. The Sonoran Riverlands of the Salt River comprising 7% of the study area and the Mountain Lands of South Mountain comprising 20% of the study area represent the regionally significant scenery resources within the study area. The Sonoran Valley Lands subtype

comprises the remainder of the project study area. Regionally significant scenery resources situated within the region of the project study area include the Gila River and Estrella Mountains located to the West of the project study area and the Papago Mountains, Camelback Mountain and Phoenix South Mountains located to the North of the project study area. These landforms serve as the major landscape focal points within the regional context of the project study area.

Open Space & Recreation Resources
Regionally significant open space and recreation resources situated within the project study area include the South Mountain Regional Park. Segments of the Maricopa County Regional Trail are located along the Salt River and the Summit of South Mountain. Regionally significant open space resources situated within the regional context of the project study area include the remainder of the South Mountain City Regional Park extending westerly from the project study area, the Sierra Estrella County Regional Park located further West and Papago Mountain city regional park, Camelback Mountain city regional park, and the Phoenix Mountains preserve located to the North of the project study area. Virtually all of these regionally significant recreation and open space resources are interconnected or are planned to be connected via *various segments of the Maricopa County Regional Trail System.*

Local Project Area Context
The purpose of the local project scale inventory is to provide a general understanding of land and resource conditions at the local project scale.

Scenery Resources - Landscape Character Physical Settings:
Physical settings represent subdivisions of the Landscape Character Subtypes that display similar visual and physical characteristics. The Valley Plains physical setting comprises approximately 73 percent of the project study area. The Valley Washes physical setting comprises less than 1% of the study area. Within the Mountain Lands subtype, the Mountains setting comprises 13%, the Upper Bajada setting comprises 7% of the study area. Within the River Lands subtype, the River Terrace setting comprises 6% and the River Channel setting comprises 1% of the study area.

Scenery Resources - Existing Landscape Character Cultural Settings:
Suburban landscape settings comprise 45% of the study area. Natural settings comprise 23% of the study area. Urban settings comprise 18%. Rural settings comprise 9% of the study area, while the remainder (5%) is industrial.

Scenery Resources – Future Landscape Character Cultural Settings:
Suburban landscape settings within the project study area are expected to increase to 53% in the future. Urban settings are expected to increase to 20%, while the natural settings are expected to decline to 16% of the study area. Rural settings are expected to decrease to 6%, while industrial settings are expected to remain at approximately the same level as currently exists.

Scenery Resources - Existing Landscape Character Units:
Landscape Character Units are the product of combining the physical and cultural landscape character settings. Within the Valley Plains Subtype, the Suburban Valley Plain Unit comprises 40%, and the Urban Valley Plains Unit comprises 15%. The Rural Valley Plains, and Industrial Valley Plains Units comprise a total of 11% of the study area. The Natural Valley Plains Unit comprises the remaining 7% of the study area.

The Natural Mountains landscape character unit comprises 12% and the Suburban Upper Bajada landscape character unit comprises 4% of the study area. The remainder of the Mountain Lands subtype consists of a variety of landscape character units, each of which comprise less than 1% of the study area.

The Natural, Urban and Industrial River Terrace landscape character units each comprise 2% of the study area (6% total). The Natural River Channel landscape character unit comprises 1% of the project study area.

Scenery Resources - Future Landscape Character Units:
The Suburban Valley Plains landscape character unit is expected to increase to 47% within the Valley Plain Subtype in the future. The Urban Valley Plains Unit is expected to increase to 17%, while the Rural and Natural Valley Plains Units are expected to decrease to 5% and 1% respectively.

Within the Mountain Lands Subtype, the Natural Mountains Unit comprises 12% of the project study area, Suburban Upper Bajada comprises 4% and Rural Upper Bajada comprises 1% of the study area. Numerous other landscape units comprise the remainder of the Mountain Lands Subtype comprising 3% of the study area.

The Natural, Urban and Industrial River Terrace Units each comprise 2% of the study area. The Natural River Channel landscape character unit comprises the remaining 1% of the study area.

Parks and Recreation Resources:
In addition to the previously mentioned South Mountain City Regional Park and the Maricopa County Regional Trail Segments, ten (10) city parks are situated within the Project study area. These include: Circle K, El Reposo, Esteban, Hayden, Hermoso, Nevitt, Nueve, Roesley, SVOB and Rio Solado Industrial Park. Four golf courses are also situated within the project study area. They include: Thunderbirds, The Raven, The Legacy and Phantom Horse.

Open Space Resources:
The South Mountain City Regional Park comprising approximately 12% of the study area represents the major open space resources within the project study area. Existing local city parks comprising a total of 1% and existing golf courses comprising a total of 3% of the project study area represent additional open space resources within the study area. The remaining 3% of the project study area, which includes the floodway and floodplain fringe of the Salt River, that is expected to remain natural, represents the only other potential future natural open space resources within the project study area. The floodplain zones of the Western and Highline Canals which pass through areas that are predominantly suburban valley plain represent the only other potential open space within the project study area.

Landscape Analysis
The following is a summary of the compatibility of the preliminary range of possible structure types, structural methods and landscape design themes with the combined landscape resources (scenery, recreation and open space) of the Hohokam ADMP study area. For additional information about these analyses, please refer to the Flood Protection Structure Types, Structural Methods and Landscape Design Themes Handbooks listed in the references section.

Structure Types Compatibility – Existing Combined Resources:
Natural structure types (Natural Resource Preservation Strategy) are the only flood hazard mitigation structure types that are compatible within the floodway and flood fringe of the Salt River as well as the slopes of South Mountain (18% of the Project Study Area). Approximately 71% of the project study area, consisting predominantly of valley plain landscape units is classified as compatibility class 6 and is compatible with natural structures, underground facilities, channel levees, conveyance channels, storage basins and Dams at various scales (please refer to map). The remainder of the study area is classified as compatibility class 5 and is compatible with all of the aforementioned structure types at various scales, except for Dam structures.

Structure Types Compatibility – Future Combined Resources:
Structure types compatibility based upon planned future conditions remains essentially the same as for existing conditions.

Structural Methods Compatibility - Existing Combined Resources:
Natural methods is the only structural method that is compatible within the floodways, flood fringe areas and the slopes of South Mountain (18% of the study area). The Semi-Soft, Soft and Natural Methods are compatible for a majority of the suburban valley plains (62% of the study area). The

Hard Structural Method is additionally compatible within urban valley plain landscapes (16% of the study area) and all of the structural methods are compatible within the industrial valley plain landscape units (3% of the study area).

Structural Methods Compatibility – Future Combined Resources:
Structural methods compatibility based upon planned future conditions remains essentially the same as for existing conditions.

Landscape Design Theme Compatibility:
The Natural Desert Uplands and Uplands Riparian landscape design themes will be compatible within the Mountain Lands Subtype. Natural Lower Sonoran Desert Riparian and Hydro-riparian landscape design themes will be compatible within the River Lands Subtype. Within the developed parts of the project study area, culturally influenced landscape design themes including the Semi-natural Desert, Enhanced Desert, Desert Park, Oasis and plaza themes will be compatible.

Recommendations

1. Conduct further landscape inventories and analyses as required in the project scope of work
2. Maximize opportunities for preserving the remaining natural resources of the project study area as a part of the development of project alternatives
3. The District is a sponsor of the Maricopa County Regional Trail. In accordance with the regional trail master plan, maximize opportunities for implementation of segments of the Maricopa Regional Trail within District flood control projects
4. Protect and enhance all existing parks and recreation resources within the project study area.
5. Develop a minimum of one alternative that is designed to be context sensitive to the maximum degree possible (ie one that is acceptable to the local community, compatible with the environment and effective in reducing the risks of flooding)

References

1. *Policy for the Aesthetic Treatment and Landscaping of Flood Control Projects*, FCDMC, December 16, 1996, with Cost Ceiling Tables 1 & 2, March 3, 2009
2. *The Context Sensitive Flood Hazard Mitigation Planning and Design Approach*, FCDMC, April 19, 2010
3. *Flood Control District Land & Resource Goals & Objectives for Planning Studies and Project Design*, FCDMC, November 13, 2008
4. *Flood Protection Structure Types Handbook - Descriptions, Photo Examples and Land & Resource Compatibility ratings for Scenery, Recreation and Open Space Resources in Maricopa County*, FCDMC, June, 2010
5. *Flood Protection Methods Handbook - Descriptions, Photo Examples and Land & Resource Compatibility ratings for Scenery, Recreation and Open Space Resources in Maricopa County*, FCDMC, June, 2010
6. *Landscape Design Themes Handbook - Descriptions, Photo Examples and Land & Resource Compatibility ratings for Scenery, Recreation and Open Space Resources in Maricopa County*, FCDMC, June, 2010
7. GIS Landscape Inventory and Analysis for Maricopa County (LIA), FCDMC, 2009
8. *Aesthetic and Multiple-Use Guidelines for Flood Control Basins, Channels and Flood Retarding Structures*, FCDMC, April 23, 2002
9. Existing Facilities Landscape Aesthetics and Multi-Use Opportunities Assessment, North Valley Structures Analysis, FCDMC, February 5, 2001
10. *Existing Facilities Landscape Aesthetics and Multi-Use Opportunities Assessment, West Valley Structures Analysis*, FCDMC, June 1, 2001
11. *Maricopa County Regional Trail System Plan*, Maricopa County Trail Commission, August 16, 2004
12. *Desert Spaces, An Open Space Plan for the Maricopa County*, Maricopa Association of Governments, undated

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  - Landscape Character Sub-Types
  - Regional Landscape Character Physical Settings
  - Landscape Character Physical Settings
  - Existing Cultural Settings
  - Future Cultural Settings
  - Existing Landscape Character Units
  - Future Landscape Character Units
- **Parks & Recreation Resource Inventory**
  - Regional Parks & Recreation Resources
  - Parks & Recreation Resources
- **Open Space Resources Inventory**
  - Regional Open Space Resources
  - Open Space Resources

Landscape Analysis
- **Structure Types Compatibility Analysis**
  - Flood Protection Structure Types Overview
  - Compatibility Classes & The Range of Compatible Structure Types
  - Existing Landscape Character Units Structure Types Compatibility
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  - Open Space Resources Structural Methods Compatibility
  - Combined Existing Structural Methods Compatibility
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- **Landscape Design Themes Compatibility Analysis**
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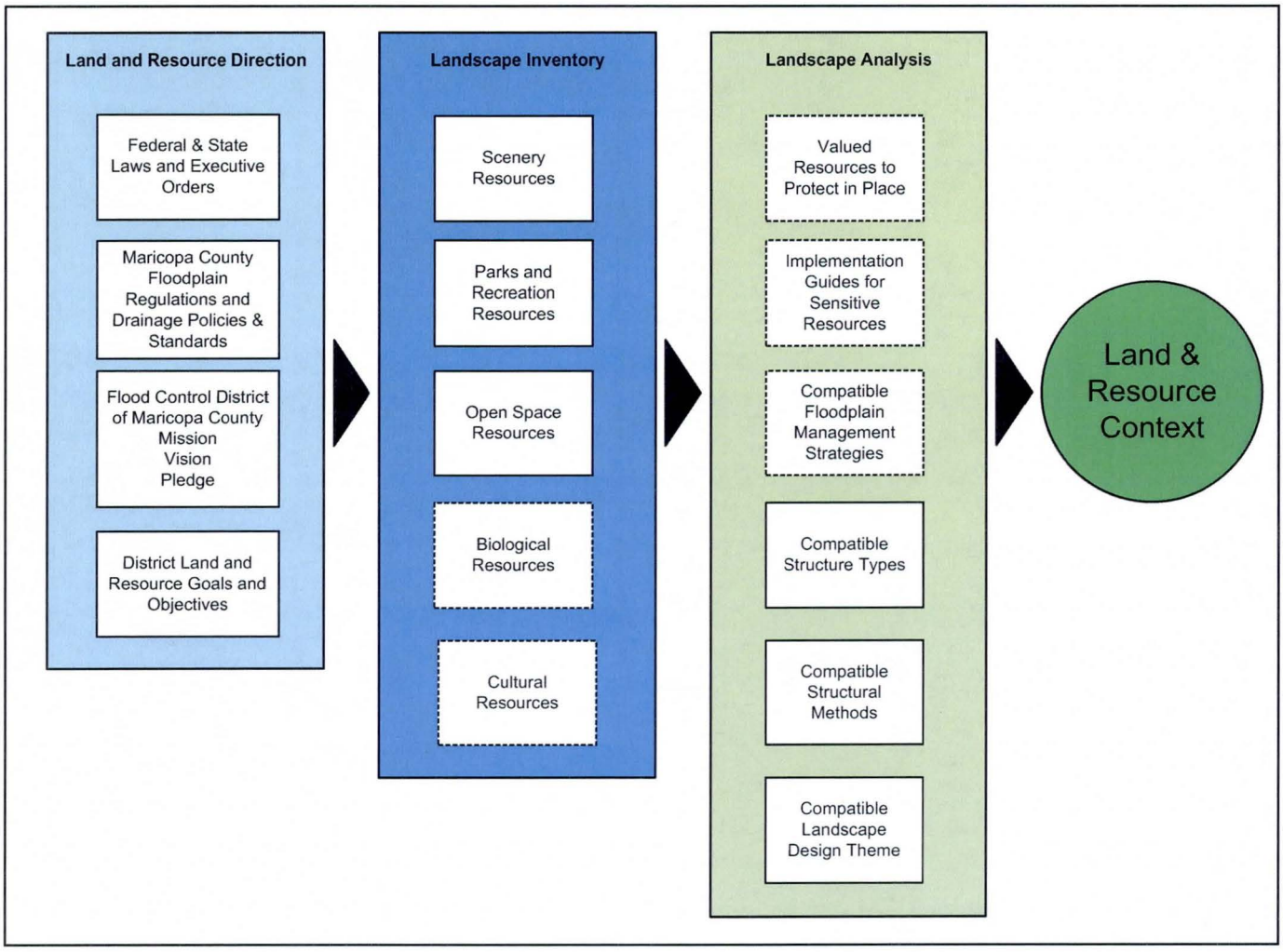
  - Landscape Design Themes Compatible with Landscape Character Units
  - Landscape Design Themes Compatible with Parks & Recreation Resources
  - Landscape Design Themes Compatible with Open Space Resources

Landscape Inventory & Analysis Process



Currently Available

Under Development

Landscape Inventory

Scenery Resources

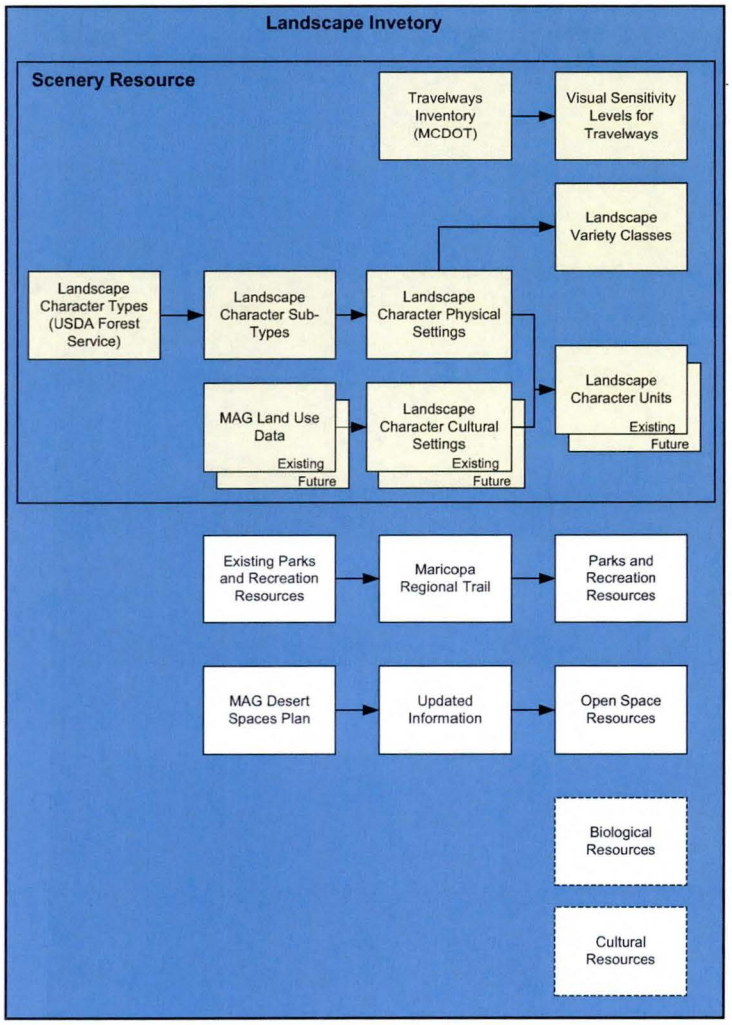
Parks & Recreation Resources

Open Space Resources

Biological Resources (Reserved)

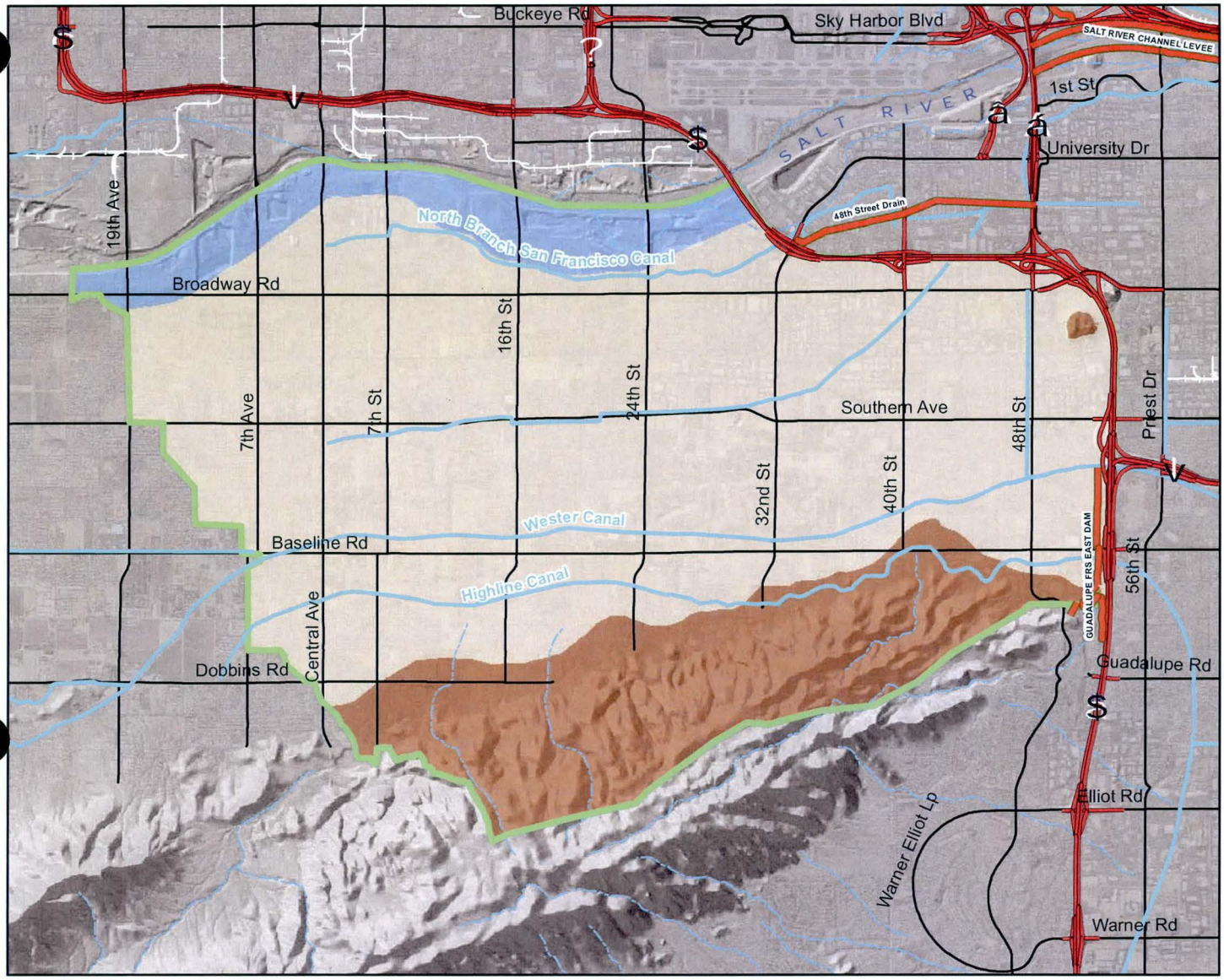
Cultural Resources (Reserved)

Scenery Resource Inventory



Hohokam Area Drainage Master Plan

Landscape Character Sub-Types



Landscape Character Sub-Types

- Sonoran Mountain Lands
- Sonoran River Lands
- Sonoran Valley Lands

Reference Features

- Study Area
- Highways
- Major Arterial
- FCD Structures
- Rail-Road
- Canals
- Streams

Sources

- Flood Control District of Maricopa County Landscape Inventory & Analysis (LIA), 2008
  - Landscape Character Types Map, 2008
- "Landscape Character Types of the National Forests in Arizona, and New Mexico," USDA Forest Service
- Aerial photography and topographic mapping, Flood Control District of Maricopa County

Prepared by
Flood Control District of Maricopa County
May 2010

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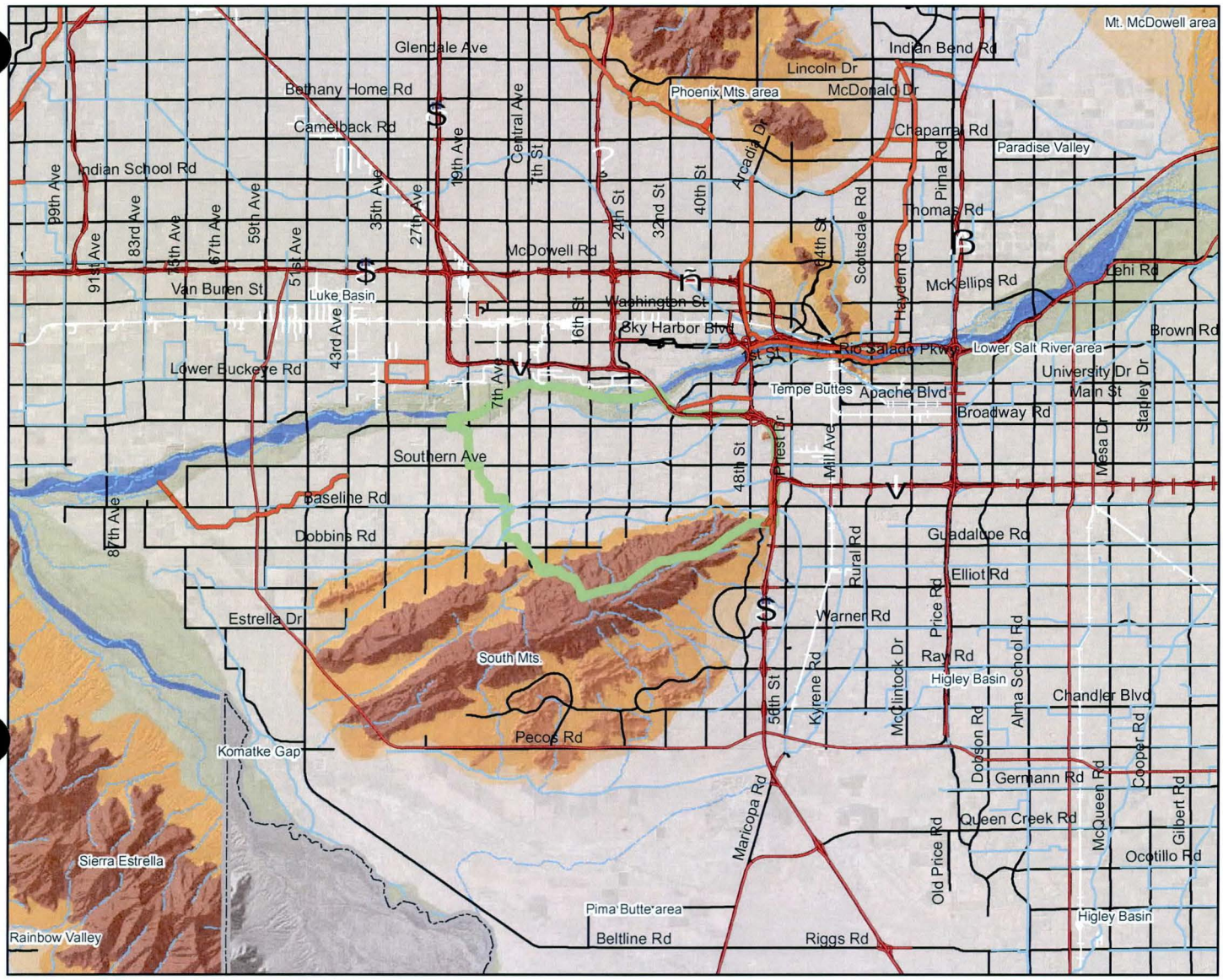
1 inch = 1.25 miles

Hohokam Area Drainage Master Plan

Regional Landscape Character Physical Settings



Landscape Character Physical Settings

Sonoran River Lands Sub-Type

- River Channel
- River Terrace

Sonoran Valley Lands Sub-Type

- Valley Plains
- Valley Wash

Sonoran Mountain Lands Sub-Type

- Arroyo
- Foothills
- Mountains

Reference Features

- Study Area
- Highways
- Major Arterial
- FCD Structures
- Rail-Road
- Canals
- Streams
- Maricopa County

Sources

- Flood Control District of Maricopa County Landscape Inventory & Analysis (LIA), 2008
  - Landscape Character Types and Subtypes Map, 2008
- Aerial photography and topographic mapping, Flood Control District of Maricopa County
- Land Cover Types Map, Arizona Land and Resource Inventory System, State of Arizona

Prepared by
Flood Control District of Maricopa County
May 2010

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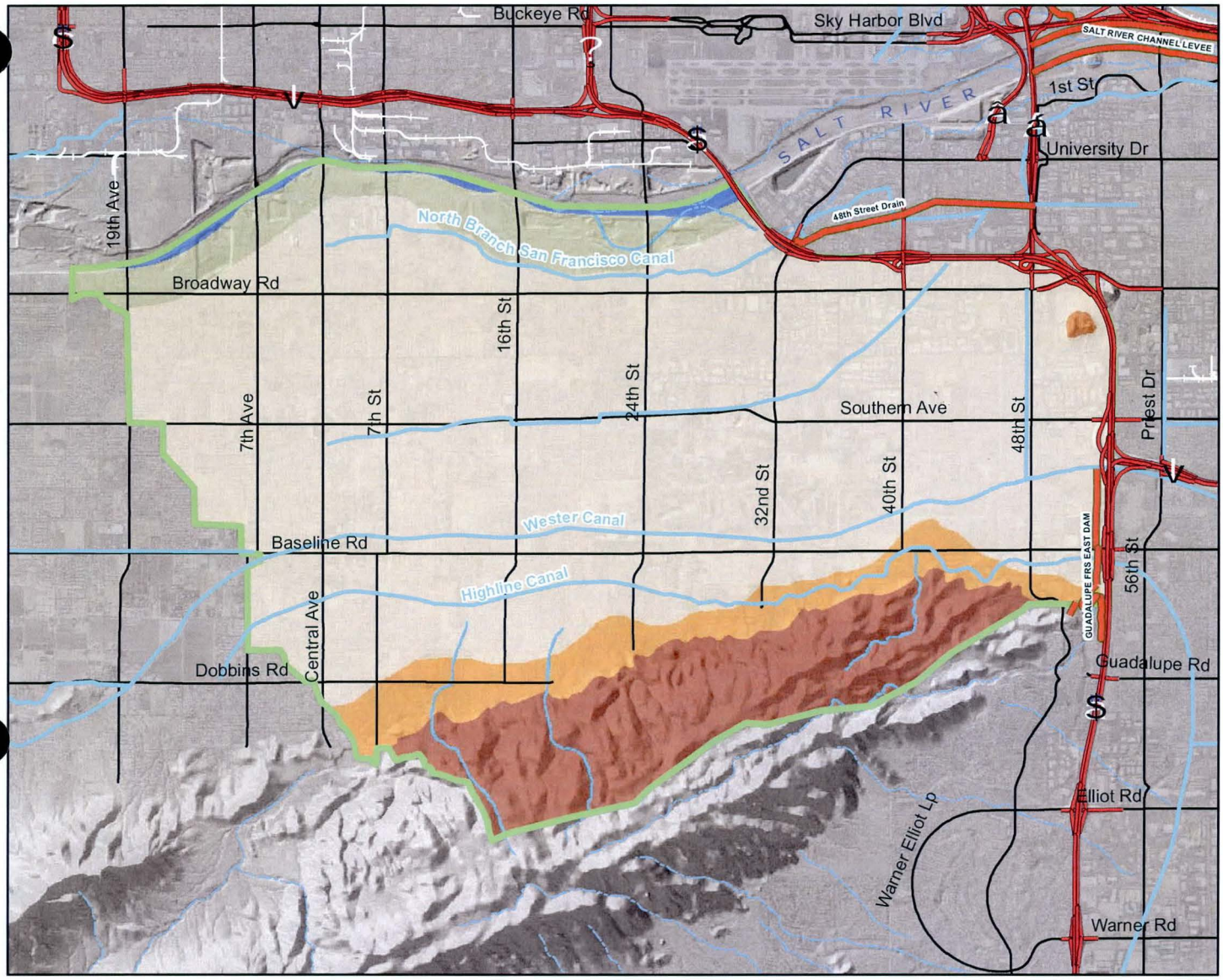
1 inch = 4 miles

Hohokam Area Drainage Master Plan

Landscape Character Physical Settings



Landscape Character Physical Settings

- Arroyo
- Foothills
- Mountains
- River Channel
- River Terrace
- Valley Plains
- Valley Wash

Reference Features

- Study Area
- Highways
- Major Arterial
- FCD Structures
- Rail-Road
- Canals
- Streams

Sources

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  - Landscape Character Types and Subtypes Map, 2008
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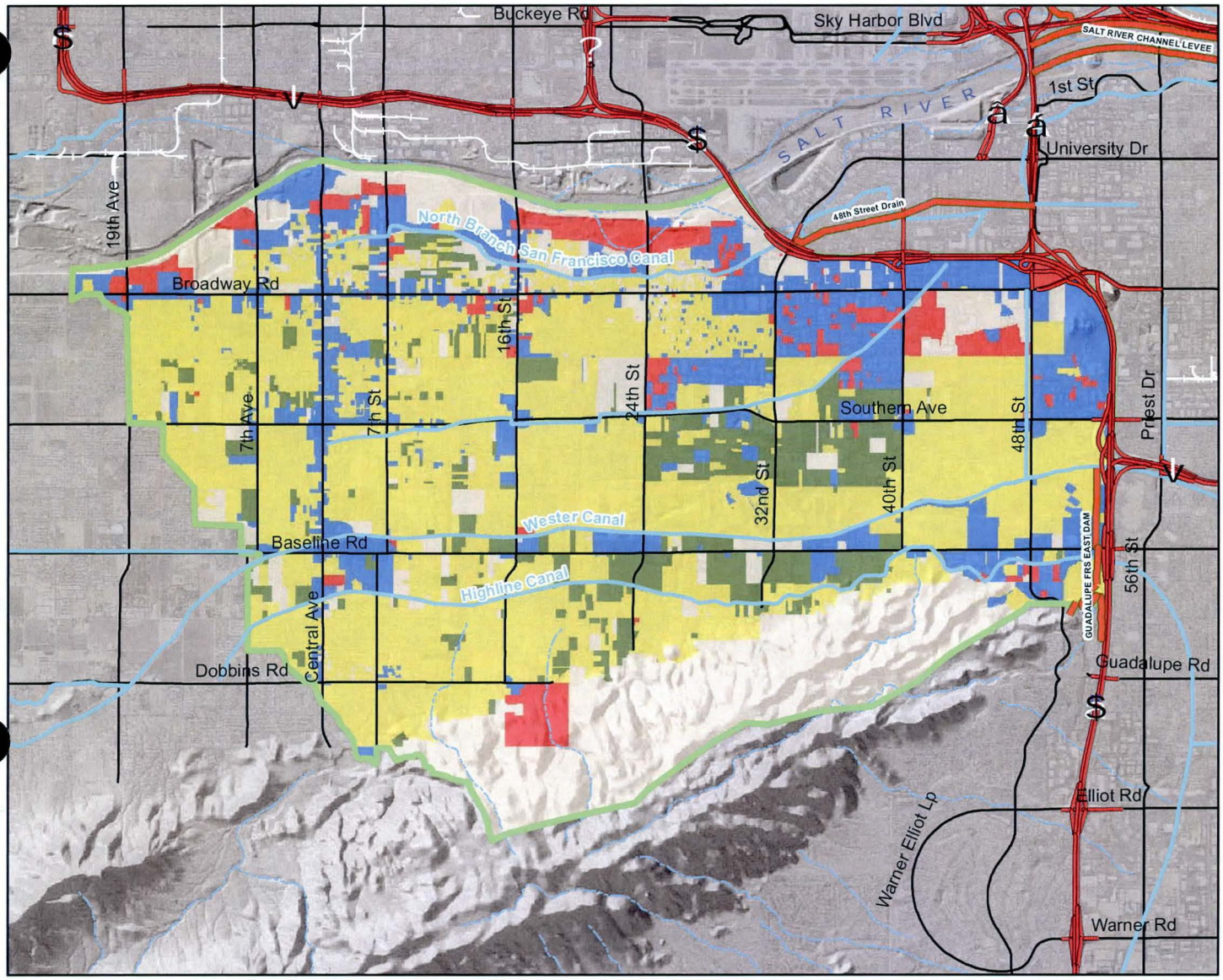
Hohokam Area Drainage Master Plan

Existing Cultural Settings



Existing Cultural Settings

- Natural
- Rural
- Suburban
- Urban
- Industrial

Reference Features

- Study Area
- Highways
- Major Arterial
- FCD Structures
- Rail-Road
- Canals
- Streams

Sources

- MAG 2004 Land Use data base
- Reclassification of 2005 MAG Land Use classifications into Cultural Settings by Flood Control District of Maricopa County

Prepared by
Flood Control District of Maricopa County
May 2010

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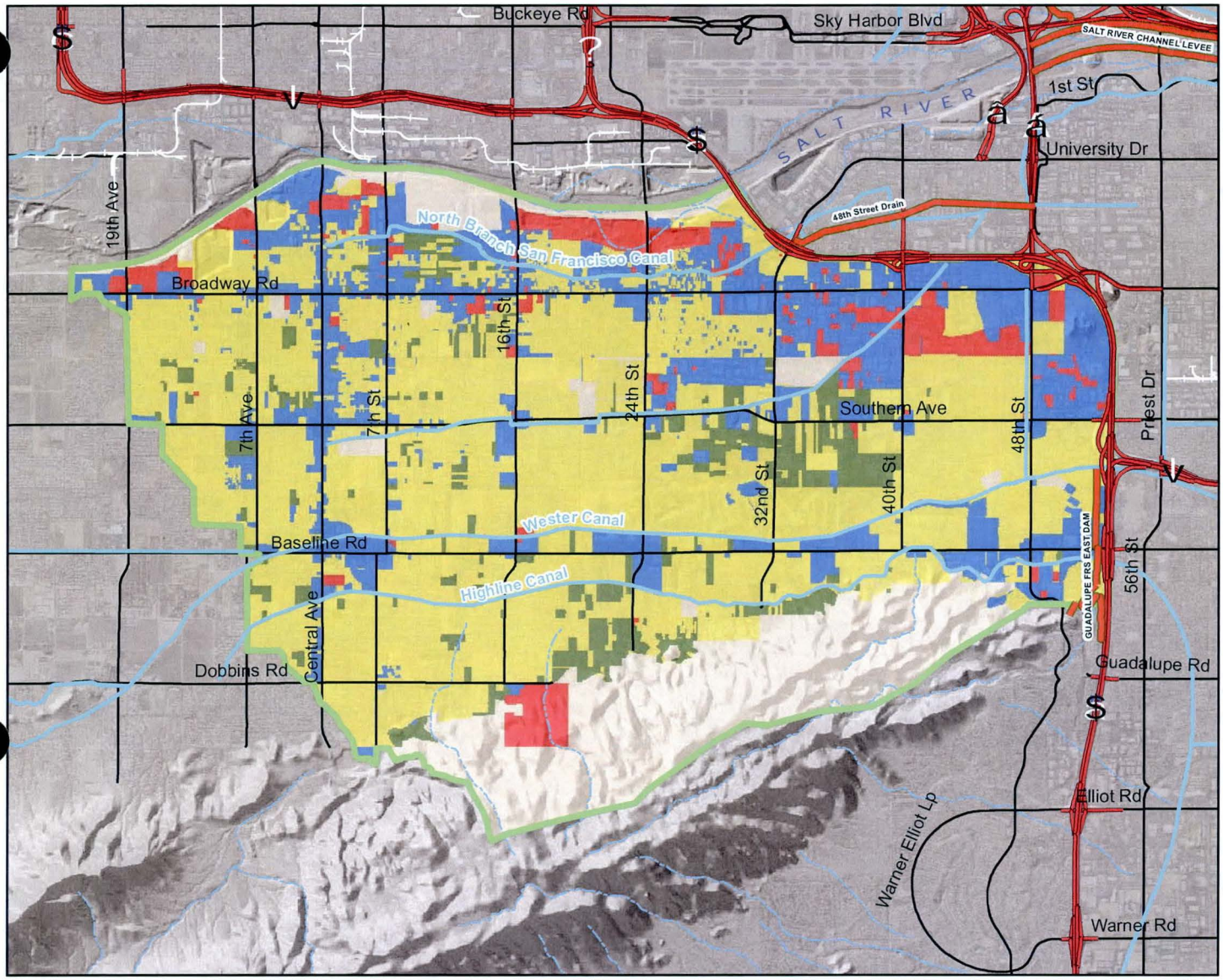
Hohokam Area Drainage Master Plan

Future Cultural Settings



Future Cultural Settings

- Natural
- Rural
- Suburban
- Urban
- Industrial

Reference Features

- Study Area
- Highways
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- Streams

Sources

- MAG Future Land Use data base
- Updated Land Use information from BLM, cities of Avondale, Buckeye, Goodyear, El Mirage, and Surprise 2008
- Reclassification of 2005 MAG Land Use classifications into Cultural Settings by Flood Control District of Maricopa County

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May 2010

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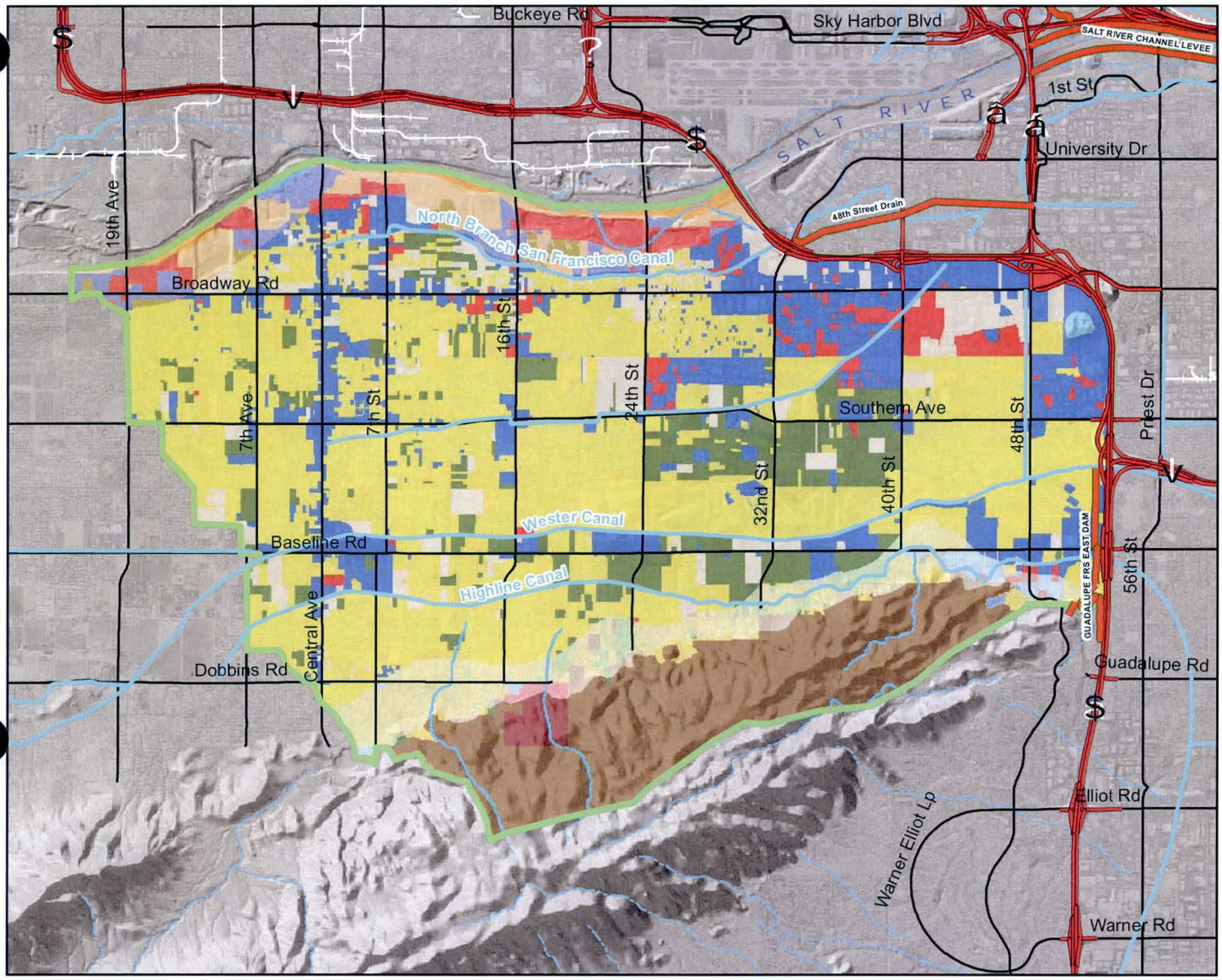
Hohokam Area Drainage Master Plan

Existing Landscape Character Units



Existing Landscape Character Units

- Natural Arroyo
- Natural Mountains
- Natural River Channel
- Natural River Terrace
- Natural Upper Bajada
- Natural Valley Plains
- Natural Valley Wash
- Rural Mountains
- Rural Upper Bajada
- Rural Valley Plains
- Rural Valley Wash
- Suburban Arroyo
- Suburban Mountains
- Suburban River Terrace
- Suburban Upper Bajada
- Suburban Valley Plains
- Suburban Valley Wash
- Urban Arroyo
- Urban Foothills
- Urban Mountains
- Urban River Channel
- Urban River Terrace
- Urban Upper Bajada
- Urban Valley Plains
- Urban Valley Wash
- Industrial Arroyo
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- Industrial Upper Bajada
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- Flood Control District of Maricopa County Landscape Inventory & Analysis (LIA), 2008
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  - Landscape Character Physical Settings Map, 2008

Prepared by
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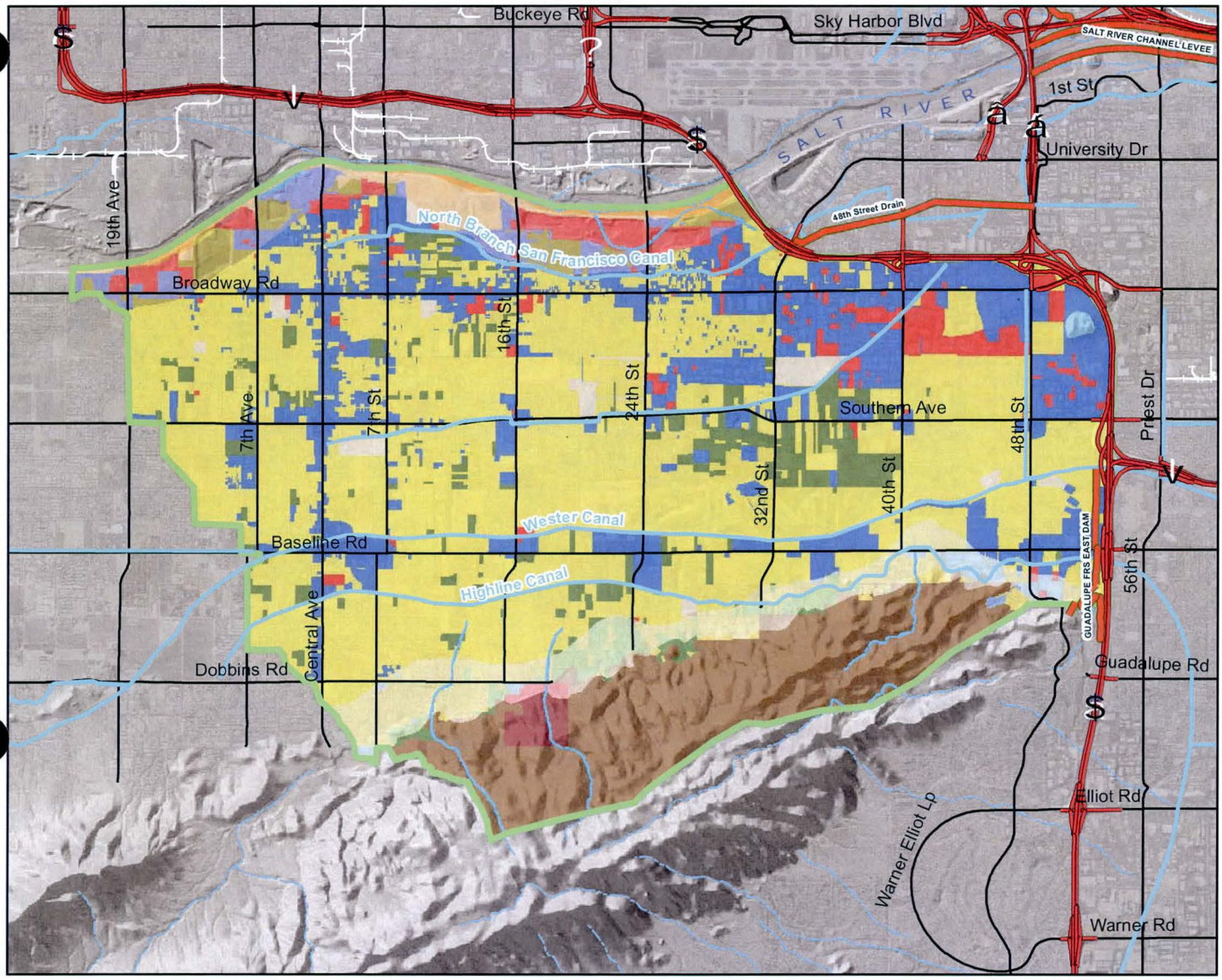
Hohokam Area Drainage Master Plan

Future Landscape Character Units



Future Landscape Character Units

- Natural Arroyo
- Natural Mountains
- Natural River Channel
- Natural River Terrace
- Natural Upper Bajada
- Natural Valley Plains
- Natural Valley Wash
- Rural Arroyo
- Rural Mountains
- Rural Upper Bajada
- Rural Valley Plains
- Rural Valley Wash
- Suburban Arroyo
- Suburban Mountains
- Suburban River Channel
- Suburban River Terrace
- Suburban Upper Bajada
- Suburban Valley Plains
- Suburban Valley Wash
- Urban Arroyo
- Urban Foothills
- Urban Mountains
- Urban River Channel
- Urban River Terrace
- Urban Upper Bajada
- Urban Valley Plains
- Urban Valley Wash
- Industrial Arroyo
- Industrial Mountains
- Industrial River Channel
- Industrial River Terrace
- Industrial Upper Bajada
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  - Future Landscape Character Cultural Settings Map, 2008
  - Landscape Character Physical Settings Map, 2008

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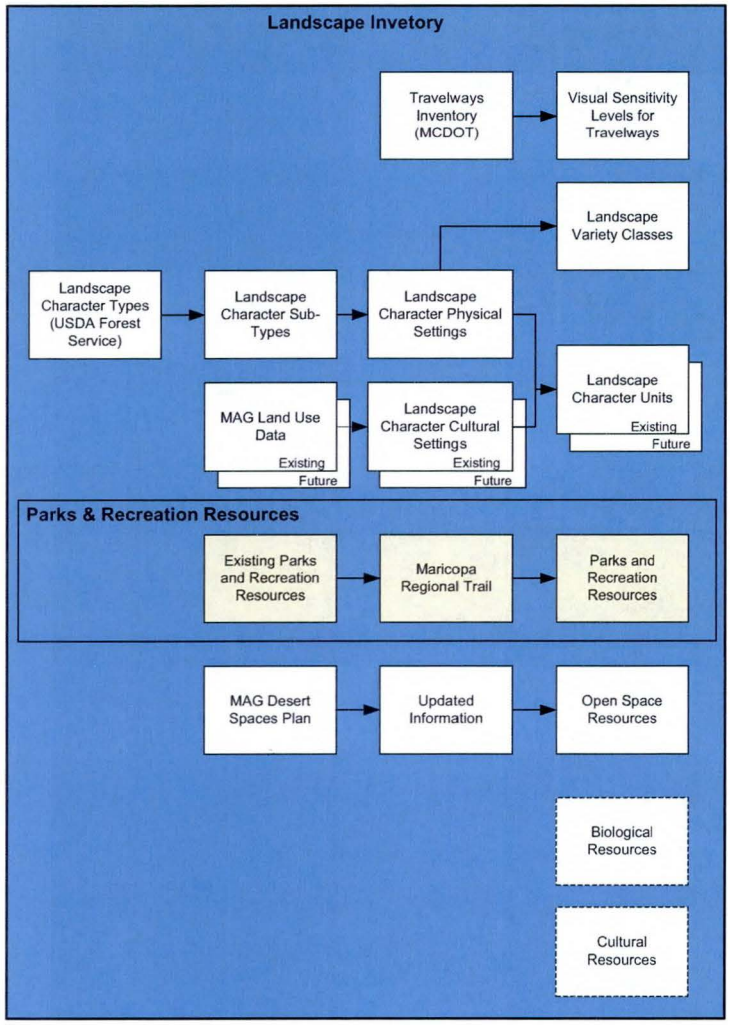
May 2010

0 0.4 0.8 1.6 2.4 Miles

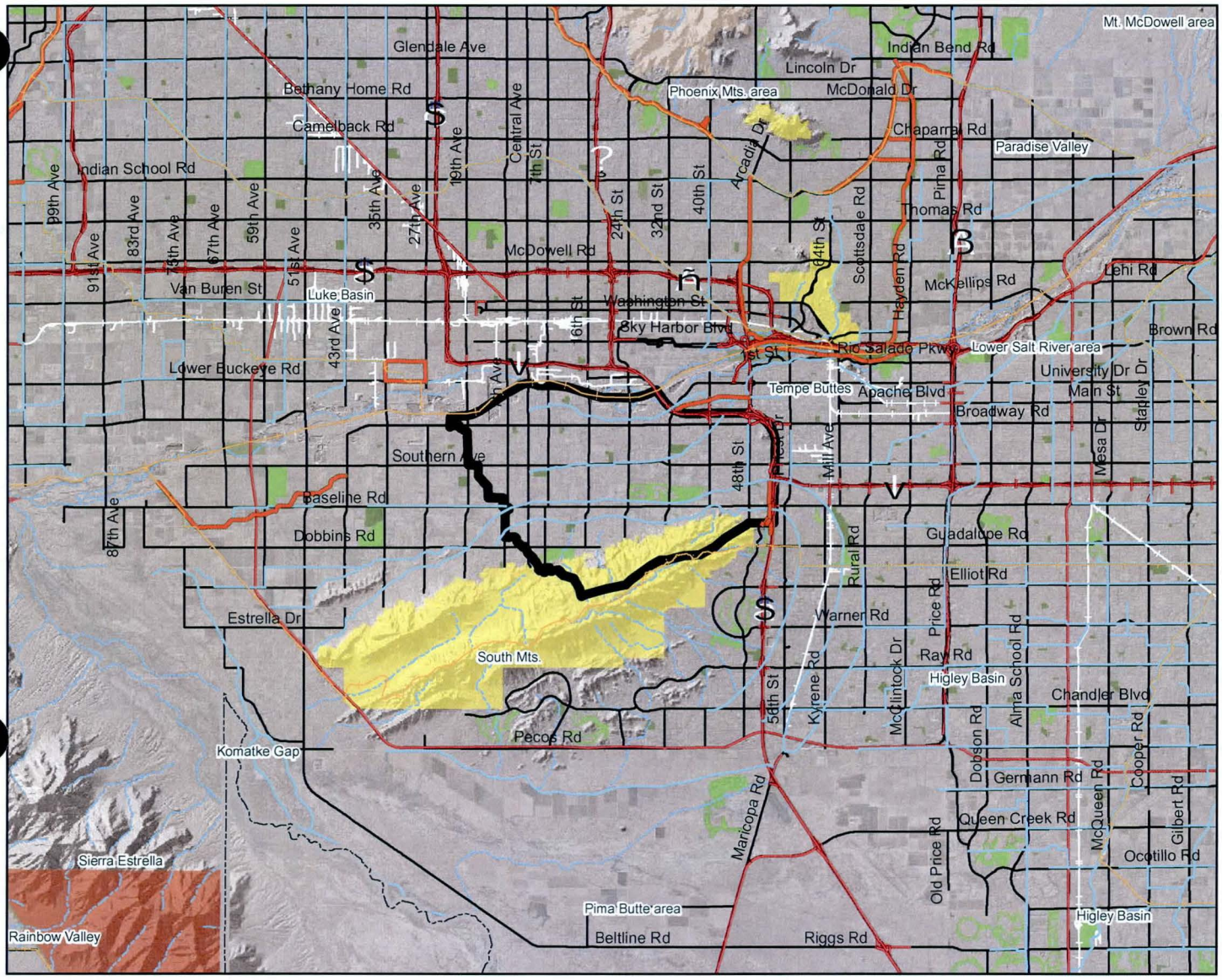
1 inch = 1.25 miles

Parks & Recreation Resources Inventory



Hohokam Area Drainage Master Plan

Regional Parks & Recreation Resources



Parks & Recreation Resources

Federal

- Wilderness Areas

Regional

- City Mountain Preserves
- City Regional Parks
- Maricopa Regional Trail System

Local

- County and city Parks
- Golf Courses

Reference Features

- Study Area
- Highways
- Major Arterial
- FCD Structures
- Rail-Road
- Canals
- Streams
- Maricopa County

Sources

- Maricopa County District of Transportation
- USDI Bureau of Land Management (BLM)

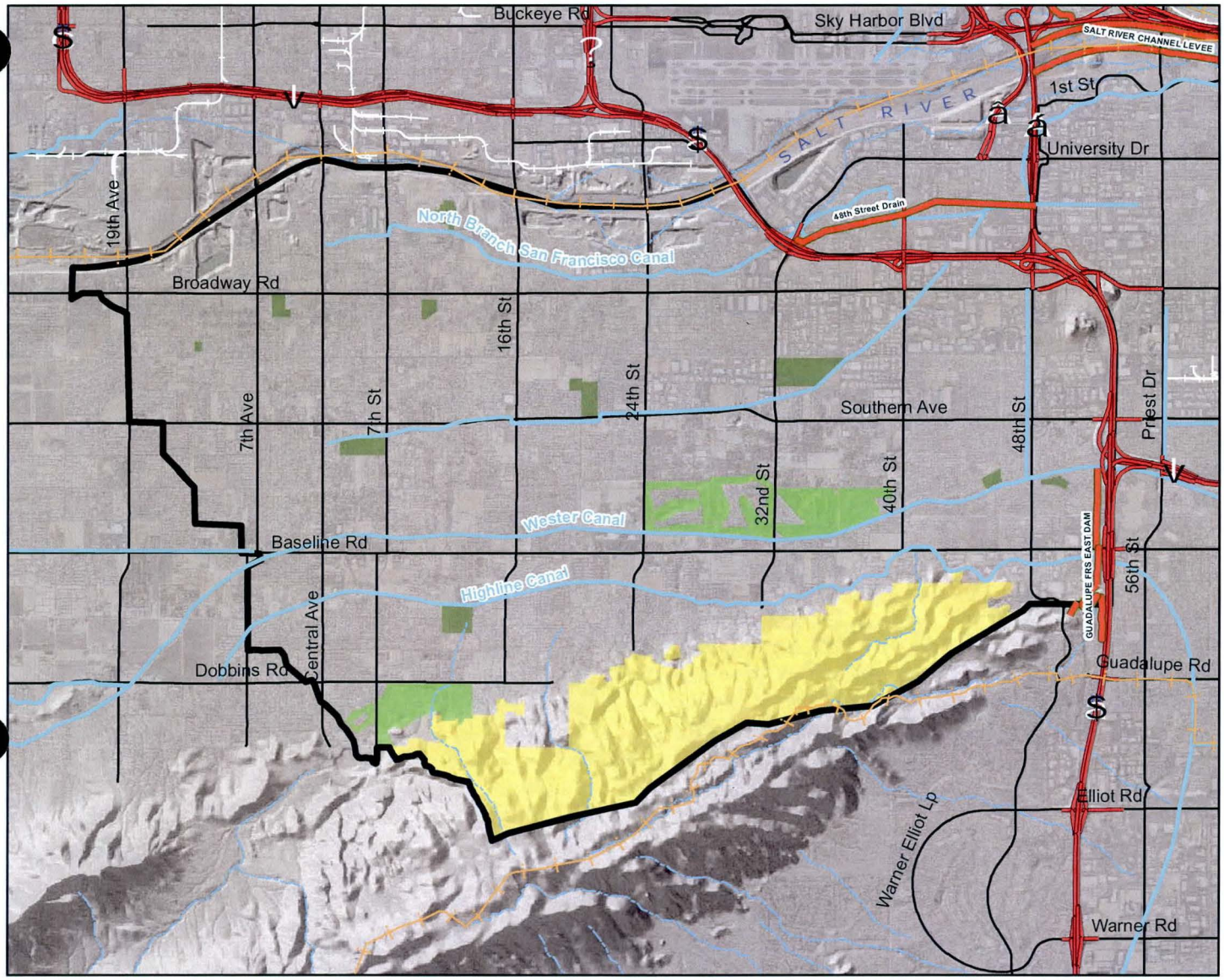
Prepared by
Flood Control District of Maricopa County
May 2010

0 1.25 2.5 5 7.5 Miles

1 inch = 4 miles

Hohokam Area Drainage Master Plan

Parks & Recreation Resources



Parks & Recreation Resources

- City Regional Parks
- Local City Parks
- Local Golf Courses
- Maricopa Regional Trail System

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Prepared by
Flood Control District of Maricopa County
May 2010

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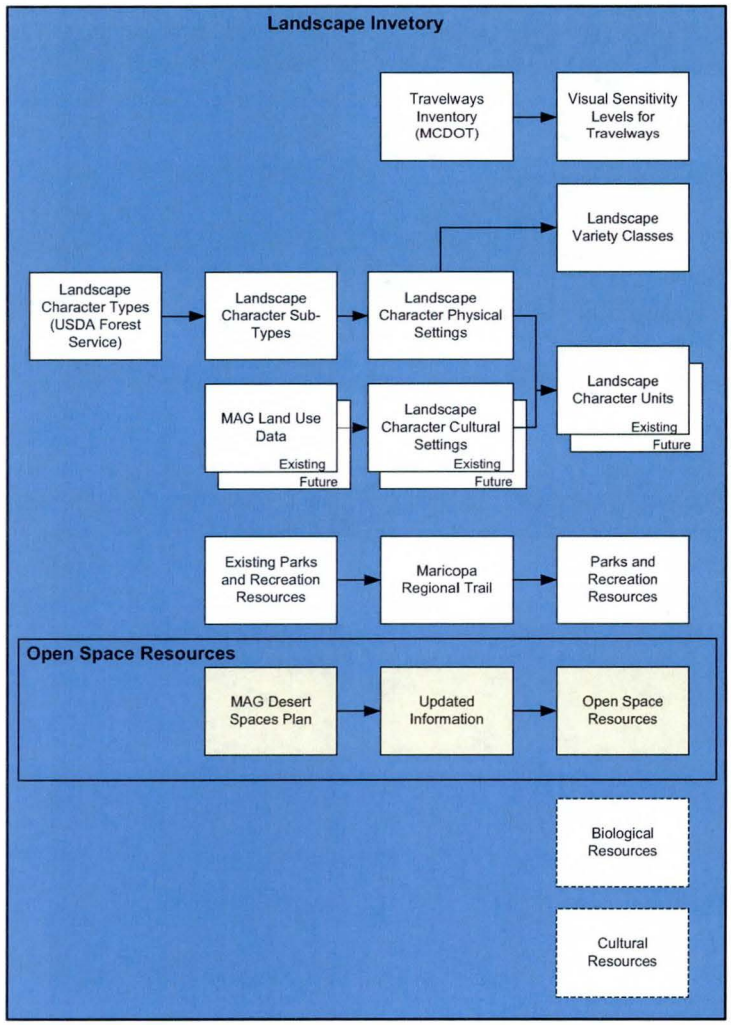
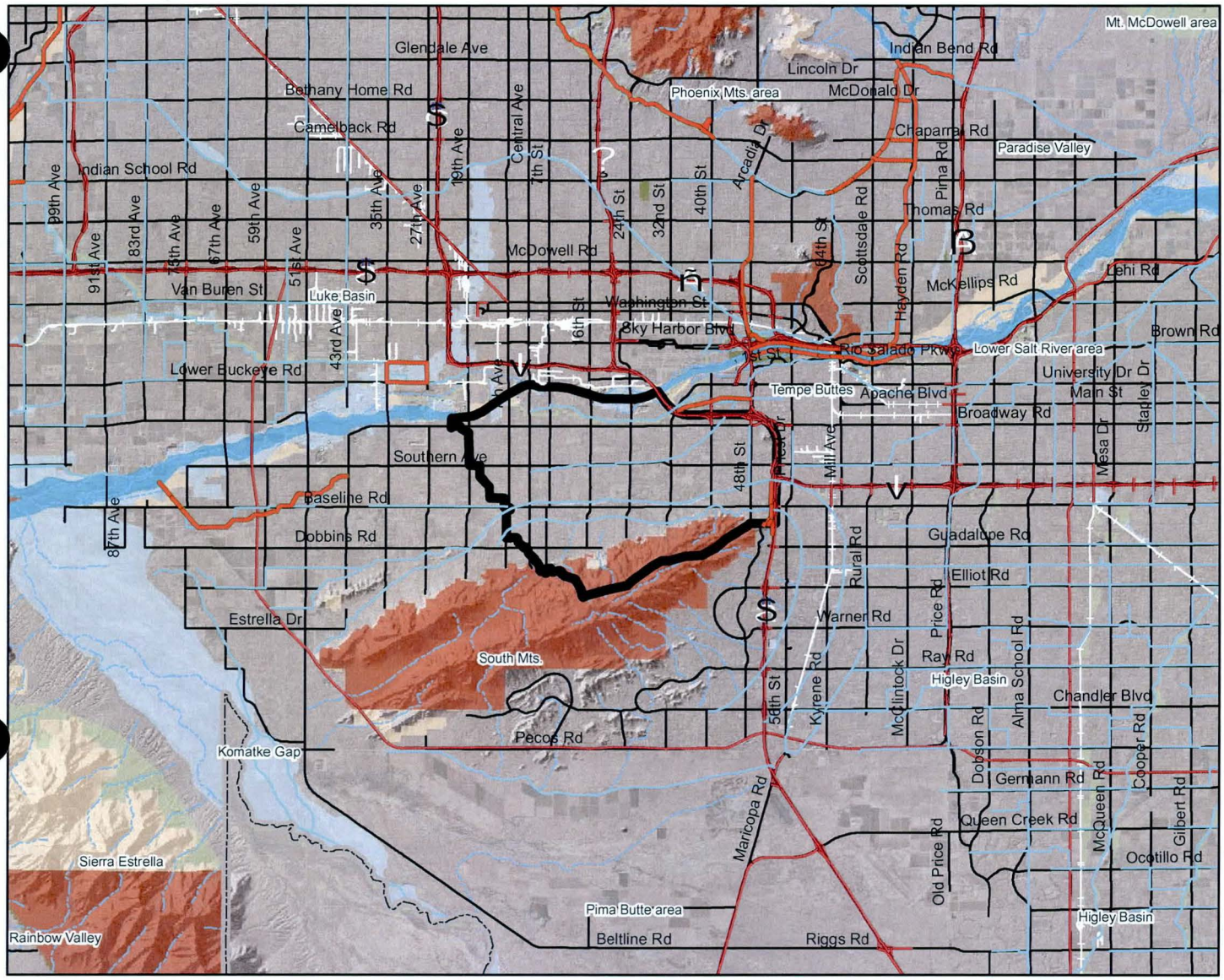
Open Space Resources Inventory



Hohokam Area Drainage Master Plan

Regional Open Space Resources



Open Space Resources

Secure Open Space

- Wilderness Areas
  City Mountain Preserves
  City Regional Parks
- Open Space Conservation Areas
- Open Space Retention Areas
- Floodway
- Floodplain Fringe & Other Floodplian Zones

Reference Features

- Study Area
- Highways
- Major Arterial
- FCD Structures
- Rail-Road
- Canals
- Streams
- Maricopa County

Sources

- Maricopa Association of Governments
- USDI Bureau of Land Management
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Prepared by
Flood Control District of Maricopa County
May 2010

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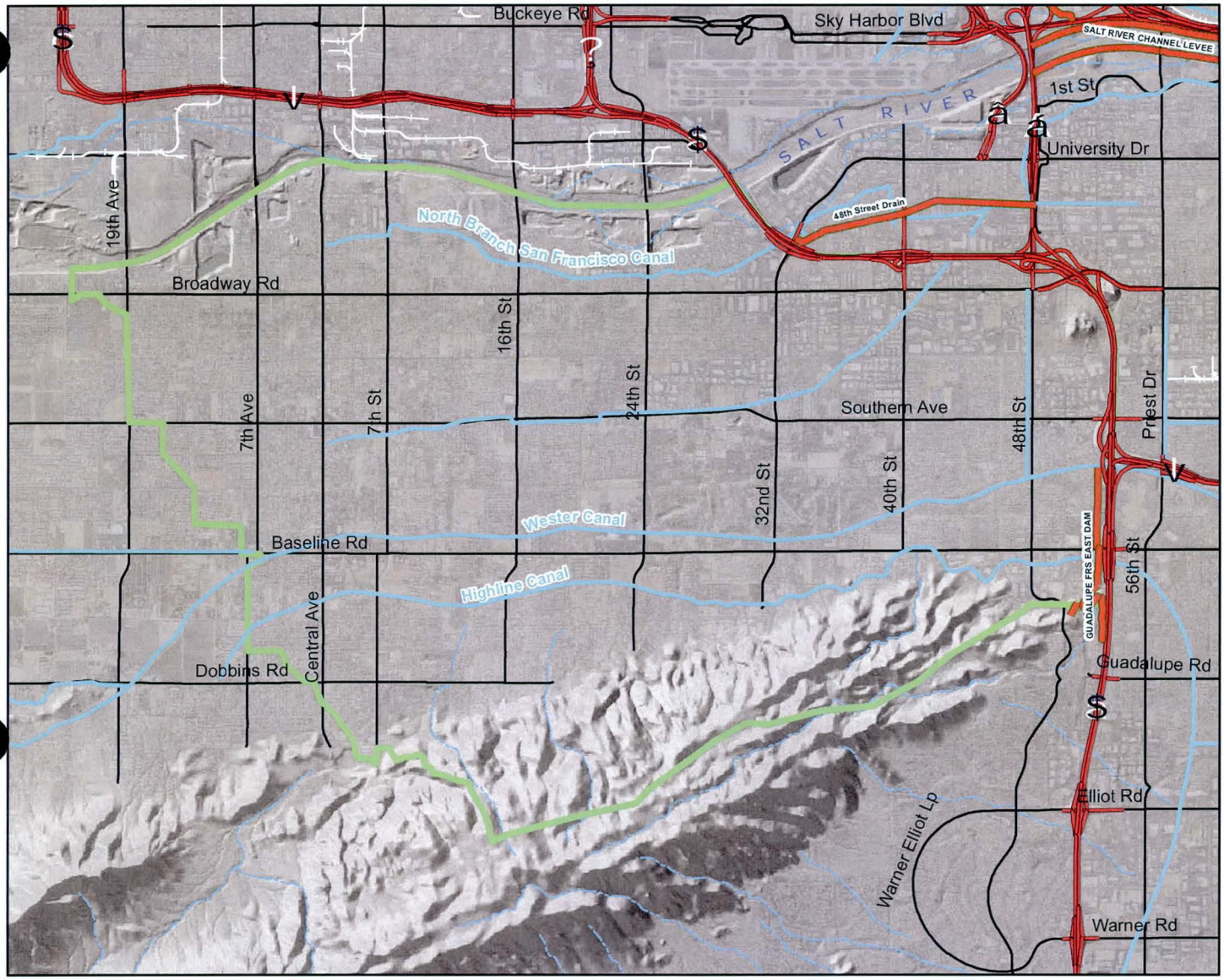
1 inch = 4 miles

Hohokam Area Drainage Master Plan

Open Space Resources



Open Space Resources

- Secure Open Space -City Regional Parks
- Open Space Conservation Areas
- Open Space Retention Areas
- Floodway
- Floodway Fringe & Other Floodplain Zones

Reference Features

- Study Area
- Highways
- Major Arterial
- FCD Structures
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- Streams

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- USDI Bureau of Land Management
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Prepared by
Flood Control District of Maricopa County
May 2010

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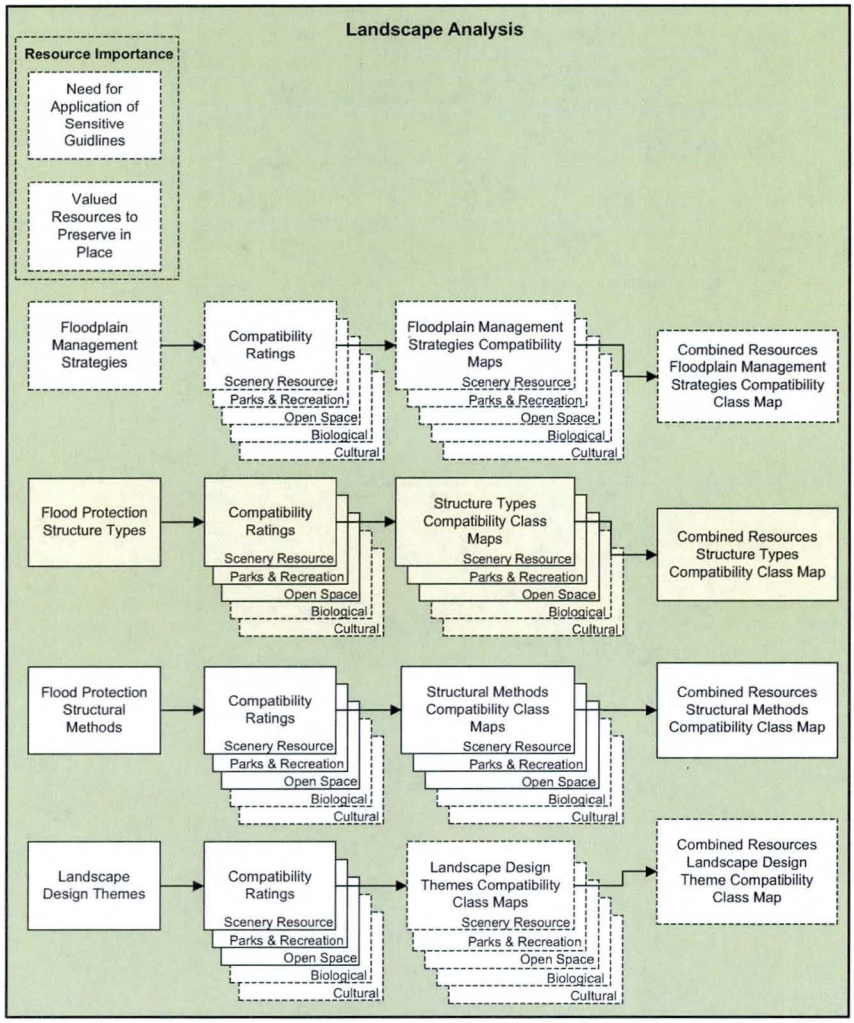
Landscape Analysis

Structure Types Compatibility

Structural Methods Compatibility

Landscape Design Themes Compatibility

Structure Types Compatibility Analysis



FLOOD PROTECTION STRUCTURE TYPES

Introduction

Preservation of the natural landscapes of Maricopa County and protection of local community character are primary objectives of the Flood Control District's Board approved Policy for the Landscaping and Aesthetic Treatment of Flood Control Structures. The development of context sensitive flood mitigation solutions that protect and enhance open spaces, recreation, biological, and cultural resource environments of Maricopa County are also important goals that are an integral part of carrying out the District's overall mission.

The identification and selection of flood protection structure types that have the potential to be context sensitive with the environments in which they are placed is an important early step in District planning studies. This handbook is intended to serve as a guide to assist in the identification and selection of flood control structure types that have the potential to be context sensitive with the valued characteristics of the scenery, recreation and open space environments of Maricopa County. Future updates of this handbook will include guidelines for the identification and selection of flood protection structure types that are context sensitive with the biological and cultural resource environments of Maricopa County.

Six Flood Control Structure Types that are frequently considered, evaluated and recommended in District Area Drainage and Watercourse Master Planning studies, Project Pre-designs and Final Designs are listed in Table 1 below.

Table 1 Flood Protection Structure Types and thier Potential to Acheieve Context Sensitivity with the landscape settings of Maricopa County

Flood Protection Structure Types	Potential Magnitude of Landscape Alteration	Potential to Achieve Context Sensitivity
Non-Structural Underground Pipe Channel Levee Conveyance Channel Storage Basin Flood Retarding Structure or Dam	Lowest ↑ Highest	Highest ↑ Lowest

These structure types vary in their physical and visual characteristics and, hence, their ability to complement the variety of landscape settings, open spaces and recreation environments found within Maricopa County. The above structure types are arrayed as a spectrum according to their overall potential to modify and achieve context sensitivity with the landscape settings commonly found within Maricopa County. Within this spectrum, the Non-structural and Underground Pipe structure types have the highest potential for achieving context sensitivity with a majority of the landscape settings in Maricopa County. The Levee and Conveyance Channel structure Types generally have an intermediate potential, whereas the Storage Basin and Flood Retarding structure types tend to have the lowest potential for achieving context sensitivity with a majority of the landscape settings in Maricopa County.

The physical dimension or "scale" of the structure types relative to the size of the features in the surrounding landscape setting also influences the perceived ability of flood control structures to achieve context sensitivity with the visual environments in which they are placed. The size and depth of large scale flood control structures can appear to be visually overwhelming and out of context with landscape settings comprised of small scale features. For this reason, the Levee, Conveyance Channel, Storage Basin and Flood Retarding structure types are further stratified into three structure type scale sub-classes. The three scale sub-classes include:

Small Scale Structures
Medium Scale Structures
Large Scale Structures

The physical dimensions of the structure types associated with each Scale Sub-Class are summarized in Table 2.

Table 2 Flood Protection Structure Types Scale Sub-Classes

Structure Type	Scale Sub-Class	Physical Dimension
Non-Structural	NA	NA
Underground Pipe	NA	NA
Channel Levee	Small Medium Large	up to 6 ft. height and up to 25 ft. width 6-10 ft. height and 25-100 ft. width 10+ ft. height and 100 ft.+ width
Conveyance Channel	Small Medium Large	up to 6 ft. depth and up to 25 ft. width 6-8 ft. depth and 25-100 ft. width 8 ft. + depth and 100 ft. + width
Storage Basin	Small Medium Large	up to 8 ft depth and 5 acres or less up to 8 ft depth (80%), up to 15 ft depth (40%) and 5-20 acres in size 15 + ft depth and 20+ acres in size
Dam	Small Medium Large	up to 10 ft high and up to 1 mile in total length 10-15 ft high and 1-2 miles in total length 15+ feet height and 2+ miles in total length

Non-Structural Method

The Non-Structural Structure Type is representative of flood plain preservation and is characterized by an absence of structural elements or features for flood protection or other purposes. Exceptions may include low standard road facilities for flood plain monitoring and administrative purposes and low impact facilities to support passive recreation activities, public education/orientation, and natural resource restoration and management. Typically, this structure type is implemented through a variety of local ordinances, County floodplain regulations, State statutes and Federal regulations. Natural topographic features such as rivers, washes, arroyos, channels, valleys and ridges perform the functions of storm water conveyance, storage and retardation. Since the visual character of the landscape is usually preserved under this structure type, it will usually complement and become context sensitive with the visual character of most landscape settings.

Unnamed Arroyo, White Tank Mountain

Upper New River, Tonto National Forest

Gila River at Gila Bend, AZ

Gila River at El Mirage Road

Waterman Wash

Agua Fria River at Carefree Highway

Hubbell Basin, West side of White Tank Mountain

Underground Pipe

The underground pipe structure type includes construction of all types of buried conduit conveyance structures. The overall form of this structure type is linear. Visible landscape disturbances resulting from this structure type are usually limited to the introduction of linear lines and patterns into the landscape setting. With sufficient right of way, the visibility of these disturbances often can be minimized through vegetation restoration and application of landscape architectural design principles. Consequently, this structure type is typically low in visual prominence and is able to achieve context sensitivity with a wide range of landscape settings, recreation and open space environments in Maricopa County. This structure type also provides opportunities for linear parks, trails, open space connectivity and spatial separation of local communities.

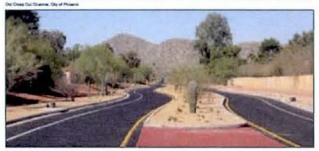
Gila River at Scale House 67

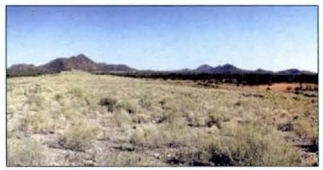
Bethany Home Outlet Channel Reach C, City of Glendale

Vista Street Storm Drain, City of Phoenix

Vista Street Storm Drain, City of Phoenix

Old Cross Cut Channel, City of Phoenix


Desoto Tree Ranch Road, Paradise Valley


Central Arizona Project Underground Pipe

Channel Levee

The channel levee structure type includes earthen and hard structural embankments, dikes and vertical flood walls for controlling flood waters adjacent to a watercourse. The channel levee structure type is seen as a linear protuberance with a geometric or organic convex form in the landscape. Since this structure type is usually limited to a height of six feet or less, its visual prominence in the landscape is most often moderately low. This structure type, therefore, is context sensitive with a moderate range of landscape settings, recreation and open space environments in Maricopa County.

Channel Levees may be constructed either as stand alone structures or in combination with a constructed conveyance channel. When constructed as stand alone structures, channel levees can provide opportunities for preservation of natural river and wash floodplains situated behind the levee. When they are constructed as an integral part of a conveyance channel, the levee structure is likely to appear as a vertical extension of the channel side slopes above the natural grade of the landscape.

The Channel Levee structure type is further stratified into three scale sub-classes to better define their potential context sensitivity with the landscape settings, recreation and open space environments in Maricopa County. The three scale sub-classes include:

Small Scale Channel Levees: Up to 6 ft. height and up to 25 ft. width

Medium Scale Channel Levees: 6-10 ft. height and 25-100 ft. width

Large Scale Channel Levees: 10+ ft. height and 100 ft. + width

GC Ranch, City of Scottsdale

Tempe Town Lake

Salt River at Phoenix International Airport

Sahuaro Development

McKinzie Open Outlet Channel

New River Channel

GC Ranch, City of Scottsdale

Gila River

Conveyance Channel

The conveyance channel structure type includes all types of constructed earthen and hard lined open channel structures that serve the purpose of conveying storm waters. The major structural components of this structure type include the channel bottom, side slopes and overbank area, the latter of which typically includes a maintenance road and landscape setback (buffer) area. The overall form of the conveyance channel structure type typically appears in the landscape as a concave linear flat bottomed trough with either a geometric or organic shape. The exterior side slopes of this structure type can vary from vertical to gently sloping. This structure type typically includes a variety of ancillary structural features which can include inlets, outlets, weirs, grade control structures, energy dissipaters and low flow channels. The length and width of these structures can vary significantly. The overall visual prominence of the conveyance channel structure type ranges from moderately low to moderate based upon their size and interior position in the landscape. The conveyance channel structure type is context sensitive with a moderate range of landscape settings, recreation and open space environments in Maricopa County.

The conveyance channel structure type is further stratified into scale sub-classes to better define their context sensitivity with the visual, recreation and open space environments of Maricopa County. The scale sub-classes for this structure type include the following:

Small Scale Conveyance Channels
Up to 5 ft. depth and up to 25 ft. width

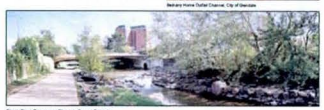
Medium Scale Conveyance Channels
5-8 ft. depth and up to 25-100 ft. width

Large Scale Conveyance Channels
8 ft.+ depth and up to 100 ft. + width

Lareen Area Conveyance Channel, City of Phoenix

East Maricopa Freeway Channel, West of Gilbert

Bethany Home Outlet Channel, City of Glendale


Cherry Creek Conveyance Channel - Denver, Colorado

Shumakers Water Conveyance Channel

Ranch Circle Channel, Arkadelphia

Criterion Development Channel, Arkadelphia

Arizona Canal Overbank Channel, City of Phoenix

McKinzie Golf Course Conveyance Channel, City of Scottsdale

Storage Basin

The storage basin structure type includes all types of earthen and hardened open flood water storage basins that are commonly found throughout metropolitan areas of Maricopa County.

The major structural components of this structure type include a large bottom area, side slopes and an overbank area that typically contains a maintenance road facility and landscape setback area. Storage basin structures typically appear as a large concave depression or hollow with either a geometric or organic form in the landscape. Ancillary features often include a low flow channel, inlets, weirs, energy dissipaters, outlets and river structures. The overall size of these structure types can vary significantly. The visual prominence of these structures typically ranges from moderately high to high due to their apparent size and extent. The storage basin structure type is context sensitive with a limited range of landscape settings, recreation and open space environments in Maricopa County.

The storage basin structure type is further stratified into scale sub-classes to better define their context sensitivity with the visual, recreation and open space environments of Maricopa County. The scale sub-classes for this structure type include the following:

Small Scale Storage Basins
Up to 8 ft depth 5 acres in size

Medium Scale Storage Basins
Up to 8 ft depth (60%), up to 15 ft depth (40%)
5-20 acres in size

Large Scale Storage Basins
15 + ft depth 20+ acres in size

Salt Basin, City of Scottsdale

Kiwanis Park, City of Tempe

East Maricopa Freeway Golf Course

Vista Street Basin, City of Phoenix

Hetz Del Camino Park - Indian Bend Wash, City of Scottsdale

Sun Ray Park, Arkadelphia

Town of Guadalupe North Basin

Dam

The dam structure type includes all types of earthen and hardened flood retarding structures that are designed to retard and temporarily store storm waters. The major structural components of this structure type include the dam embankment, pool reservoir, principle outlet, emergency spillway.

The dam structure type usually appears in the landscape as an extended linear protuberance with either a geometric or organic convex form. It is similar in overall form to the channel levee structure type but its physical dimension is usually much larger. Ancillary structures include principal and emergency spillways, outlets, and river structures. Dam structures that are owned and operated by the District are typically situated in the landscape along the cusp between the lower bajada and the valley plain and are usually viewed against the backdrop of isolated mountain ranges that are found throughout the Sonoran Desert in Maricopa County. The visual prominence of these structures is typically high due to the scale and magnitude of their protuberant form. The dam structure type is context sensitive with a limited range of landscape settings, recreation and open space environments in Maricopa County.

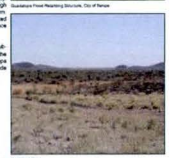
The Dam structure type is further stratified into scale sub-classes to better define their context sensitivity with the visual, recreation and open space environments of Maricopa County. The scale sub-classes for this structure type include the following:

Small Scale Dams:
Up to 10 ft high 1 mile or less in total length

Medium Scale Dams:
10-15 ft high 1-2 miles in total length

Large Scale Dams:
15+ feet height and 2+ miles in total length

Guadalupe Flood Retarding Structure, City of Tempe


New River Dam

White Spots Flood Retarding Structure #5

Cave Creek Dam

McKinzie Dam

New River Dam

Compatibility Classes & The Range of Compatible Structure Types

Flood Protection Structure Types Compatibility Ratings Table						
Compatibility Class	**Non Structural**	**Underground Pipe**	**Channel Levee**	**Conveyance Channel**	**Storage Basin**	**Dam**
Class 1						
Class 2						
Class 3						
Class 4						
Class 5						
Class 6						

Structure Types Scale Sub-Classes Table

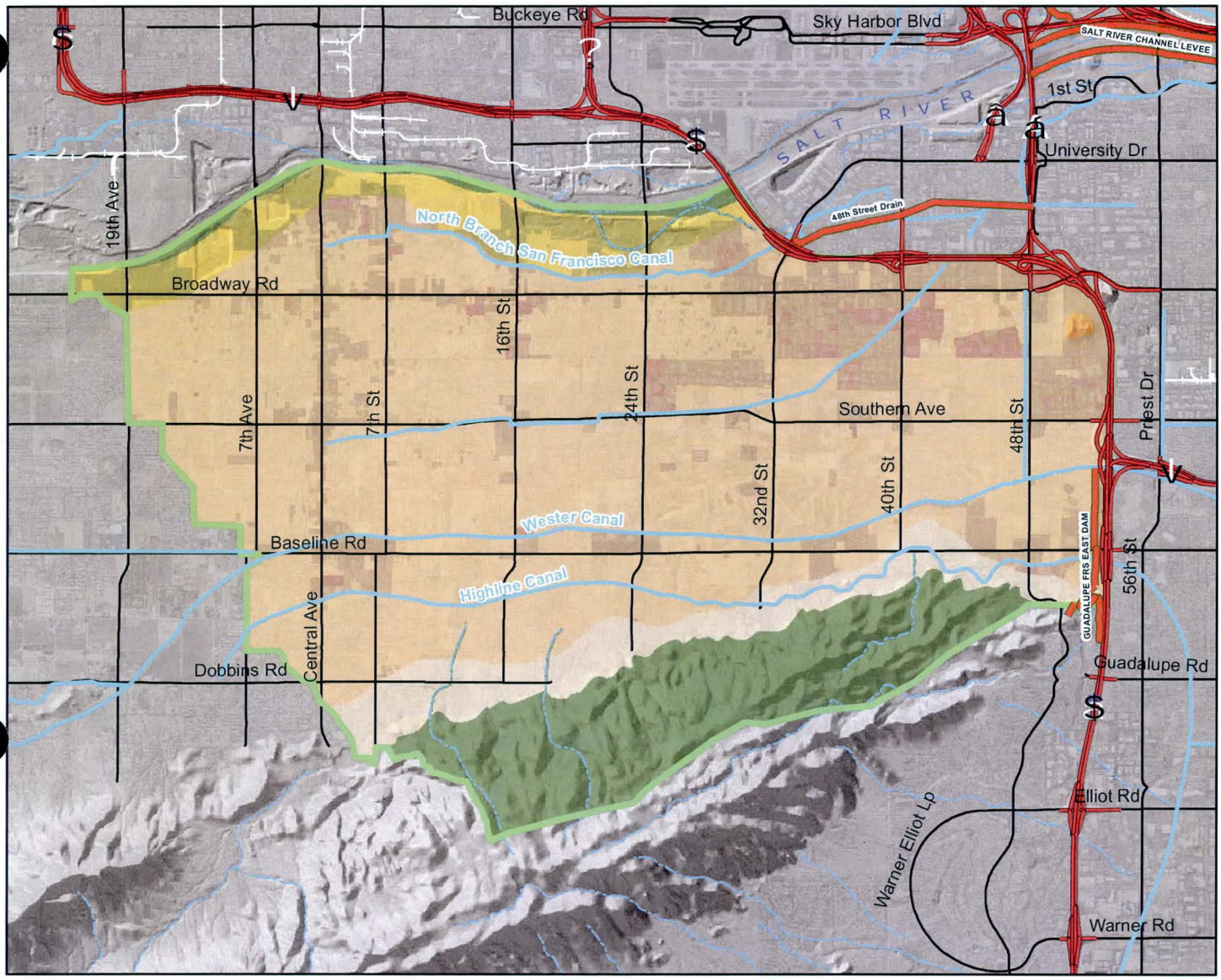
Flood Protection Structure Types Scale Sub-Classes		
Structure Type	**Scale Sub-Cass**	**Physical Dimension**
Non-Structural	NA	NA
Underground Pipe	NA	NA
Channel Levee	Small Medium Large	Up to 6 ft height and up to 25 ft width 6-10 ft height and 25-100 ft width 10 ft+ height and 100 ft+ width
Conveyance Channel	Small Medium Large	Up to 5 ft depth and up to 25 ft width 5-8 ft depth and 25-100 ft width 8 ft+ depth and 100 ft+ width
Storage Basin	Small Medium Large	Up to 8 ft depth and 5 acres in size Up to 8 ft depth (60%), up to 15 ft depth (40%) and 5-20 acres in size 15 ft+ height and 20+ acres in size
Dam	Small Medium Large	Up to 10 ft high and up to 1 mile in total length 10-15 ft high and 1-2 miles in total length 15 ft+ height and 2+ miles in total length

Compatibility Sub-Classes & The Range of Compatible Structure Types

Flood Protection Structure Types Sub-Class Compatibility		
Compatibility Class	**Compatibility Sub-Class**	**Description**
Class 1	1	Compatible with Non-Structural
Class 2	2	Compatible with Non-Structural and Underground Pipe
Class 3	3.1	Compatible with Non-Structural, Underground Pipe and SMALL Channel Levee
Class 3	3.2	Compatible with Non-Structural, Underground Pipe and MEDIUM Channel Levee
Class 3	3.3	Compatible with Non-Structural, Underground Pipe and LARGE Channel Levee
Class 4	4.1	Compatible with Non-Structural, Underground Pipe, SMALL Channel Levee, and SMALL Conveyance Channel
Class 4	4.2	Compatible with Non-Structural, Underground Pipe, MEDIUM Channel Levee, and SMALL Conveyance Channel
Class 4	4.3	Compatible with Non-Structural, Underground Pipe, MEDIUM Channel Levee, and MEDIUM Conveyance Channel
Class 4	4.4	Compatible with Non-Structural, Underground Pipe, MEDIUM Channel Levee, and LARGE Conveyance Channel
Class 4	4.5	Compatible with Non-Structural, Underground Pipe, LARGE Channel Levee, and LARGE Conveyance Channel
Class 5	5.1	Compatible with Non-Structural, Underground Pipe, SMALL Channel Levee, SMALL Conveyance Channel, and SMALL Storage Basin
Class 5	5.2	Compatible with Non-Structural, Underground Pipe, MEDIUM Channel Levee, SMALL Conveyance Channel, and SMALL Storage Basin
Class 5	5.3	Compatible with Non-Structural, Underground Pipe, MEDIUM Channel Levee, SMALL Conveyance Channel, and MEDIUM Storage Basin
Class 5	5.4	Compatible with Non-Structural, Underground Pipe, MEDIUM Channel Levee, MEDIUM Conveyance Channel, and MEDIUM Storage Basin
Class 5	5.5	Compatible with Non-Structural, Underground Pipe, MEDIUM Channel Levee, LARGE Conveyance Channel, and MEDIUM Storage Basin
Class 5	5.6	Compatible with Non-Structural, Underground Pipe, LARGE Channel Levee, LARGE Conveyance Channel, and LARGE Storage Basin
Class 6	6.1	Compatible with Non-Structural, Underground Pipe, SMALL Channel Levee, SMALL Conveyance Channel, SMALL Storage Basin and SMALL Dam
Class 6	6.2	Compatible with Non-Structural, Underground Pipe, SMALL Channel Levee, MEDIUM Conveyance Channel, SMALL Storage Basin and MEDIUM Dam
Class 6	6.3	Compatible with Non-Structural, Underground Pipe, MEDIUM Channel Levee, MEDIUM Conveyance Channel, MEDIUM Storage Basin and MEDIUM Dam
Class 6	6.4	Compatible with Non-Structural, Underground Pipe, MEDIUM Channel Levee, LARGE Conveyance Channel, MEDIUM Storage Basin and LARGE Dam
Class 6	6.5	Compatible with Non-Structural, Underground Pipe, LARGE Channel Levee, LARGE Conveyance Channel, LARGE Storage Basin and LARGE Dam

Hohokam Area Drainage Master Plan

Existing Landscape Character Units Structure Types Compatibility



Existing Landscape Character Units Structure Types Compatibility

- Compatibility Class 1
- Compatibility Class 4
- Compatibility Class 5.1
- Compatibility Class 5.2
- Compatibility Class 6.1
- Compatibility Class 6.3
- Compatibility Class 6.4
- Compatibility Class 6.5

Reference Features

- Study Area
- Highways
- Major Arterial
- FCD Structures
- Rail-Road
- Canals
- Streams

Sources

- Flood Control District of Maricopa County Landscape Inventory & Analysis (LIA), 2008
  - Existing Landscape Character Units Structure Types Compatibility Ratings Matrix, 2008
  - Existing Landscape Character Units Map, 2008

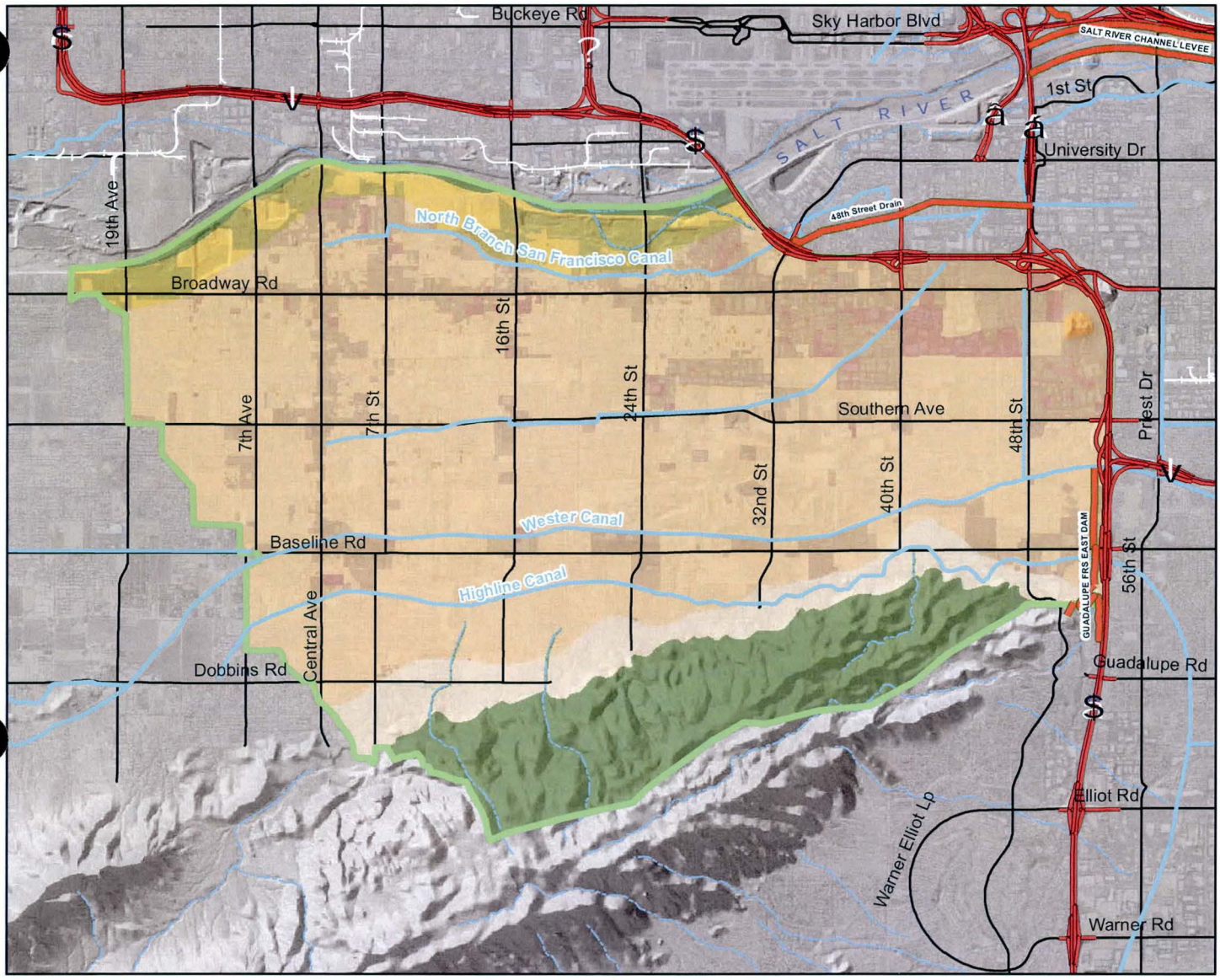
Prepared by
Flood Control District of Maricopa County
May 2010

0 0.4 0.8 1.6 2.4 Miles

1 inch = 1.25 miles

Hohokam Area Drainage Master Plan

Future Landscape Character Units Structure Types Compatibility



Future Landscape Character Units Structure Types Compatibility

- Compatibility Class 1
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- Compatibility Class 6.4
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Reference Features

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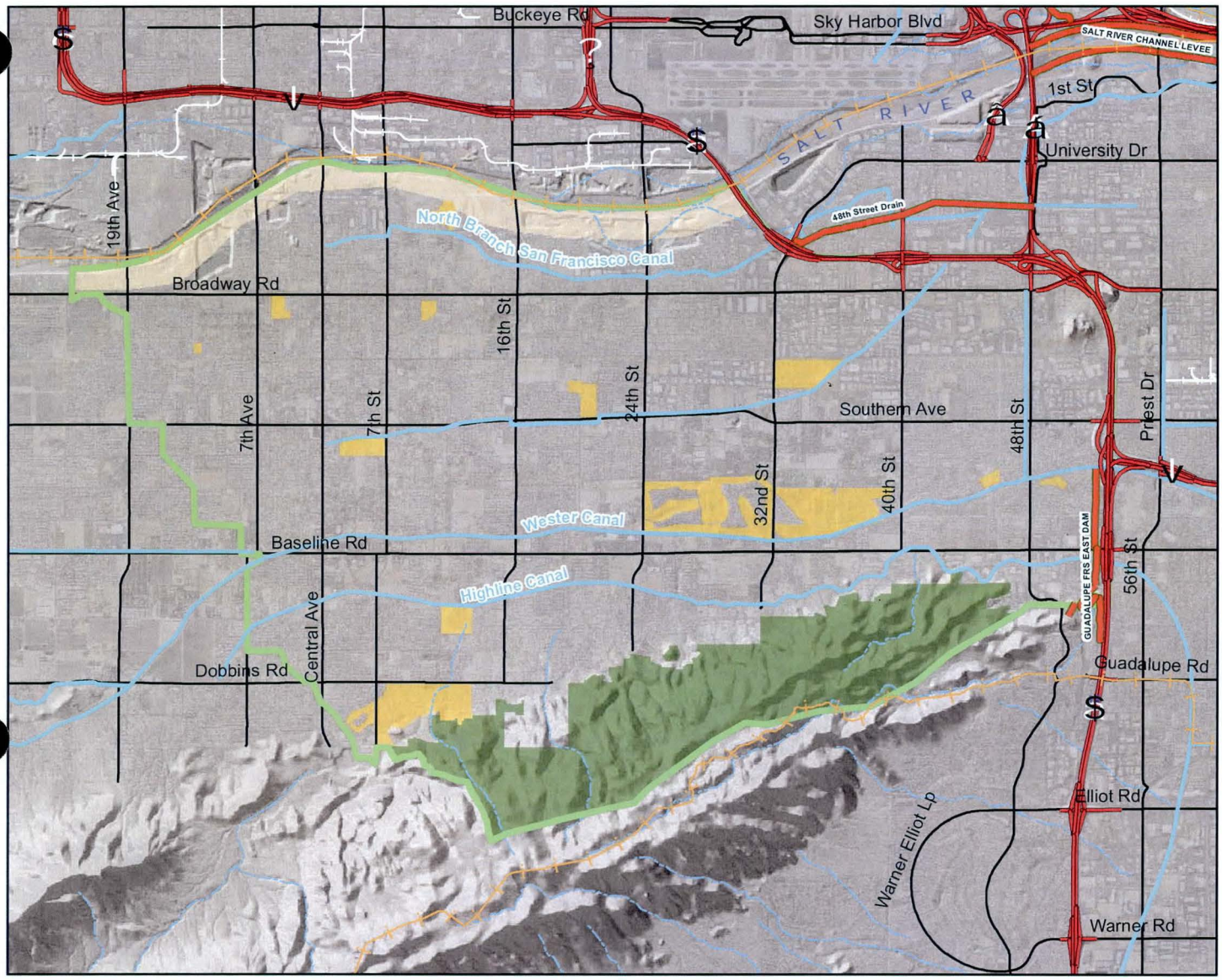
Hohokam Area Drainage Master Plan

Parks & Recreation Resources Structure Types Compatibility



Parks & Recreation Resources Structure Types Compatibility

- Compatibility Class 1
- Compatibility Class 5
- Compatibility Class 6
- Maricopa Regional Trail System

Reference Features

- Study Area
- Highways
- Major Arterial
- FCD Structures
- Rail-Road
- Canals
- Streams

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- Flood Control District of Maricopa County Landscape Inventory & Analysis (LIA)
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Prepared by
Flood Control District of Maricopa County
May 2010

0 0.4 0.8 1.6 2.4 Miles

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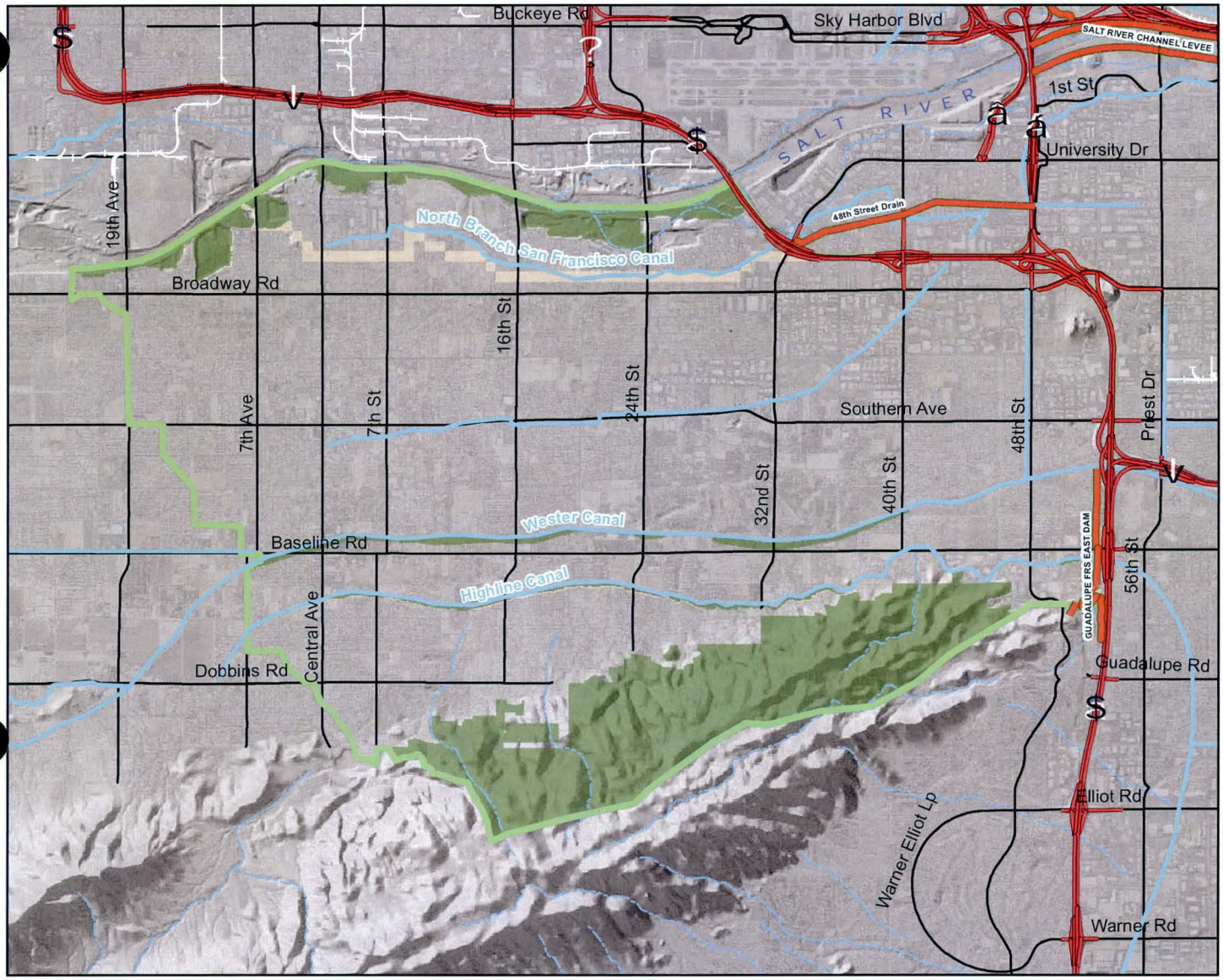
Hohokam Area Drainage Master Plan

Open Space Resources Structure Types Compatibility



Open Space Resources Structure Types Compatibility

- Compatibility Class 1
- Compatibility Class 6

Reference Features

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Sources

- Maricopa Association of Governments
- USDI Bureau of Land Management
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  - Open Space Resources Map, 2008

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0 0.4 0.8 1.6 2.4 Miles

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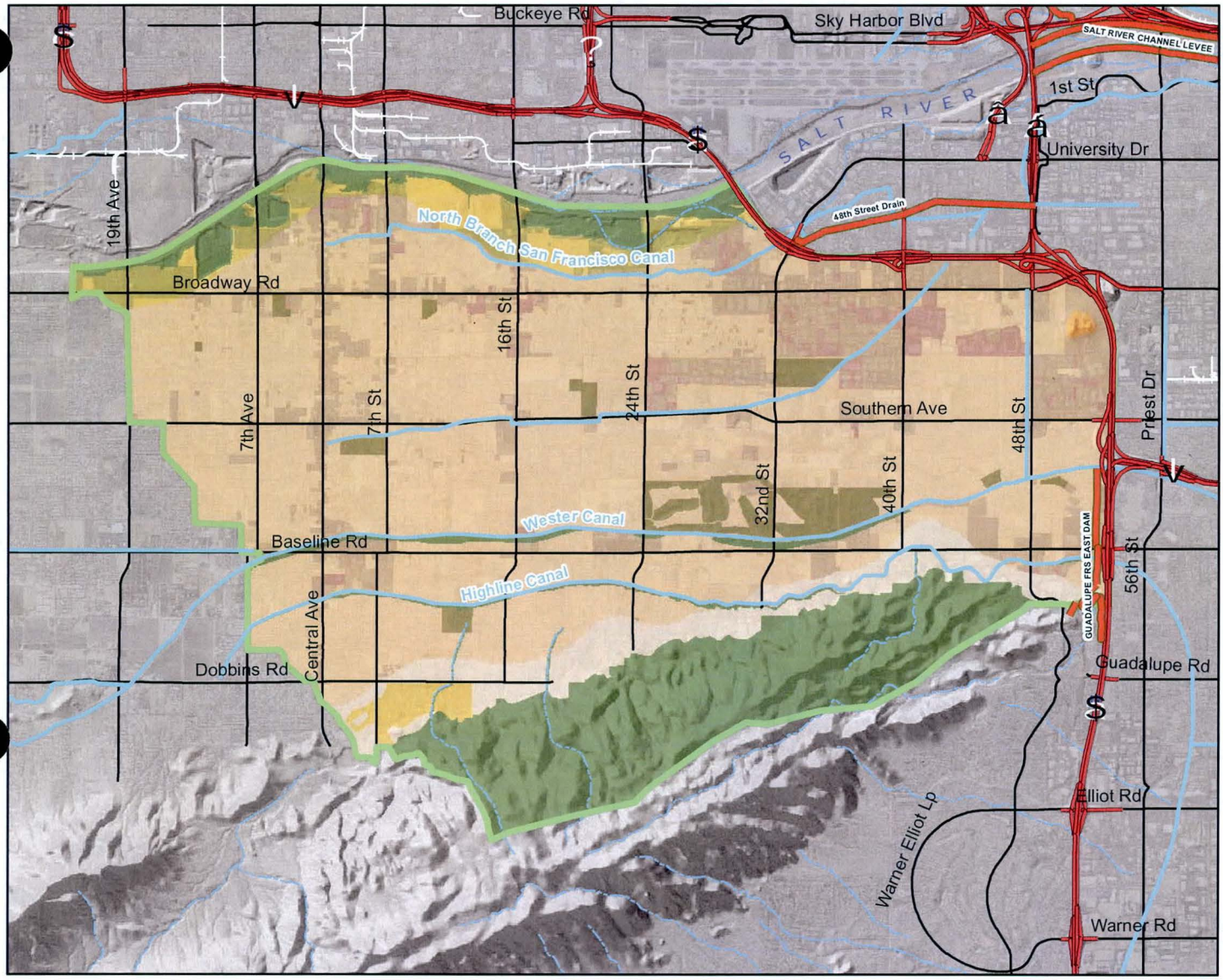
Hohokam Area Drainage Master Plan
Existing Combined Structure Types Compatibility



Existing Combined Structure Types Compatibility

- Compatibility Class 1
- Compatibility Class 4
- Compatibility Class 5.1
- Compatibility Class 5.2
- Compatibility Class 5.4
- Compatibility Class 5.5
- Compatibility Class 5.6
- Compatibility Class 6.1
- Compatibility Class 6.3
- Compatibility Class 6.4
- Compatibility Class 6.5

Reference Features

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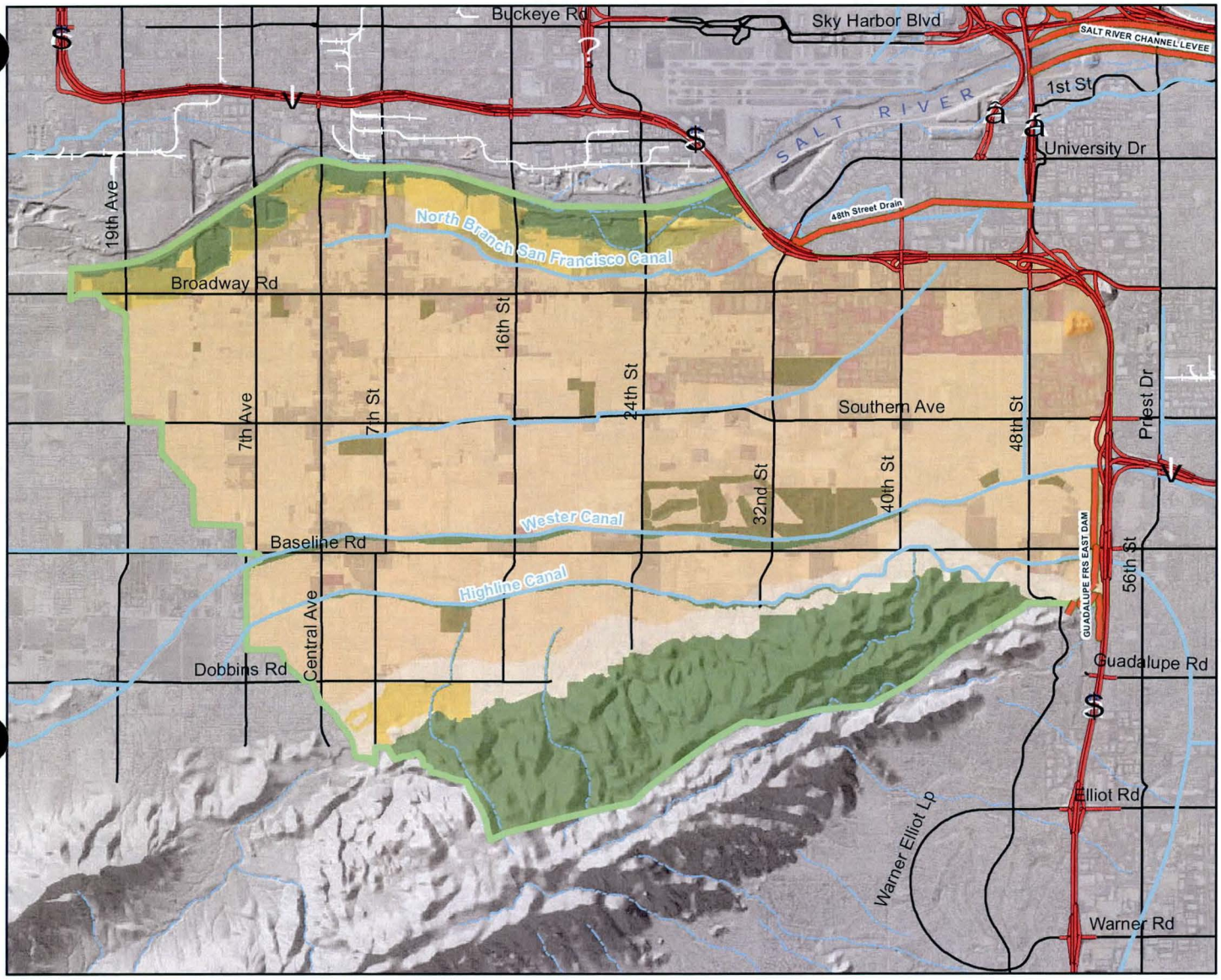
  - Parks & Recreation Resources Structure Types Compatibility Map, 2008
  - Open Space Resources Structure Types Compatibility Map, 2008

Prepared by
Flood Control District of Maricopa County
May 2010

0 0.4 0.8 1.6 2.4 Miles

1 inch = 1.25 miles

Hohokam Area Drainage Master Plan
Future Combined Structure Types Compatibility



Future Combined Structure Types Compatibility

- Compatibility Class 1
- Compatibility Class 4
- Compatibility Class 5.1
- Compatibility Class 5.2
- Compatibility Class 5.4
- Compatibility Class 5.5
- Compatibility Class 5.6
- Compatibility Class 6.1
- Compatibility Class 6.3
- Compatibility Class 6.4
- Compatibility Class 6.5

Reference Features

- Study Area
- Highways
- Major Arterial
- FCD Structures
- Rail-Road
- Canals
- Streams

Sources

- Flood Control District of Maricopa County Landscape Inventory & Analysis (LIA)
  - Future Landscape Character Units Structure Types Compatibility Map, 2008
  - Parks & Recreation Resources Structure Types Compatibility Map, 2008
  - Open Space Resources Structure Types Compatibility Map, 2008

Prepared by
Flood Control District of Maricopa County
May 2010

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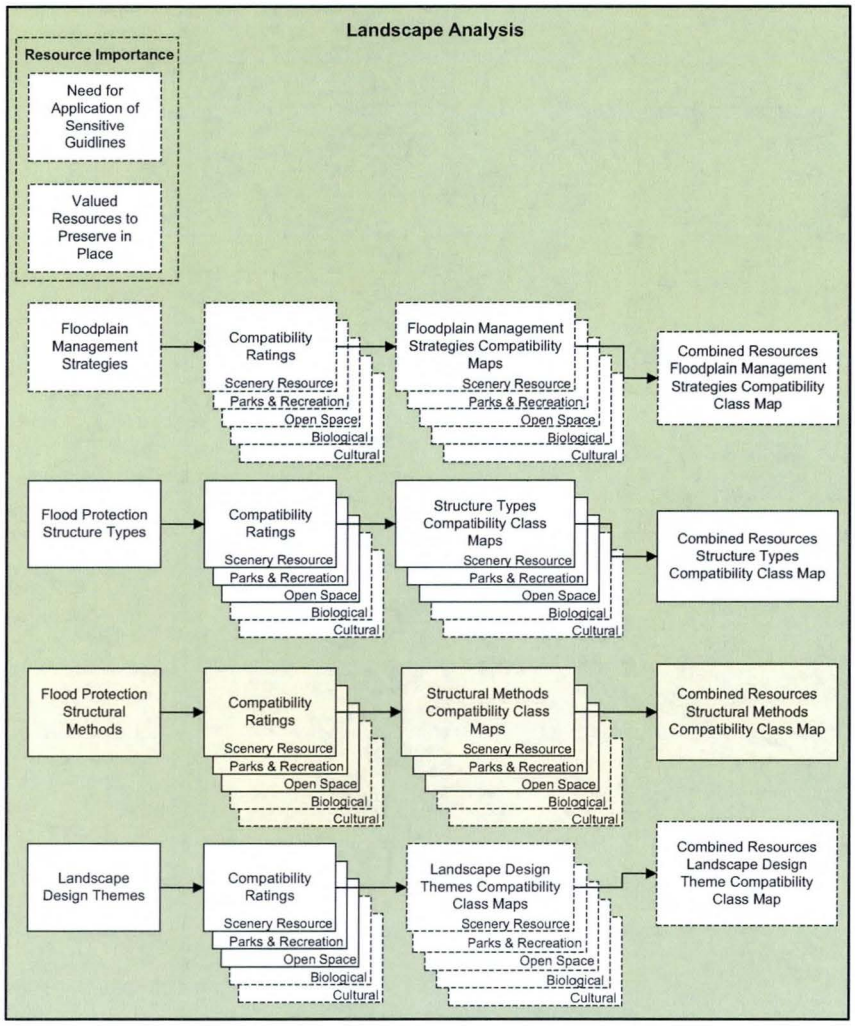
Structural Methods Compatibility Analysis



FLOOD PROTECTION STRUCTURAL METHODS

Introduction

Preservation of the natural landscapes of Maricopa County and protection of local community character are primary objectives of the Flood Control District's Board approved Policy for Landscaping and Aesthetic Treatment of Flood Control Facilities. These objectives are accomplished by planning and designing flood protection facilities to complement the positive visual characteristics of the landscape settings in which they are located.

The District routinely evaluates and implements a variety of non-structural and structural methods for providing flood protection in Area Drainage and Watercourse Master Planning, Project Pre-Design and Final Design. Listed below are six of the most commonly applied methods by the Flood Control District of Maricopa County.

- Non-Structural Method
- Soft Structural Method
- Semi-Soft Structural Method
- Hard Structural Method with Aesthetic Treatment
- Semi-Hard Structural Method
- Hard Structural Method

These flood protection structural methods vary in their physical and visual characteristics and their relative ability to complement or enhance the visual character of the landscape settings found in Maricopa County. The above flood protection structural methods are arrayed as a spectrum according to their visual character and potential for achieving context sensitivity with the landscapes of Maricopa County (refer to Tables 1 and 2).

The identification and selection of flood protection structural methods that have the potential to complement the visual character of the landscape settings in which they will be constructed, therefore, is a key first step towards developing flood protection solutions that will be context sensitive with the visual environment and meet the goals of the District's aesthetic treatment policy.

Following are brief descriptions and photo examples for each of the flood protection structural methods identified above. They are presented here to provide a better understanding of their visual characteristics, potential to achieve context sensitivity with the visual environments of Maricopa County, and their use in flood protection method landscape compatibility assessments.

Table 1

Flood Protection Methods	Super Structure					Structural Components			
	None	Earthen		Hard		None	Concealed or Buried	Aesthetic Treatment Applied	Standard Engineering Design
		With Aesthetic Treatment	Without Aesthetic Treatment	With Aesthetic Treatment	Without Aesthetic Treatment				
Non Structural	X					X			
Soft Structural		X					X		
Semi-Soft Structural		X						X	
Hard Structural Method with Aesthetic Treatment				X				X	
Semi-Hard Structural			X						X
Hard Structural					X				X

Table 2

Flood Protection Methods	Level of Landscape Modification	Effect on Landscape Character	Potential for Context Sensitivity
Non Structural	Not Present (None)	Preserved	Highest
Soft Structural	Not Evident	Retained	
Semi-Soft Structural	Slightly Evident	Partially Retained	
Hard with Aesthetic Treatment	Evident*	Modified	
Semi Hard Structural	Strongly Evident (Visually Dominant)	Strongly Modified	
Hard Structural	Very Strong Evident (Drastic Alteration)	Drastically Modified	Lowest

Non-Structural Method

- Characterized by an absence of flood control structures
- May include low standard roads for administration
- Natural landforms & drainage features convey or store storm waters
- Existing landscape character is preserved
- Complements the character of most landscape settings

Waterman Wash

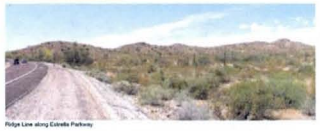
Gila River

Gila River

Gila River

Estrella Ranch Natural Upland Basin - Natural

Agua Fria River


Ridge Line along Estrella Parkway

Soft-Structural Method

- Superstructure is constructed of earthen (soft) materials
- Overall form emulates surrounding natural landforms
- Hard structural components are concealed or are not noticeable
- Utilizes materials with colors & textures found in surrounding landscape
- Aesthetic features include vegetation planting & landscape buffers
- Existing landscape character is retained
- Complements the character of most landscape settings

Falcon Dunes Golf Course Detention Basin

Wildfire Golf Course Conveyance Channel

Oak Basin

Arizona Biltmore Basin

Old Cross Cut Channel

Stone Creek Golf Course, Indian Bend Wash Channel

Freestone Park Basin

Guadalupe Flood Retarding Structure

White Tanks Flood Retarding Structure #3 (Simulation)

Semi-Soft Structural Method

- Superstructure is constructed of earthen (soft) materials
- Structural components such as inlets & outlets may be hard (concrete)
- Forms, colors and textures of structural components complement the setting
- Aesthetic features include vegetation planting & landscape buffers
- Existing landscape character is slightly modified
- Complements the character of most landscape settings

Upper East Fork Cave Creek & Paradise Valley Detention Basin

Wildfire Golf Course Conveyance Channel

Laveen Area Conveyance Channel

Vista Del Camino Park - Indian Bend Wash

Thunderbird Paseo Conveyance Channel

El Dorado Park - Indian Bend Wash

10th Street Basin

Bethany Home Outfall Channel

El Dorado Park - Indian Bend Wash

43rd Ave & Southern Detention Basin

Guadalupe Flood Retarding Structure

Hard Structural Method with Aesthetic Treatment

- Superstructure is constructed of hard (concrete) materials
- Overall form is freeform or gracefully meandering
- Structural components (inlets, outlets, etc) may be hard or soft
- Aesthetic features include:
  - User of attractive colors and textures
  - Architectural detailing & rustication techniques
  - Urban art
  - Vegetation planting & Landscape buffers
- Character of structure is visually dominant as a feature attraction
- Complementary to select settings

Double Tree Ranch Channel

Criterion Development Channel

Arizona Canal Diversion Channel

Cherry Creek Conveyance Channel - Denver, Colorado

Arizona Canal Diversion Channel

Santa Fe Dam

Cherry Creek Conveyance Channel - Denver, Colorado

Cave Creek Dam

Semi-Hard Structural Method

- Superstructure is constructed of earthen (soft) materials
- Overall form is geometric & contrasts with natural landforms
- Structural components are hard & geometric
- Aesthetic features are absent
- Structure is visually dominant within the setting
- Compatible with limited landscape settings

Sunny Cove River Structure Dam

McMicken Outlet Channel

East Maricopa Floodway Channel

Tatum Wash Basin

Sunset Basin

Guadalupe Flood Retarding Structure (Downstream Slope)

McMicken Dam

Sossaman Basin

White Tanks Flood Retarding Structure #3

Hard Structural Method

- Superstructure is constructed of hard (concrete) materials
- Overall form is geometric & contrasts with natural landforms
- Structural components are hard & geometric
- Aesthetic features are absent
- Structure strongly dominates the character of the setting
- Compatible with limited landscape settings

Scottsdale Flood Retarding Structure Conveyance Channel

White Tanks 4 Inlet Conveyance Channel

US 60 Arizona Department of Transportation Basin

Dysart Drain Conveyance Channel

City of Mesa Conveyance Channel

Skunk Creek 4 Drop Structure

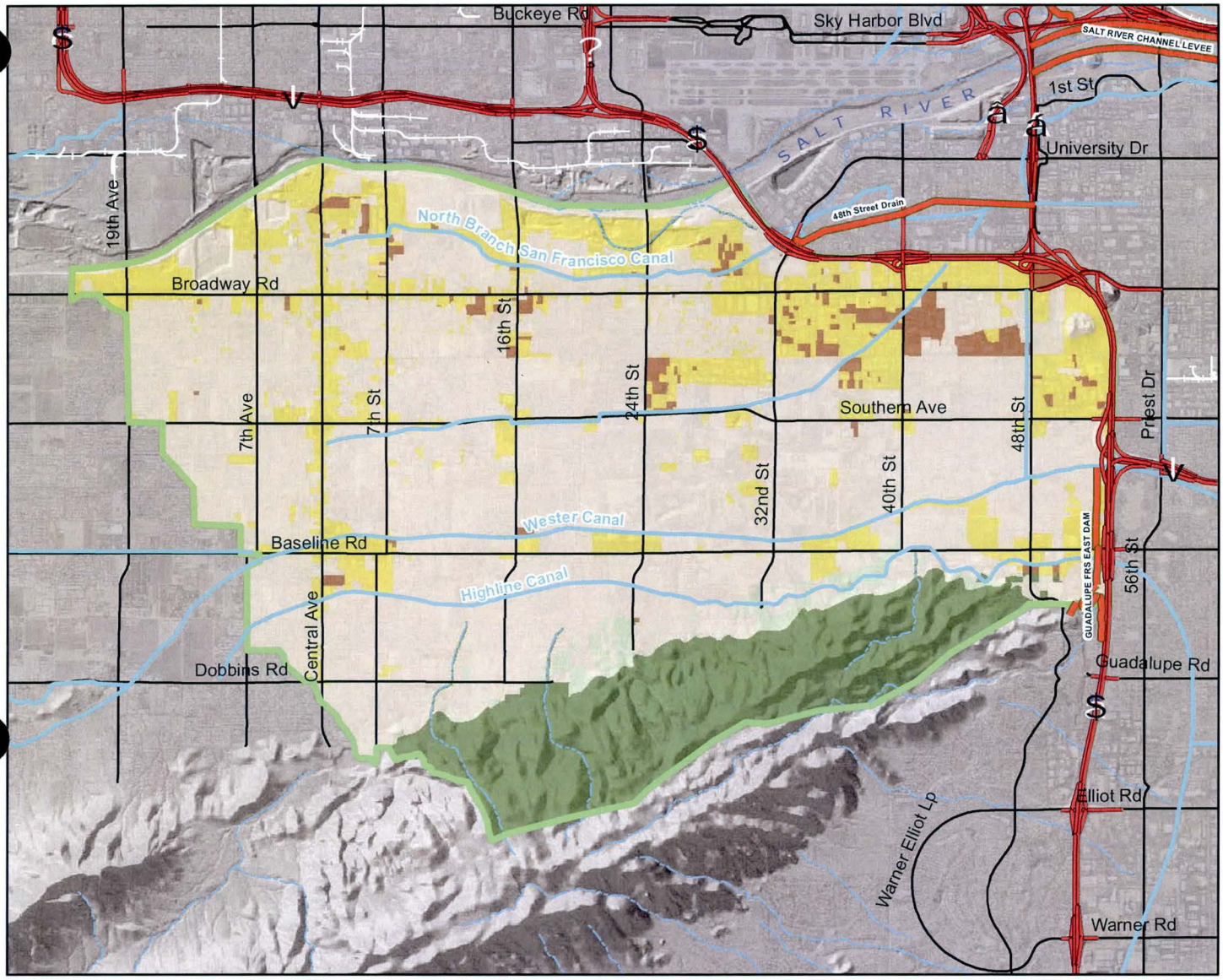
City of Williams Dam

Compatibility Classes & The Range of Compatible Structural Methods

Flood Protection Structural Methods Compatibility Ratings Table						
Compatibility Class	**Non Structural**	**Soft Structural**	**Semi-Soft Structural**	**Enhanced Hard Structural**	**Semi-Hard Structural**	**Hard Structural**
Class 1						
Class 2						
Class 3						
Class 4						
Class 5						
Class 6						

Hohokam Area Drainage Master Plan

Existing Landscape Character Units Structural Methods Compatibility



Existing Landscape Character Units Structural Methods Compatibility

- Compatibility Class 1
- Compatibility Class 2
- Compatibility Class 3
- Compatibility Class 4
- Compatibility Class 6

Reference Features

- Study Area
- Highways
- Major Arterial
- FCD Structures
- Rail-Road
- Canals
- Streams

Sources

- Flood Control District of Maricopa County Landscape Inventory & Analysis (LIA), 2008
  - Existing Landscape Character Flood Protection Structural Methods Compatibility Ratings Matrix, 2008
  - Existing Landscape Character Units Map, 2008

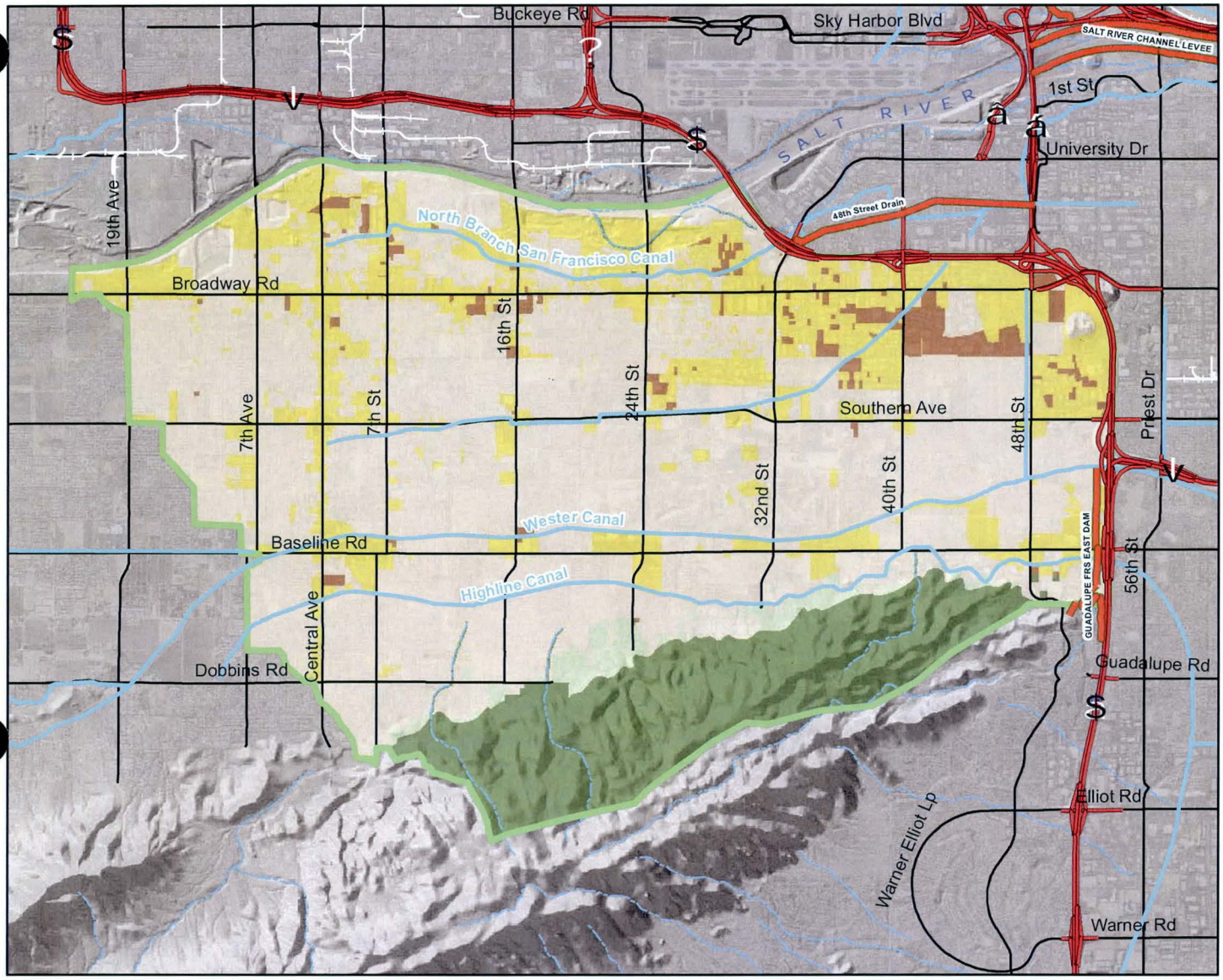
Prepared by
Flood Control District of Maricopa County
May 2010

0 0.4 0.8 1.6 2.4 Miles

1 inch = 1.25 miles

Hohokam Area Drainage Master Plan

Future Landscape Character Units Structural Methods Compatibility



Future Landscape Character Units Structural Methods Compatibility

- Compatibility Class 1
- Compatibility Class 2
- Compatibility Class 3
- Compatibility Class 4
- Compatibility Class 6

Reference Features

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Prepared by
Flood Control District of Maricopa County
May 2010

0 0.4 0.8 1.6 2.4 Miles

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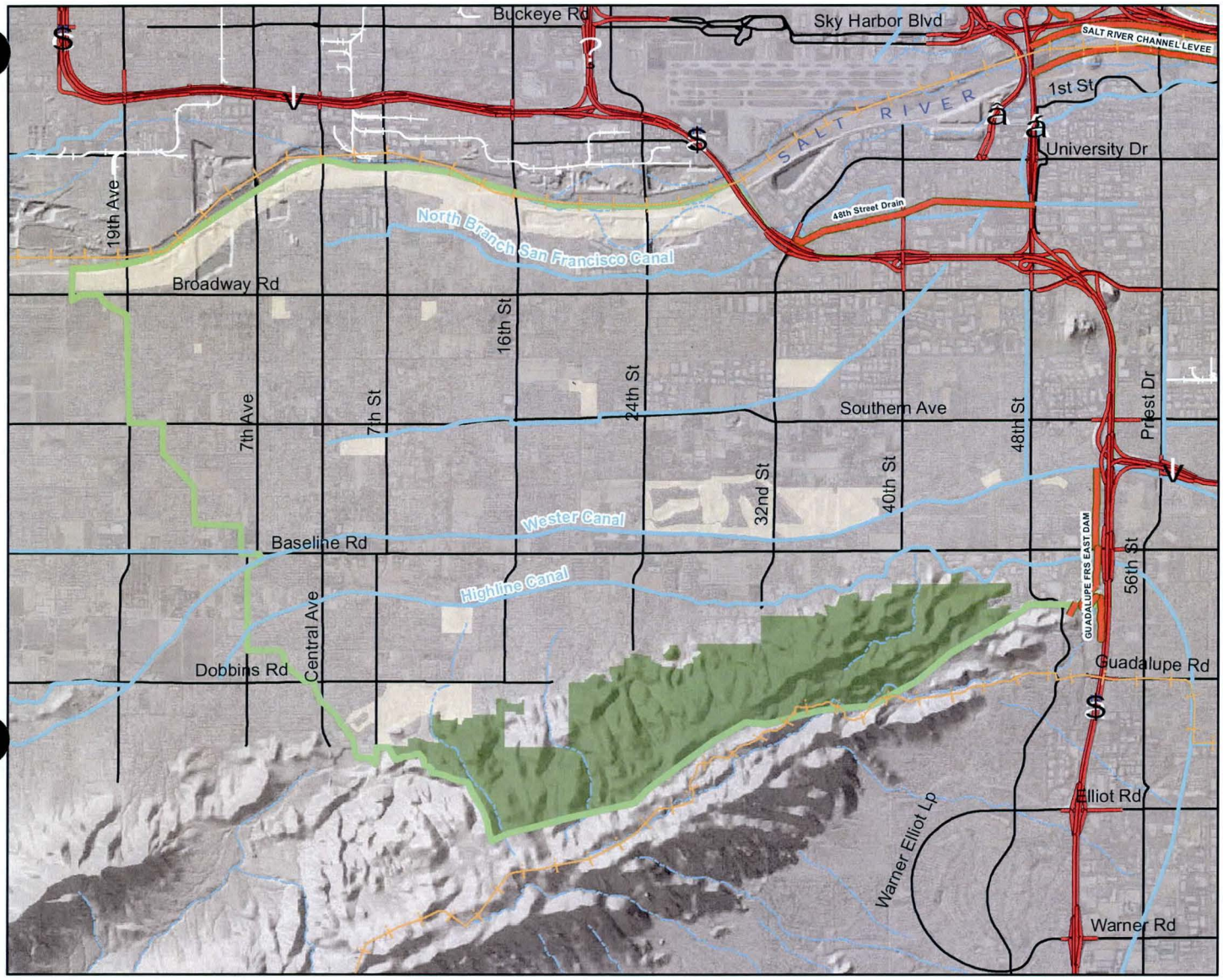
Hohokam Area Drainage Master Plan

Parks & Recreation Resources Structural Methods Compatibility



Parks & Recreation Resources Structural Methods Compatibility

- Compatibility Class 1
- Compatibility Class 3
- Maricopa Regional Trail System

Reference Features

- Study Area
- Highways
- Major Arterial
- FCD Structures
- Rail-Road
- Canals
- Streams

Sources

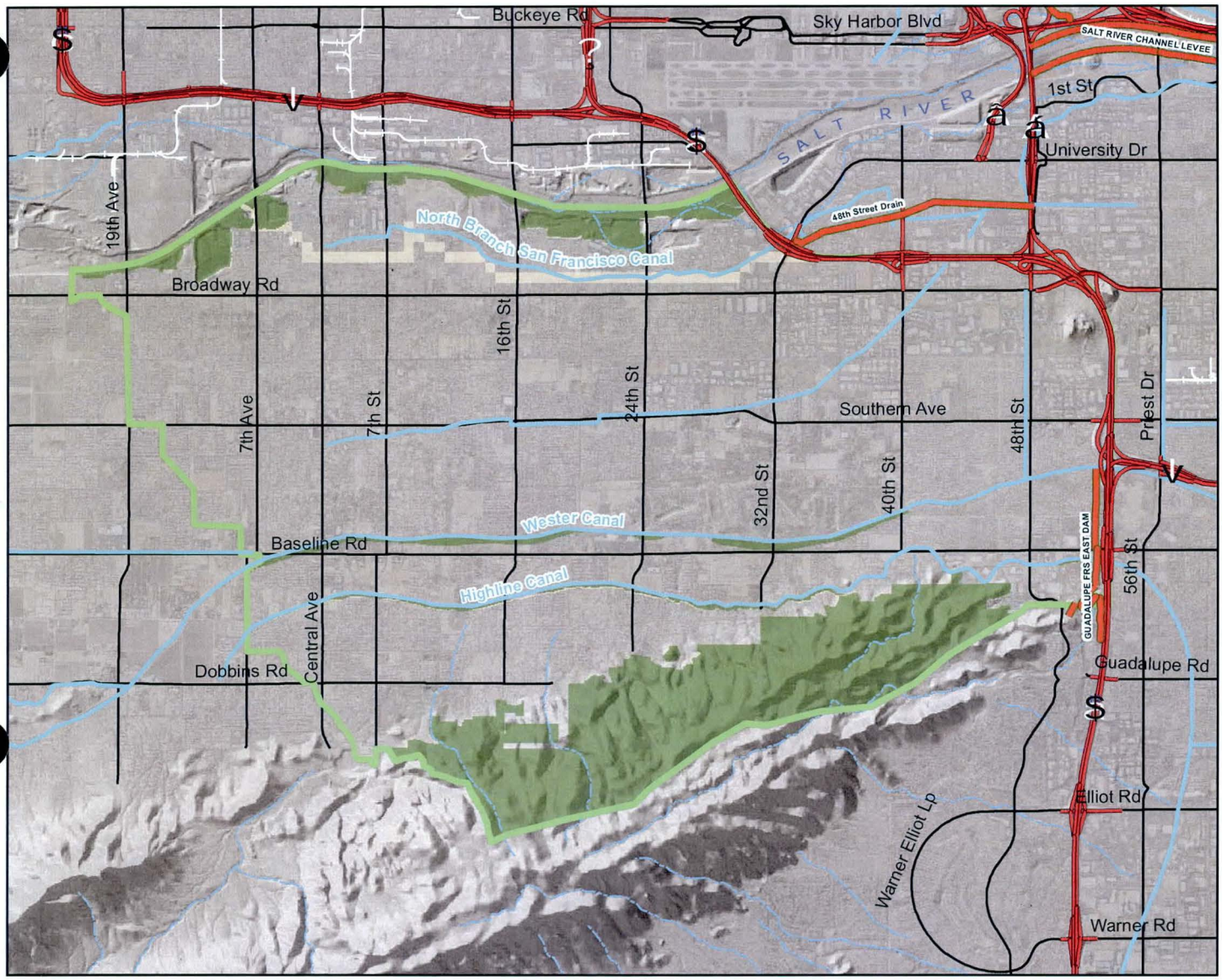
- Flood Control District of Maricopa County Landscape Inventory & Analysis (LIA), 2008
  - Parks & Recreation Resources Flood Protection Structural Methods Compatibility Ratings Matrix, 2008
  - Parks & Recreation Resources Map, 2008

Prepared by
Flood Control District of Maricopa County
May 2010

0 0.4 0.8 1.6 2.4 Miles

1 inch = 1.25 miles

Hohokam Area Drainage Master Plan
Open Space Resources
Structural Methods Compatibility



Open Space Resources Structural Methods Compatibility

- Compatibility Class 1
- Compatibility Class 3

Reference Features

- Study Area
- Highways
- Major Arterial
- FCD Structures
- Rail-Road
- Canals
- Streams

Sources

- Maricopa Association of Governments
- USDI Bureau of Land Management
- Flood Control District of Maricopa County Landscape Inventory & Analysis (LIA), 2008
  - Open Space Resources Flood Protection Structural Methods Compatibility Ratings Matrix, 2008
  - Open Space Resources Map, 2008

Prepared by
Flood Control District of Maricopa County
May 2010

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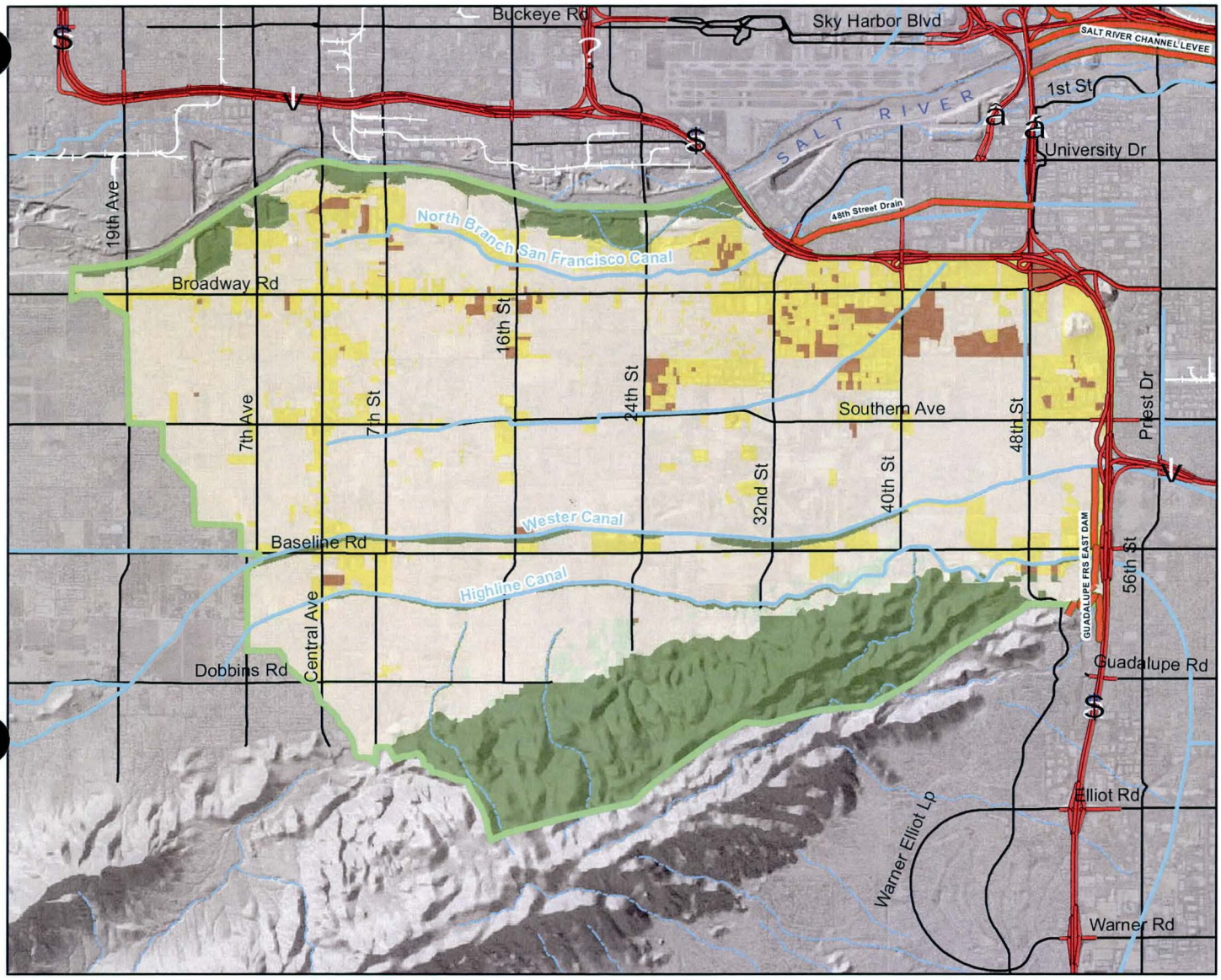
Hohokam Area Drainage Master Plan

Existing Combined Structural Methods Compatibility



Existing Combined Structural Methods Compatibility

- Compatibility Class 1
- Compatibility Class 2
- Compatibility Class 3
- Compatibility Class 4
- Compatibility Class 6

Reference Features

- Study Area
- Highways
- Major Arterial
- FCD Structures
- Rail-Road
- Canals
- Streams

Sources

- Flood Control District of Maricopa County Landscape Inventory & Analysis (LIA)
  - Existing Landscape Character Units Flood Protection Structural Methods Map, 2008
  - Parks & Recreation Resources Flood Protection Structural Methods Map, 2008
  - Open Space Resources Flood Protection Structural Methods Map, 2008

Prepared by
Flood Control District of Maricopa County
May 2010

0 0.4 0.8 1.6 2.4 Miles

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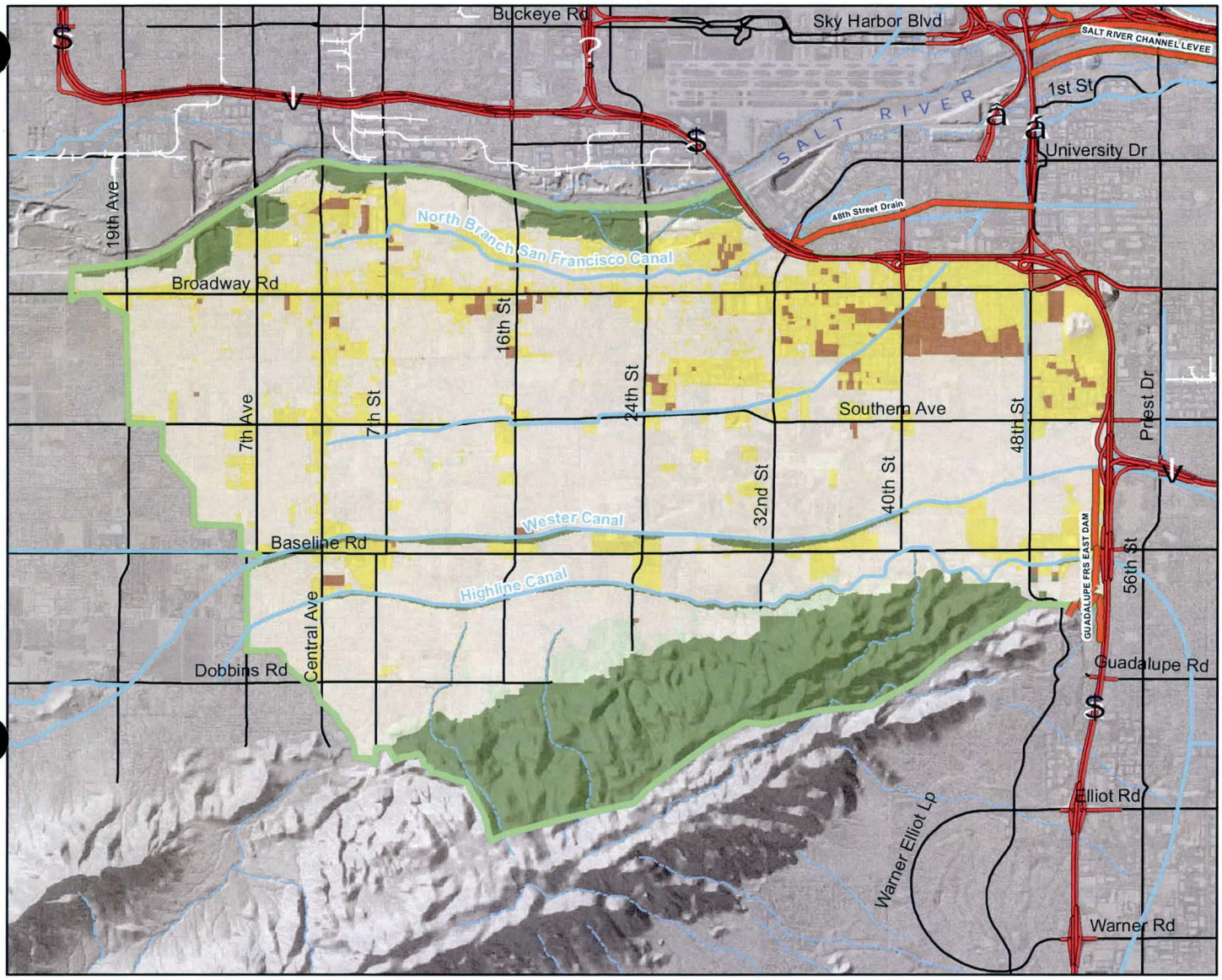
Hohokam Area Drainage Master Plan

Future Combined Structural Methods Compatibility



Future Combined Structural Methods Compatibility

- Compatibility Class 1
- Compatibility Class 2
- Compatibility Class 3
- Compatibility Class 4
- Compatibility Class 6

Reference Features

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  - Parks & Recreation Resources Flood Protection Structural Methods Map, 2008
  - Open Space Resources Flood Protection Structural Methods Map, 2008

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Flood Control District of Maricopa County
May 2010

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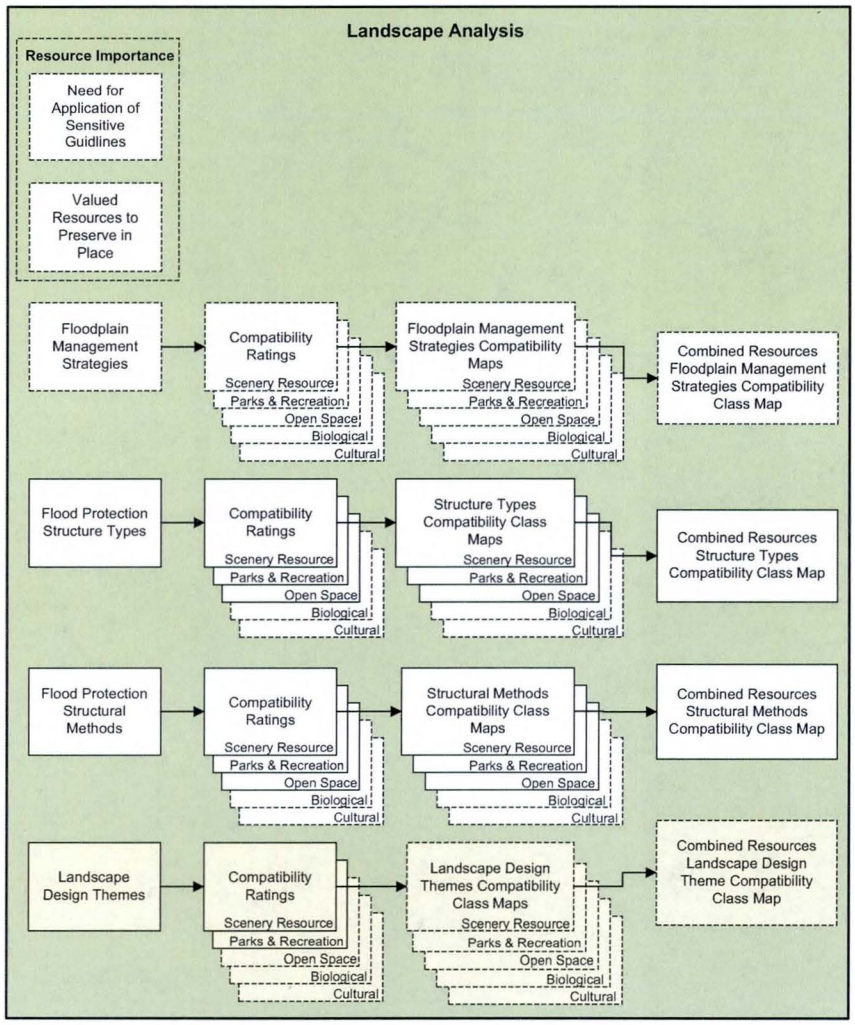
Landscape Design Themes Compatible Analysis



LANDSCAPE DESIGN THEMES

Introduction

The planning and design of flood control facilities to preserve the natural beauty of Sonoran Desert landscapes and protect local community character is a primary goal of the landscaping and aesthetic treatment policy of the Flood Control District of Maricopa County. The identification of landscape design themes based upon the character of the landscape is an important early step in the planning and design of flood control facilities to be context sensitive with the visual environments of Maricopa County.

Landscape design themes identify the desired overall "look" for flood control projects for specific landscape settings. The landscape design theme, as intended herein, is a visual design concept that is established to unify the visual appearance of flood control projects with the visual character of their surrounding landscape settings. Landscape design themes serve as a basis for establishing a cohesive set of landscape design guidelines for project design that address appropriate scale, landform grading, plant materials selection and arrangement, and use of other materials, forms, colors and textures, to achieve the desired appearance.

The purpose is to provide guidance for the identification and application of landscape design themes that will enable District flood control projects to become context sensitive with the landscape settings found in Maricopa County. The information and approach presented herein may be useful to other jurisdictions and may have application to other land use activities within Maricopa County.

It is recognized that additional landscape design themes may be desired based upon historic or planned landscape character. It is further recognized that District flood control requirements and recreational, wildlife, cultural, and other multiple-use program requirements, may strongly influence or dictate the selection of landscape design themes for particular flood control projects. The landscape themes presented are intended to serve as a framework and starting point for development of more refined landscape design themes, as needed, during project planning and design studies for application to specific landscape settings.

Natural Sonoran Desert Uplands Theme

•This theme emulates the visual character of natural bajada, foothills and mountain landscape settings found within the Sonoran Desert.

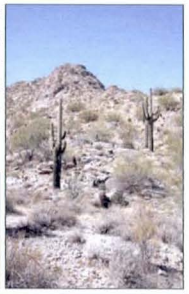
•Flood water storage basins and channels are sized and shaped to replicate the scale of natural landforms and drainage features within the Mountain Lands Landscape character subtype.

•The overall form of flood control structures is designed to conform to, and accentuate, natural topographic forms in the subtype.

•Plant palette consists of species found in the paloverde-mixed cacti forest, of which Paloverde and Saguaro are signature plant species.

•Plant materials are arranged to replicate the patterns and densities found within the subtype.

•This theme is context sensitive with the bajada, foothills and mountains physical settings within Maricopa County.



Natural Lower Sonoran Desert Riparian Theme

• This theme emulates the visual character of natural desert washes that traverse the valley floor of the Sonoran Desert.

•Flood control channels and storage basins are sized and configured to replicate the scale and accentuate the form of drainage features found in the Valley Lands landscape character subtype.

•Their overall form typically replicates the dendritic drainage patterns and may include small islands and gravel bars similar to those found within the subtype.

•Plant palette includes plant species that are prominent along natural washes and other drainage features within the subtype, of which Mesquite and Willow are signature species.

•Plant materials are combined and arranged to form bosques and other natural patterns that are typically associated with the drainage features found in this subtype.

•This theme is context sensitive with all of the physical settings of the valley lands and river lands landscape character subtypes in Maricopa County.

Natural Sonoran Desert Uplands Riparian Theme

•This theme emulates the visual character of natural arroyo landscape settings found within the Sonoran Desert.

• Flood control channels and storage basins are sized and configured to replicate the scale and accentuate the form of drainage features found in the Mountain Lands landscape character subtype.

•Their overall form may emulate both braided and dendritic drainage patterns and may include small islands and gravel bars similar to those found within the subtype.

•Plant palette includes plant species that are prominent along natural arroyos and other drainage features within the subtype, of which Palo Verde, Ironwood and Willow are signature species.

•Plant materials are combined and arranged to form bosques and other patterns that are typically associated with drainage features in the subtype.

•This theme is context sensitive with all physical settings of the Sonoran Mountain Lands landscape character subtype in Maricopa County.

Natural Sonoran Desert Hydro Riparian Theme

•This theme emulates the visual character of rivers, washes and arroyos found within the Sonoran Desert that are wet year round.

•Flood control channels and storage basins are sized and configured to replicate the scale and accentuate the form of drainage features found in the River Lands landscape character subtype.

•Bottom areas are designed to replicate the variety of physical conditions and flow characteristics found within the rivers of the subtype and typically will include a natural appearing low flow feature along with a variety of sand, gravel, cobble, boulders, bars and terraces.

•Plant palette includes plant species that make up the Lower Sonoran Desert Hydric Riparian native plant community, of which Cottonwood and Willow galleries are a signature feature.

•Plant materials are arranged to replicate the densities and patterns that naturally occur within the subtype.

•This theme is context sensitive with all landscape settings within the Sonoran Desert Landscape Character Type in Maricopa County.

Natural Lower Sonoran Desert Theme

•This theme emulates the visual characteristics of natural settings found within the valley floor of the Sonoran Desert.

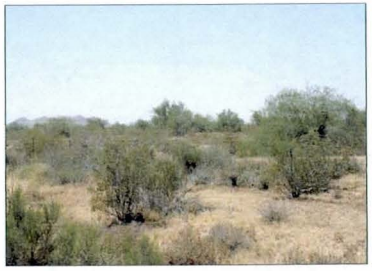
•Flood control channels and basins are sized and shaped to replicate the scale of landforms and secondary drainage features found within the Valley Lands landscape character subtype and may include landscape berms and other topographic features to control the apparent size of flood control structures.

•The overall form of flood control structures is designed to accentuate natural landforms and vegetation patterns found within the subtype.

•Plant palette includes plant species that are visually prominent within the Lower Sonoran Desert, of which the signature species include Mesquite, Sumage and Creosote.

•Plant densities and arrangements replicate the densities and patterns that are characteristic within the subtype.

•This theme is context sensitive only within the valley plains physical setting in Maricopa County.



Semi-Natural Sonoran Desert Theme

•This theme is a variant of any of the preceding natural themes.

•Flood control channels and basins are sized and configured to replicate the scale of natural landforms, vegetation patterns and drainage features found within the Sonoran Desert landscape character type and/or the scale of open space features typically associated with suburban and rural residential settings within the character type.

•The overall form of flood control structures accentuates and exaggerates the forms of natural topographic and drainage features found in the character type to provide additional landscape variety and visual interest.

•Plant palettes typically consist of signature species and other plant materials associated with the landscape character subtype within which flood control facilities are located.

•The number and density of signature plant species is significantly increased to create an enhanced and more prominent natural appearance.

•This theme is context sensitive with all physical and cultural settings within the Sonoran Desert character type where a natural appearance with increased visual variety is desired.

Enhanced Desert Theme

•This theme is also a variant of any of the preceding natural themes that emphasizes extensive use of inert gravel materials and an open arrangement of plant materials with a managed appearance.

•Flood control channels and basins are sized and configured to replicate the scale of natural landforms, vegetation patterns and drainage features found within the Sonoran Desert landscape character type and the scale of open space and predominant structural features found within the suburban and rural residential settings within the character type.

•The overall form of flood control structures accentuates and exaggerates the forms of natural topographic and drainage features found in the character type to create additional landscape variety and visual interest.

•Surface treatments typically involve extensive use of decomposed granite gravels and other natural inert materials in combination with a variety of native and desert adapted plant species.

•Plant materials and inert materials are arranged to create interesting variety in forms, patterns and spaces, accentuate the topographic forms of the structure, reinforce gateways, enframe views, provide shade and to screen discordant features from view.

•This theme is context sensitive with suburban, urban and industrial settings and transportation corridors in Maricopa County where an enhanced natural appearance is desired.

Desert Park Theme

•This theme is a combination of the Enhanced Desert and Desert Oasis Themes.

•Flood control channels and basins are sized and configured to be in scale with the size of open spaces and structural features that are typically found within the surrounding suburban and rural residential settings.

•The overall form of flood control structures accentuates and exaggerates the forms of natural topographic and drainage features found in the character type to create additional landscape variety and visual interest.

•Surface treatments typically include a combination of turf and gravel pavements with both native and desert adapted canopy trees and palms that has a more lush and green appearance than the previously described themes.

•Plant materials and inert materials are arranged to create interesting variety in forms, patterns and spaces, accentuate the topographic forms of the structure, reinforce gateways, enframe views, provide shade and to screen discordant features from view.

•This theme is context sensitive with suburban, urban and industrial cultural settings within the Sonoran Desert landscape character type.

Desert Oasis Theme

•This theme emphasizes a park-like appearance with an emphasis on turf and canopy trees.

•Flood control channels and basins are sized and configured to be in scale with the size of open spaces and structural features that are typically found within the surrounding suburban and rural residential settings.

•The overall form of flood control structures accentuates and exaggerates the forms of natural topographic and drainage features found in the character type to create additional landscape variety and visual interest.

•Surface treatments typically are turf with both native and desert adapted canopy trees and palms.

•Plant materials and inert materials are arranged to create interesting variety in forms, patterns and spaces, accentuate the topographic forms of the structure, reinforce gateways, enframe views, provide shade and to screen discordant features from view.

•This theme is context sensitive with suburban, urban and industrial cultural settings within the Sonoran Desert landscape character type.

Desert Plaza Theme

•This theme emphasizes extensive use of architecturally designed hardscored materials with plant materials serving mainly as visual accents.

•Flood control facilities are sized and configured to be in scale with the structural features and spaces that are typically found within the surrounding urban setting.

•The overall form of flood control structures is inspired by the physical characteristics of drainage features found within the Sonoran Desert Character Type and often accentuates and exaggerates the scale and variety of those characteristics in abstract forms, colors and textures to create additional landscape variety and visual interest.

•Surface treatments predominantly consist of architecturally designed hardscape materials in a variety of colors, textures, patterns and special design motifs.

•Plant materials include a variety of native and introduced species that are employed for special effects, shade and spatial definition.

•This theme is context sensitive primarily with urban settings in Maricopa County.

Landscape Design Themes Compatible with Landscape Character Units

Sonoran Desert Character Type	1 Natural Sonoran Desert Upland	2 Natural Sonoran Desert Upland Riparian	3 Natural Lower Sonoran Desert	4 Natural Lower Sonoran Desert Riparian	5 Natural Sonoran Desert Hydro Riparian	6 Semi-Natural Sonoran Desert	7 Enhanced Desert	8 Desert Park	9 Desert Oasis	10 Urban Plaza
Landscape Character Units										
Natural River Channel	IC	IC	IC	C	C	C	IC	IC	IC	IC
Suburban River Channel	IC	IC	IC	C	C	C	C	C	C	IC
Urban River Channel	IC	IC	IC	C	C	C	C	C	C	C
Industrial River Channel	IC	IC	IC	C	C	C	C	C	C	IC
Natural River Terrace	IC	IC	IC	C	C	C	IC	IC	IC	IC
Suburban River Terrace	IC	IC	IC	C	C	C	C	C	C	IC
Urban River Terrace	IC	IC	IC	C	C	C	C	C	C	C
Industrial River Terrace	IC	IC	IC	C	C	C	C	C	C	IC
Natural Valley Plain	IC	IC	C	C	C	C	IC	IC	IC	IC
Rural Valley Plain	IC	IC	C	C	C	C	IC	IC	IC	IC
Suburban Valley Plain	IC	IC	C	C	C	C	C	C	C	IC
Urban Valley Plain	IC	IC	C	C	C	C	C	C	C	C
Industrial Valley Plain	IC	IC	C	C	C	C	C	C	C	IC
Natural Valley Wash	IC	IC	IC	C	C	C	IC	IC	IC	IC
Rural Valley Wash	IC	IC	IC	C	C	C	IC	IC	IC	IC
Suburban Valley Wash	IC	IC	IC	C	C	C	C	C	C	IC
Urban Valley Wash	IC	IC	IC	C	C	C	C	C	C	C
Industrial Valley Wash	IC	IC	IC	C	C	C	C	C	C	IC
Natural Arroyo	IC	C	IC	IC	C	C	IC	IC	IC	IC
Rural Arroyo	IC	C	IC	IC	C	C	IC	IC	IC	IC
Suburban Arroyo	IC	C	IC	IC	C	C	C	C	C	IC
Urban Arroyo	IC	C	IC	IC	C	C	C	C	C	C
Industrial Arroyo	IC	C	IC	IC	C	C	C	C	C	IC
Natural Upper Bajada	C	C	IC	IC	C	C	IC	IC	IC	IC
Rural Upper Bajada	C	C	IC	IC	C	C	IC	IC	IC	IC
Suburban Upper Bajada	C	C	IC	IC	C	C	C	C	C	IC
Urban Upper Bajada	C	C	IC	IC	C	C	C	C	C	C
Industrial Upper Bajada	C	C	IC	IC	C	C	C	C	C	IC
Urban Foothills	C	C	IC	IC	C	C	C	C	C	C
Natural Mountains	C	C	IC	IC	C	C	IC	IC	IC	IC
Rural Mountains	C	C	IC	IC	C	C	IC	IC	IC	IC
Suburban Mountains	C	C	IC	IC	C	C	C	C	C	IC
Urban Mountains	C	C	IC	IC	C	C	C	C	C	C
Industrial Mountains	C	C	IC	IC	C	C	C	C	C	IC

C = Compatible with Landscape Design Theme
IC = Incompatible with Landscape Design Theme

Landscape Design Themes Compatible with Parks & Recreation Resources

Sonoran Desert Character Type	1 Natural Sonoran Desert Upland	2 Natural Sonoran Desert Upland Riparian	3 Natural Lower Sonoran Desert	4 Natural Lower Sonoran Desert Riparian	5 Natural Sonoran Desert Hydro Riparian	6 Semi-Natural Sonoran Desert	7 Enhanced Desert	8 Desert Park	9 Desert Oasis	10 Urban Plaza
Federal										
Wilderness Areas	C	C	C	C	C	IC	IC	IC	IC	IC
National Monuments	C	C	C	C	C	IC	IC	IC	IC	IC
National Wildlife Refuges / Preserves	C	C	C	C	C	IC	IC	IC	IC	IC
Other BLM Lands	C	C	C	C	C	C	C	C	IC	IC
Other National Forest Lands	C	C	C	C	C	C	C	C	IC	IC
State										
State Parks (None)	C	C	C	C	C	IC	IC	IC	IC	IC
Wildlife Areas	C	C	C	C	C	IC	IC	IC	IC	IC
Regional										
County Regional Parks	C	C	C	C	C	IC	IC	IC	IC	IC
County Recreation Areas	C	C	C	C	C	C	IC	IC	IC	IC
City Regional Parks	C	C	C	C	C	C	IC	IC	IC	IC
City Mountain Preserves	C	C	C	C	C	IC	IC	IC	IC	IC
Maricopa Regional Trail System	C	C	C	C	C	C	C	C	C	C
Local										
City and County Parks										
Rural	C	C	C	C	C	C	C	C	C	C
Suburban	C	C	C	C	C	C	C	C	C	C
Urban	C	C	C	C	C	C	C	C	C	C
Other Recreation Areas										
Golf Courses	C	C	C	C	C	C	C	C	C	C

C = Compatible with Landscape Design Theme
IC = Incompatible with Landscape Design Theme
Parks & Recreation Resources within Hohokam ADMP

Landscape Design Themes Compatible with Open Space Resources

Sonoran Desert Character Type	1 Natural Sonoran Desert Upland	2 Natural Sonoran Desert Upland Riparian	3 Natural Lower Sonoran Desert	4 Natural Lower Sonoran Desert Riparian	5 Natural Sonoran Desert Hydro Riparian	6 Semi-Natural Sonoran Desert	7 Enhanced Desert	8 Desert Park	9 Desert Oasis	10 Urban Plaza
Desert Spaces Open Space Plan										
Secured Open Space										
Federal										
Wilderness Areas	C	C	C	C	C	C	IC	IC	IC	IC
National Monuments	C	C	C	C	C	C	IC	IC	IC	IC
National Wildlife Refuges / Preserves	C	C	C	C	C	C	IC	IC	IC	IC
State										
State Parks (None)	C	C	C	C	C	IC	IC	IC	IC	IC
Wildlife Areas	C	C	C	C	C	IC	IC	IC	IC	IC
Regional										
County Regional Parks	C	C	C	C	C	C	IC	IC	IC	IC
County Recreation Areas	C	C	C	C	C	C	IC	IC	IC	IC
City Regional Parks	C	C	C	C	C	IC	IC	IC	IC	IC
City Mountain Preserves	C	C	C	C	C	C	IC	IC	IC	IC
Conservation Open Spaces	C	C	C	C	C	IC	IC	IC	IC	IC
Retention Open Spaces	C	C	C	C	C	C	C	C	IC	IC
Other Federal Open Space Lands										
BLM	C	C	C	C	C	C	C	C	IC	IC
National Forest Lands	C	C	C	C	C	C	C	C	IC	IC
Floodplain Lands										
Floodways	IC	C	IC	C	C	C	IC	IC	IC	IC
Floodplain Fringe Areas & Other Floodplain Zones	C	C	C	C	C	C	C	C	C	IC

C = Compatible with Landscape Design Theme
IC = Incompatible with Landscape Design Theme
Open Space Resources within Hohokam ADMP

APPENDIX H

CSFHM PLANNING & DESIGN APPROACH

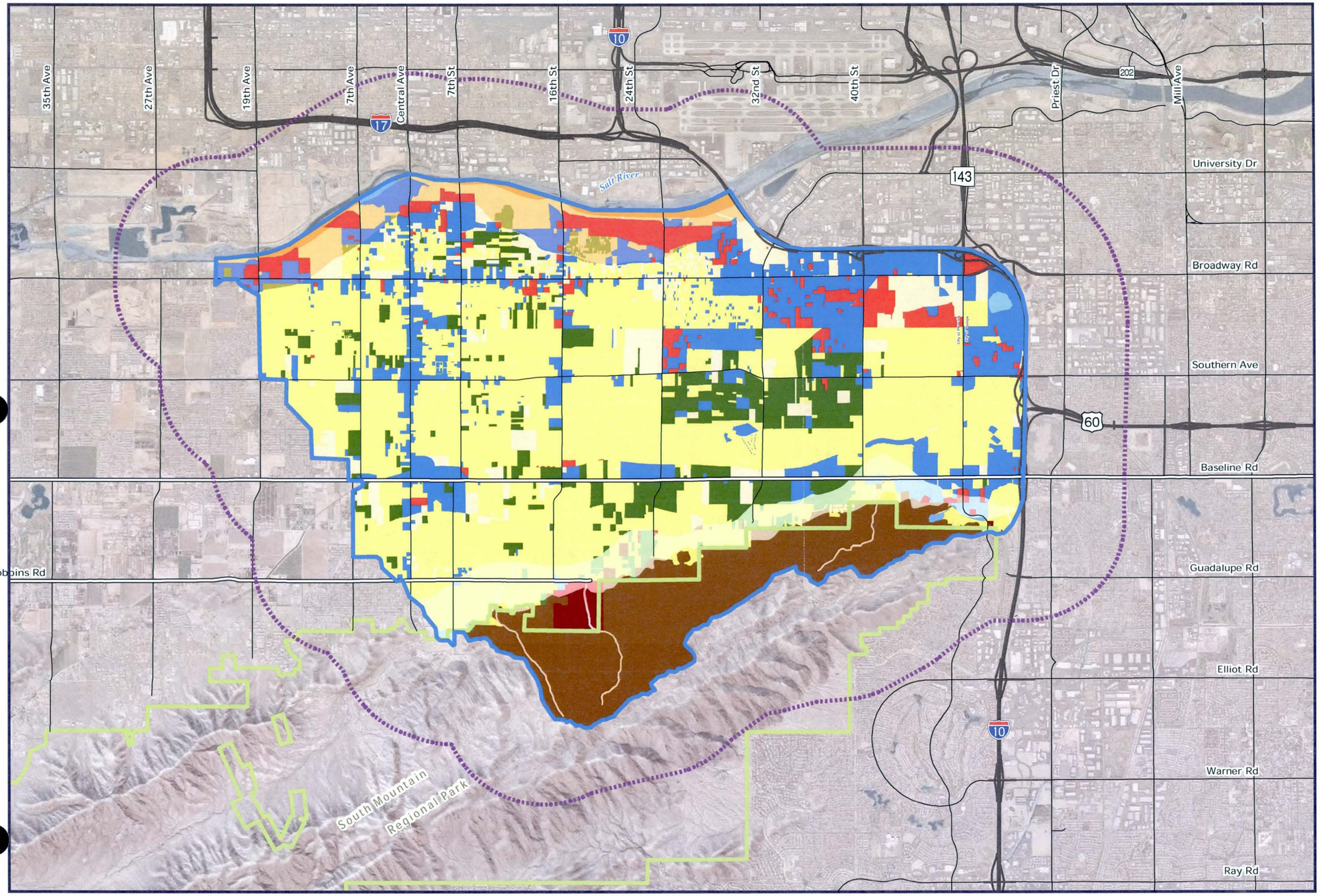
AND

COMMUNITY CONTEXT EXHIBITS

BY DISTRICT

Hohokam Area Drainage Master Study/Plan

Land & Resource Context
Landscape Character Units



Landscape Character Units

- Industrial Arroyo
- Industrial Mountains
- Industrial River Channel
- Industrial River Terrace
- Industrial Upper Bajada
- Industrial Valley Plains
- Industrial Valley Wash
- Natural Arroyo
- Natural Mountains
- Natural River Channel
- Natural River Terrace
- Natural Upper Bajada
- Natural Valley Plains
- Natural Valley Wash
- Rural Mountains
- Rural Upper Bajada
- Rural Valley Plains
- Rural Valley Wash
- Suburban Arroyo
- Suburban Mountains
- Suburban River Terrace
- Suburban Upper Bajada
- Suburban Valley Plains
- Suburban Valley Wash
- Urban Arroyo
- Urban Foothills
- Urban Mountains
- Urban River Channel
- Urban River Terrace
- Urban Upper Bajada
- Urban Valley Plains
- Urban Valley Wash

Project Features

- Hohokam ADMP
- Hohokam ADMP Review Area

Reference Features

- Highway
- Major Arterial
- Scenic_Drives
- Rail
- Regional Park

0 1 2 Mile

1 inch = 1 miles

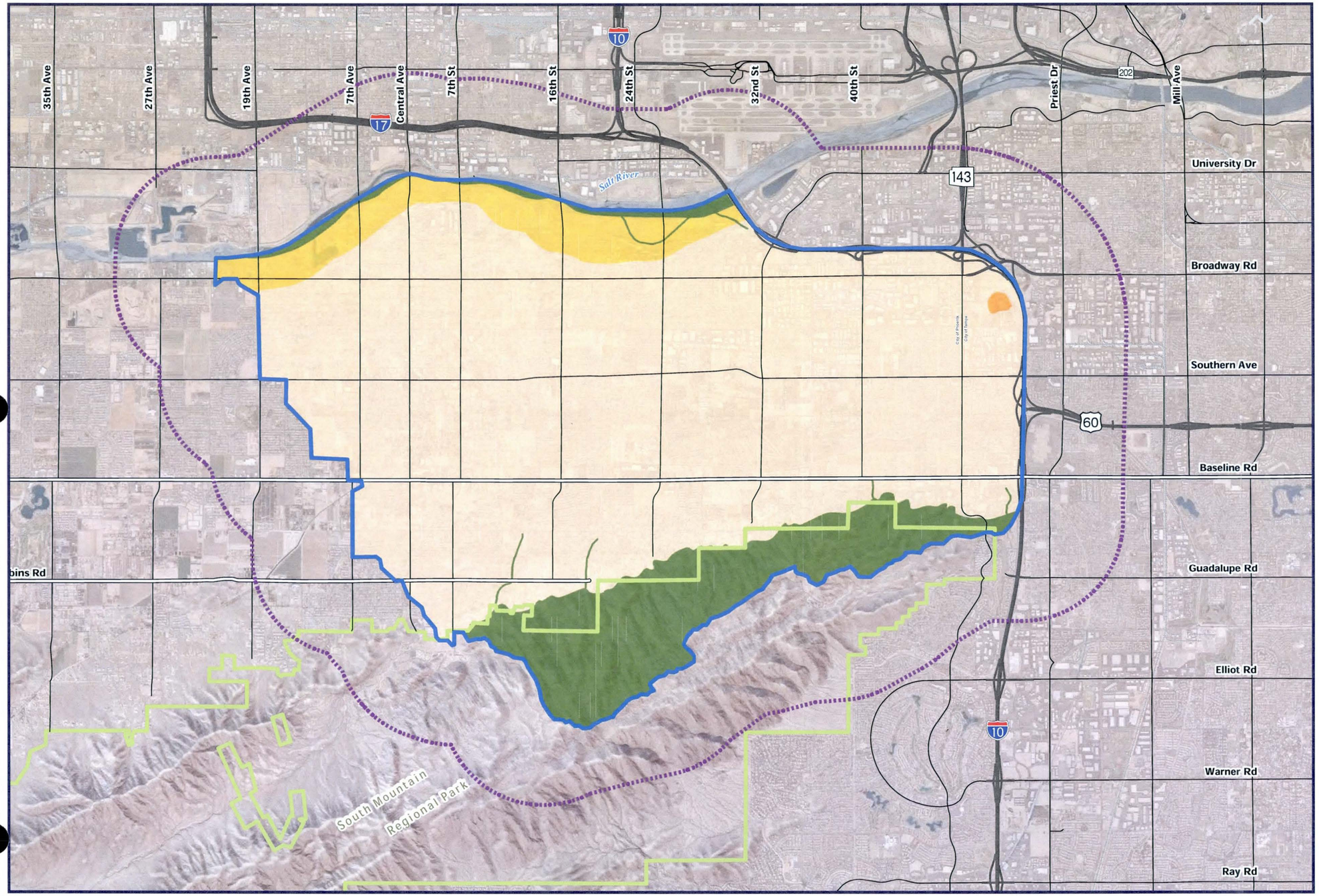
N

Sources: City of Phoenix and Maricopa County Flood Control District
Date: August 2011

Hohokam Area Drainage Master Study/Plan

Land & Resource Context

Landscape Character Units Structure Types Compatibility



Compatibility Classes (Map Codes)

- 100000
- 111100
- 111110
- 111111

1 = Compatible, 0 = Incompatible

Map Code Correlation Key

STRUCTURE TYPES	MAP CODE - 1 1 0 1 0 1
1 = Natural Structure	
2 = Underground Pipe	
3 = Channel Levee	
4 = Conveyance Channel	
5 = Storage Basin	
6 = Dam	

LEGEND KEY EXAMPLE: STRUCTURE TYPE COMPATIBLITY						
Map Unit	1 Natural Structure	2 Undergro und Pipe	3 Channel Levee	4 Conveyance Channel	5 Storage Basin	6 Dam
110101	1	1	0	1	0	1
**This Map Unit is Compatible with Structures 1,2,4 & 6						

Project Features

- Hohokam ADMP
- Hohokam ADMP Review Area

Reference Features

- Highway
- Major Arterial
- Scenic_Drives
- Rail
- Regional Park

0 1 2 Mile

1 inch = 1 miles

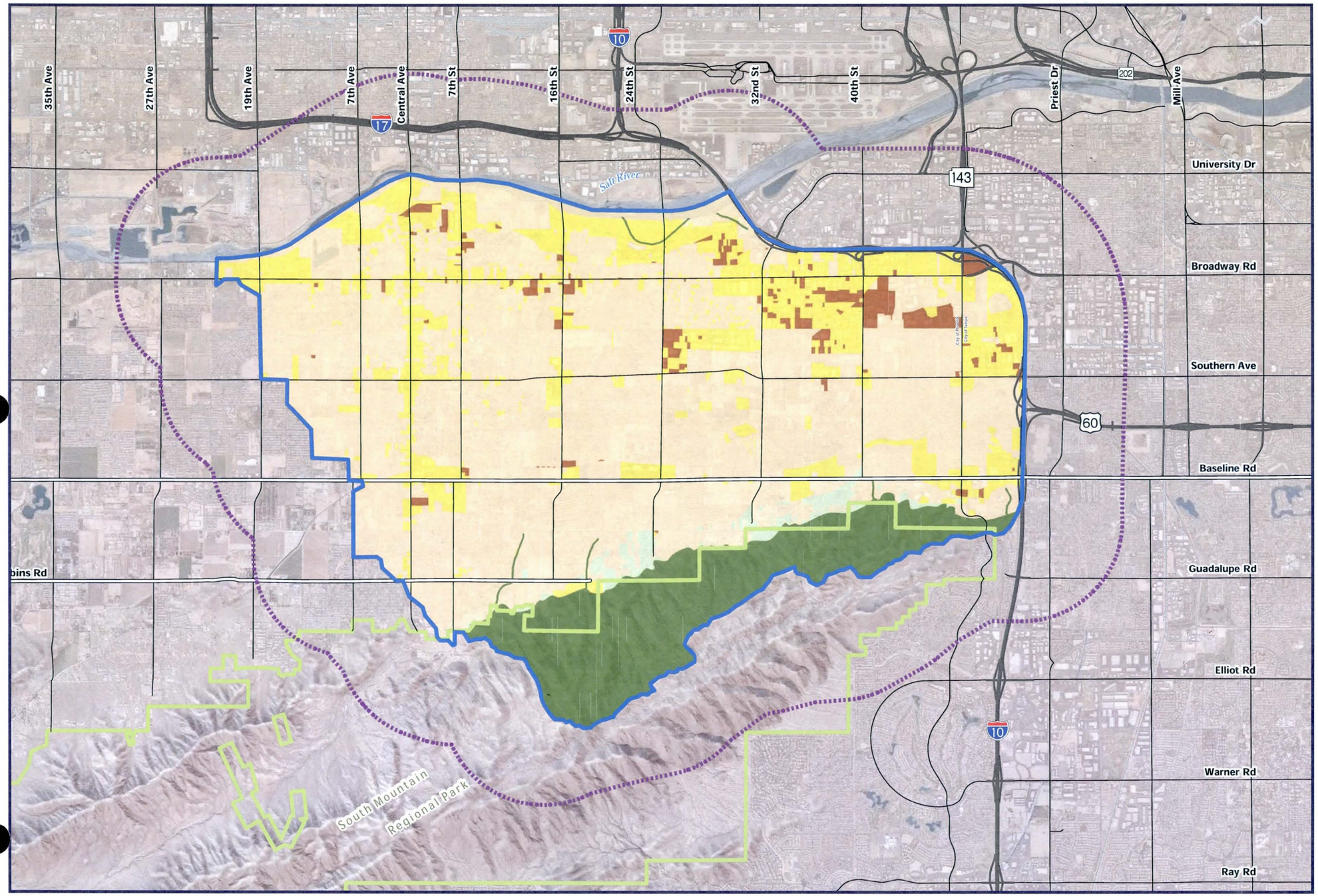
N

Sources: City of Phoenix and Maricopa County Flood Control District
Date: August 2011

Hohokam Area Drainage Master Study/Plan

Land & Resource Context

Landscape Character Units Structural Methods Compatibility



Compatibility Classes (Map Codes)

- 100000
- 110000
- 111000
- 111100
- 111111

1 = Compatible, 0 = Incompatible

Map Code Correlation Key

STRUCTURAL METHODS	MAP CODE - 1 1 0 1 0 1
1 = Natural Method	
2 = Soft Structural	
3 = Semi-Soft Structural	
4 = Enhanced Hard Structural	
5 = Semi-Hard Structural	
6 = Hard Structural	

LEGEND KEY EXAMPLE: STRUCTURAL METHODS COMPATIBILITY

Map Unit	1 Natural Method	2 Soft Structural	3 Semi-Soft Structural	4 Enhanced Hard Structural	5 Semi-Hard Structural	6 Hard Structural
110101	1	1	0	1	0	1

**This Map Unit is Compatible with Structural Methods 1,2,4 & 6

Project Features

- Hohokam ADMP
- Hohokam ADMP Review Area

Reference Features

- Highway
- Major Arterial
- Scenic_Drives
- Rail
- Regional Park

0 1 2 Mile

1 inch = 1 miles

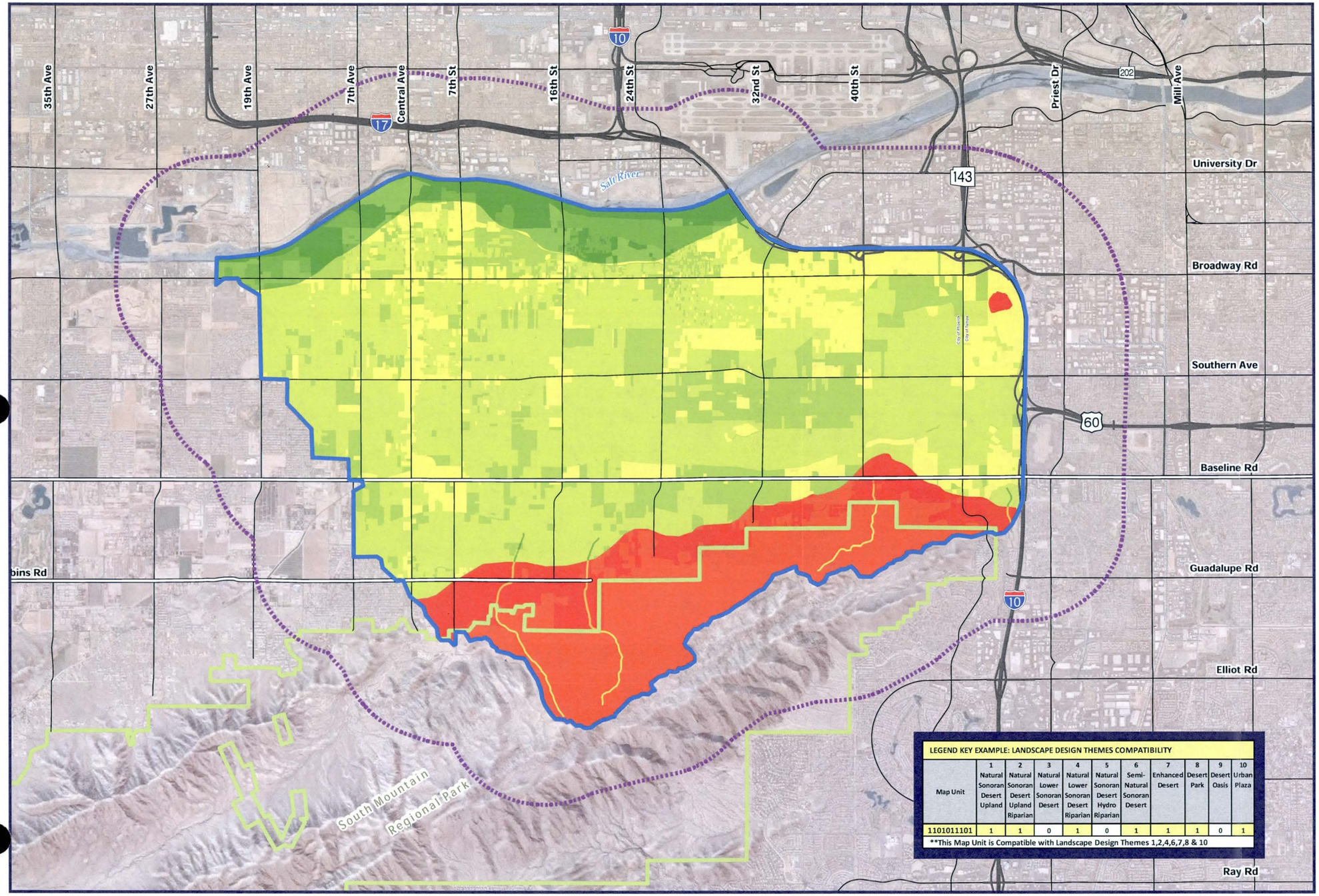
N

Sources: City of Phoenix and Maricopa County Flood Control District
Date: August 2011

Hohokam Area Drainage Master Study/Plan

Land & Resource Context

Landscape Character Units Landscape Design Themes Compatability



LEGEND KEY EXAMPLE: LANDSCAPE DESIGN THEMES COMPATIBILITY

Map Unit	1 Natural Sonoran Desert Upland	2 Natural Sonoran Desert Upland Riparian	3 Natural Lower Sonoran Desert	4 Natural Lower Sonoran Desert Riparian	5 Natural Sonoran Desert Hydro Riparian	6 Semi-Natural Sonoran Desert	7 Enhanced Desert	8 Desert Park	9 Desert Oasis	10 Urban Plaza
1101011101	1	1	0	1	0	1	1	1	0	1

**This Map Unit is Compatible with Landscape Design Themes 1,2,4,6,7,8 & 10

Compatibility Classes (Map Codes)

0001110000	0100110000
0001111110	0100111110
0001111111	0100111111
0011110000	1100110000
0011111110	1100111110
0011111111	1100111111

1 = Compatible, 0 = Incompatible
*Refer to Legend Key Example

Map Code Correlation Key

LANDSCAPE DESIGN THEMES	MAP CODE - 1101011101
1 = Natural Sonoran Desert Upland	
2 = Natural Sonoran Desert Upland Riparian	
3 = Natural Lower Sonoran Desert	
4 = Natural Lower Sonoran Desert Riparian	
5 = Natural Sonoran Desert Hydro Riparian	
6 = Semi-Natural Sonoran Desert	
7 = Enhanced Desert	
8 = Desert Park	
9 = Desert Oasis	
10 = Urban Plaza	

Project Features

- Hohokam ADMP
- Hohokam ADMP Review Area

Reference Features

- Highway
- Major Arterial
- Scenic_Drives
- Rail
- Regional Park

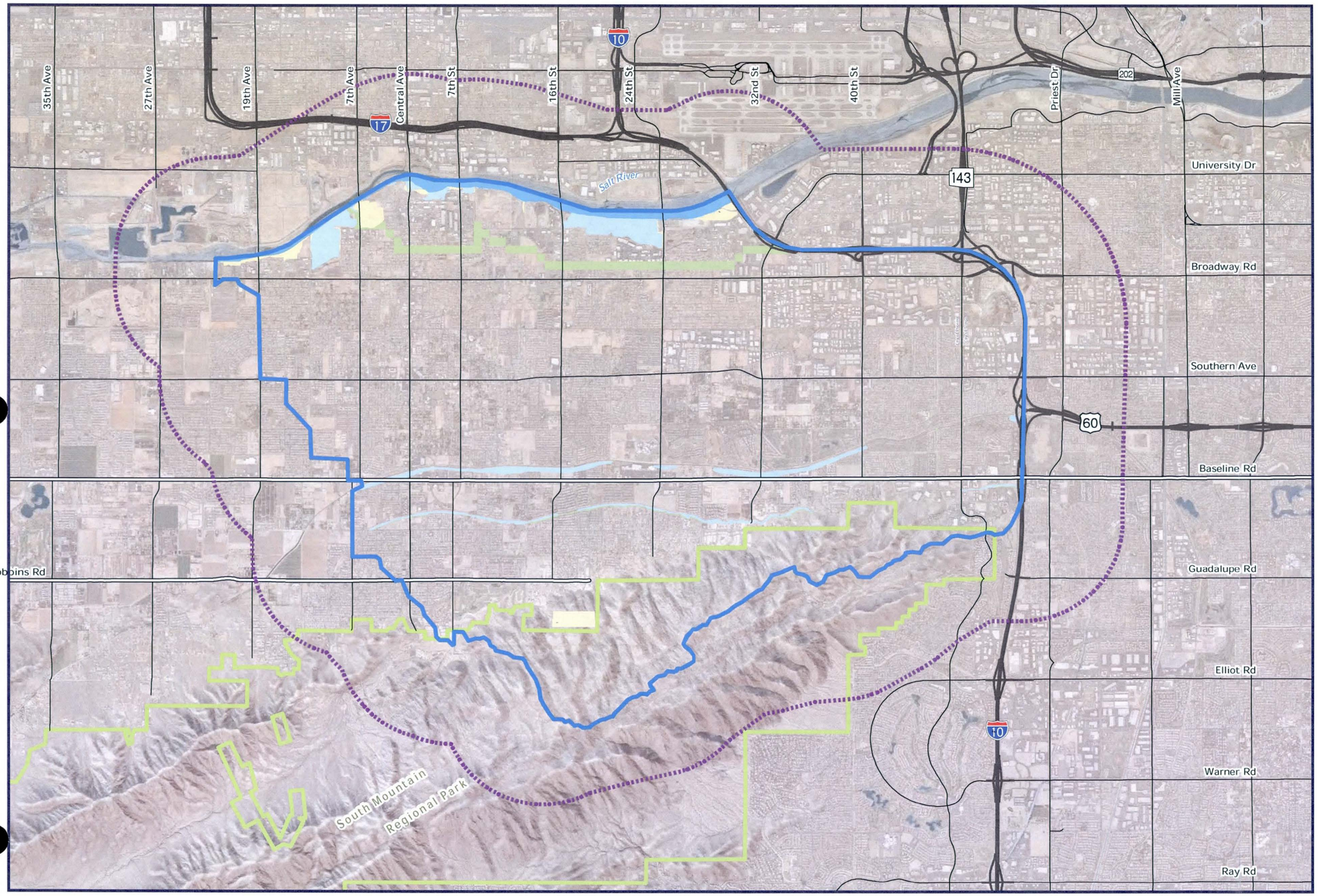
0 1 2 Mile
1 inch = 1 miles

N

Sources: City of Phoenix and Maricopa County Flood Control District
Date: August 2011

Hohokam Area Drainage Master Study/Plan

Land & Resource Context
Open Space Resources



Open Space Resources

- Open Space Conservation Areas
- Open Space Retention Areas
- Floodway
- Floodplain Fringe & Other Floodplain Zones

Project Features

- Hohokam ADMP
- Hohokam ADMP Review Area

Reference Features

- Highway
- Major Arterial
- Scenic_Drives
- Rail
- Regional Park

0 1 2 Mile

1 inch = 1 miles

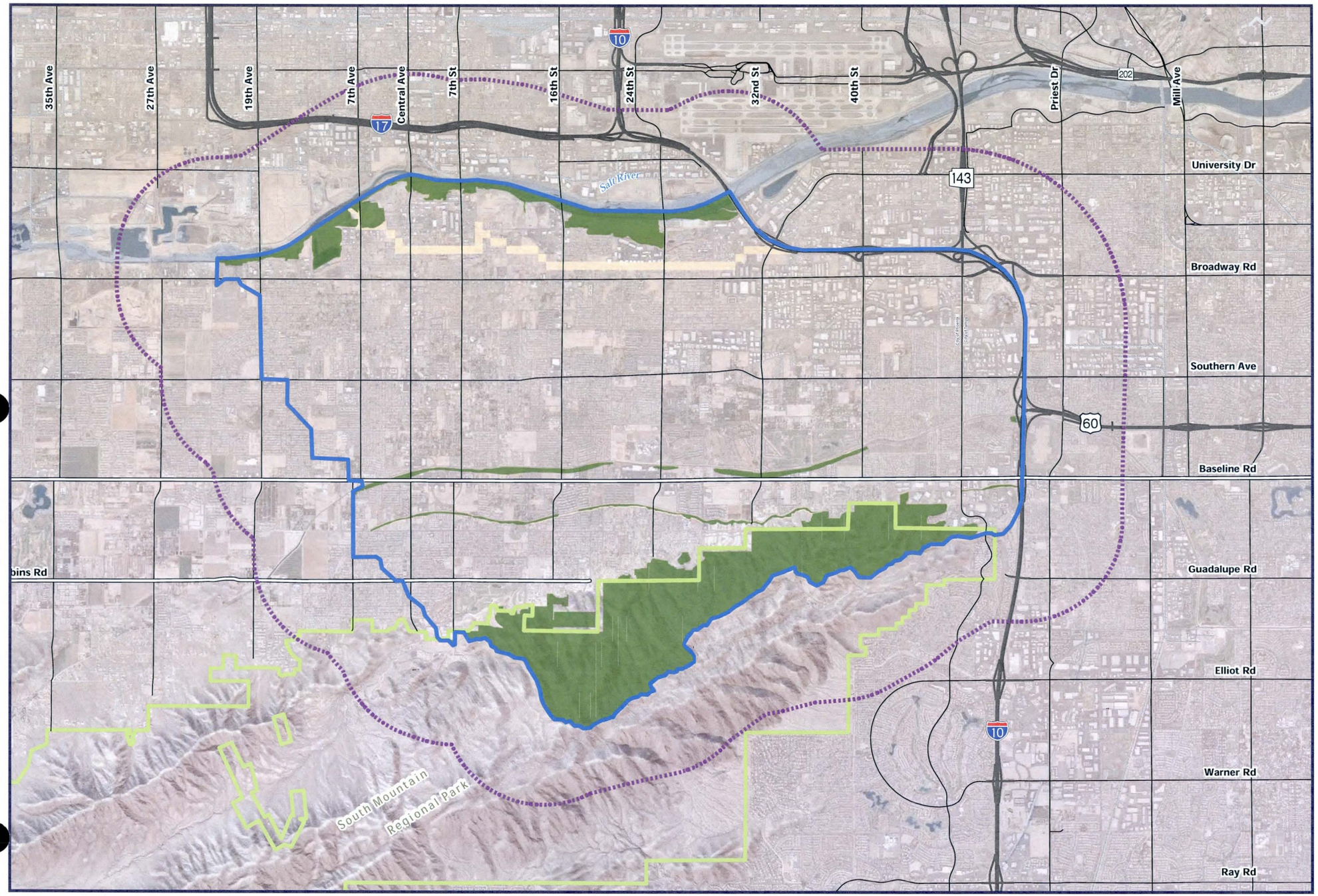
N

Sources: City of Phoenix and Maricopa County Flood Control District
Date: August 2011

Hohokam Area Drainage Master Study/Plan

Land & Resource Context

Open Space Resources Structure Types Compatibility



Compatibility Classes (Map Codes)

- 100000
- 111111

1 = Compatible, 0 = Incompatible

Map Code Correlation Key

STRUCTURE TYPES	MAP CODE - 1 1 0 1 0 1
1 = Natural Structure	
2 = Underground Pipe	
3 = Channel Levee	
4 = Conveyance Channel	
5 = Storage Basin	
6 = Dam	

LEGEND KEY EXAMPLE: STRUCTURE TYPE COMPATIBLITY						
Map Unit	1 Natural Structure	2 Undergro und Pipe	3 Channel Levee	4 Conveyance Channel	5 Storage Basin	6 Dam
110101	1	1	0	1	0	1
**This Map Unit is Compatible with Structures 1,2,4 & 6						

Project Features

- Hohokam ADMP
- Hohokam ADMP Review Area

Reference Features

- Highway
- Major Arterial
- Scenic_Drives
- Rail
- Regional Park

0 1 2 Mile

1 inch = 1 miles

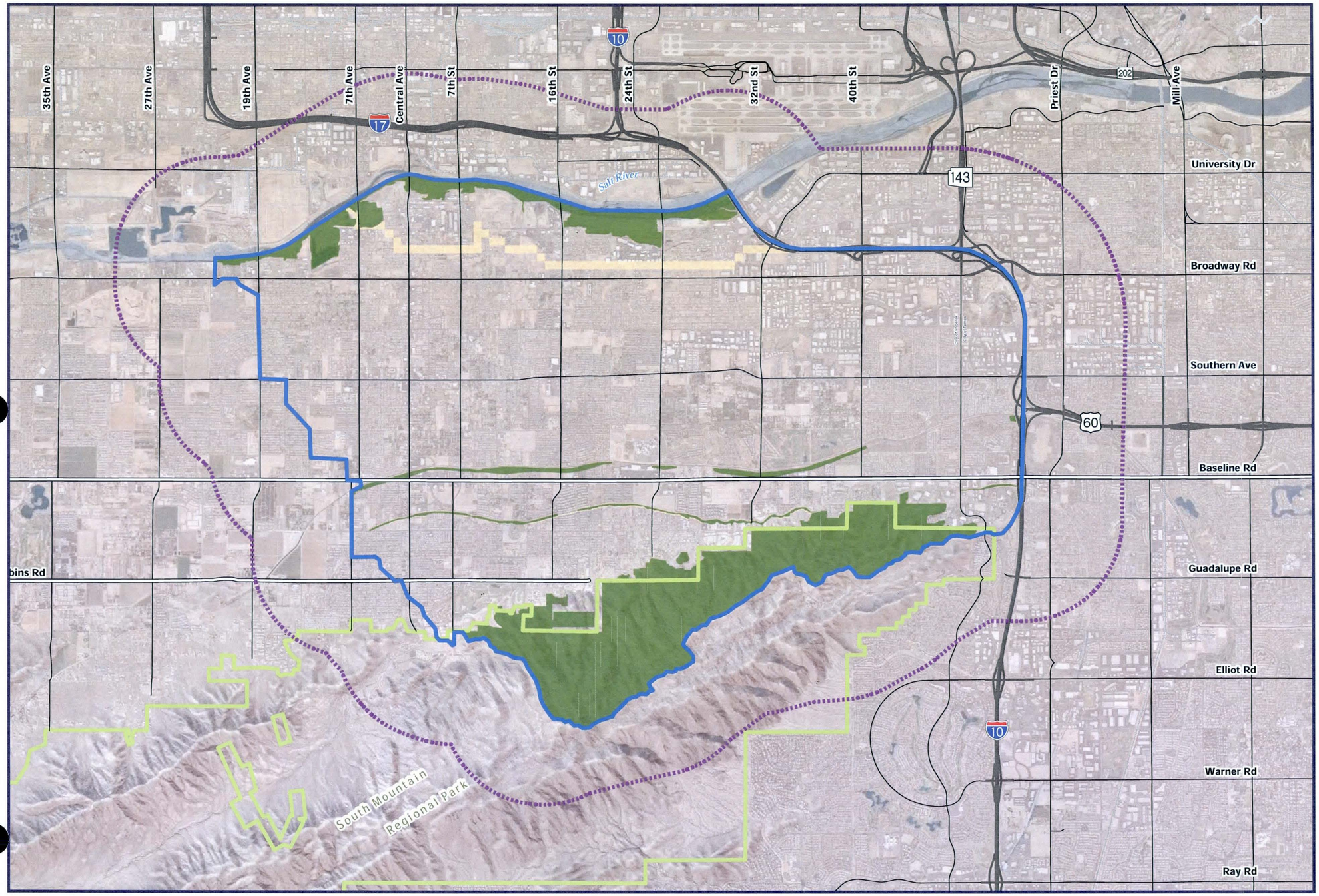
N

Sources: City of Phoenix and Maricopa County Flood Control District
Date: August 2011

Hohokam Area Drainage Master Study/Plan

Land & Resource Context

Open Space Resources Structural Methods Compatibility



Compatibility Classes (Map Codes)

- 100000
- 111000

1 = Compatible, 0 = Incompatible

Map Code Correlation Key

STRUCTURAL METHODS	MAP CODE - 1 1 0 1 0 1
1 = Natural Method	
2 = Soft Structural	
3 = Semi-Soft Structural	
4 = Enhanced Hard Structural	
5 = Semi-Hard Structural	
6 = Hard Structural	

LEGEND KEY EXAMPLE: STRUCTURAL METHODS COMPATIBILITY

Map Unit	1 Natural Method	2 Soft Structural	3 Semi-Soft Structural	4 Enhanced Hard Structural	5 Semi-Hard Structural	6 Hard Structural
110101	1	1	0	1	0	1

**This Map Unit is Compatible with Structural Methods 1,2,4 & 6

Project Features

- Hohokam ADMP
- Hohokam ADMP Review Area

Reference Features

- Highway
- Major Arterial
- Scenic_Drives
- Rail
- Regional Park

0 1 2 Mile

1 inch = 1 miles

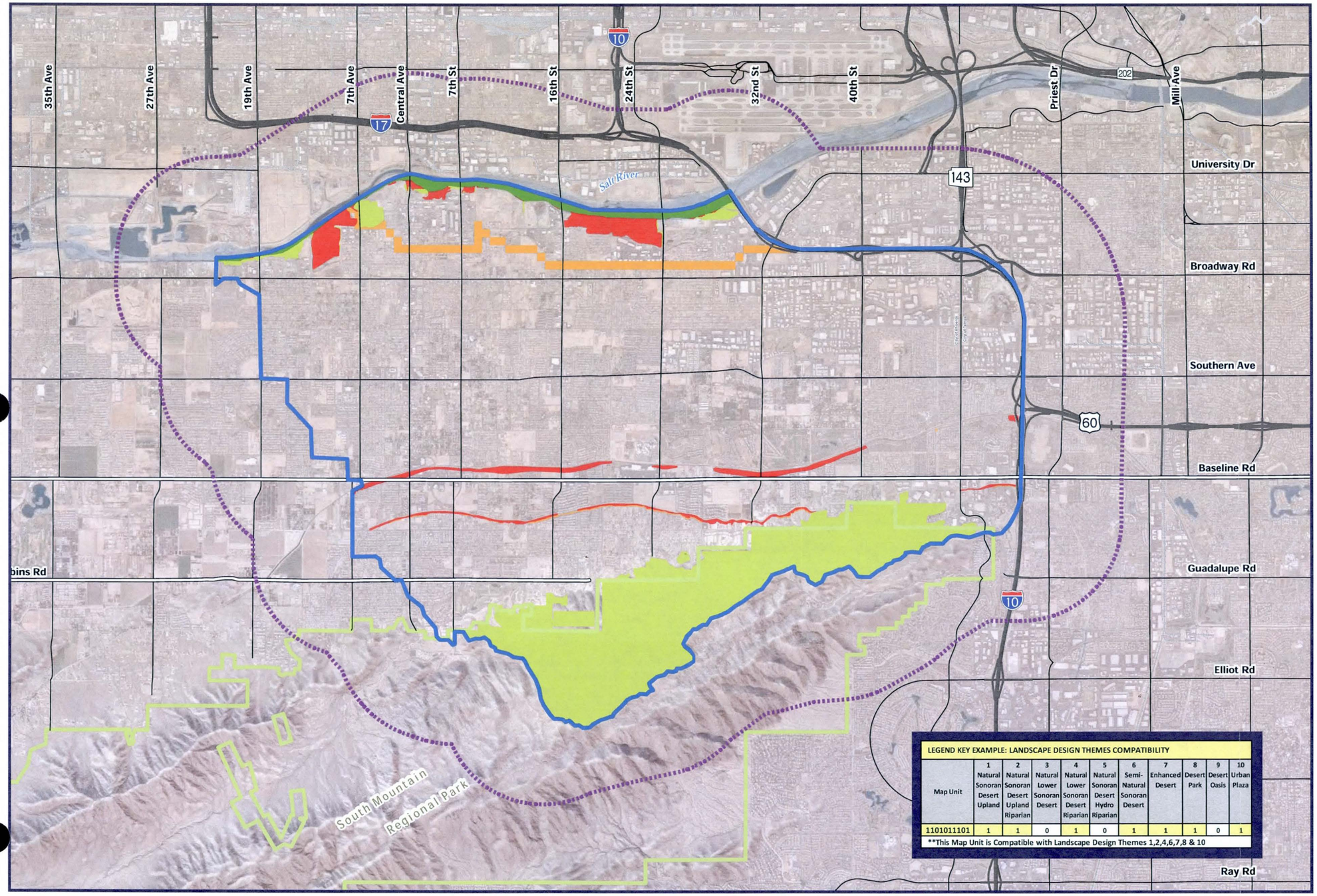
N

Sources: City of Phoenix and Maricopa County Flood Control District
Date: August 2011

Hohokam Area Drainage Master Study/Plan

Land & Resource Context

Open Space Resources Landscape Design Themes Compatability



LEGEND KEY EXAMPLE: LANDSCAPE DESIGN THEMES COMPATIBILITY

Map Unit	1 Natural Sonoran Desert Upland	2 Natural Sonoran Desert Upland Riparian	3 Natural Lower Sonoran Desert	4 Natural Lower Sonoran Desert Riparian	5 Natural Sonoran Desert Hydro Riparian	6 Semi-Natural Sonoran Desert	7 Enhanced Desert	8 Desert Park	9 Desert Oasis	10 Urban Plaza
1101011101	1	1	0	1	0	1	1	1	0	1

**This Map Unit is Compatible with Landscape Design Themes 1,2,4,6,7,8 & 10

Compatibility Classes (Map Codes)

- 0101110000
- 1111100000
- 1111111100
- 1111111110

1 = Compatible, 0 = Incompatible
*Refer to Legend Key Example

Map Code Correlation Key

LANDSCAPE DESIGN THEMES	MAP CODE - 1101011101
1 = Natural Sonoran Desert Upland	
2 = Natural Sonoran Desert Upland Riparian	
3 = Natural Lower Sonoran Desert	
4 = Natural Lower Sonoran Desert Riparian	
5 = Natural Sonoran Desert Hydro Riparian	
6 = Semi-Natural Sonoran Desert	
7 = Enhanced Desert	
8 = Desert Park	
9 = Desert Oasis	
10 = Urban Plaza	

Project Features

- Hohokam ADMP
- Hohokam ADMP Review Area

Reference Features

- Highway
- Major Arterial
- Scenic_Drives
- Rail
- Regional Park

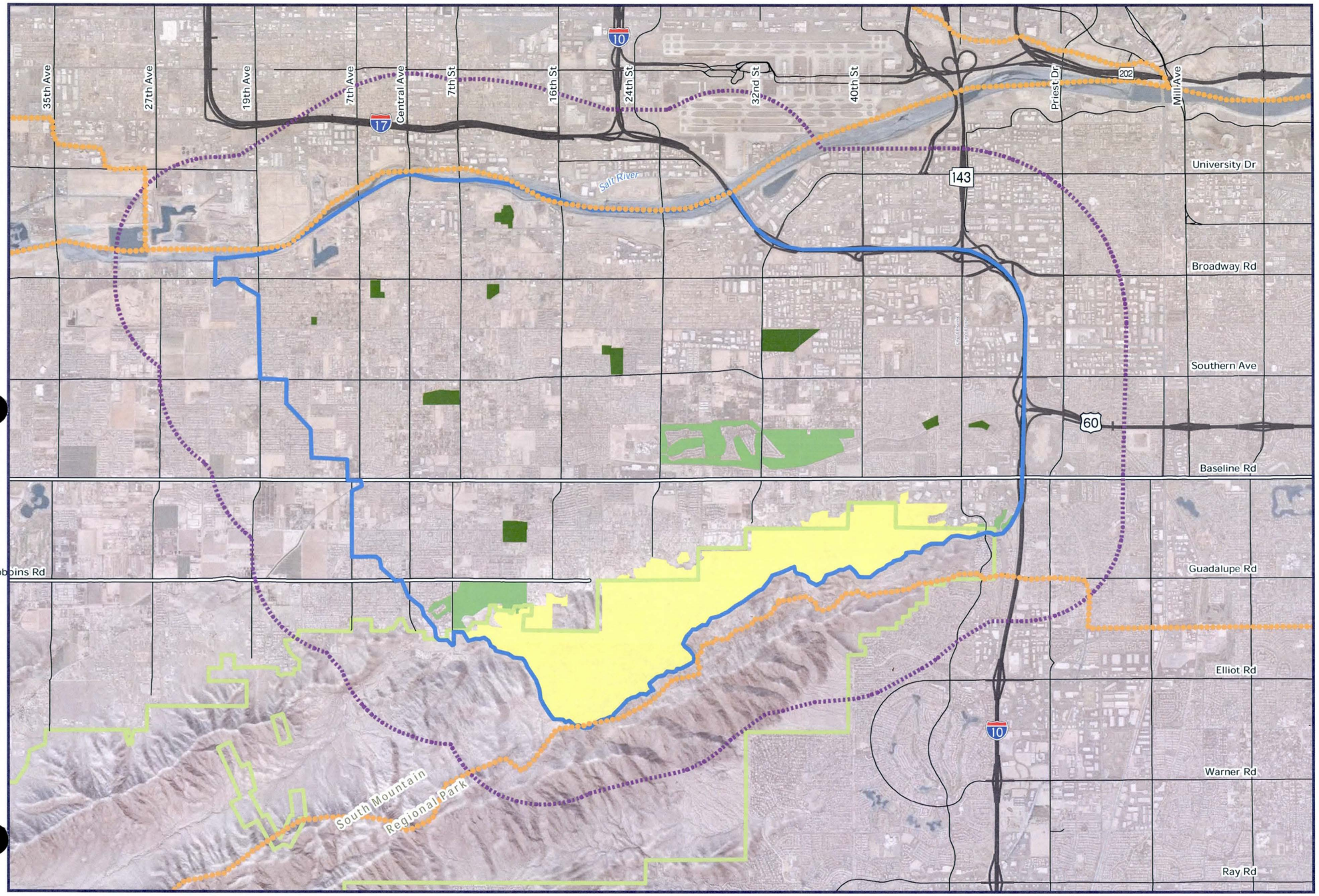
0 1 2 Mile
1 inch = 1 miles

N

Sources: City of Phoenix and Maricopa County Flood Control District
Date: August 2011

Hohokam Area Drainage Master Study/Plan

Land & Resource Context
Parks & Recreation Resources



Parks & Recreation Resources

- Regional City Regional Parks
- Local City Parks
- Local Golf Courses
- Maricopa Regional Trail System

Project Features

- Hohokam ADMP
- Hohokam ADMP Review Area

Reference Features

- Highway
- Major Arterial
- Scenic_Drives
- Rail
- Regional Park

0 1 2 Mile

1 inch = 1 miles

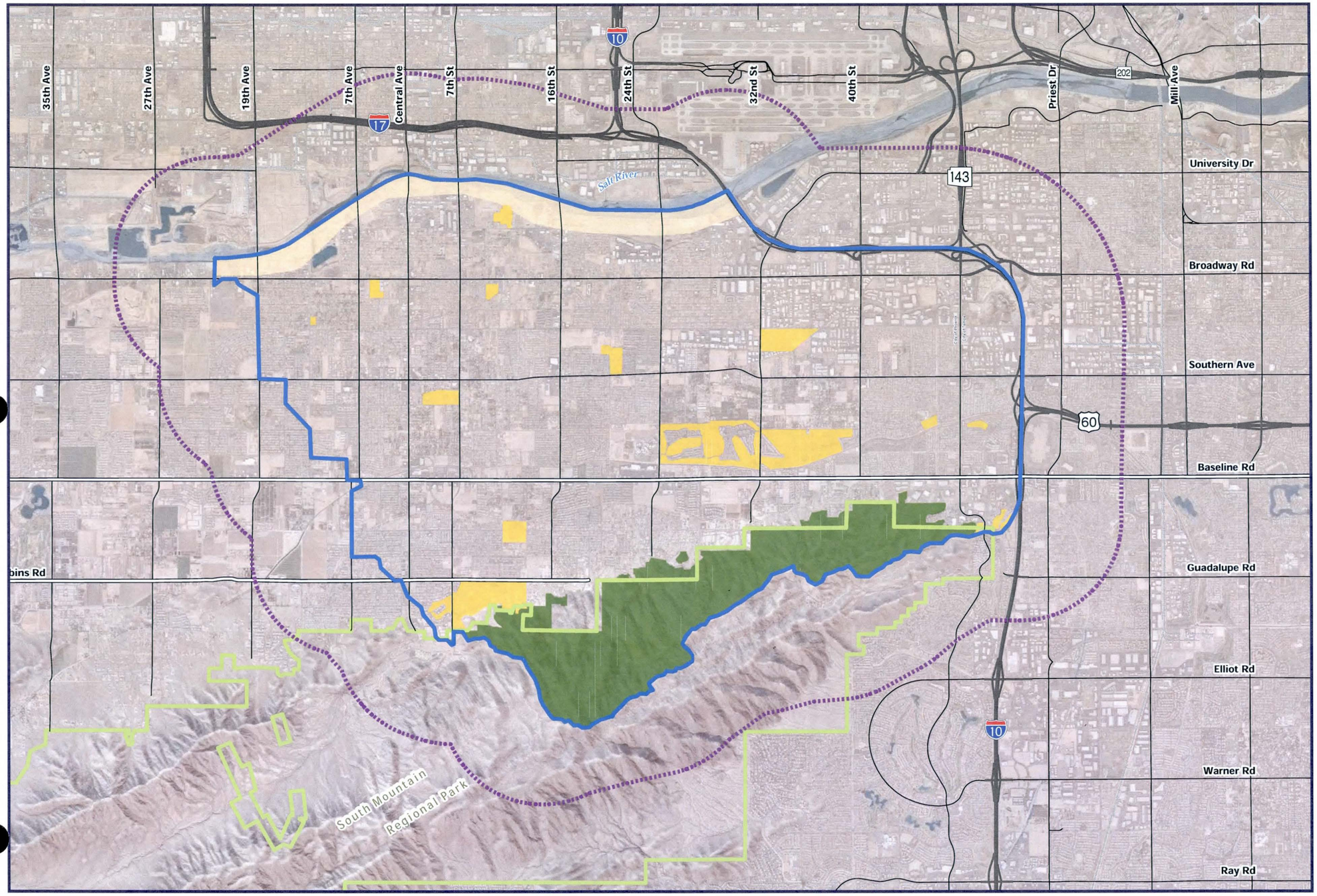
N

Sources: City of Phoenix and Maricopa County Flood Control District
Date: August 2011

Hohokam Area Drainage Master Study/Plan

Land & Resource Context

Parks & Recreation Resources Structure Types Compatibility



Compatibility Classes (Map Codes)

- 100000
- 111110
- 111111

1 = Compatible, 0 = Incompatible

Map Code Correlation Key

STRUCTURE TYPES	MAP CODE - 1 1 0 1 0 1
1 = Natural Structure	
2 = Underground Pipe	
3 = Channel Levee	
4 = Conveyance Channel	
5 = Storage Basin	
6 = Dam	

LEGEND KEY EXAMPLE: STRUCTURE TYPE COMPATIBLITY						
Map Unit	1 Natural Structure	2 Undergro und Pipe	3 Channel Levee	4 Conveyance Channel	5 Storage Basin	6 Dam
110101	1	1	0	1	0	1
**This Map Unit is Compatible with Structures 1,2,4 & 6						

Project Features

- Hohokam ADMP
- Hohokam ADMP Review Area

Reference Features

- Highway
- Major Arterial
- Scenic_Drives
- Rail
- Regional Park

0 1 2 Mile

1 inch = 1 miles

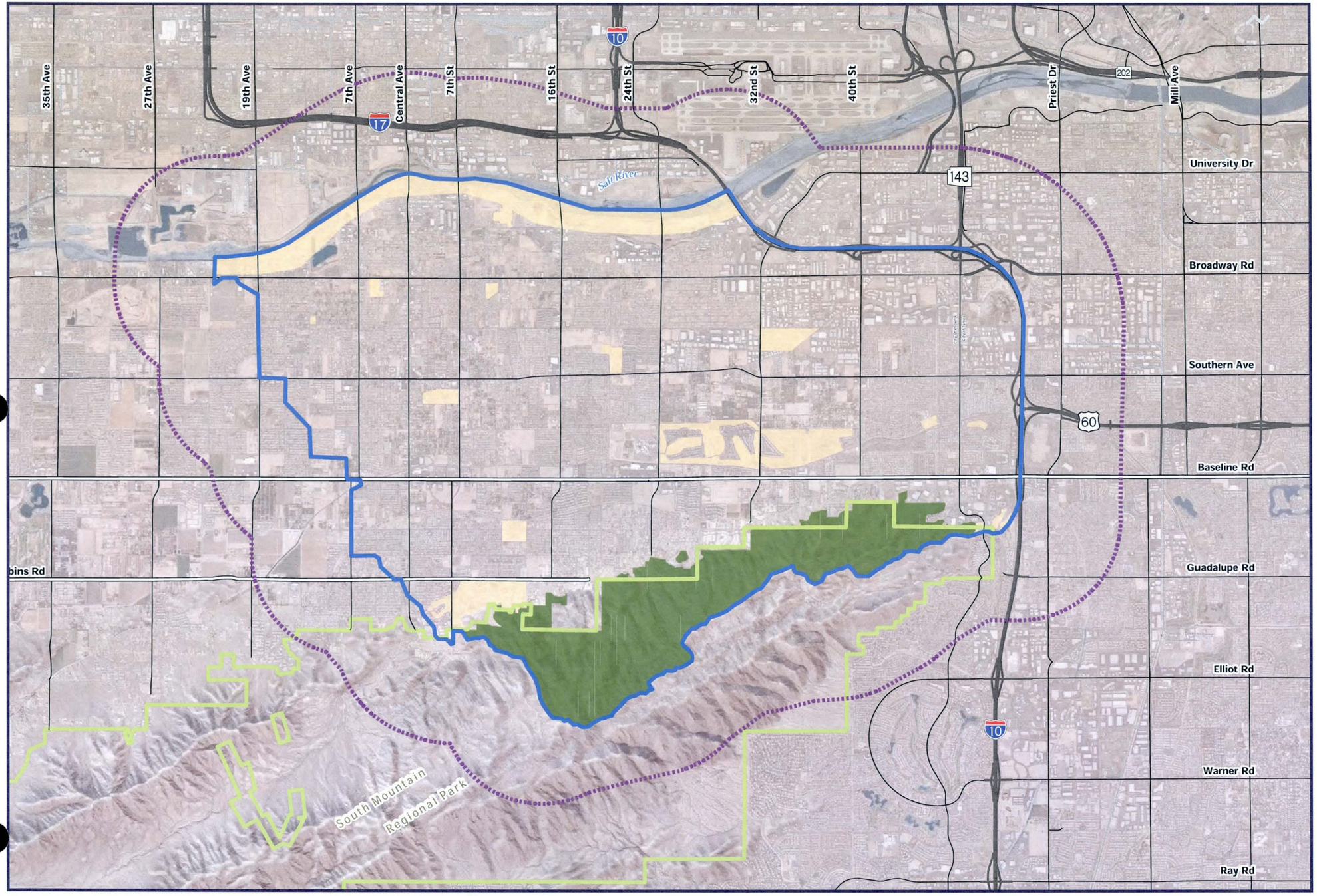
N

Sources: City of Phoenix and Maricopa County Flood Control District
Date: August 2011

Hohokam Area Drainage Master Study/Plan

Land & Resource Context

Parks & Recreation Resources Structural Methods Compatibility



Compatibility Classes (Map Codes)

- 100000
- 111000

1 = Compatible, 0 = Incompatible

Map Code Correlation Key

STRUCTURAL METHODS	MAP CODE - 1 1 0 1 0 1
1 = Natural Method	
2 = Soft Structural	
3 = Semi-Soft Structural	
4 = Enhanced Hard Structural	
5 = Semi-Hard Structural	
6 = Hard Structural	

LEGEND KEY EXAMPLE: STRUCTURAL METHODS COMPATIBILITY

Map Unit	1 Natural Method	2 Soft Structural	3 Semi-Soft Structural	4 Enhanced Hard Structural	5 Semi-Hard Structural	6 Hard Structural
110101	1	1	0	1	0	1

**This Map Unit is Compatible with Structural Methods 1,2,4 & 6

Project Features

- Hohokam ADMP
- Hohokam ADMP Review Area

Reference Features

- Highway
- Major Arterial
- Scenic_Drives
- Rail
- Regional Park

0 1 2 Mile

1 inch = 1 miles

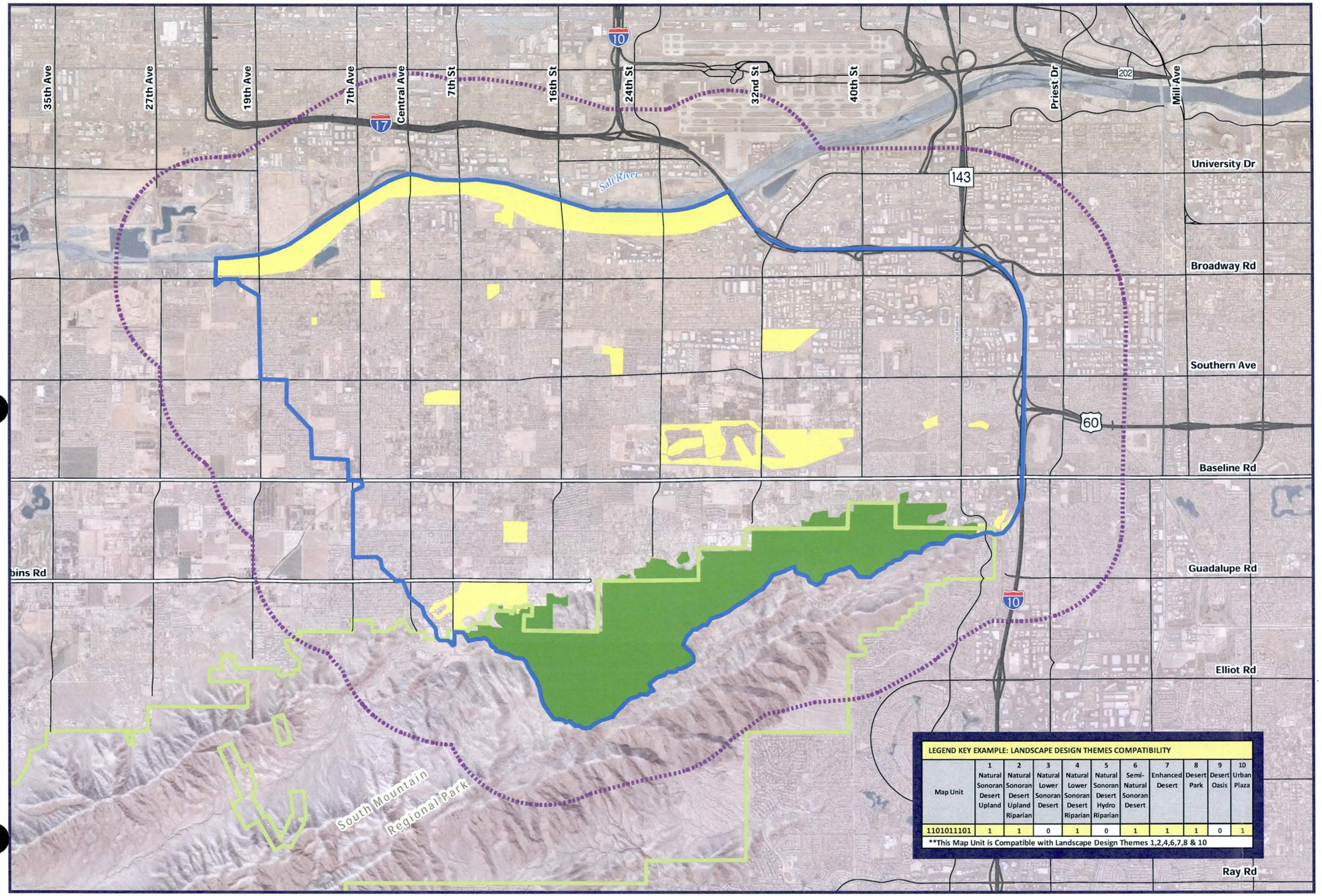
N

Sources: City of Phoenix and Maricopa County Flood Control District
Date: August 2011

Hohokam Area Drainage Master Study/Plan

Land & Resource Context

Parks & Recreation Resources Landscape Design Themes Compatability



LEGEND KEY EXAMPLE: LANDSCAPE DESIGN THEMES COMPATIBILITY

Map Unit	1 Natural Sonoran Desert Upland	2 Natural Sonoran Desert Upland Riparian	3 Natural Lower Sonoran Desert	4 Natural Lower Sonoran Desert Riparian	5 Natural Sonoran Desert Hydro Riparian	6 Semi-Natural Sonoran Desert	7 Enhanced Desert	8 Desert Park	9 Desert Oasis	10 Urban Plaza
1101011101	1	1	0	1	0	1	1	1	0	1

**This Map Unit is Compatible with Landscape Design Themes 1,2,4,6,7,8 & 10

Compatibility Classes (Map Codes)

- 1111110000
- 1111111111

1 = Compatible, 0 = Incompatible
*Refer to Legend Key Example

Map Code Correlation Key

LANDSCAPE DESIGN THEMES	MAP CODE - 1101011101
1 = Natural Sonoran Desert Upland	
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Project Features

- Hohokam ADMP
- Hohokam ADMP Review Area

Reference Features

- Highway
- Major Arterial
- Scenic_Drives
- Rail
- Regional Park

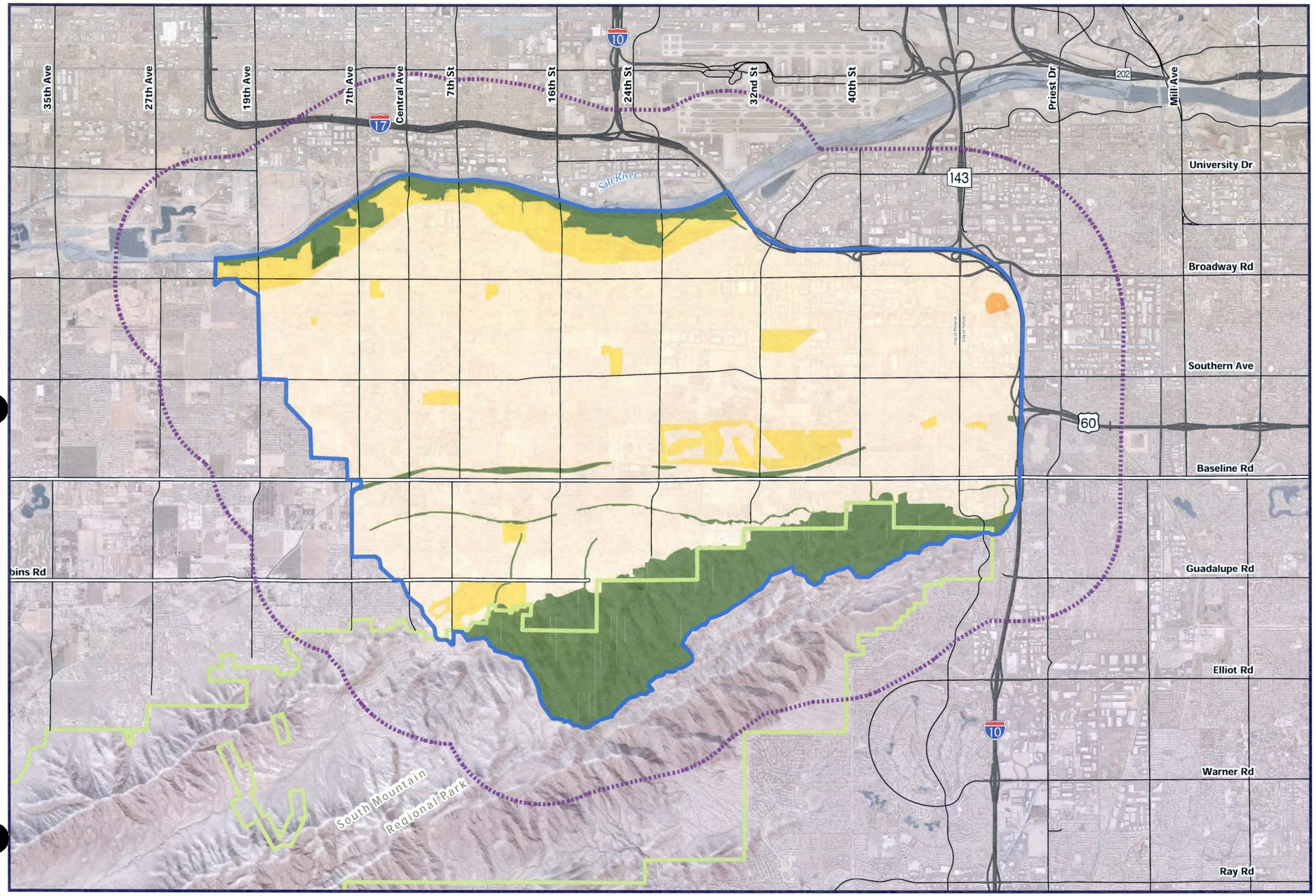
0 1 2 Mile
1 inch = 1 miles

N

Sources: City of Phoenix and Maricopa County Flood Control District
Date: August 2011

Hohokam Area Drainage Master Study/Plan

Land & Resource Context
Structure Types Compatibility Map



Compatibility Classes (Map Codes)

- 100000
- 111100
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Map Code Correlation Key

STRUCTURE TYPES	MAP CODE - 1 1 0 1 0 1
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6 = Dam	

LEGEND KEY EXAMPLE: STRUCTURE TYPE COMPATIBLITY						
Map Unit	1 Natural Structure	2 Undergro und Pipe	3 Channel Levee	4 Conveyance Channel	5 Storage Basin	6 Dam
110101	1	1	0	1	0	1
**This Map Unit is Compatible with Structures 1,2,4 & 6						

Project Features

- Hohokam ADMP
- Hohokam ADMP Review Area

Reference Features

- Highway
- Major Arterial
- Scenic_Drives
- Rail
- Regional Park

0 1 2 Mile

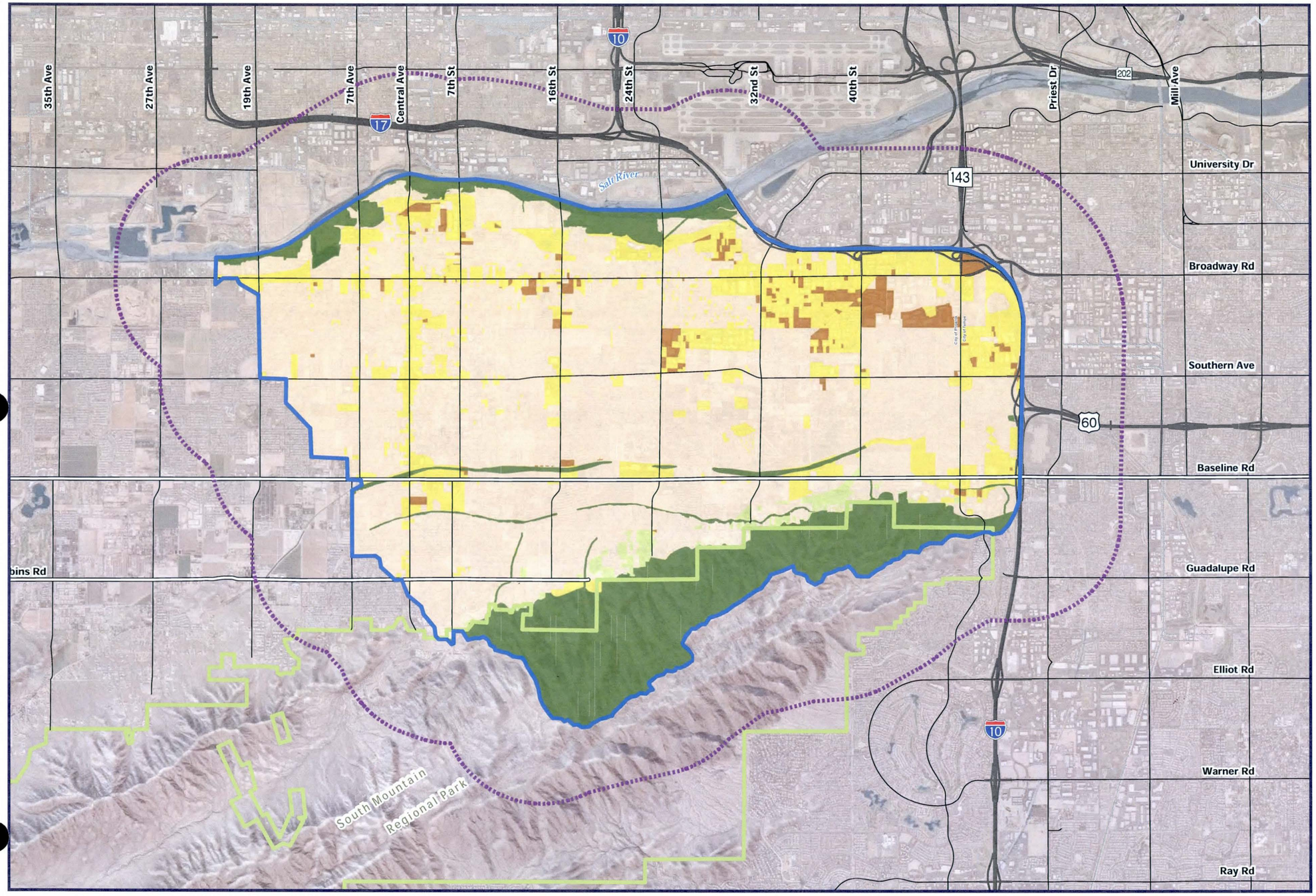
1 inch = 1 miles

N

Sources: City of Phoenix and Maricopa County Flood Control District
Date: August 2011

Hohokam Area Drainage Master Study/Plan

Land & Resource Context
Structural Methods Compatibility Map



Compatibility Classes (Map Codes)

- 100000
- 110000
- 111000
- 111100
- 111111

1 = Compatible, 0 = Incompatible

Map Code Correlation Key

STRUCTURAL METHODS	MAP CODE - 1 1 0 1 0 1
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4 = Enhanced Hard Structural	
5 = Semi-Hard Structural	
6 = Hard Structural	

LEGEND KEY EXAMPLE: STRUCTURAL METHODS COMPATIBILITY

Map Unit	1 Natural Method	2 Soft Structural	3 Semi-Soft Structural	4 Enhanced Hard Structural	5 Semi-Hard Structural	6 Hard Structural
110101	1	1	0	1	0	1

**This Map Unit is Compatible with Structural Methods 1,2,4 & 6

Project Features

- Hohokam ADMP
- Hohokam ADMP Review Area

Reference Features

- Highway
- Major Arterial
- Scenic_Drives
- Rail
- Regional Park

0 1 2 Mile

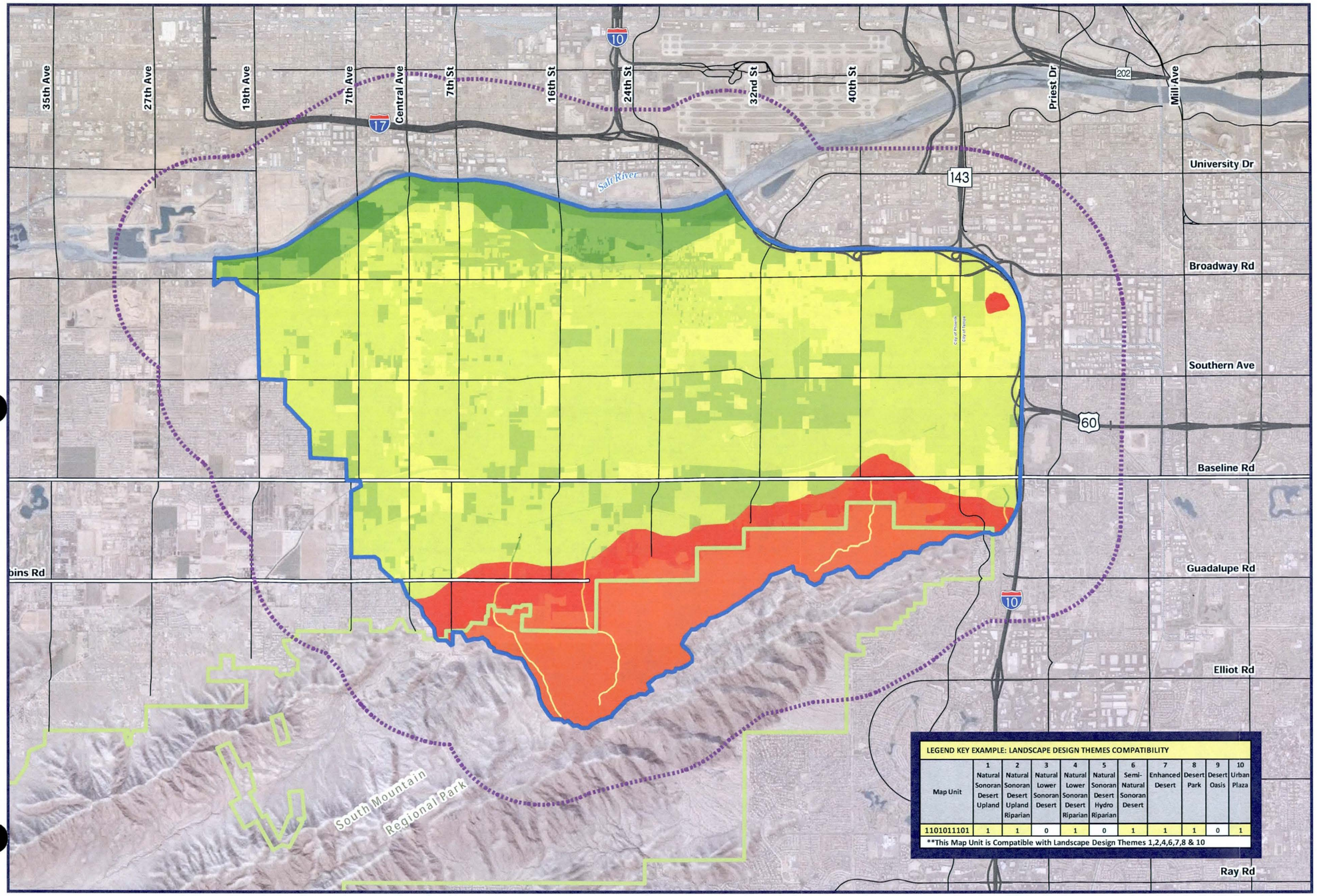
1 inch = 1 miles

N

Sources: City of Phoenix and Maricopa County Flood Control District
Date: August 2011

Hohokam Area Drainage Master Study/Plan

Land & Resource Context
Landscape Design Themes Compatability Map



LEGEND KEY EXAMPLE: LANDSCAPE DESIGN THEMES COMPATIBILITY										
Map Unit	1 Natural Sonoran Desert Upland	2 Natural Sonoran Desert Upland Riparian	3 Natural Lower Sonoran Desert	4 Natural Lower Sonoran Desert Riparian	5 Natural Sonoran Desert Hydro Riparian	6 Semi-Natural Sonoran Desert	7 Enhanced Desert	8 Desert Park	9 Desert Oasis	10 Urban Plaza
1101011101	1	1	0	1	0	1	1	1	0	1
**This Map Unit is Compatible with Landscape Design Themes 1,2,4,6,7,8 & 10										

Compatibility Classes (Map Codes)

0001100000	0100110000
0001110000	0100111110
0001111100	0100111111
0001111110	0101110000
0001111111	1100100000
0011110000	1100110000
0011111100	1100111110
0011111110	1100111111
0011111111	1111100000
0100100000	

1 = Compatible, 0 = Incompatible
*Refer to Legend Key Example

Map Code Correlation Key

LANDSCAPE DESIGN THEMES	MAP CODE - 1101011101
1 = Natural Sonoran Desert Upland	
2 = Natural Sonoran Desert Upland Riparian	
3 = Natural Lower Sonoran Desert	
4 = Natural Lower Sonoran Desert Riparian	
5 = Natural Sonoran Desert Hydro Riparian	
6 = Semi-Natural Sonoran Desert	
7 = Enhanced Desert	
8 = Desert Park	
9 = Desert Oasis	
10 = Urban Plaza	

Project Features

- Hohokam ADMP
- Hohokam ADMP Review Area

Reference Features

- Highway
- Major Arterial
- Scenic_Drives
- Rail
- Regional Park

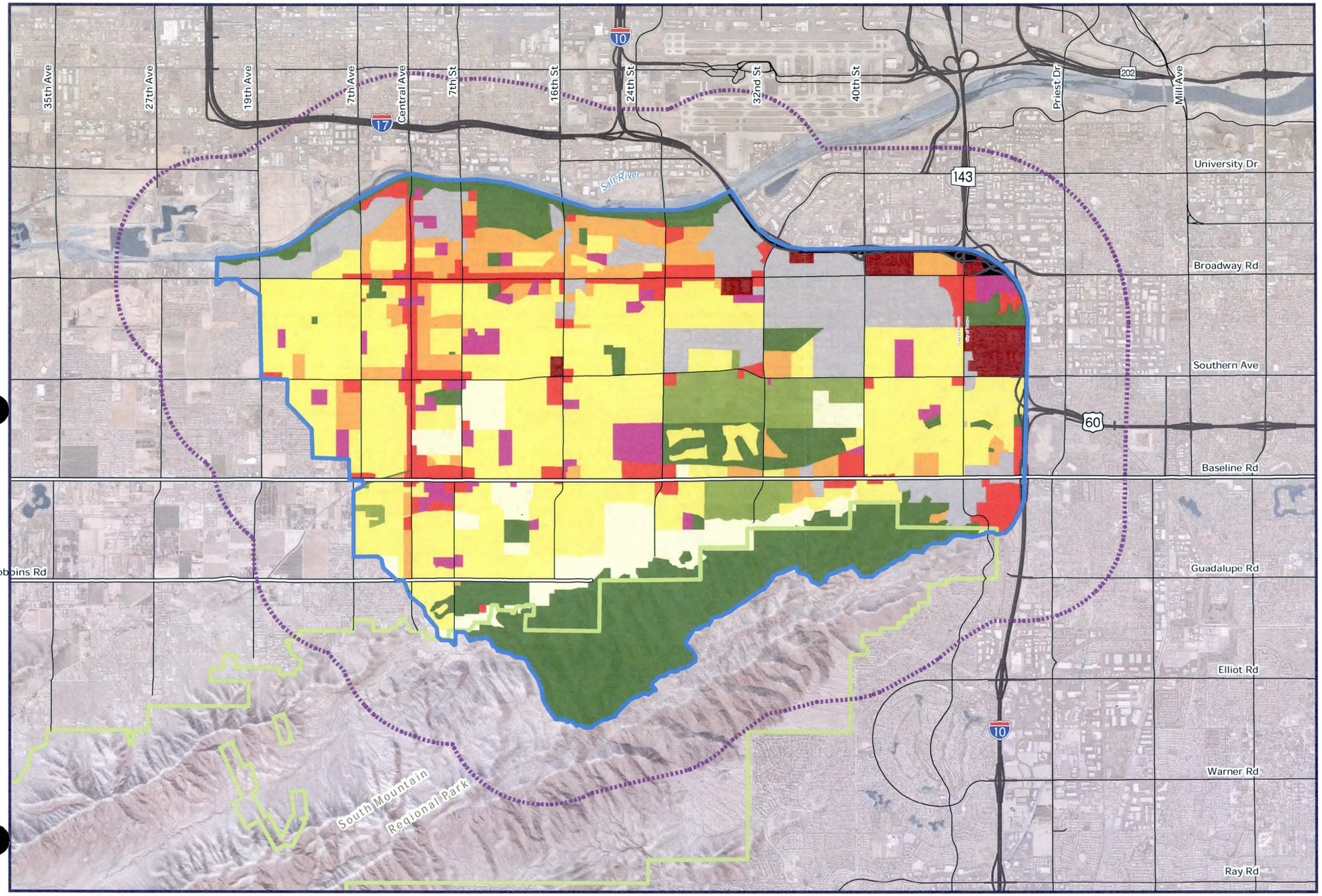
0 1 2 Mile
1 inch = 1 miles

N

Sources: City of Phoenix and Maricopa County Flood Control District
Date: August 2011

Hohokam Area Drainage Master Study/Plan

Community Context
General Plan Categories



General Plan Categories

- Large Lot Residential
- Traditional Lot Residential
- High Density Residential
- Recreation/Parks/Open Space
- Public/Quasi-Public
- Commercial
- Commerce/Business Park
- Industrial
- Agriculture
- Transportation

Project Features

- Hohokam ADMP
- Hohokam ADMP Review Area

Reference Features

- Highway
- Major Arterial
- Scenic_Drives
- Rail
- Regional Park

0 1 2 Mile

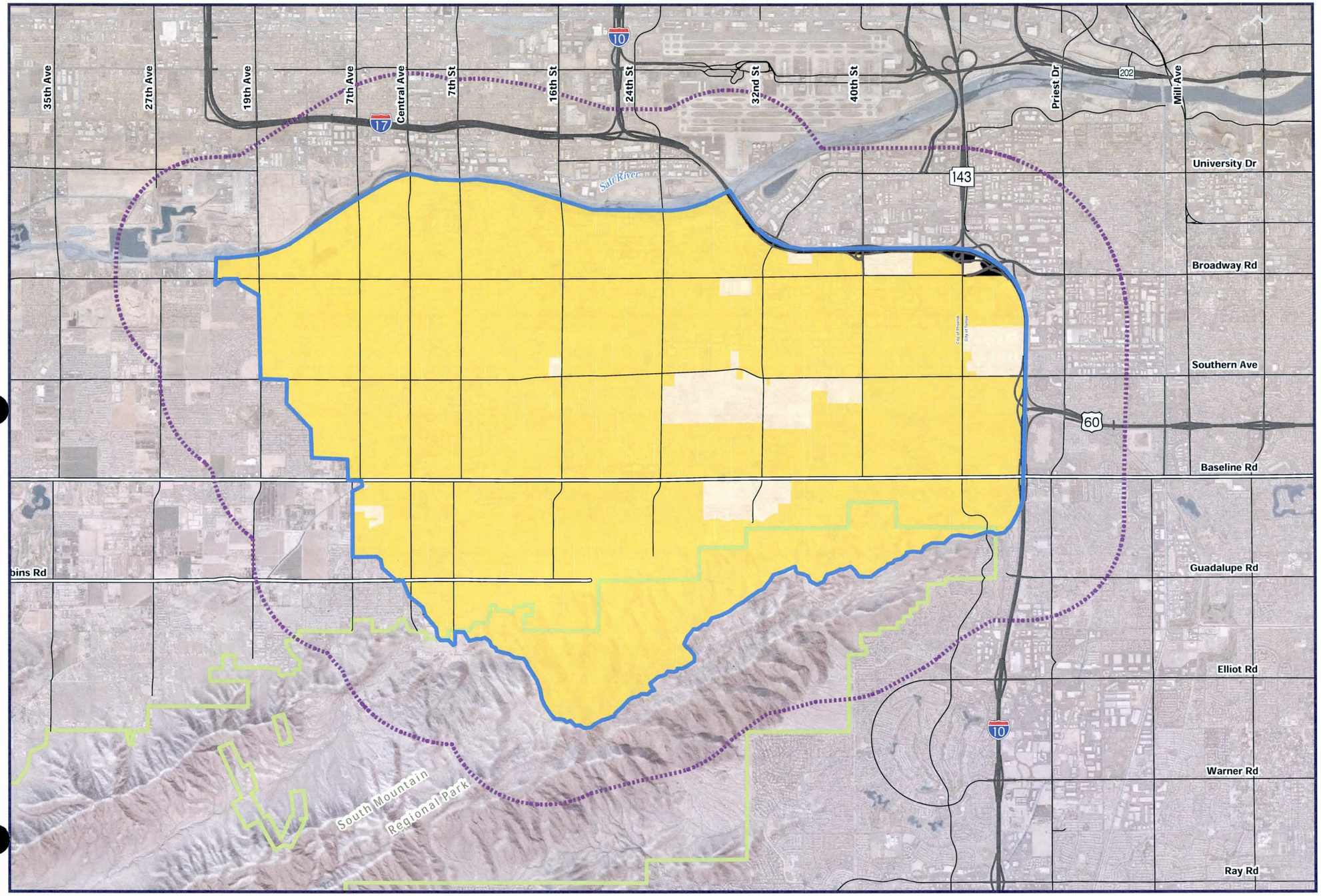
1 inch = 1 miles

N

Sources: City of Phoenix and Maricopa County Flood Control District
Date: August 2011

Hohokam Area Drainage Master Study/Plan

Community Context
General Plan Categories Structure Types Acceptability



Acceptability Classes (Map Codes)

- 111110
- 111111
- Roads (Null)

1 = Acceptable, 0 = Unacceptable

Map Code Correlation Key

STRUCTURE TYPES	MAP CODE - 1 1 0 1 0 1
1 = Natural Structure	
2 = Underground Pipe	
3 = Channel Levee	
4 = Conveyance Channel	
5 = Storage Basin	
6 = Dam	

LEGEND KEY EXAMPLE: STRUCTURE TYPE ACCEPTABILITY

Map Unit	1 Natural Structure	2 Underground Pipe	3 Channel Levee	4 Conveyance Channel	5 Storage Basin	6 Dam
110101	1	1	0	1	0	1

**This Map Unit is Acceptable with Structures 1,2,4 & 6

Project Features

- Hohokam ADMP
- Hohokam ADMP Review Area

Reference Features

- Highway
- Major Arterial
- Scenic_Drives
- Rail
- Regional Park

0 1 2 Mile

1 inch = 1 miles

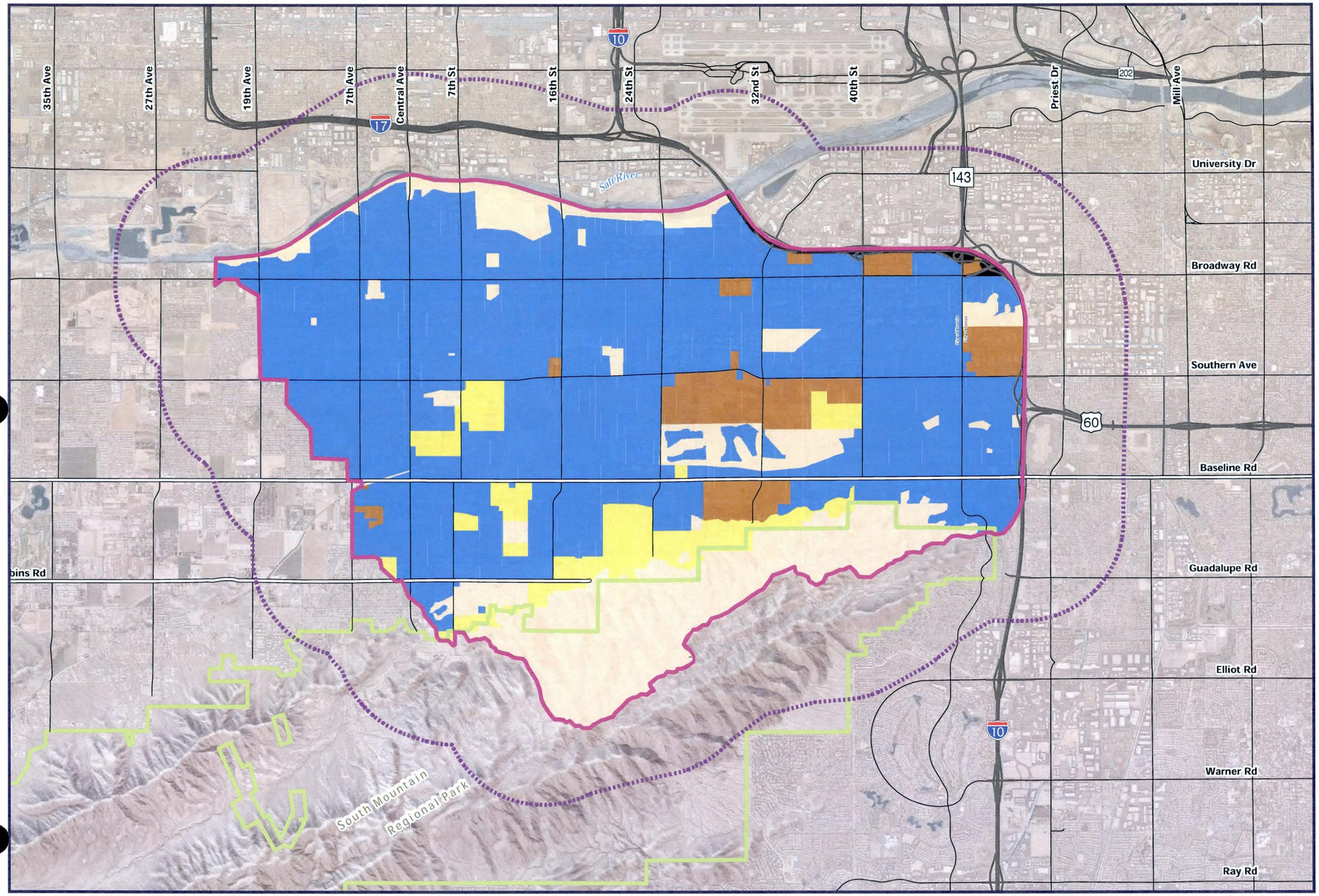
N

Sources: City of Phoenix and Maricopa County Flood Control District
Date: August 2011

Hohokam Area Drainage Master Study/Plan

Community Context

General Plan Categories Structural Methods Acceptability



Acceptability Classes (Map Codes)

- 111000
- 111100
- 111110
- 111111
- Roads (Null)

1 = Acceptable, 0 = Unacceptable

Map Code Correlation Key

STRUCTURAL METHODS	MAP CODE - 1 1 0 1 0 1
1 = Natural Method	
2 = Soft Structural	
3 = Semi-Soft Structural	
4 = Enhanced Hard Structural	
5 = Semi-Hard Structural	
6 = Hard Structural	

LEGEND KEY EXAMPLE: STRUCTURAL METHODS ACCEPTABILITY

Map Unit	1 Natural Method	2 Soft Structural	3 Semi-Soft Structural	4 Enhanced Hard Structural	5 Semi-Hard Structural	6 Hard Structural
110101	1	1	0	1	0	1

**This Map Unit is Acceptable with Structural Methods 1,2,4 & 6

Project Features

- Hohokam ADMP
- Hohokam ADMP Review Area

Reference Features

- Highway
- Major Arterial
- Scenic_Drives
- Rail
- Regional Park

0 1 2 Mile

1 inch = 1 miles

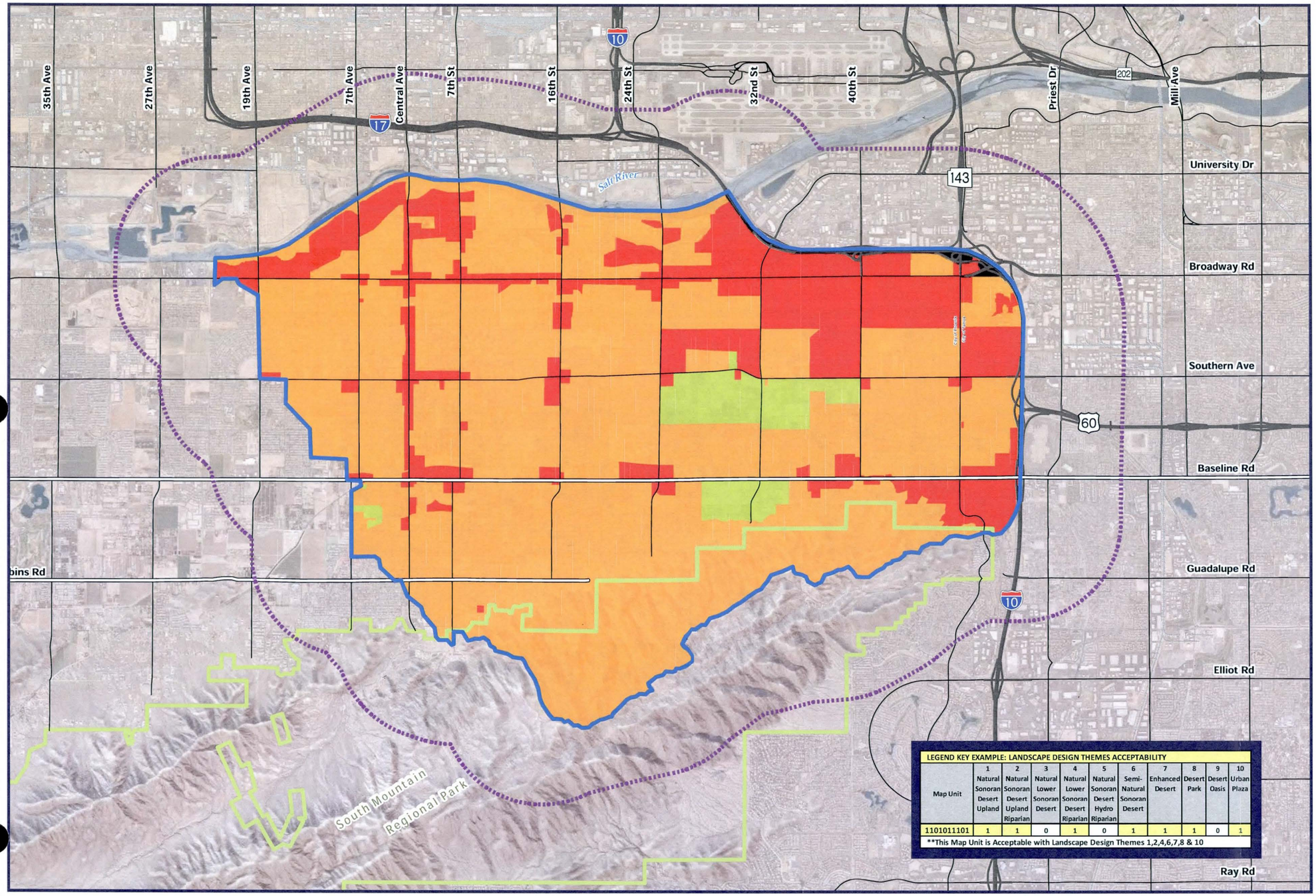
N

Sources: City of Phoenix and Maricopa County Flood Control District
Date: August 2011

Hohokam Area Drainage Master Study/Plan

Community Context

General Plan Categories Landscape Design Themes Acceptability



LEGEND KEY EXAMPLE: LANDSCAPE DESIGN THEMES ACCEPTABILITY

Map Unit	1 Natural Sonoran Desert Upland	2 Natural Sonoran Desert Upland Riparian	3 Natural Lower Sonoran Desert	4 Natural Lower Sonoran Desert Riparian	5 Natural Sonoran Desert Hydro Riparian	6 Semi-Natural Sonoran Desert	7 Enhanced Desert	8 Desert Park	9 Desert Oasis	10 Urban Plaza
1101011101	1	1	0	1	0	1	1	1	0	1

**This Map Unit is Acceptable with Landscape Design Themes 1,2,4,6,7,8 & 10

Acceptability Classes (Map Codes)

- 1111011110
- 1111111110
- 1111111111
- Roads (Null)

1 = Compatible, 0 = Incompatible
*Refer to Legend Key Example

Map Code Correlation Key

LANDSCAPE DESIGN THEMES	MAP CODE - 1101011101
1 = Natural Sonoran Desert Upland	
2 = Natural Sonoran Desert Upland Riparian	
3 = Natural Lower Sonoran Desert	
4 = Natural Lower Sonoran Desert Riparian	
5 = Natural Sonoran Desert Hydro Riparian	
6 = Semi-Natural Sonoran Desert	
7 = Enhanced Desert	
8 = Desert Park	
9 = Desert Oasis	
10 = Urban Plaza	

Project Features

- Hohokam ADMP
- Hohokam ADMP Review Area

Reference Features

- Highway
- Major Arterial
- Scenic_Drives
- Rail
- Regional Park

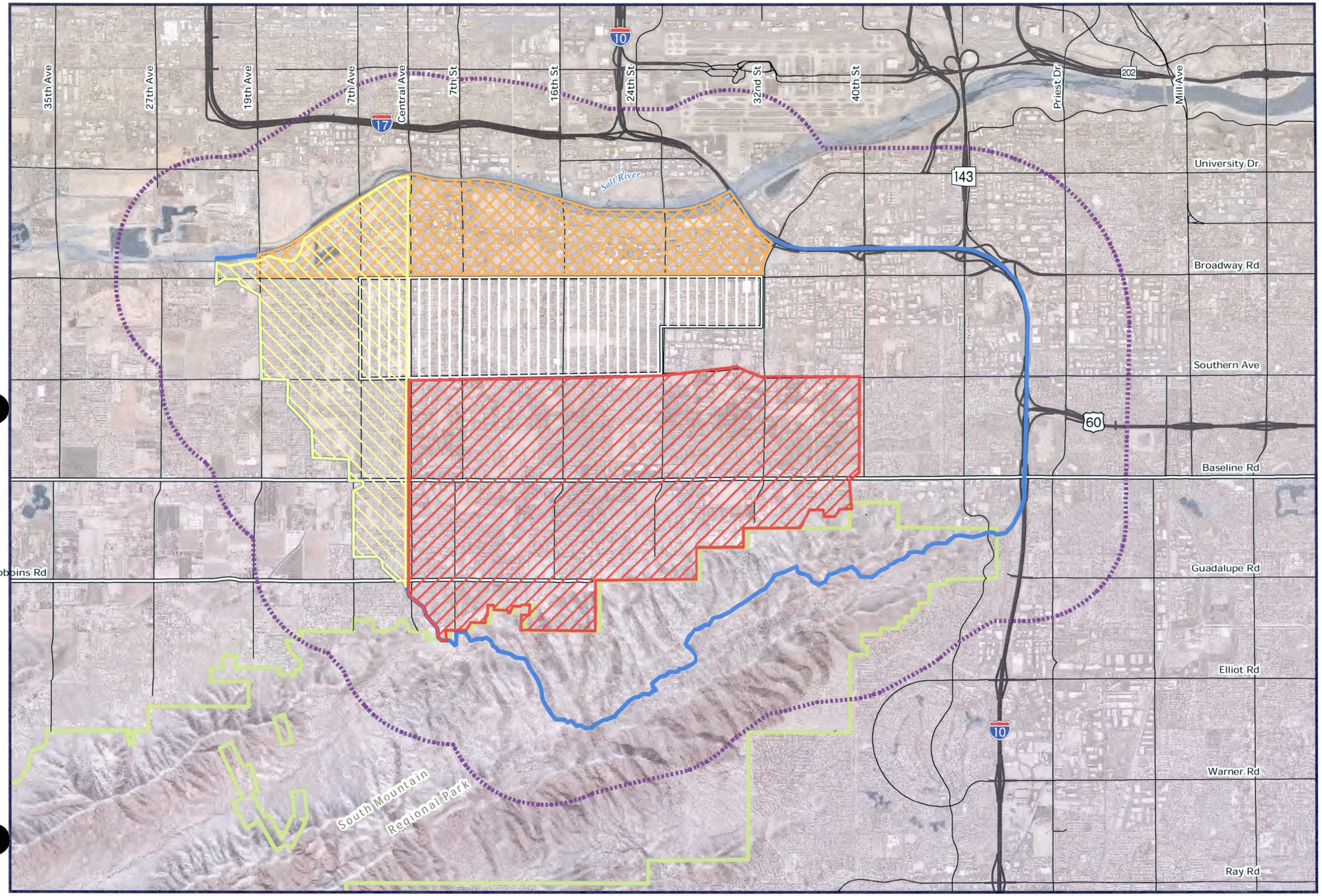
0 1 2 Mile
1 inch = 1 miles

N

Sources: City of Phoenix and Maricopa County Flood Control District
Date: August 2011

Hohokam Area Drainage Master Study/Plan

Community Context
Specific Area Plans



General Plan Categories

- Baseline Area Plan and Overlay Distrcit
- Rio Montana Plan
- Rio Salado Beyond the Banks Area Plan
- TargetAreaB

Project Features

- Hohokam ADMP
- Hohokam ADMP Review Area

Reference Features

- Highway
- Major Arterial
- Scenic_Drives
- Rail
- Regional Park

0 1 2 Mile

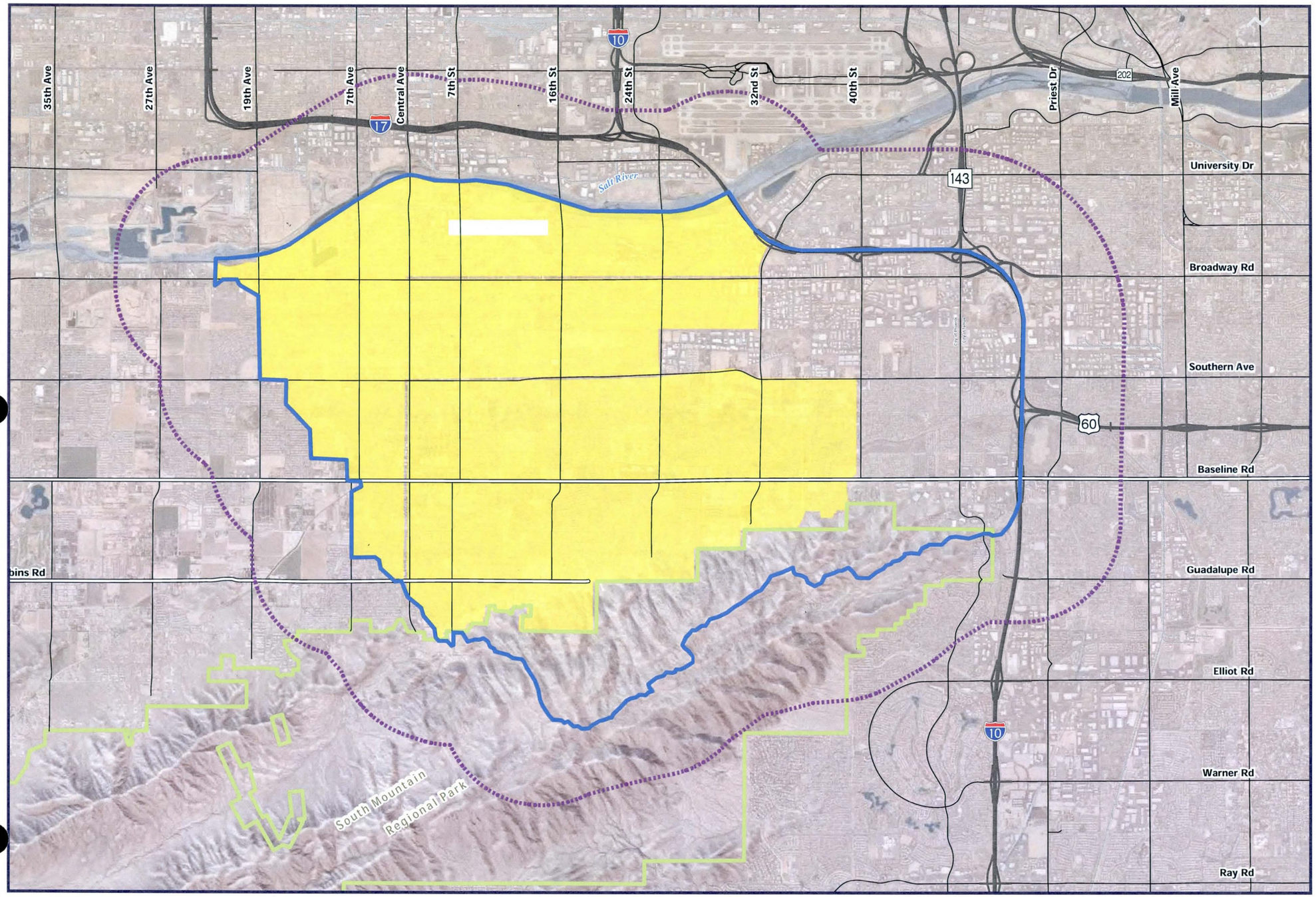
1 inch = 1 miles

N

Sources: City of Phoenix and Maricopa County Flood Control District
Date: August 2011

Hohokam Area Drainage Master Study/Plan

Community Context
Specific Area Plans Structure Types Acceptability



Acceptability Classes (Map Codes)

111110

1 = Acceptable, 0 = Unacceptable

Map Code Correlation Key

STRUCTURE TYPES	MAP CODE - 1 1 0 1 0 1
1 = Natural Structure	
2 = Underground Pipe	
3 = Channel Levee	
4 = Conveyance Channel	
5 = Storage Basin	
6 = Dam	

LEGEND KEY EXAMPLE: STRUCTURE TYPE ACCEPTABILITY						
Map Unit	1 Natural Structure	2 Undergro und Pipe	3 Channel Levee	4 Conveyance Channel	5 Storage Basin	6 Dam
110101	1	1	0	1	0	1
**This Map Unit is Acceptable with Structures 1,2,4 & 6						

Project Features

- Hohokam ADMP
- Hohokam ADMP Review Area

Reference Features

- Highway
- Major Arterial
- Scenic_Drives
- Rail
- Regional Park

0 1 2 Mile

1 inch = 1 miles

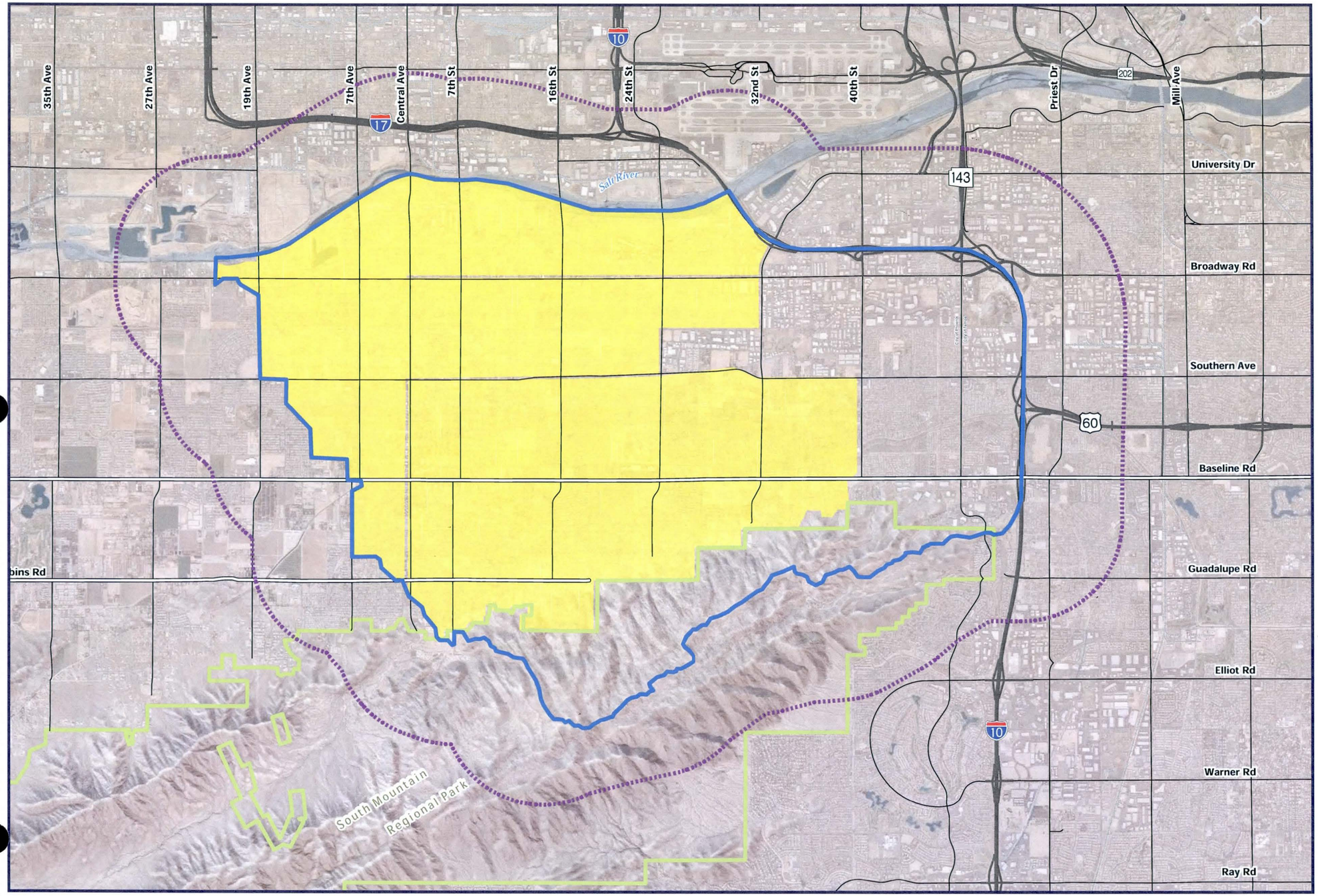
N

Sources: City of Phoenix and Maricopa County Flood Control District
Date: August 2011

Hohokam Area Drainage Master Study/Plan

Community Context

Specific Plan Plans Structural Methods Acceptability



Acceptability Classes (Map Codes)

111100

1 = Acceptable, 0 = Unacceptable

Map Code Correlation Key

STRUCTURAL METHODS	MAP CODE - 1 1 0 1 0 1
1 = Natural Method	
2 = Soft Structural	
3 = Semi-Soft Structural	
4 = Enhanced Hard Structural	
5 = Semi-Hard Structural	
6 = Hard Structural	

LEGEND KEY EXAMPLE: STRUCTURAL METHODS ACCEPTABILITY						
Map Unit	1 Natural Method	2 Soft Structural	3 Semi-Soft Structural	4 Enhanced Hard Structural	5 Semi-Hard Structural	6 Hard Structural
110101	1	1	0	1	0	1
**This Map Unit is Acceptable with Structural Methods 1,2,4 & 6						

Project Features

- Hohokam ADMP
- Hohokam ADMP Review Area

Reference Features

- Highway
- Major Arterial
- Scenic_Drives
- Rail
- Regional Park

0 1 2 Mile

1 inch = 1 miles

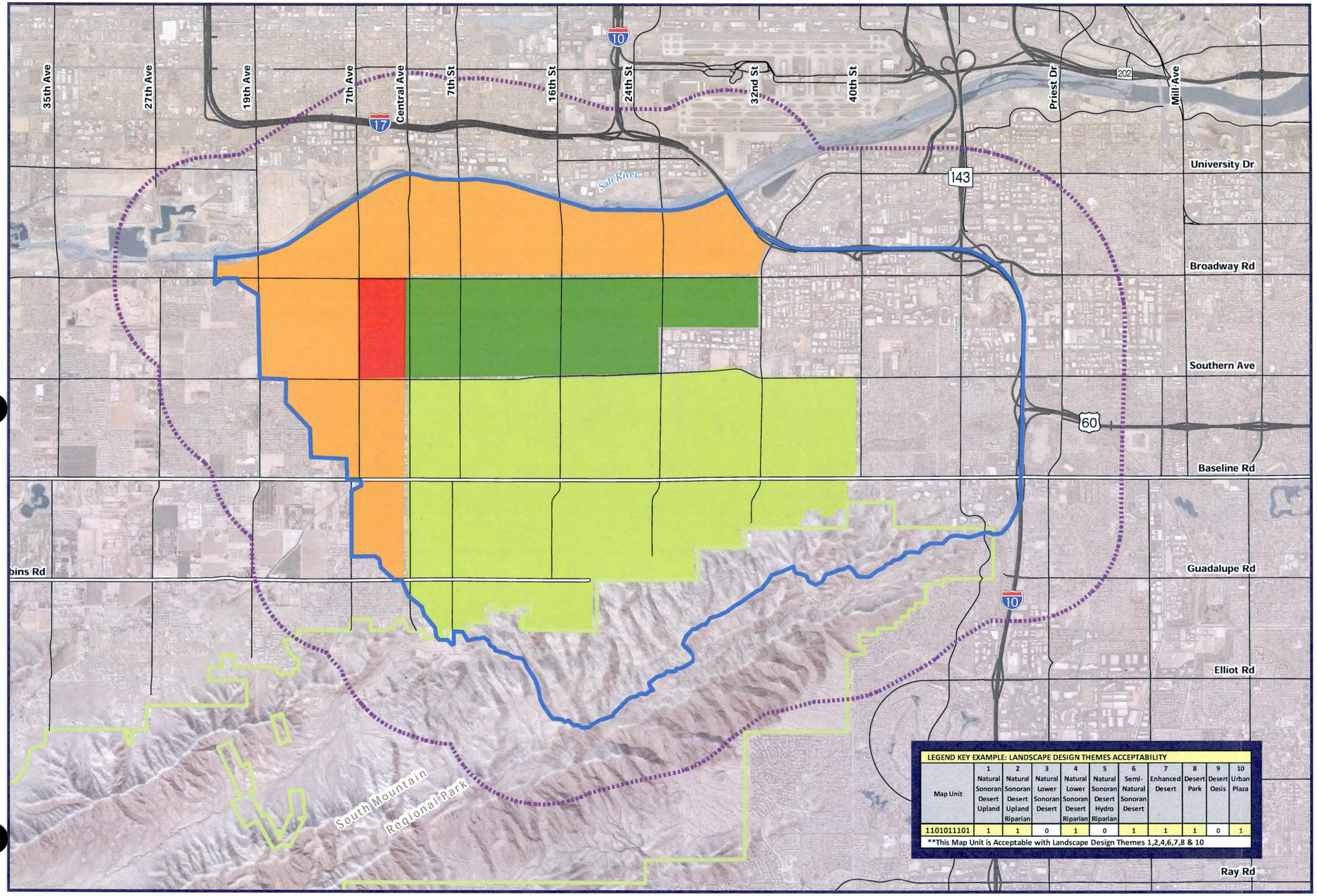
N

Sources: City of Phoenix and Maricopa County Flood Control District
Date: August 2011

Hohokam Area Drainage Master Study/Plan

Community Context

Specific Area Plans Landscape Design Themes Acceptability



LEGEND KEY EXAMPLE: LANDSCAPE DESIGN THEMES ACCEPTABILITY

Map Unit	1 Natural Sonoran Desert Upland	2 Natural Sonoran Desert Upland Riparian	3 Natural Lower Sonoran Desert	4 Natural Lower Sonoran Desert Riparian	5 Natural Sonoran Desert Hydro Riparian	6 Semi-Natural Sonoran Desert	7 Enhanced Desert	8 Desert Park	9 Desert Oasis	10 Urban Plaza
1101011101	1	1	0	1	0	1	1	1	0	1

**This Map Unit is Acceptable with Landscape Design Themes 1,2,4,6,7,8 & 10

Acceptability Classes (Map Codes)

- 0011011111
- 0011111111
- 1111011100
- 1111011111

1 = Compatible, 0 = Incompatible
*Refer to Legend Key Example

Map Code Correlation Key

LANDSCAPE DESIGN THEMES	MAP CODE - 1101011101
1 = Natural Sonoran Desert Upland	
2 = Natural Sonoran Desert Upland Riparian	
3 = Natural Lower Sonoran Desert	
4 = Natural Lower Sonoran Desert Riparian	
5 = Natural Sonoran Desert Hydro Riparian	
6 = Semi-Natural Sonoran Desert	
7 = Enhanced Desert	
8 = Desert Park	
9 = Desert Oasis	
10 = Urban Plaza	

Project Features

- Hohokam ADMP
- Hohokam ADMP Review Area

Reference Features

- Highway
- Major Arterial
- Scenic_Drives
- Rail
- Regional Park

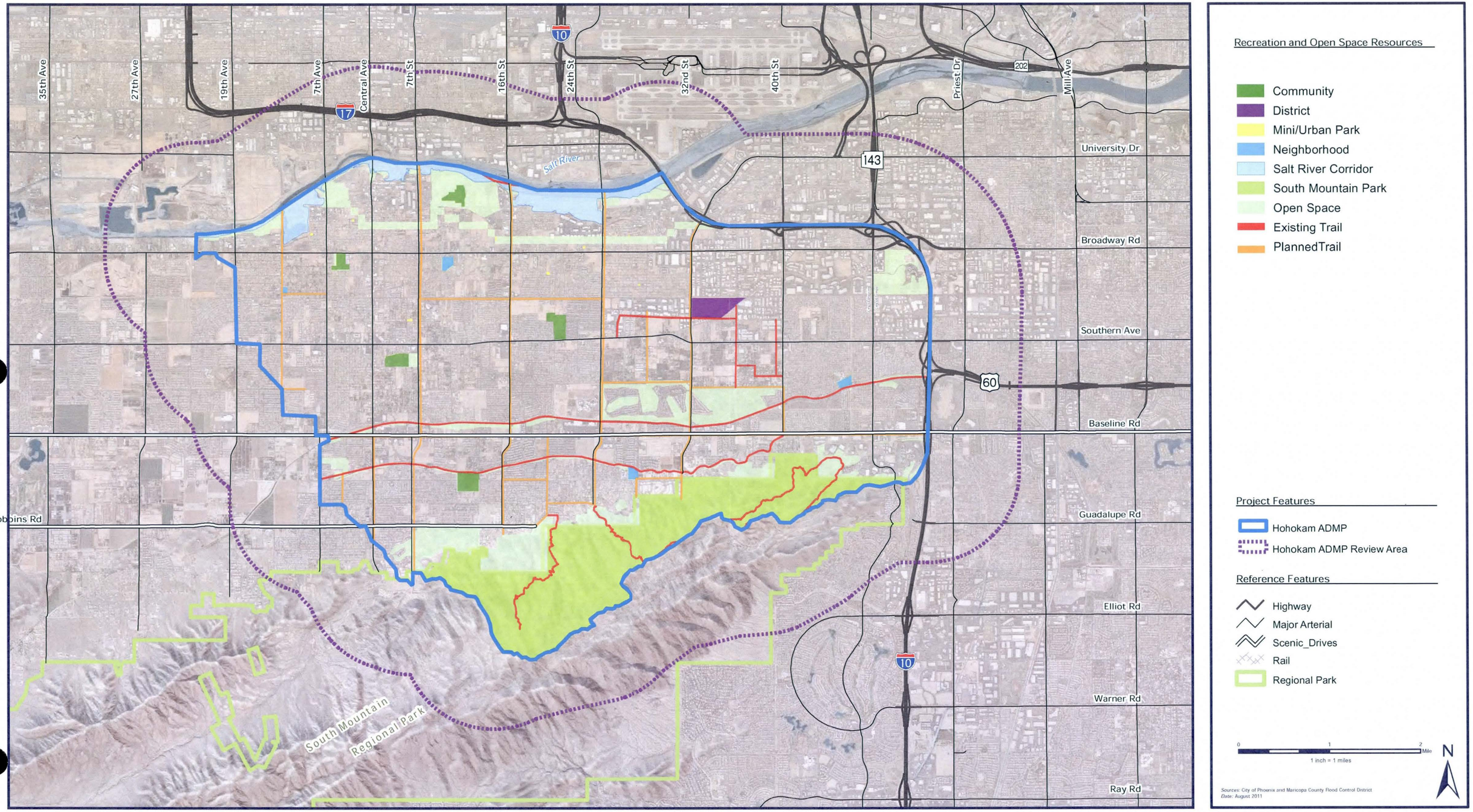
0 1 2 Mile
1 inch = 1 miles

N

Sources: City of Phoenix and Maricopa County Flood Control District
Date: August 2011

Hohokam Area Drainage Master Study/Plan

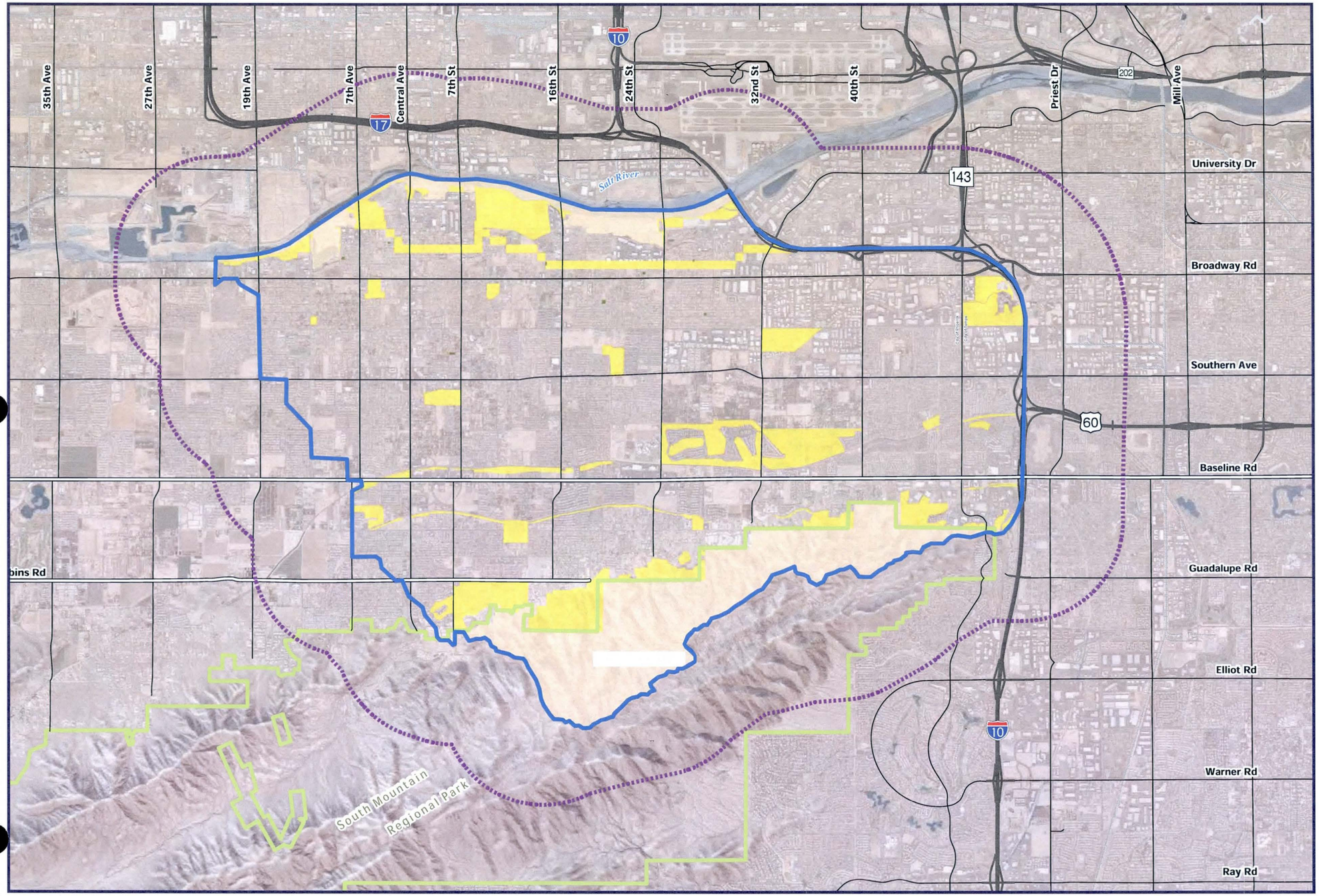
Community Context
Recreation and Open Space Resources



Hohokam Area Drainage Master Study/Plan

Community Context

Recreation and Open Space Resources Structure Types Acceptability



Acceptability Classes (Map Codes)

- 010000
- 110110
- 111111

1 = Acceptable, 0 = Unacceptable

Map Code Correlation Key

STRUCTURE TYPES	MAP CODE - 1 1 0 1 0 1
1 = Natural Structure	
2 = Underground Pipe	
3 = Channel Levee	
4 = Conveyance Channel	
5 = Storage Basin	
6 = Dam	

LEGEND KEY EXAMPLE: STRUCTURE TYPE ACCEPTABILITY

Map Unit	1 Natural Structure	2 Undergro und Pipe	3 Channel Levee	4 Conveyance Channel	5 Storage Basin	6 Dam
110101	1	1	0	1	0	1

**This Map Unit is Acceptable with Structures 1,2,4 & 6

Project Features

- Hohokam ADMP
- Hohokam ADMP Review Area

Reference Features

- Highway
- Major Arterial
- Scenic_Drives
- Rail
- Regional Park

0 1 2 Mile

1 inch = 1 miles

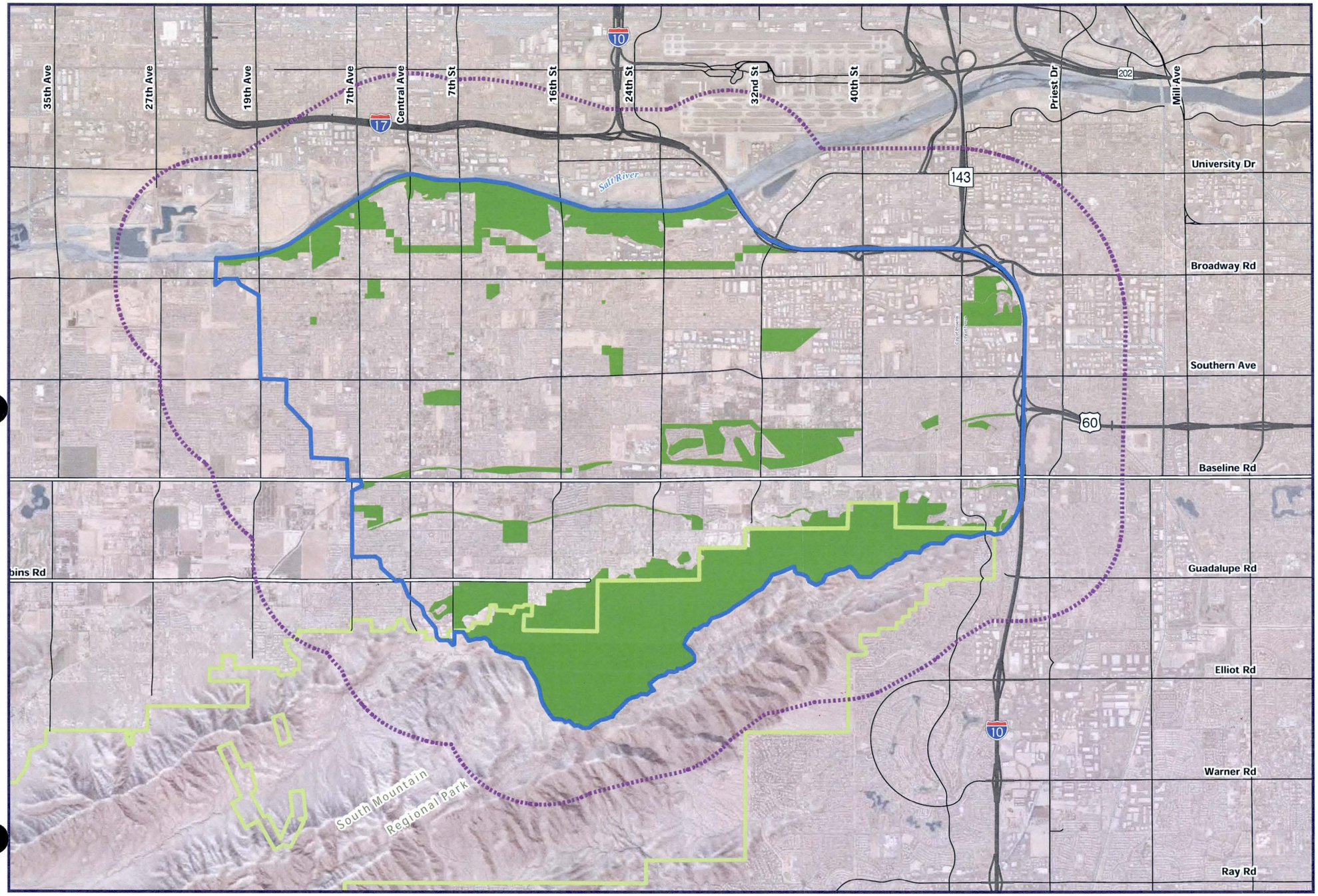
N

Sources: City of Phoenix and Maricopa County Flood Control Dstrict
Date: August 2011

Hohokam Area Drainage Master Study/Plan

Community Context

Recreation and Open Space Resources Structural Methods Acceptability



Acceptability Classes (Map Codes)

111000

1 = Acceptable, 0 = Unacceptable

Map Code Correlation Key

STRUCTURAL METHODS	MAP CODE - 1 1 0 1 0 1
1 = Natural Method	
2 = Soft Structural	
3 = Semi-Soft Structural	
4 = Enhanced Hard Structural	
5 = Semi-Hard Structural	
6 = Hard Structural	

LEGEND KEY EXAMPLE: STRUCTURAL METHODS ACCEPTABILITY						
Map Unit	1 Natural Method	2 Soft Structural	3 Semi-Soft Structural	4 Enhanced Hard Structural	5 Semi-Hard Structural	6 Hard Structural
110101	1	1	0	1	0	1
**This Map Unit is Acceptable with Structural Methods 1,2,4 & 6						

Project Features

- Hohokam ADMP
- Hohokam ADMP Review Area

Reference Features

- Highway
- Major Arterial
- Scenic_Drives
- Rail
- Regional Park

0 1 2 Mile

1 inch = 1 miles

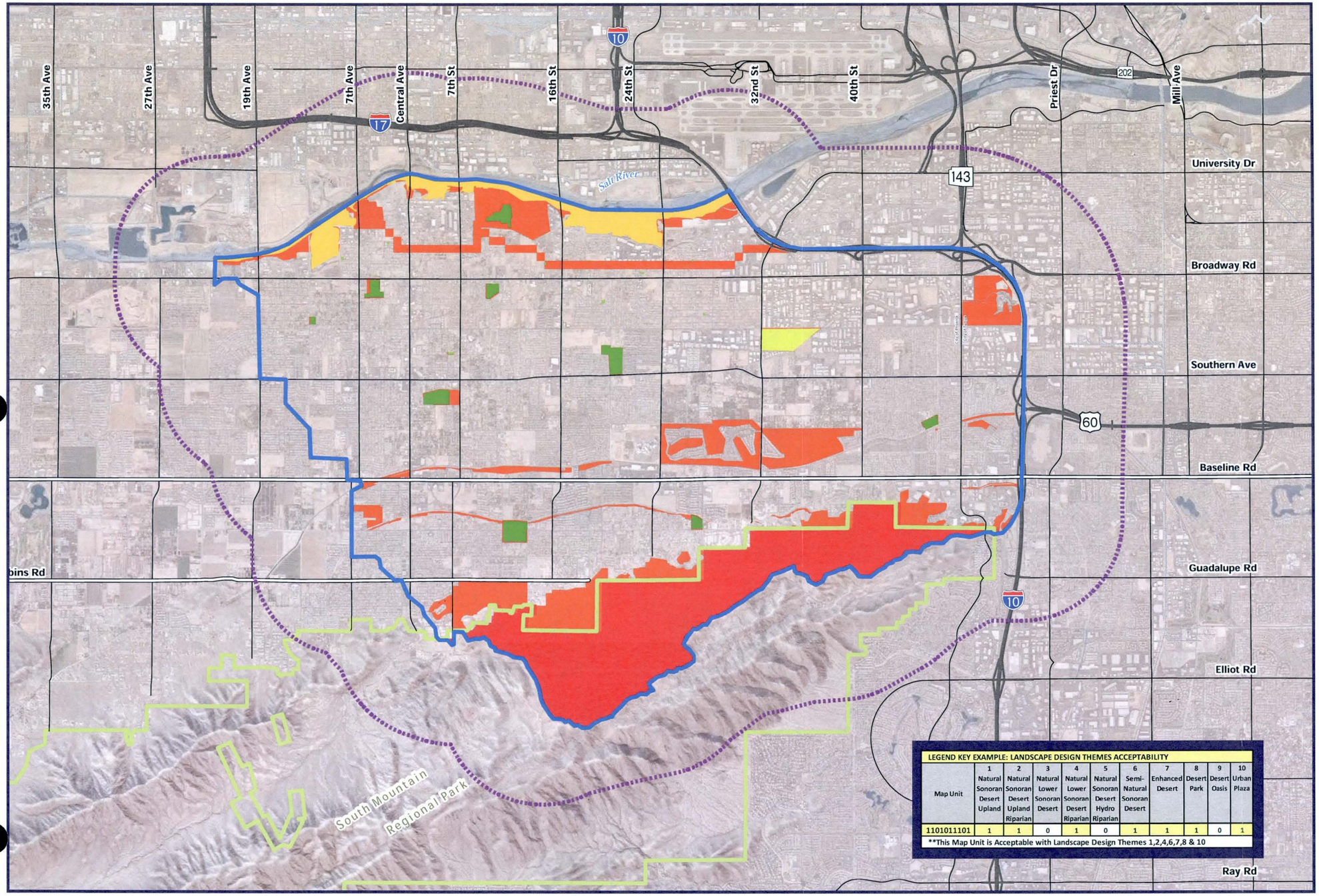
N

Sources: City of Phoenix and Maricopa County Flood Control District
Date: August 2011

Hohokam Area Drainage Master Study/Plan

Community Context

Recreation & Open Space Resources Landscape Design Themes Acceptability



LEGEND KEY EXAMPLE: LANDSCAPE DESIGN THEMES ACCEPTABILITY

Map Unit	1 Natural Sonoran Desert Upland	2 Natural Sonoran Desert Upland Riparian	3 Natural Lower Sonoran Desert	4 Natural Lower Sonoran Desert Riparian	5 Natural Sonoran Desert Hydro Riparian	6 Semi-Natural Sonoran Desert	7 Enhanced Desert	8 Desert Park	9 Desert Oasis	10 Urban Plaza
1101011101	1	1	0	1	0	1	1	1	0	1

**This Map Unit is Acceptable with Landscape Design Themes 1,2,4,6,7,8 & 10

Acceptability Classes (Map Codes)

- 0000011110
- 0000011111
- 0011111110
- 1111000000
- 1111100000
- 1111111110

1 = Compatible, 0 = Incompatible
*Refer to Legend Key Example

Map Code Correlation Key

LANDSCAPE DESIGN THEMES	MAP CODE - 1101011101
1 = Natural Sonoran Desert Upland	
2 = Natural Sonoran Desert Upland Riparian	
3 = Natural Lower Sonoran Desert	
4 = Natural Lower Sonoran Desert Riparian	
5 = Natural Sonoran Desert Hydro Riparian	
6 = Semi-Natural Sonoran Desert	
7 = Enhanced Desert	
8 = Desert Park	
9 = Desert Oasis	
10 = Urban Plaza	

Project Features

- Hohokam ADMP
- Hohokam ADMP Review Area

Reference Features

- Highway
- Major Arterial
- Scenic_Drives
- Rail
- Regional Park

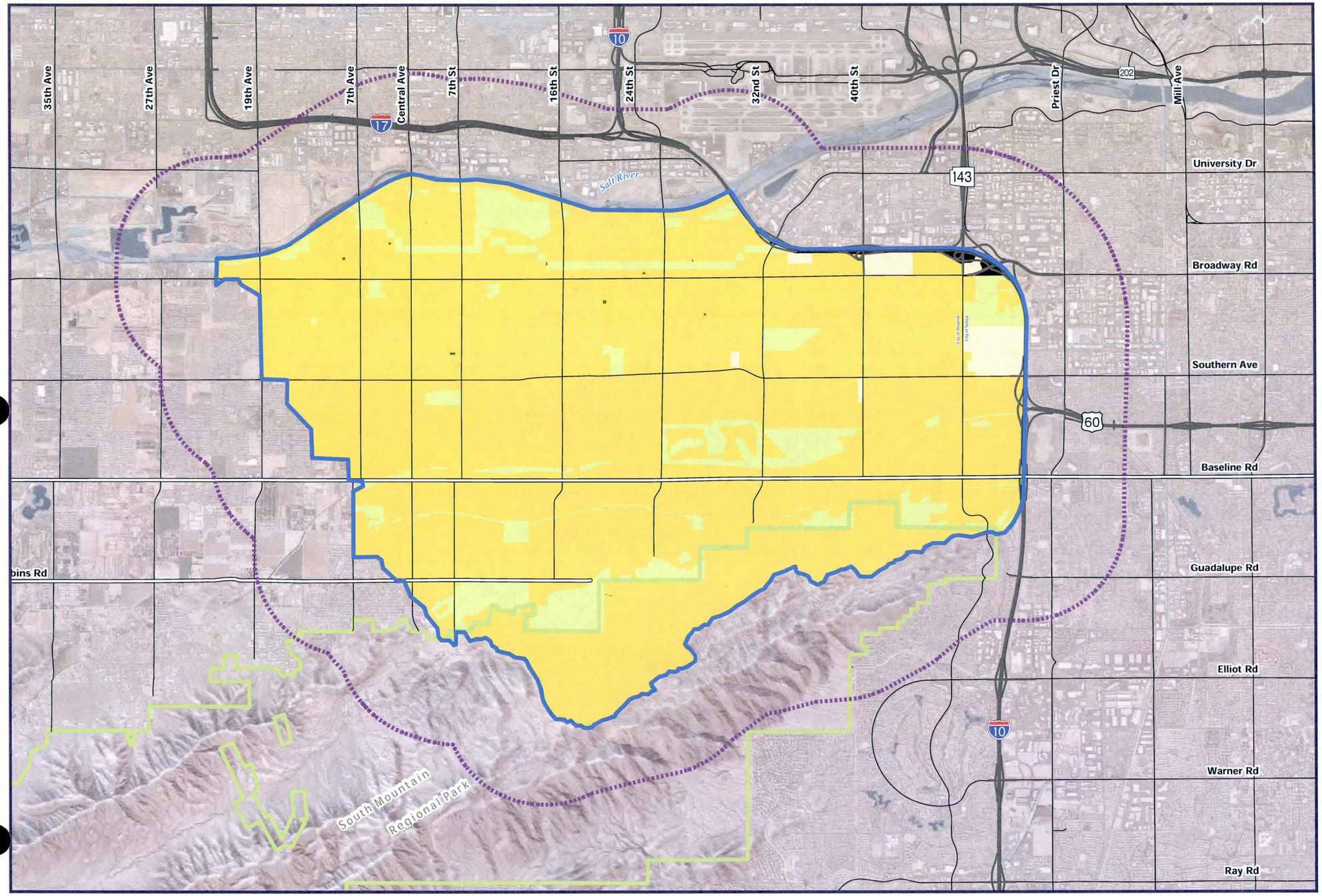
0 1 2 Mile
1 inch = 1 miles

N

Sources: City of Phoenix and Maricopa County Flood Control District
Date: August 2011

Hohokam Area Drainage Master Study/Plan

Community Context
Structure Types Acceptability Map



Acceptability Classes (Map Codes)

- 010000
- 110110
- 111110
- 111111
- Roads (Null)

1 = Acceptable, 0 = Unacceptable

Map Code Correlation Key

STRUCTURE TYPES	MAP CODE - 1 1 0 1 0 1
1 = Natural Structure	
2 = Underground Pipe	
3 = Channel Levee	
4 = Conveyance Channel	
5 = Storage Basin	
6 = Dam	

LEGEND KEY EXAMPLE: STRUCTURE TYPE ACCEPTABILITY						
Map Unit	1 Natural Structure	2 Underground Pipe	3 Channel Levee	4 Conveyance Channel	5 Storage Basin	6 Dam
110101	1	1	0	1	0	1
**This Map Unit is Acceptable with Structures 1,2,4 & 6						

Project Features

- Hohokam ADMP
- Hohokam ADMP Review Area

Reference Features

- Highway
- Major Arterial
- Scenic_Drives
- Rail
- Regional Park

0 1 2 Mile

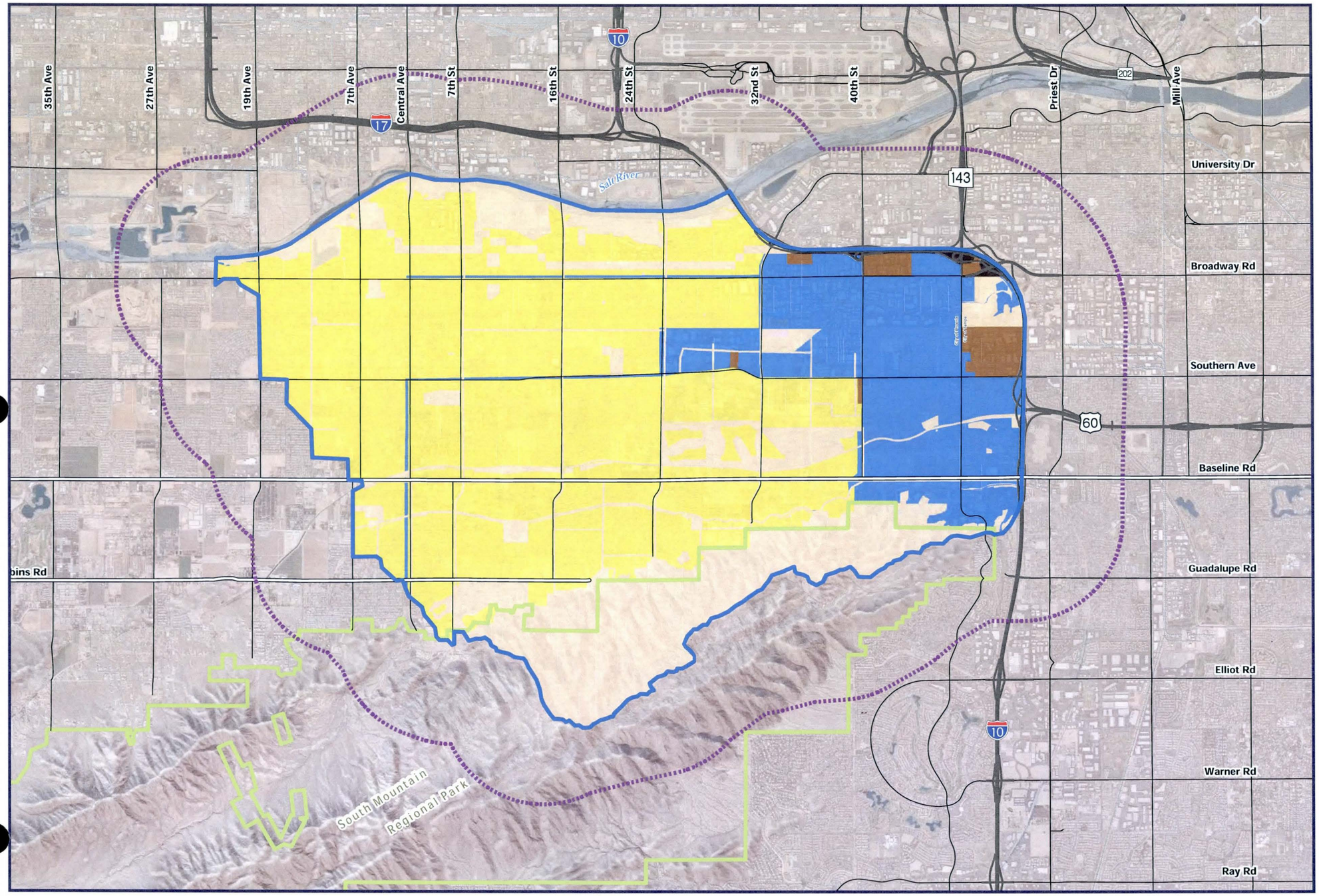
1 inch = 1 miles

N

Sources: City of Phoenix and Maricopa County Flood Control District
Date: August 2011

Hohokam Area Drainage Master Study/Plan

Community Context
Structural Methods Acceptability Map



Acceptability Classes (Map Codes)

- 111000
- 111100
- 111110
- 111111
- Roads (Null)

1 = Acceptable, 0 = Unacceptable

Map Code Correlation Key

STRUCTURAL METHODS	MAP CODE - 1 1 0 1 0 1
1 = Natural Method	
2 = Soft Structural	
3 = Semi-Soft Structural	
4 = Enhanced Hard Structural	
5 = Semi-Hard Structural	
6 = Hard Structural	

LEGEND KEY EXAMPLE: STRUCTURAL METHODS ACCEPTABILITY						
Map Unit	1 Natural Method	2 Soft Structural	3 Semi-Soft Structural	4 Enhanced Hard Structural	5 Semi-Hard Structural	6 Hard Structural
110101	1	1	0	1	0	1
**This Map Unit is Acceptable with Structural Methods 1,2,4 & 6						

Project Features

- Hohokam ADMP
- Hohokam ADMP Review Area

Reference Features

- Highway
- Major Arterial
- Scenic_Drives
- Rail
- Regional Park

0 1 2 Mile

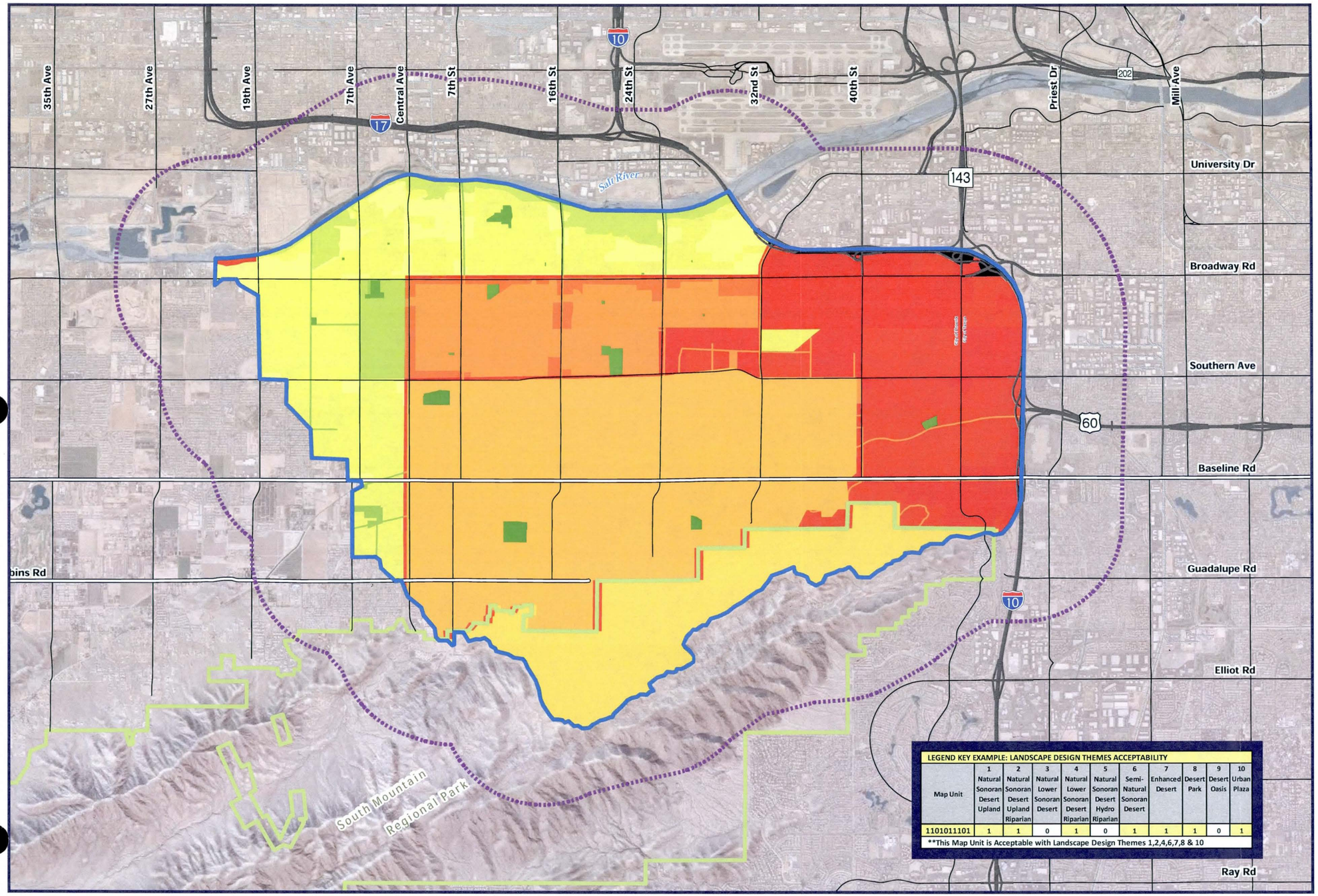
1 inch = 1 miles

N

Sources: City of Phoenix and Maricopa County Flood Control District
Date: August 2011

Hohokam Area Drainage Master Study/Plan

Community Context
Landscape Design Themes Acceptability Map



LEGEND KEY EXAMPLE: LANDSCAPE DESIGN THEMES ACCEPTABILITY										
Map Unit	1 Natural Sonoran Desert Upland	2 Natural Sonoran Desert Upland Riparian	3 Natural Lower Sonoran Desert	4 Natural Lower Sonoran Desert Riparian	5 Natural Sonoran Desert Hydro Riparian	6 Semi-Natural Sonoran Desert	7 Enhanced Desert	8 Desert Park	9 Desert Oasis	10 Urban Plaza
1101011101	1	1	0	1	0	1	1	1	0	1
**This Map Unit is Acceptable with Landscape Design Themes 1,2,4,6,7,8 & 10										

Acceptability Classes (Map Codes)

- 0000011100
- 0000011110
- 0000011111
- 0011000000
- 0011011110
- 0011011111
- 0011100000
- 0011111110
- 0011111111
- 1111000000
- 1111011100
- 1111011110
- 1111011111
- 1111100000
- 1111111110
- 1111111111
- Roads (Null)

1 = Compatible, 0 = Incompatible
*Refer to Legend Key Example

Map Code Correlation Key

LANDSCAPE DESIGN THEMES	MAP CODE - 1101011101
1 = Natural Sonoran Desert Upland	
2 = Natural Sonoran Desert Upland Riparian	
3 = Natural Lower Sonoran Desert	
4 = Natural Lower Sonoran Desert Riparian	
5 = Natural Sonoran Desert Hydro Riparian	
6 = Semi-Natural Sonoran Desert	
7 = Enhanced Desert	
8 = Desert Park	
9 = Desert Oasis	
10 = Urban Plaza	

Project Features

- Hohokam ADMP
- Hohokam ADMP Review Area

Reference Features

- Highway
- Major Arterial
- Scenic_Drives
- Rail
- Regional Park

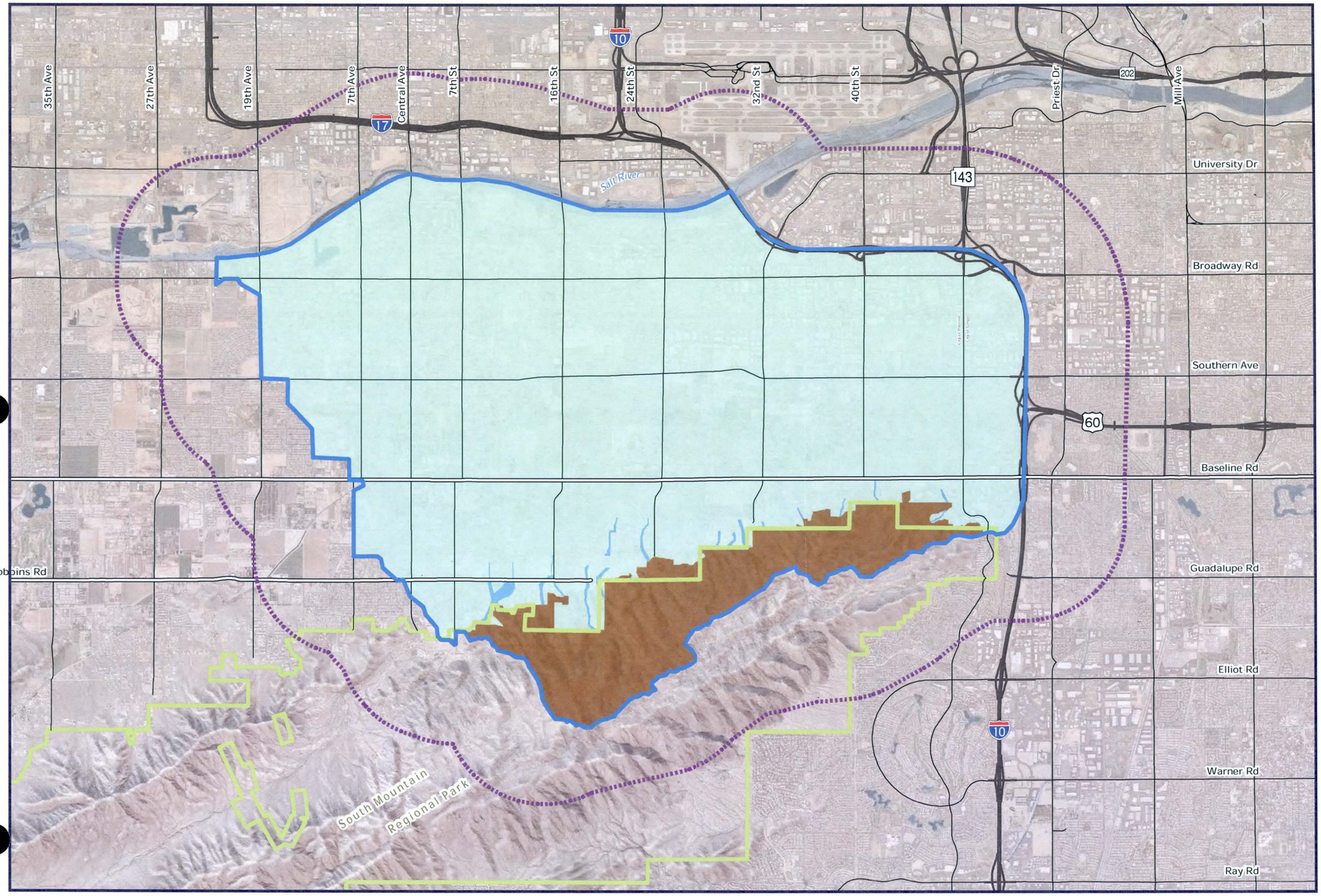
0 1 2 Mile
1 inch = 1 miles

N

Sources: City of Phoenix and Maricopa County Flood Control District
Date: August 2011

Hohokam Area Drainage Master Study/Plan

Flooding Context
Flooding Types



Flooding Types

- Revierine (Wash)
- Overland Sheet Flow
- South Mountain Park

Project Features

- Hohokam ADMP
- Hohokam ADMP Review Area

Reference Features

- Highway
- Major Arterial
- Scenic_Drives
- Rail
- Regional Park

0 1 2 Mile

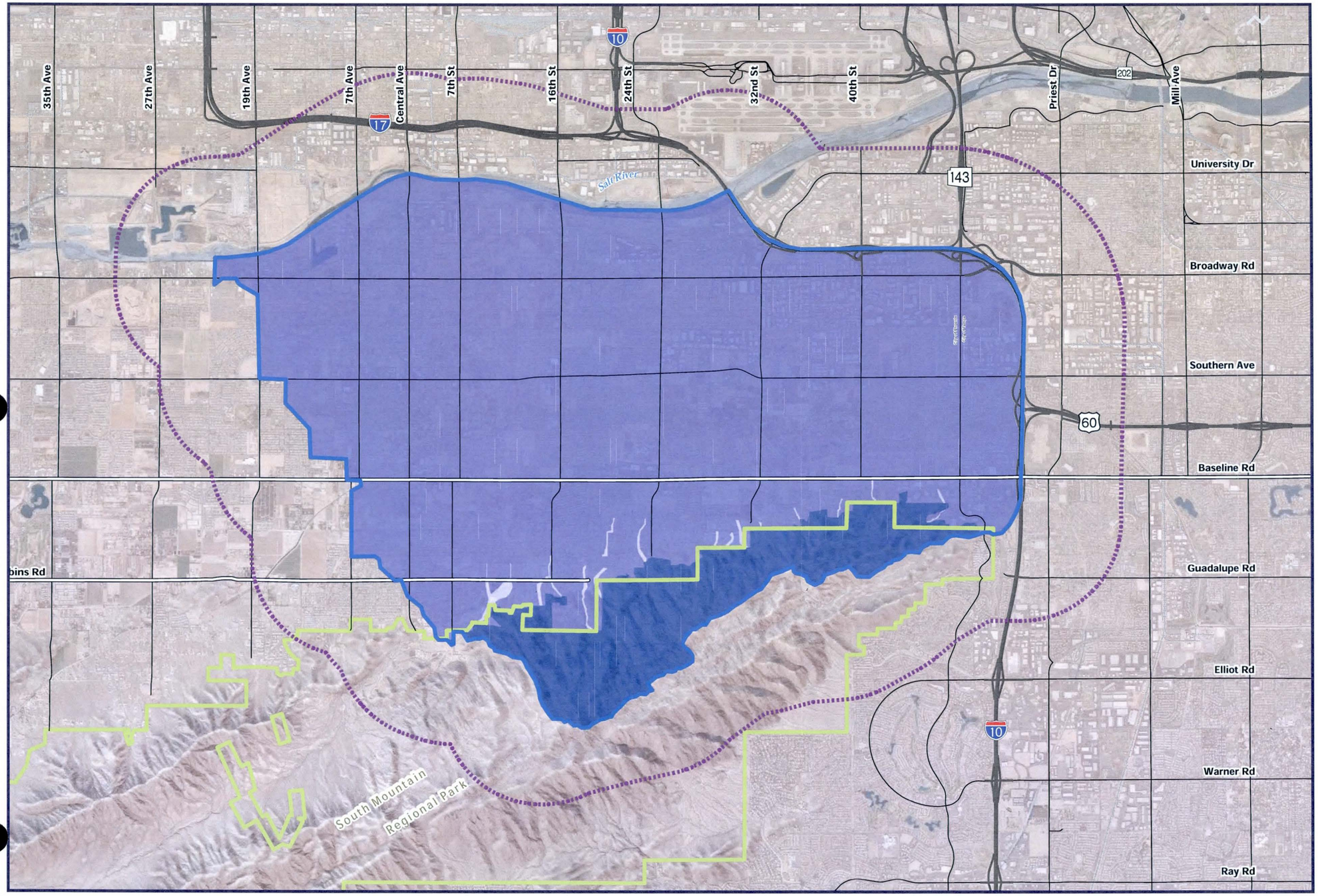
1 inch = 1 miles

N

Sources: City of Phoenix and Maricopa County Flood Control District
Date: August 2011

Hohokam Area Drainage Master Study/Plan

Flooding Context
Flooding Types Structure Types Effectiveness



Effectiveness Classes (Map Codes)

- 011100
- 011111
- 111111

1 = Effective, 0 = Ineffective

Map Code Correlation Key

STRUCTURE TYPES	MAP CODE - 1 1 0 1 0 1
1 = Natural Structure	
2 = Underground Pipe	
3 = Channel Levee	
4 = Conveyance Channel	
5 = Storage Basin	
6 = Dam	

LEGEND KEY EXAMPLE: STRUCTURE TYPE EFFECTIVENESS

Map Unit	1 Natural Structure	2 Undergro und Pipe	3 Channel Levee	4 Conveyance Channel	5 Storage Basin	6 Dam
110101	1	1	0	1	0	1

**This Map Unit is Effective with Structures 1,2,4 & 6

Project Features

- Hohokam ADMP
- Hohokam ADMP Review Area

Reference Features

- Highway
- Major Arterial
- Scenic_Drives
- Rail
- Regional Park

0 1 2 Mile

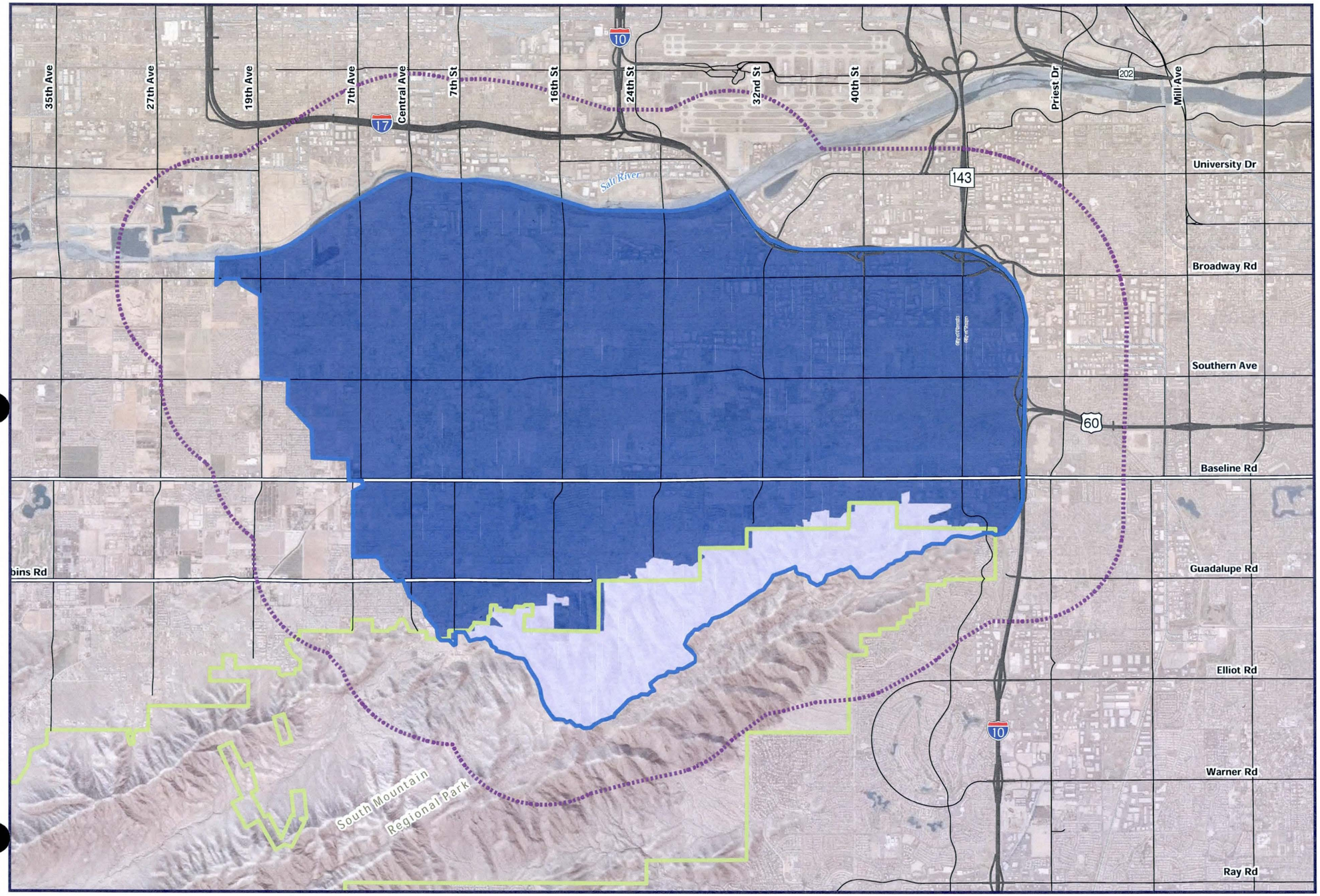
1 inch = 1 miles

N

Sources: City of Phoenix and Maricopa County Flood Control District
Date: August 2011

Hohokam Area Drainage Master Study/Plan

Flooding Context
Flooding Types Structural Methods Effectiveness



Effectiveness Classes (Map Codes)

- 011111
- 111111

1 = Effective, 0 = Ineffective

Map Code Correlation Key

STRUCTURAL METHODS	MAP CODE - 1 1 0 1 0 1
1 = Natural Method	
2 = Soft Structural	
3 = Semi-Soft Structural	
4 = Enhanced Hard Structural	
5 = Semi-Hard Structural	
6 = Hard Structural	

LEGEND KEY EXAMPLE: STRUCTURAL METHODS EFFECTIVENESS

Map Unit	1 Natural Method	2 Soft Structural	3 Semi-Soft Structural	4 Enhanced Hard Structural	5 Semi-Hard Structural	6 Hard Structural
110101	1	1	0	1	0	1

**This Map Unit is Effective with Structural Methods 1,2,4 & 6

Project Features

- Hohokam ADMP
- Hohokam ADMP Review Area

Reference Features

- Highway
- Major Arterial
- Scenic_Drives
- Rail
- Regional Park

0 1 2 Mile

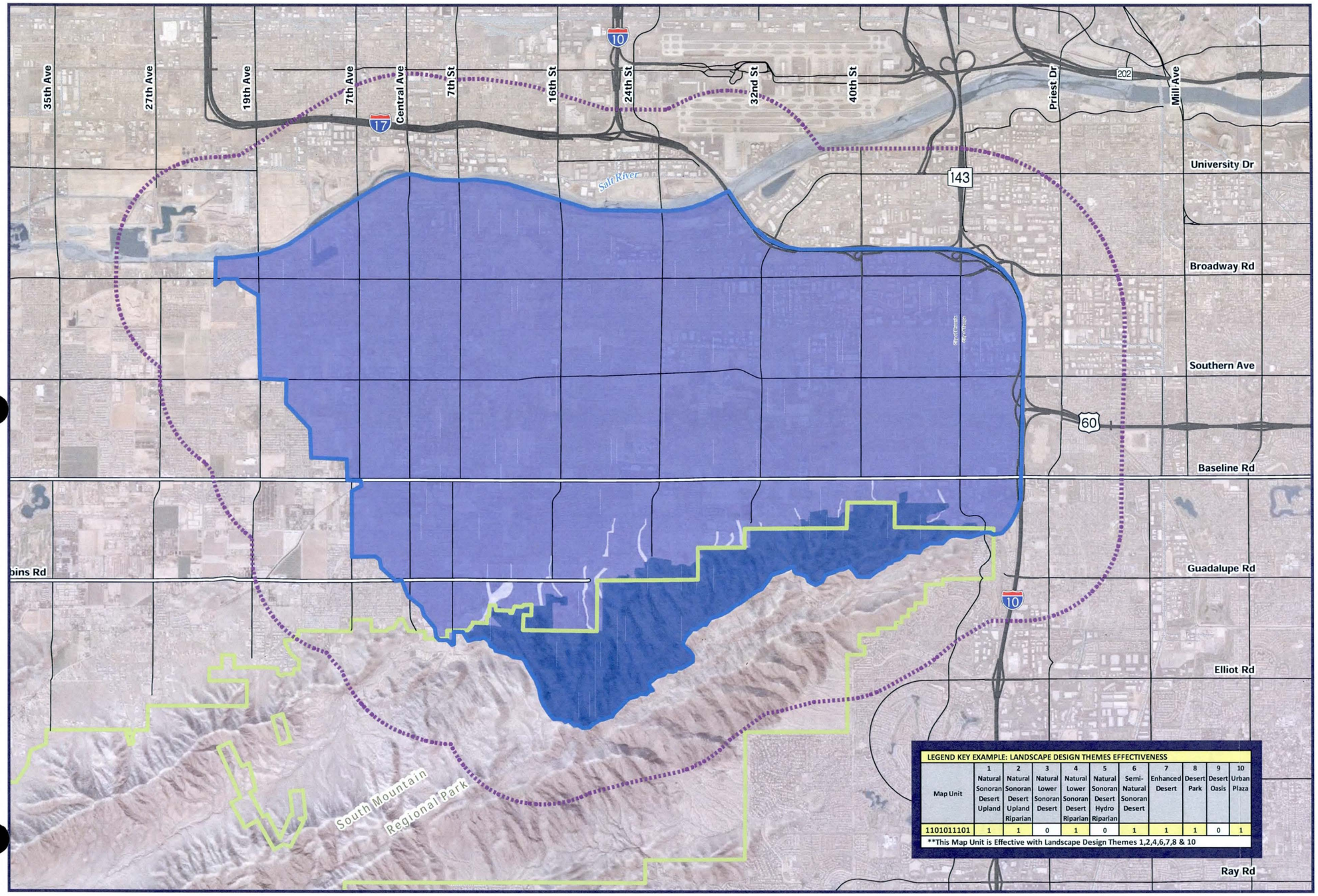
1 inch = 1 miles

N

Sources: City of Phoenix and Maricopa County Flood Control District
Date: August 2011

Hohokam Area Drainage Master Study/Plan

Flooding Context
Flooding Types Landscape Design Themes Effectiveness



LEGEND KEY EXAMPLE: LANDSCAPE DESIGN THEMES EFFECTIVENESS											
Map Unit	1 Natural Sonoran Desert Upland	2 Natural Sonoran Desert Upland Riparian	3 Natural Lower Sonoran Desert	4 Natural Lower Sonoran Desert Riparian	5 Natural Sonoran Desert Hydro Riparian	6 Semi-Natural Sonoran Desert	7 Enhanced Desert	8 Desert Park	9 Desert Oasis	10 Urban Plaza
1101011101	1	1	0	1	0	1	1	1	0	1
**This Map Unit is Effective with Landscape Design Themes 1,2,4,6,7,8 & 10										

Effectiveness Classes (Map Codes)

- 0011111100
- 0011111111
- 1111111111

1 = Effective, 0 = Ineffective
*Refer to Legend Key Example

Map Code Correlation Key

LANDSCAPE DESIGN THEMES	MAP CODE - 1101011101
1 = Natural Sonoran Desert Upland	
2 = Natural Sonoran Desert Upland Riparian	
3 = Natural Lower Sonoran Desert	
4 = Natural Lower Sonoran Desert Riparian	
5 = Natural Sonoran Desert Hydro Riparian	
6 = Semi-Natural Sonoran Desert	
7 = Enhanced Desert	
8 = Desert Park	
9 = Desert Oasis	
10 = Urban Plaza	

Project Features

- Hohokam ADMP
- Hohokam ADMP Review Area

Reference Features

- Highway
- Major Arterial
- Scenic_Drives
- Rail
- Regional Park

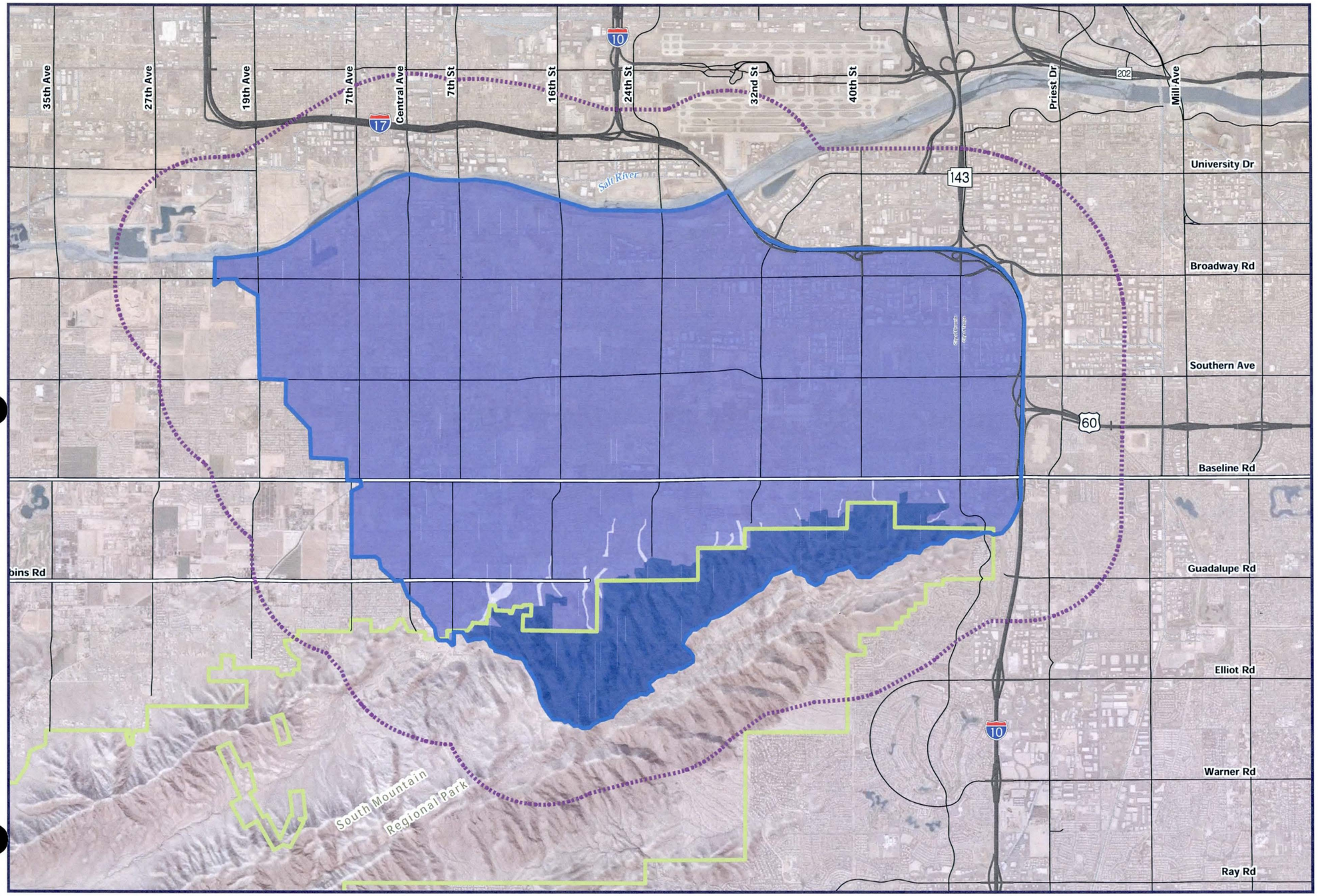
0 1 2 Mile
1 inch = 1 miles

N

Sources: City of Phoenix and Maricopa County Flood Control District
Date: August 2011

Hohokam Area Drainage Master Study/Plan

Flooding Context
Structure Types Effectiveness Map



Effectiveness Classes (Map Codes)

- 011100
- 011111
- 111111

1 = Effective, 0 = Ineffective

Map Code Correlation Key

STRUCTURE TYPES	MAP CODE - 1 1 0 1 0 1
1 = Natural Structure	
2 = Underground Pipe	
3 = Channel Levee	
4 = Conveyance Channel	
5 = Storage Basin	
6 = Dam	

LEGEND KEY EXAMPLE: STRUCTURE TYPE EFFECTIVENESS						
Map Unit	1 Natural Structure	2 Undergro und Pipe	3 Channel Levee	4 Conveyance Channel	5 Storage Basin	6 Dam
110101	1	1	0	1	0	1
**This Map Unit is Effective with Structures 1,2,4 & 6						

Project Features

- Hohokam ADMP
- Hohokam ADMP Review Area

Reference Features

- Highway
- Major Arterial
- Scenic_Drives
- Rail
- Regional Park

0 1 2 Mile

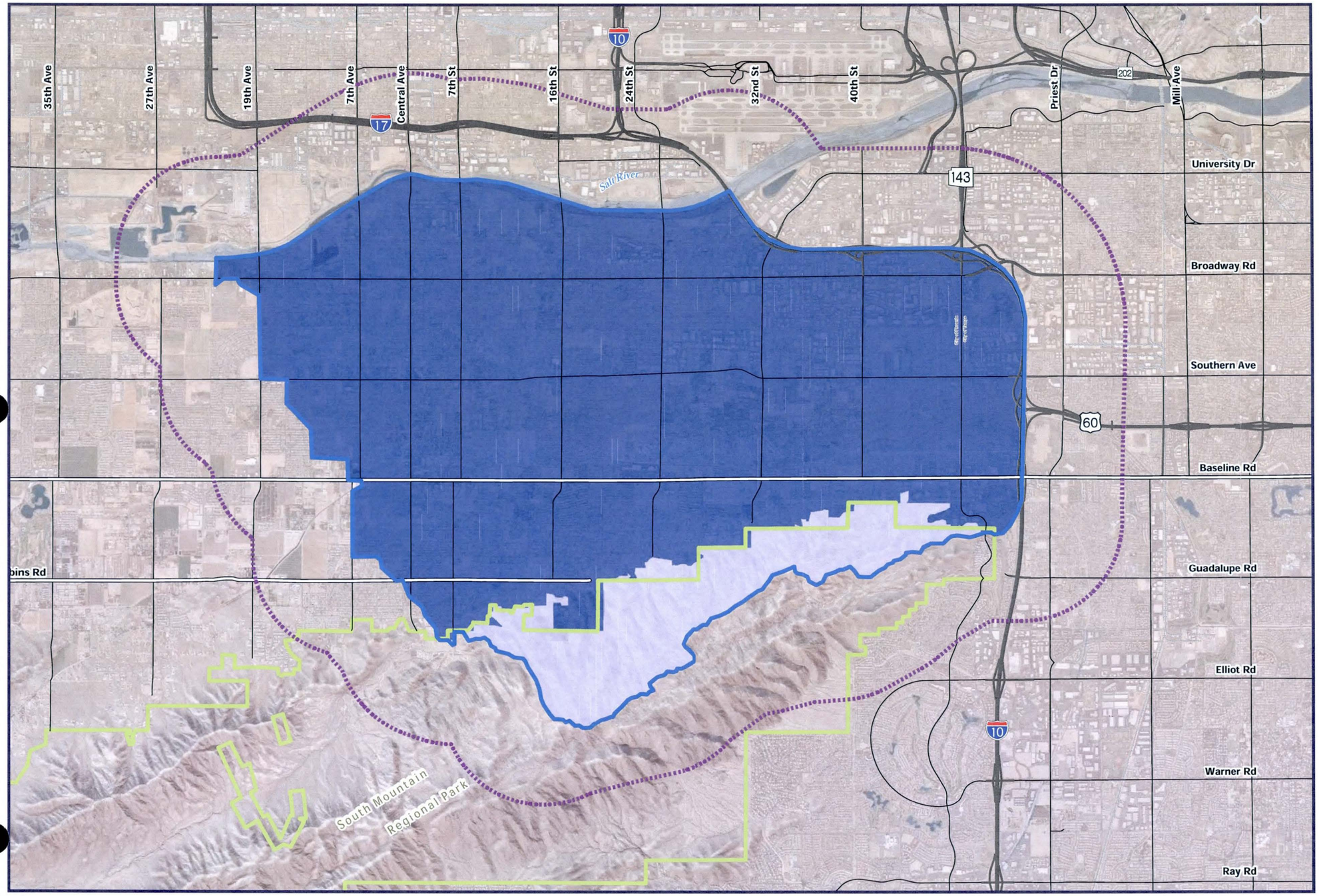
1 inch = 1 miles

N

Sources: City of Phoenix and Maricopa County Flood Control District
Date: August 2011

Hohokam Area Drainage Master Study/Plan

Flooding Context
Structural Methods Effectiveness Map



Effectiveness Classes (Map Codes)

- 011111
- 111111

1 = Effective, 0 = Ineffective

Map Code Correlation Key

STRUCTURAL METHODS	MAP CODE - 1 1 0 1 0 1
1 = Natural Method	
2 = Soft Structural	
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4 = Enhanced Hard Structural	
5 = Semi-Hard Structural	
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LEGEND KEY EXAMPLE: STRUCTURAL METHODS EFFECTIVENESS

Map Unit	1 Natural Method	2 Soft Structural	3 Semi-Soft Structural	4 Enhanced Hard Structural	5 Semi-Hard Structural	6 Hard Structural
110101	1	1	0	1	0	1

**This Map Unit is Effective with Structural Methods 1,2,4 & 6

Project Features

- Hohokam ADMP
- Hohokam ADMP Review Area

Reference Features

- Highway
- Major Arterial
- Scenic_Drives
- Rail
- Regional Park

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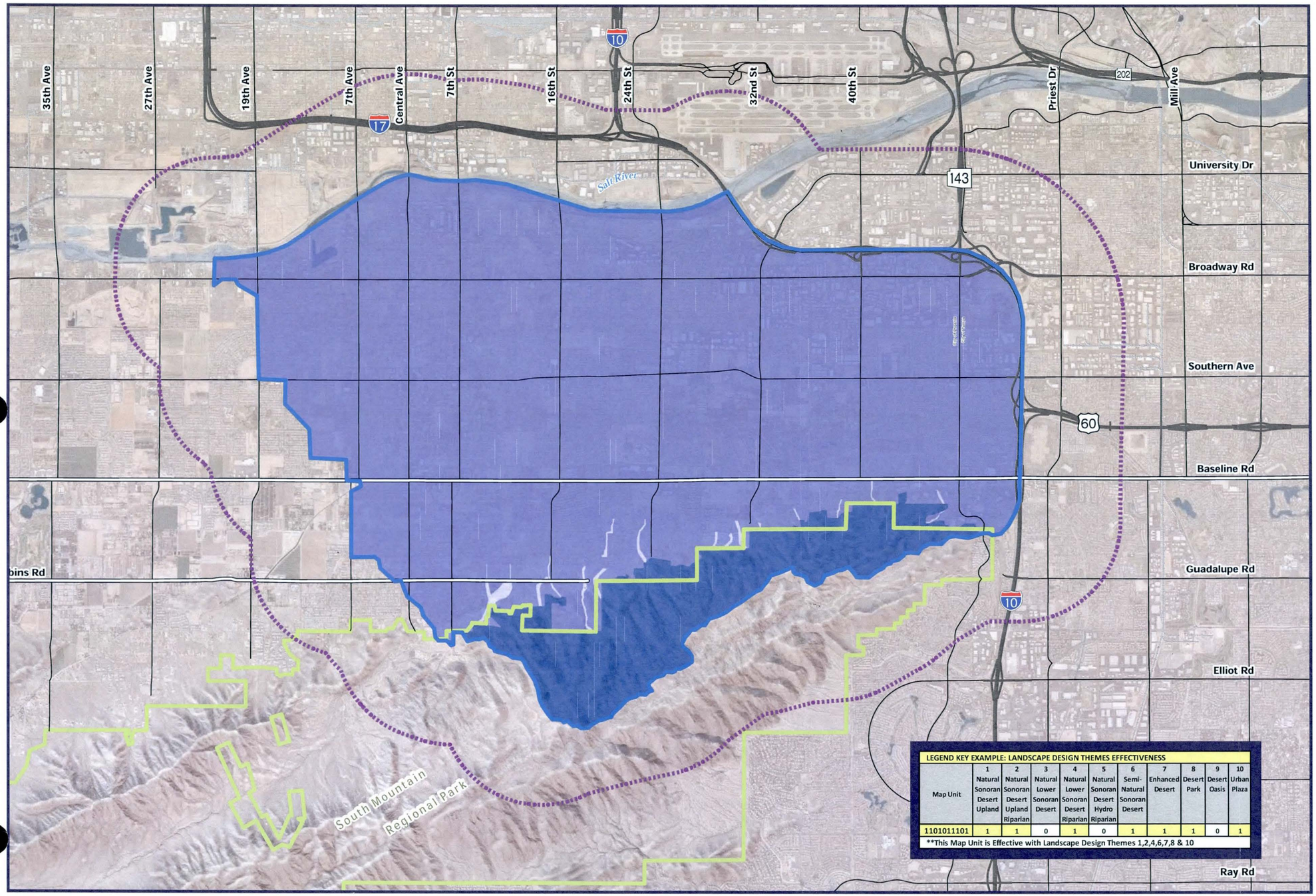
Sources: City of Phoenix and Maricopa County Flood Control District
Date: August 2011

Hohokam Area Drainage Master Study/Plan

Flooding Context
Landscape Design Themes Effectiveness Map



LEGEND KEY EXAMPLE: LANDSCAPE DESIGN THEMES EFFECTIVENESS											
Map Unit	1 Natural Sonoran Desert Upland	2 Natural Sonoran Desert Upland Riparian	3 Natural Lower Sonoran Desert	4 Natural Lower Sonoran Desert Riparian	5 Natural Sonoran Desert Hydro Riparian	6 Semi-Natural Sonoran Desert	7 Enhanced Desert	8 Desert Park	9 Desert Oasis	10 Urban Plaza
1101011101	1	1	0	1	0	1	1	1	0	1
**This Map Unit is Effective with Landscape Design Themes 1,2,4,6,7,8 & 10										

Effectiveness Classes (Map Codes)

- 0011111100
- 0011111111
- 1111111111

1 = Effective, 0 = Ineffective
*Refer to Legend Key Example

Map Code Correlation Key

LANDSCAPE DESIGN THEMES	MAP CODE - 1101011101
1 = Natural Sonoran Desert Upland	
2 = Natural Sonoran Desert Upland Riparian	
3 = Natural Lower Sonoran Desert	
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5 = Natural Sonoran Desert Hydro Riparian	
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Project Features

- Hohokam ADMP
- Hohokam ADMP Review Area

Reference Features

- Highway
- Major Arterial
- Scenic_Drives
- Rail
- Regional Park

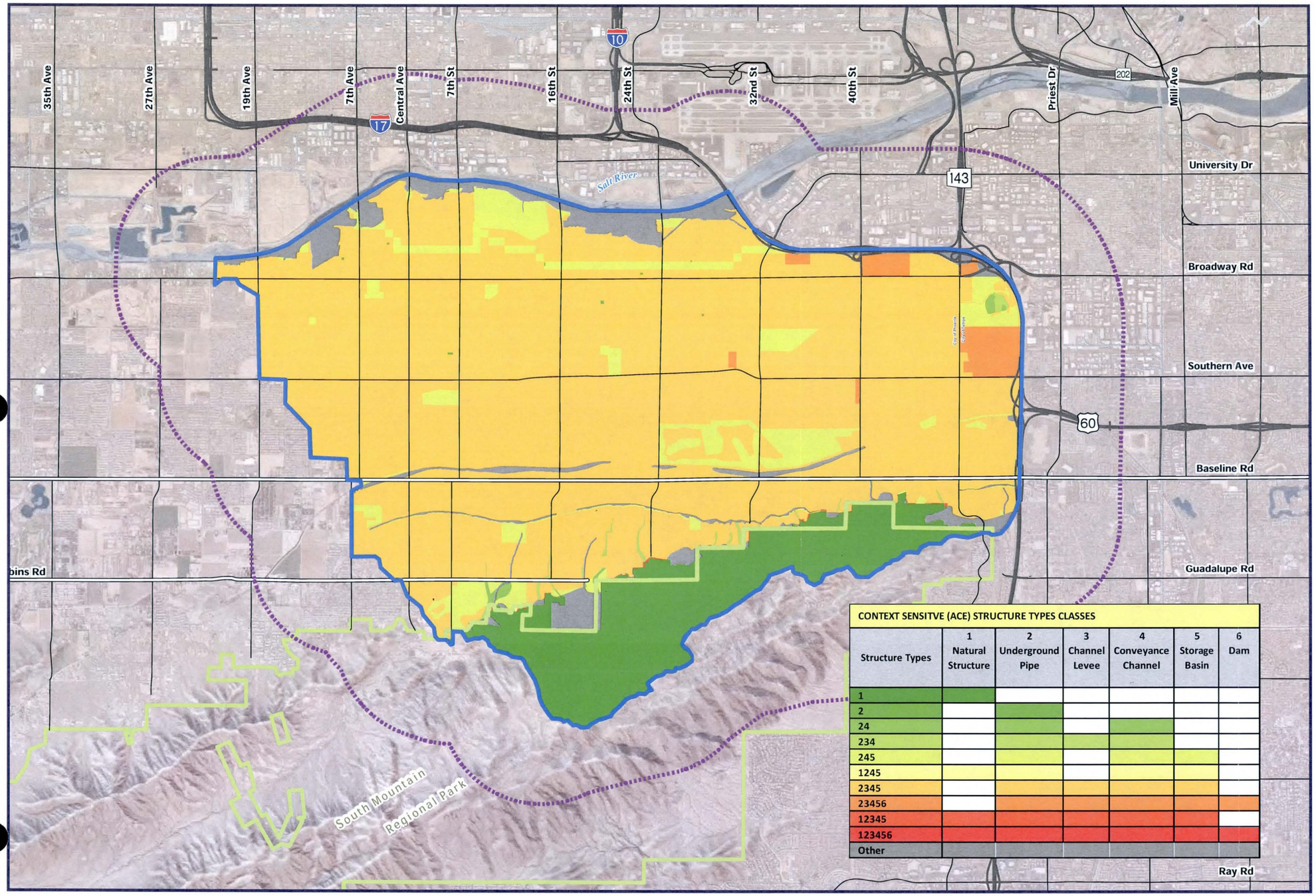
0 1 2 Mile
1 inch = 1 miles

N

Sources: City of Phoenix and Maricopa County Flood Control District
Date: August 2011

Hohokam Area Drainage Master Study/Plan

Context Sensitive (ACE) Structure Types Class Map



CONTEXT SENSITVE (ACE) STRUCTURE TYPES CLASSES						
Structure Types	1 Natural Structure	2 Underground Pipe	3 Channel Levee	4 Conveyance Channel	5 Storage Basin	6 Dam
1	■					
2		■				
24		■		■		
234		■	■	■		
245		■		■	■	
1245	■	■		■	■	
2345		■	■	■	■	
23456		■	■	■	■	■
12345	■	■	■	■	■	
123456	■	■	■	■	■	■
Other	■	■	■	■	■	■

Classes

- 1
- 2
- 24
- 234
- 245
- 1245
- 2345
- 23456
- 12345
- 123456
- Other

Project Features

- Hohokam ADMP
- Hohokam ADMP Review Area

Reference Features

- Highway
- Major Arterial
- Scenic_Drives
- Rail
- Regional Park

0 1 2 Mile

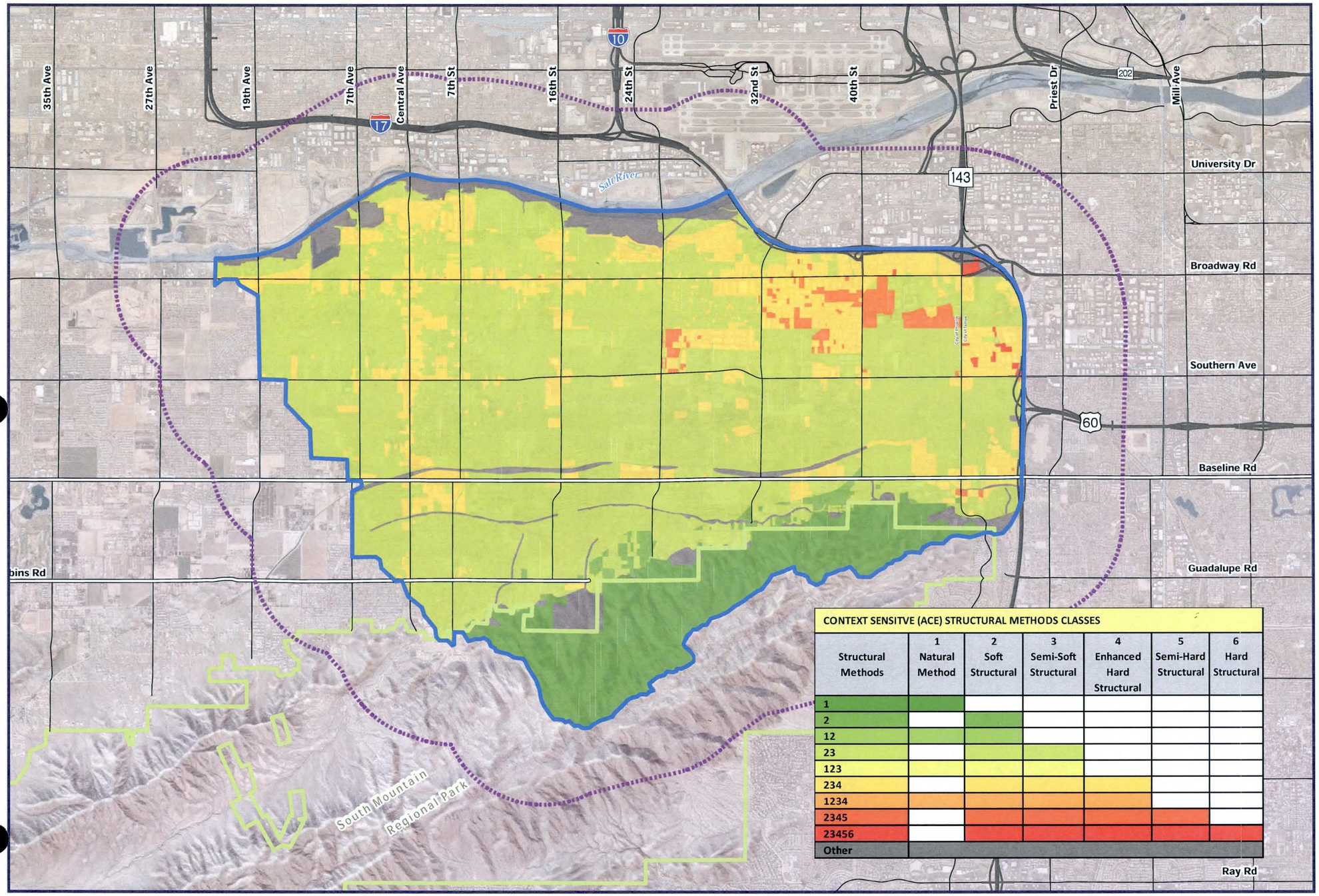
1 inch = 1 miles

N

Sources: City of Phoenix and Maricopa County Flood Control District
Date: August 2011

Hohokam Area Drainage Master Study/Plan

Context Sensitive (ACE) Structural Methods Class Map



CONTEXT SENSITVE (ACE) STRUCTURAL METHODS CLASSES

Structural Methods	1 Natural Method	2 Soft Structural	3 Semi-Soft Structural	4 Enhanced Hard Structural	5 Semi-Hard Structural	6 Hard Structural
1						
2						
12						
23						
123						
234						
1234						
2345						
23456						
Other						

Classes

- 1
- 2
- 12
- 23
- 123
- 234
- 1234
- 2345
- 23456
- Other

Project Features

- Hohokam ADMP
- Hohokam ADMP Review Area

Reference Features

- Highway
- Major Arterial
- Scenic_Drives
- Rail
- Regional Park

0 1 2 Mile

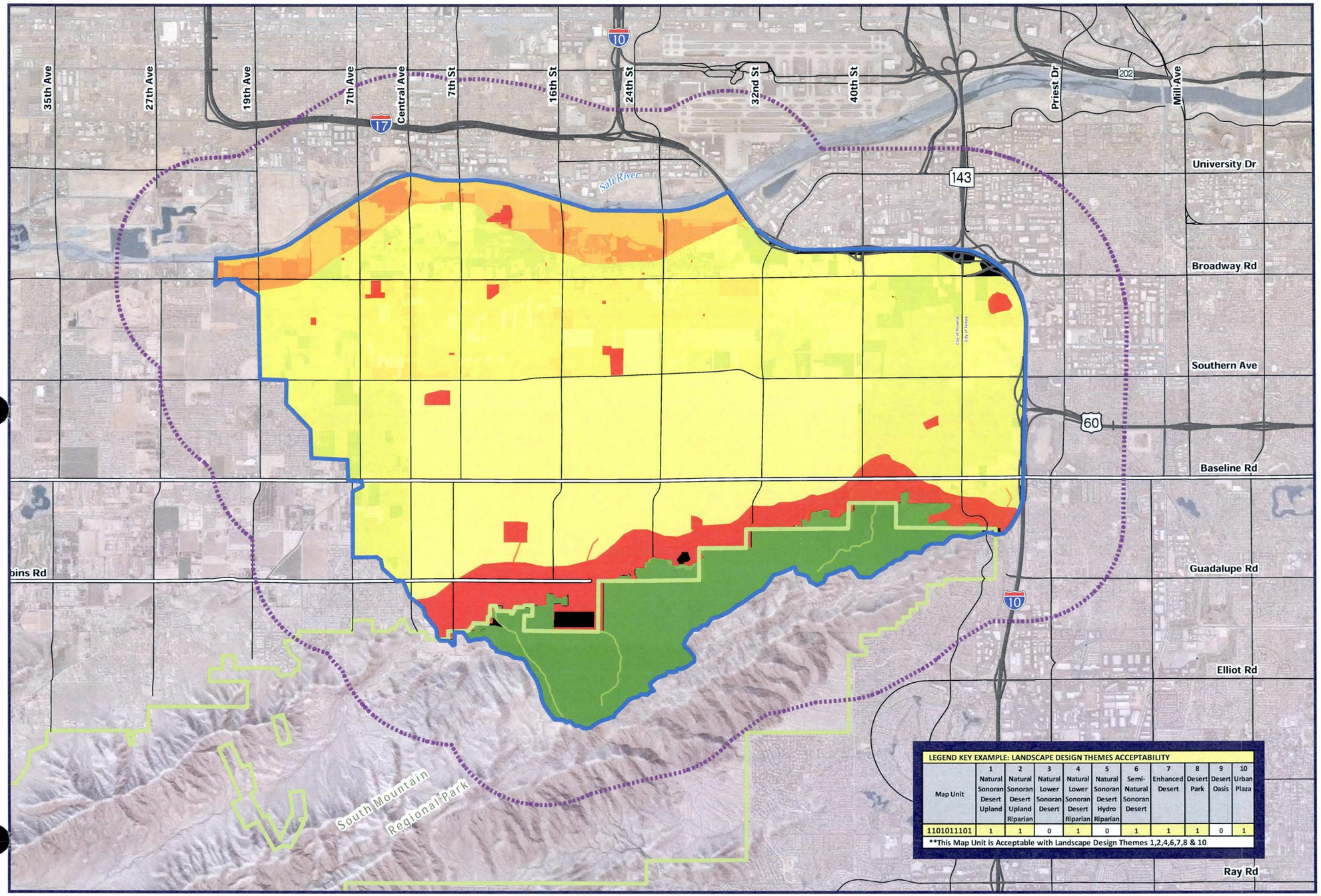
1 inch = 1 miles

N

Sources: City of Phoenix and Maricopa County Flood Control District
Date: August 2011

Hohokam Area Drainage Master Study/Plan

Context Sensitive (ACE) Landscape Design Themes Class Map



LEGEND KEY EXAMPLE: LANDSCAPE DESIGN THEMES ACCEPTABILITY

Map Unit	1 Natural Sonoran Desert Upland	2 Natural Sonoran Desert Upland Riparian	3 Natural Lower Sonoran Desert	4 Natural Lower Sonoran Desert Riparian	5 Natural Sonoran Desert Hydro Riparian	6 Semi-Natural Sonoran Desert	7 Enhanced Desert	8 Desert Park	9 Desert Oasis	10 Urban Plaza
1101011101	1	1	0	1	0	1	1	1	0	1

**This Map Unit is Acceptable with Landscape Design Themes 1,2,4,6,7,8 & 10

Classes

- 12
- 12345
- 125
- 1256
- 1256789
- 125678910
- 126
- 12678
- 126789
- 2
- 2456
- 25
- 256
- 256789
- 26
- 2678
- 3456
- 345678
- 3456789
- 345678910
- 346
- 34678
- 346789
- 34678910
- 4
- 45
- 456
- 45678
- 456789
- 45678910
- 46
- 4678
- 46789
- 5
- 56
- 5678
- 56789
- 5678910
- 6
- 678
- 6789
- Roads (Null)

*Acceptable Landscape Design Themes, Refer to Legend Key Example

Project Features

- Hohokam ADMP
- Hohokam ADMP Review Area

Reference Features

- Highway
- Major Arterial
- Scenic_Drives
- Rail
- Regional Park

0 1 2 Mile

1 inch = 1 miles

N

Sources: City of Phoenix and Maricopa County Flood Control District
Date: August 2011