Loop 303 Corridor/White Tanks Area Drainage Master Plan Update Contract FCD 99-40

VOLUME II

Level I Alternatives Analysis Report

Prepared for:

Flood Control District of Maricopa County

June 2004

Prepared by:

URS

LEVEL I ALTERNATIVES REPORT
CONTRACT FCD 99-40

Prepared for
FLOOD CONTROL DISTRICT OF
MARICOPA COUNTY

URS Job No. E1-00001526
June 2004

Comment Responses for Level I Report: General Comments

1. **Page I – Need to add reference to the PAC meetings.**
2. **Page I - Syntax.** *Revised per comment.*
3. **Page 1-1 – Executive Summary more than 2 pages just call it a summary and highlight recommendations and conclusions.** *A paragraph was added to highlight the recommended alternatives. The title of section 1.0 was changed from Executive Summary to Summary.*
4. **Page 1-4 – Syntax.** *Revised per comment.*
5. **Page 2-1 – Syntax.** *Revised per comment.*
6. **Figure 1.1 – Add date.** *Dated added to Figure along with updated title block.*
7. **Page 2-4 – Use correct date for Landscape…Assessment Report.** *We have updated the report date to October 28, 2002.*
8. **Page 3-3 – Revise to submitted and by whom?** *Corrected to show Level I Existing Conditions Hydrology Report was submitted by URS.*
9. **Page 3-3 – Use correct date for Landscape…Assessment Report.** *We have updated the report date to October 28, 2002.*
10. **Page 3-4 – Syntax.** *Revised per comment.*
11. **Page 3-6 – Syntax.** *Revised per comment.*
12. **Page 3-9 – Syntax.** *Revised per comment.*
13. **Page 3-13 – Combined alternatives?** *Since neither baseline nor the West Maricopa drain were part of the previous alternatives presented, they are not the result of combining previous alternatives.*
14. **Page 3-14 – Syntax.** *Revised per comment.*
15. **Page 3-14 – Start heading for each combined alternative on a new page.** *Each (10) combined alternative is started on a new page with the representative Figure being before the text.*
16. **Figure 3.1 – Place either at start or end of each alternative description. This will break up the text and make it clear as to what you are presenting. Typical for all figures.** *Figures will now be inserted the page before the alternative description.*
17. **Page 3-40 – How many people?** *Rewrote sentence to indicate that approximately 24 people were in attendance for the two nights.*
18. **Page 3-41 – What are the impacts? The Data Collection Report does not tell me what the impacts are.** *Tables were added showing this information.*
19. **Figure 3.11 – Add date.** *Date added to Figure along with updated title block.*
20. **Page 4-1 – Make reference to Sections 5 and 6 or insert as indicated in the following documents.** *References have been made to these Sections in the text.*
21. **Page 4-6 – Environmental impacts?** *The environmental impacts of Alternative 1 are addressed in Section 5.0.*
22. **Page 4-7 – Why?** *Few utilities have responded to numerous attempts at obtaining existing utility locations in the project area. Any information received will be shown on the Level III 15% conceptual plans.*
23. **Page 4-14 – Environmental impacts?** *The environmental impacts of Alternative 2 are addressed in Section 5.0.*
24. **Page 4-20 – Environmental impacts?** *The environmental impacts of Alternative 3 are addressed in Section 5.0.*
25. **Page 4-23 – Environmental impacts?** *The environmental impacts of Alternative 4 are addressed in Section 5.0.*

26. **Page 5-1 – Exhibit showing the impacts for each alternative?** *Per our meeting with FCDMC on 5/15/03, URS has included a matrix-type table showing these impacts.*
27. **Page 5-1 – Social/ Haz Mat not addressed.** *This has been addressed.*
28. **Page 5-2 – See previous comment.** *This has been addressed.*
29. **Page 5-3 – See previous comment.** *This has been addressed.*
30. **Page 6-1 – Exhibit for each alternative?** *From the meeting with FCDMC on 5/15/03, this comment was explained in more detail. According to FCDMC, this comment was in regard to the exhibits used at the second public meeting (held on 8/28/01 & 8/30/01). Since the Level II Phase II report (which addresses the entire project area) was submitted in September of 2001, there is a detailed discussion regarding the results of Neighborhood meeting(s) 2. Therefore, it seemed logical to include the LSD exhibits from the second neighborhood meeting within this section (2.4.3) of the Level II Phase II report. Additional exhibits were added to the end of section 6 of the Level I report.*

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1.0 SUMMARY

The Flood Control District of Maricopa County (FCDMC) contracted with the URS Corporation (URS) team to develop an update to the Area Drainage Master Plan (ADMP Update) for the Loop 303 Corridor/White Tanks Area, Contract No. FCD 99-40. This study updates the prior ADMP by The WLB Group, Inc. in March 1995. The update includes flood control projects constructed on recommendation of the previous study as well as infrastructure and land use change. The need for the update reflects dramatic changes in population density and land use in the West Valley, converting land from agriculture to residential use. The land use changes are requiring infrastructure improvements that keep pace with development. Included in these infrastructure improvements must be flood control. Now is the opportunity to improve the drainage infrastructure of the area, since crucial drainage ways could be blocked as a result of development. Planning and implementing drainage improvement concurrently with development can provide favorable alliances with stakeholders that ensure land, financing, and public support. Early planning simplifies decisions including multi-use activities as part of the project. It also allows for facilitating and coordinating landscape character and visual themes into the project.

There are two primary objectives to this ADMP Update. The first is to develop a plan to control runoff and prevent flood damage in the watershed. The second is to develop and implement a plan to manage the interim condition due to discontinuous development in order to preserve the ability to provide protection to lands downstream from 100-year flood events.

The White Tank Mountains to the west, McMicken Dam/Deer Valley Road to the north, the Agua Fria River to the east, and Gila River to the south bound the area being studied. The area includes the portions of the incorporated areas Avondale, Buckeye, El Mirage, Glendale, Goodyear, Litchfield Park, Peoria, Sun City, and Surprise, as well as unincorporated areas of Maricopa County.

The project is separated into four components:

1 Data Collection and Existing Conditions

2 Level I Alternatives Analysis (Alternatives Formulation/Preliminary Analysis)

3 Level II Alternatives Analysis (Alternative Analysis)

4 Level III Alternatives Analysis (Preferred Alternative Analysis)

The Level I portion of the project identifies several alternatives for an overall flood control within the Loop 303 ADMP Update study area.

Four levels of evaluation led to the development and selection of three alternatives recommended for further study. The levels of evaluation included the following:

- ***Initial Alternative Development***
- ***Alternative Refinement for First Neighborhood Meeting***
- ***Matrix Development and Alternative Evaluation***
- ***Recommended Alternatives***

Factors considered during alternative evaluation included cost, feasibility, environmental/cultural impacts and the impacts of each upon the existing hydrologic conditions.

The combined alternatives are presented in Section 3.0 of this report.

As a result of the Level I analysis, 3 alternatives were recommended for further study along with the baseline alternative. The recommended alternatives were selected based on the evaluation of a weighted matrix of criteria by which each alternative is evaluated relative to all of the others as well as input from project stakeholders. A brief summary of each recommended alternative follows:

- Recommended Alternative 1 – This alternative is based on a major flood control channel along the SR 303L alignment with several smaller channels placed on a grid using a spacing of roughly 2 miles. There are no proposed basins for Recommended Alternative 1.
- Recommended Alternative 2 – This alternative is similar to Recommended Alternative 1. Like Recommended Alternative 1, this alternative is based on a major flood control channel along the SR 303L alignment with several smaller channels placed on a grid. However, unlike Recommended Alternative 1, this alternative proposes fewer channels with several proposed basins.
- Recommended Alternative 3 – Like recommended alternatives 1 and 2, this alternative is based on a major flood control channel along the SR 303L alignment. However, unlike recommended alternatives 1 and 2, this alternative consists primarily of north to south channels with very few west to east channels. As with Recommended Alternative 2, this alternative proposes fewer channels than Recommended Alternative 1 and adds several basins to mange channel section top widths. Landscape Aesthetics and Multi-Use Assessment

All of the alternatives will be designed with landscape and aesthetic elements playing a significant role. Care will be taken to develop landscape character themes used in particular of

the area that reflect the overall feel of the surrounding area. Since the proposed facilities will cross through different areas, each with a unique character, themes used in landscaping the proposed improvements must transition from one to the next. An example would be transitioning from a desert/mountain theme to a neighborhood/urban theme in going from the White Tank Mountains east to the Cities of Surprise, Goodyear, Avondale, Litchfield, etc... In addition, multi-use for proposed flood control facilities will be incorporated in the form of parks, trails and other recreational applications.

For more detail regarding the multi-use and themes proposed for the alternatives, refer to the "Landscape Aesthetics Assessment and Multi-Use Opportunities Assessment," by Logan Simpson Design, inc., dated July 6, 2000.

Cultural Resource Impacts

Human societies have occupied the region at least 12,000 years ago. The earliest occupants had minimal impacts on the regional environment relative to climate changes wrought by the waning of the last Ice Age.

Approximately 2,000 years ago, the Hohokam developed canal systems to irrigate extensive fields. The Hohokam remained in the area for roughly 1,000 years and significantly altered the local landscape near the Gila River in the southern part of the approximately 220-square-mile project area. The Hohokam also altered upland areas where other non-riverine villages were located. Early settlers of the United States were able to follow the alignments of some of the ancient Hohokam canals and began a new era of agricultural development.

Today, agricultural fields with extensive canals systems, deep wells, and drainage ponds dominate the area. The White Tank Mountains on the western edge of the study area remain largely undeveloped. Several small towns and cities are rapidly being transformed into larger, urban communities as the Phoenix metropolitan area expands to the west. The majority of the proposed facilities are in upland areas where there are likely to be few intact archaeological and historical resources. However, some archaeological sites have been recorded in the undeveloped area at the head of Bullard Wash south of Luke AFB, where a small channel is proposed to relieve ponding due to subsidence.

In general, the most potential for impacts are associated with north-south channels and Loop 303. On the north side of the Gila River, these alignments cross ancient Hohokam irrigation canal systems, as well as the historic Buckeye Canal and Roosevelt Irrigation District Canal. A proposed north-south channel could also impact three Hohokam village sites (Van Liere, M-1,

and M-4) and perhaps the site of a historic stage station. Archaeological investigations may be required to mitigate impacts to those resources.

The archaeological studies required for the Bullard Wash Outfall through the Hohokam Canal Liberty system and the Hohokam village known as Alkali Ruin was of modest scope.

In summary, because of the extent of prior development, implementation of any of the alternative flood control projects may affect some archaeological resources but is unlikely to have major impacts and no fatal cultural resource flaws have been identified. Intensive cultural resource survey of the selected plan is likely to be required to comply with the Arizona Antiquities Act. If facilities would affect jurisdictional waters of the United States and require a Section 404 permit from the U.S. Army Corps of Engineers, the FCDMC would be required to undertake studies and analyses to assist the Corps in complying with Section 106 of the National Historic Preservation Act.

Environmental Impacts

The proposed structures for the three recommended alternatives would be located mostly within agricultural areas or urban developments that are not biologically sensitive. Small areas of undeveloped Lower Colorado River Valley (LCR) subdivision of Sonoran Desert are present along the proposed structures. Such areas could provide habitat for the endangered cactus ferruginous pygmy-owl (Glaucidium brasilianum cactorum), Sonoran desert tortoise (Gopherus agassizii) and the lesser long-nosed bat (Leptonycteris curasoae yerbabuenae), but the presence of these species is unlikely because of the small size of the remnant habitats.

Proposed outfall structures could impact riparian areas along the Gila River, which could potentially affect several special status species of animals. There are several irrigation drainage ponds that have developed wetland vegetation, and any alteration of those ponds may require mitigation of impacts to any sensitive species. Most impacts to sensitive species are expected to be minor, but if these species are present, mitigation measures should be developed to minimize impacts. If a permit under Section 404 of the Clean Water Act is required, the Corps of Engineers is likely to require measures to mitigate impacts to wetlands or riparian areas.

Cost Estimate – The alternatives and baseline alternative were evaluated on a relative cost basis. They were categorized as High, Medium, Low and Very Low cost relative to one another. This level of cost analysis was very broad and non-detailed. General assumptions were made and consistently applied to all alternatives. The main factors considered were land acquisition costs, channel construction cost, basin/park construction cost and culvert/facility crossing construction cost. Using a variety of sources such as previous (recent) ADMP's and published Arizona

Department of Transportation (ADOT) costs from 1998 and 1999, general unit costs were applied to each alternative. The alternatives are shown below in order of the overall cost associated with each.

Combined Alternative 1 – High

Combined Alternative 2 – Medium

Combined Alternative 3 – Low

Baseline Alternative – Very Low – The cost calculated for this alternative is an order of magnitude lower than the others.

2.0 INTRODUCTION

2.1 PROJECT DESCRIPTION

This Alternative Analysis Report documents the methods and criteria used to develop and evaluate selected alternative solutions to existing and future flood control problems previously documented by the "Draft Data Collection Report," submitted February 14, 2000, for the Loop 303 Corridor/White Tanks Area Drainage Master Plan Update (ADMP Update) project. The ADMP Update covers an approximate 220-square-mile watershed west of metropolitan Phoenix. Although there has been a significant amount of development in the study area in the last 10 years, the dominant land use remains agricultural with a growing number of commercial and residential areas. This rapid growth, together with the Maricopa County Department of Transportation's (MCDOT) plan to improve the existing Loop 303 roadway, has prompted the FCDMC to commission a restudy of the White Tanks/Agua Fria watershed. This study will serve as an update to the existing "White Tanks/Agua Fria Area Drainage Master Plan," prepared by The WLB Group, Inc., March 1995.

The project is separated into four components:

1 Data Collection and Existing Conditions

2 Level I Alternatives Analysis (Alternatives Formulation/Preliminary Analysis)

3 Level II Alternatives Analysis (Alternative Analysis)

4 Level III Alternatives Analysis (Preferred Alternative Analysis)

This section of the final report describes the Level I component listed above. The Level I portion of the project identifies several alternatives for an overall flood control backbone system within the Loop 303 ADMP Update study area.

As part of the Level I portion of the Loop 303 ADMP Update project, the consultant then went through four levels of evaluation that took place leading up to the development and selection of three recommended alternatives documented within this report. Those levels of evaluation and the results of each are briefly described herein.

Initial Alternative Development – Initially, 11 alternatives were schematically presented at the first committee/stakeholders/brainstorming meeting held on February 22, 2000, at the FCDMC. The project team prepared these alternatives during a team brainstorming session. The team

considered flood control concepts, landscape themes, area land use, aesthetics, multi-use and many other criteria.

Upon presentation of the alternatives at the first committee meeting, several comments were made regarding fatal flaws, feasibility and overall conceptual merit associated with each alternative. Several FCDMC staff was present as well as the entire Loop 303 ADMP Update project team and several stakeholders within the Loop 303 ADMP Update project area.

Alternative Refinement for First Neighborhood Meeting – The next level of evaluation was based upon input/comments/ideas, etc., received by the attendees at the first committee meeting mentioned above. After revising the alternatives based on this information, the Loop 303 ADMP Update project team developed 10 revised alternatives that were presented at the first neighborhood meetings, held on March 7 and 9, 2000. Through conversations and questionnaires, the neighborhood meetings provided a valuable source of both formal and informal feedback regarding the revised alternatives from the general public.

Matrix Development and Alternative Evaluation – At this level of evaluation, the Loop 303 ADMP Update project team developed a weighted matrix of criteria by which each alternative was scored. In an effort to manage the overwhelming number of possible flood control solutions, the project area was divided into several smaller design units. Each design unit was evaluated for several options and given a score based upon the results of the weighted matrix. The top three options in each design unit were then combined to form the three recommended alternatives for further consideration under the Level II analysis. These alternatives are presented in Section 4.0 of this report.

Recommended Alternatives – The final alternatives developed by the above methods are presented on Figures 3.1 – 3.10 of this report.

In addition to cost, feasibility, etc., the three recommended alternatives were considered relative to the environmental/cultural impacts of each as well as the impacts of each upon the existing hydrologic conditions currently found within the project area. For detailed existing conditions hydrology, see the Level I existing conditions hydrology report submitted under separate cover by Engineering and Environmental Consultants, Inc. (EEC).

2.1.1 Location

The study area boundary is defined by the ridgeline in the White Tank Mountains on the west, the Gila River on the south, the Agua Fria River on the east, and the McMicken Dam/Deer Valley Road on the north. The study area spans across the majority of Townships 1N-4N and

Ranges 1W-3W which includes the cities of Goodyear, Glendale, Buckeye, Litchfield Park, El Mirage, Avondale, Sun City, Peoria, and Surprise, as well as unincorporated Maricopa County. See Figure 2.1.

2.1.2 Purpose

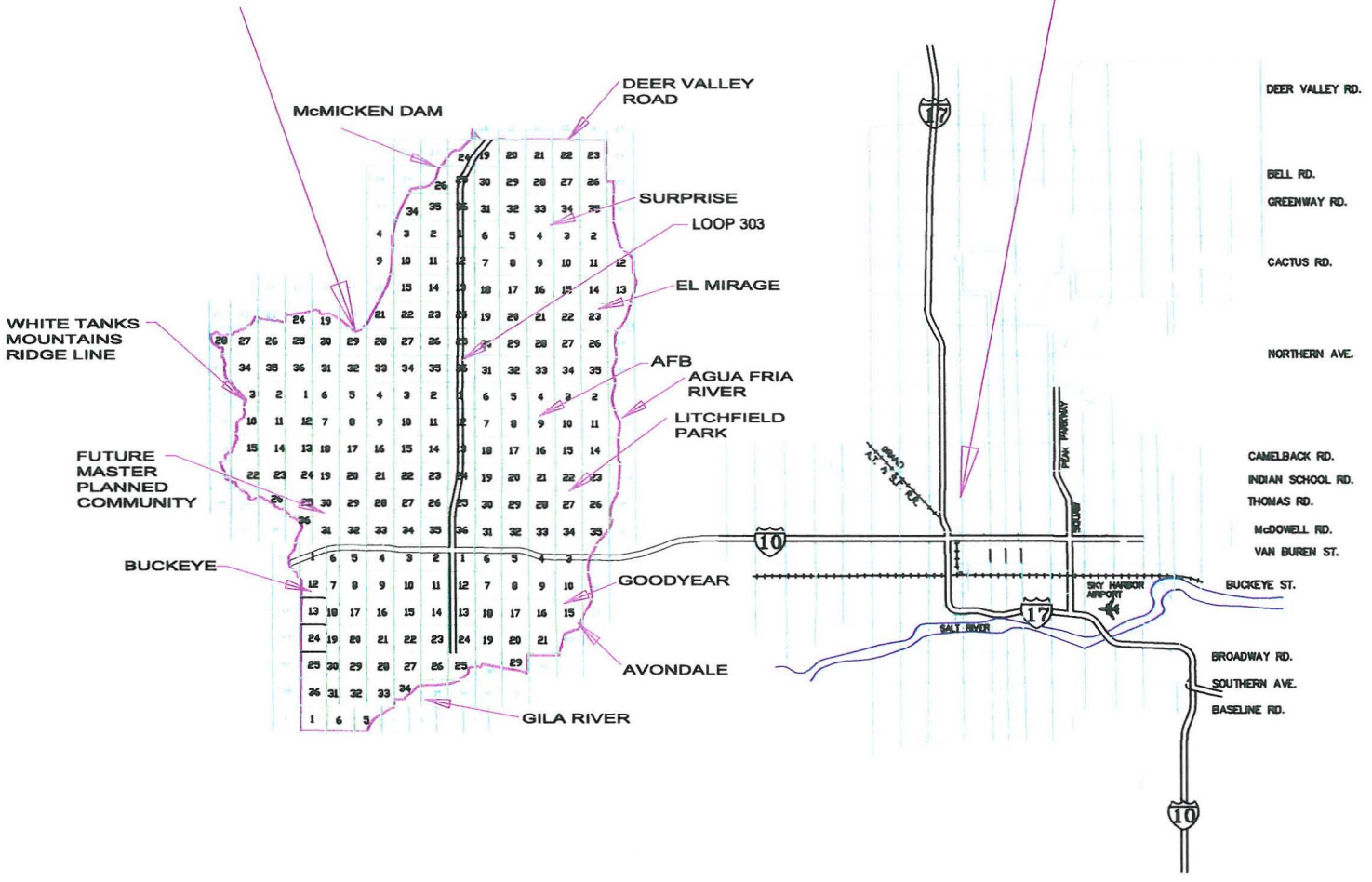
As stated in the "Data Collection Report" of February 14, 2000, the first of two major objectives for the ADMP Update project is to develop a plan to control runoff to prevent flood damage in the watershed both existing and in the future. The second objective is to develop an implementation plan to manage the interim condition due to discontinuous short-term development. The plan shall develop and identify preliminary costs, alignments, typical sections, right-of-way requirements, aesthetic/landscape themes, major utility conflicts, and potential project participants for implementation of the preferred alternatives.

The first phase of the update study conducted under the Level I portion of the project identifies several alternatives for an overall regional flood control system within the ADMP Update study area. This purpose of this report is to document the alternative comparisons and the criteria used for those comparisons. More specifically, the alternatives have been evaluated at a level of detail sufficient for a relative rating of each. The level of detail used in this evaluation was sufficient to determine technical feasibility, approximate project costs, potential environmental impacts, potential for incorporation multi-use facilities, etc.

At a minimum, each alternative considered under the Level I analysis identifies alignments, general cross sections, general right-of-way requirements, potential landscape themes and major utility conflicts. Each alternative has been evaluated for potential multiple uses and integration with other local and regional recreational facilities. Environmental issues relative to hazardous waste locations, archaeological and historical sites, and ecological impacts will continue to be monitored throughout the Level I, Level II and Level III portions of the project. Proposed facility footprints were generally estimated and used to determine relative differences required for right of way. See Section 7.0.

The proposed flood control alternatives attempt to tie existing facilities and outfalls together with proposed components into a regional system. Once a single preferred alternative is selected, any proposed components such as channels, retention/detention basins, regional outfalls, etc., will be further designed to mitigate existing known flood hazards as well as alleviate documented flooding in specific areas or locations. The single preferred alternative selection would take place at the end of the Level II analysis portion of the study. The alternatives presented in this report emphasize the importance of multiple-use facilities, landscape aesthetics, and cultural/

P:\FCDMC\E152600\SUBMITTALS\RE-SUBMIT\LEVEL 1\5-2003\CAD\FIGURE 2.1.DWG



VICINITY MAP

URS

Flood Control District of Maricopa County

MAY, 2003
Figure 2.1

environmental concerns. See the "Landscape Aesthetics Assessment and Multi-Use Opportunities Assessment," by Logan Simpson Design, inc., dated October 28, 2002 for detailed descriptions of each alternative relative to multi-use and aesthetic issues.

The purpose of this report is to document the methods and analysis used to develop multiple flood control alternatives presented in the study area. In addition, this report will narrow the number of alternatives to the three that are considered most feasible and recommended by URS for further study. The proposed alternative in the "Drainage Channel Study for West Half of Estrella Freeway Loop 303 from Interstate 17 – Drainage Technical Memorandum," dated August 1998, will be used as a benchmark for comparison of the three alternatives (identified in this report) for the Loop 303 regional drainage corridor. The benchmark for all other areas will be the no-build/do nothing alternative.

A preliminary weighted matrix of criteria was used to determine the relative feasibility for each alternative considered. Based on the evaluation results, three recommended alternatives were identified as being potentially more feasible than the others considered. These alternatives will be discussed in detail under Section 4.0 of this report.

2.2 SCOPE OF WORK

The following describes the ADMP Update Scope of Work for the Level I Analysis:

1. The purpose of the Level I Analysis (Alternatives Formulation/Preliminary Analysis) is to identify possible solutions to the flooding problem and to narrow the number of alternatives to those that are the most feasible. Elements of each alternative plan may include, but are not limited to, alternative design concepts (e.g., incorporate storage to affect peak flows, non-structural alternatives, and conduits vs. open channels), alternative alignments, alternative construction materials, and multi-use.

2. The Consultant shall identify a minimum of 10 possible projects to mitigate the existing flooding problems after completing the draft Data Collection Report. At a minimum, two of the alternatives shall be natural appearing, multiple-use alternatives. One of the natural appearing alternatives shall emphasize maximum participation with the Agencies. The other natural appearing alternative shall emphasize minimum participation with the Agencies.

3. The Consultant shall meet with the FCDMC to review and discuss these alternatives (Committee Meeting No. 1) and identify additional alternatives. Those alternatives which can be initially eliminated with no or minimal analysis shall be identified and eliminated

from further consideration. The Review Committee will make the final selection of these alternatives to be presented to the public at Neighborhood Meeting No. 1.

4. The Consultant shall document and prepare rough concept drawings and aesthetic treatment illustrations for the selected alternatives from the Brainstorming Meeting and conduct the Neighborhood Meeting No. 1. The Consultant will prepare Typical Landscape Theme Sketches, a maximum of 10 typical themes, which can be applied to the alternatives for public meeting exhibits and as part of the Alternative Analysis Report. *This will be bound and submitted under separate cover as the Landscape Aesthetics Assessment and Multi-Use Opportunities Assessment.*

   The Consultant will develop a narrative description of future landscape character and multi-use features of each alternative and document them in the Alternative Analysis Report.

   The Consultant shall develop a narrative identifying the pros and cons of each alternative and analyze each alternative with respect to evaluation criteria, which shall be documented in the Alternative Analysis Report. Examples of evaluation criteria include the following:

   a. Consistency with desired future character

   b. Captures opportunities to improve landscape aesthetics

   c. Protects valued aesthetic features

   d. Captures opportunities to incorporate multi-uses

   The Consultant shall prepare an Environmental Overview analysis. The Environmental Overview shall include a comparative analysis for each of the alternatives identified to include socioeconomic, physical and natural environmental impacts and cultural aspects of the study area as applicable. This comprehensive analysis shall address all of the major environmental disciplines and identify any potential problem areas (fatal flaws) that might exist.

   The Consultant shall develop estimates of typical costs (square foot costs for each typical theme).

5. The Consultant shall re-evaluate the alternatives from the Brainstorming Meeting to incorporate the concepts and/or new alternatives suggested by the public, the local jurisdictions, and the FCDMC. However, the proposed Four Basin and Channel alternative in the "Drainage Channel Study for West Half of Estrella Freeway Loop 303 from Interstate 17 – Drainage Technical Memorandum," dated August 1998, shall be included as

the benchmark for comparison of all alternatives for the Loop 303 regional drainage corridor. The benchmark for all other areas shall be the non-build concept.

6. The Consultant shall complete the study at a level of detail sufficient to compare the alternatives. The level of detail shall be able to evaluate and consider items such as technical feasibility, approximate project costs, potential environmental impacts, potential for incorporating multi-use activities, aesthetics, and social value. Documentation of the findings shall be prepared and submitted to FCDMC. The documentation shall be submitted as a working document for decision purposes and will be included as a chapter/section in the Alternatives Analysis Report. The documentation shall include a summary description of the alternatives, exhibits, the findings of the evaluation, and a recommendation of those alternatives to be studied in further detail.

The Level I Alternatives Analysis Report shall include the following as a minimum:

Summary
Description of Study Area
Scope of Project
Alternatives Evaluation
Selection of Recommended Alternatives
Cost Estimate
References
List of Figures
Location Map
Topographic Map
Map depicting Project Area
Alternatives Descriptions with drawing/sketches
List of Tables

3.0 PROJECT ALTERNATIVES

3.1 ALTERNATIVE DEVELOPMENT

Upon submission of the "Draft Data Collection Report" for the Loop 303 ADMP Update, February 14, 2000, to the FCDMC, URS and its subconsultants began to develop several flood control alternatives relating to the ADMP Update project area. These alternatives were developed for presentation at the first committee/stakeholders/brainstorming meeting held on February 22, 2000. From this point forward, this meeting will be referred to as the brainstorming meeting.

Initially, 11 seed alternatives were drawn up schematically to illustrate each concept discussed. These alternatives were a product of an in-house brainstorming session that took place at the URS office with the ADMP Update project team. Through incorporation of new ideas and identification of fatal flaws, 10 alternatives resulted from the brainstorming meeting. These 10 alternatives were presented at the first neighborhood meeting(s) held on March 7 and 9, 2000.

Using the additional input from the neighborhood meetings, comments from the FCDMC staff and further examination the ADMP Update project area was divided into six design units. This was done to simplify the large, complex project area. See Figure 3.11 under Section 3.2 of this report.

Flood control concepts specific to each design unit and corresponding with portions of the 10 alternatives were evaluated as separate options by a matrix of weighted criteria. From the results of this analysis, the 10 alternatives displayed at the public meetings were combined and reworked into the three most feasible solutions.

3.1.1 General Considerations

The initial 11 seed alternatives developed prior to the brainstorming meeting were sensitive to several criteria listed by the project team. These general considerations used to develop each of the alternatives were consistent throughout the Level I analysis. At a minimum, the following items were considered relative to each schematic flood control alternative developed during the Level I analysis:

- Flood Reduction
- Major Utilities (Section 4.0)
- Adjacent Land Use (Section 4.0)

- Existing Flow Patterns (see "White Tanks/Agua Fria Area Drainage Master Study – Update, Hydrology – Draft," under separate cover)
- Existing Facilities (Sections 3.0 and 4.0 – see also "Draft Data Collection Report," under separate cover)
- Proposed Development and/or Facilities (Sections 3.0 and 4.0 – see also "Draft Data Collection Report," under separate cover and "White Tanks/Agua Fria Area Drainage Master Study – Update, Hydrology – Draft," under separate cover)
- Landscape Character/Aesthetics/Multi-use (see "Landscape Aesthetics Assessment and Multi-Use Opportunities Assessment" under separate cover)
- Potential Aesthetic and/or Multi-use Themes (see "Landscape Aesthetics Assessment and Multi-Use Opportunities Assessment" under separate cover)
- Opportunity for Trails as Linkages Adjacent to Proposed Flood Control Facilities Throughout the Project Area (see "Landscape Aesthetics Assessment and Multi-Use Opportunities Assessment" under separate cover)
- Project Partnering Potential (Section 4.0, see also, "Landscape Aesthetics Assessment and Multi-Use Opportunities Assessment" under separate cover)
- Environmental/Cultural and Biological Impacts (Section 5.0)
- Estimated Right-of-Way Requirements (Section 7.0)
- Required Permits (Section 5.0)
- Potential Traffic Impacts (Sections 3.2 and 4.0 – matrix)
- Constructibility (Sections 3.2 and 4.0 – matrix)
- Relative Cost Comparison (Sections 3.2 and 4.0 – matrix)

Existing Conditions Hydrology – For detailed hydrologic information specific to the project area such as existing flow patterns, volumes of runoff and the existing conditions hydrologic model, URS submitted a comprehensive Existing Conditions Hydrology Report under separate cover.

Assessment and Multi-Use Opportunities – The size, shape, configuration, materials of the proposed flood control facilities and visual aesthetics have not been determined at this point in the study. It is anticipated that proposed facilities would be naturally appearing and earthen lined when possible; channels may have a meandering low flow channel and varying side slopes; and basins would have varying depths and side slopes.

Multi-Use – Multi-use features of any proposed alternative could include trails and parks possibly located within detention areas. Existing and proposed detention basins vary in size. Most could be developed as neighborhood/community parks. These detention basins could incorporate turf open-space capable of facilitating soccer and baseball. These detention basins could also be graded with various levels that would allow the potential for portions of the basin to be utilized during flood events. Various court sports (basketball, volleyball, golf courses, recharge, etc.) could also be incorporated into the development of the basins. For more detail, see the "Landscape Aesthetics Assessment and Multi-Use Opportunities Assessment," by Logan Simpson Design, inc., dated October 28, 2002.

Landscape Character – Existing flood control facilities located throughout the project site would be utilized and incorporated with the proposed facilities. Like the proposed facilities, existing facilities occur within many of the future desired landscape characters. All existing facilities will be reviewed during design and appropriate landscape aesthetics and multi-use treatments will be incorporated depending upon the location and future desired landscape character.

Since proposed channels pass through several different future desired landscape characters, transition zones will be created so that there will be a smooth transition from one future desired landscape character to another. The length or size of these transition zones will depend upon what future desired landscape characters are adjacent to each other and the types of materials being used.

Any proposed facility for a given alternative could be developed so that it is consistent with the desired future landscape character in any particular area. For example, the windrow tree plantings that occur along Jackrabbit Trail, Perryville Road, Citrus Road, and Cotton Lane would be preserved as well as the orchards due to no development occurring in those areas.

The proposed plant material and respective densities and arrangements will depend upon the future desired landscape character surrounding a given facility. The Landscape Aesthetics Assessment and Multi-Use Opportunities Assessment Report documents the type of landscape that would be found in the various future desired landscape character based upon the theme of the area. For example, if the flood control facility were located within an area that has a future desired landscape character of agricultural, the landscape theme would be that of agricultural. According to the Landscape Aesthetics Assessment and Multi-Use Opportunities Assessment Report, the agricultural area would have plantings of large shade tree species with few shrubs, linear windbreaks of tall trees would be created when possible, in an orchard area groves of trees would be planted, and native material for pathways and trails would be utilized.

Wildlife habitat will also be incorporated, where possible, at locations of regional outfall channels along the Gila and Agua Fria rivers. In addition, wildlife habitat will be incorporated into the channels, where possible, that are adjacent to the natural washes.

In a similar manner, the industrial areas located within ADMP Update project area may have plantings of specimen and exotic/native trees and shrubs; large, bold masses of plant material; and mimic distinct features on a smaller scale and incorporating them into structures and hardscape elements.

In urban areas, there might be opportunities to incorporate plantings of specimen and exotic trees; installation of shrubs; introduction of turf; repeating of adjacent hardscape elements, materials, and colors; and creating well organized, repetitive pattern of elements.

The neighborhood areas could have plantings of large shade tree species with shrubs used as accent plantings; selective use of turf in special use areas; would utilize a number of different materials in the hardscape; and would create an informal pattern of elements.

Finally, in the Sonoran Desert areas, there could be plantings of native trees, shrubs, and grasses; open views would be maintained to the surrounding area; and would create an irregular, more organic pattern of elements.

For more detail regarding landscape aesthetics and multi-use, refer to the "Landscape Aesthetics Assessment and Multi-Use Opportunities Assessment," Logan Simpson Design Inc., April 17, 2000.

3.1.2 In-House Brainstorming/Seed Ideas

The study team developed several hydrologic themes, listed opportunities and constraints found within the ADMP Update project area and discussed several methods of flood control commonly used. Each of the themes identified during the consultant brainstorming session is listed below. A brief summary of each follows:

Water Hydrologic Theme – The water theme was envisioned as a combination of existing washes, rivers, channels and canals with proposed channels and detention/park areas to achieve flood control/protection throughout the ADMP Update project area. Accompanying the above would be a network of trails and paths linking all of the elements together. Educational opportunities designed to inform the public of the importance of water; its role in desert areas and its hydraulic management relative to the existing canal system would exist in several locations throughout the project area.

City Connections Hydrologic Theme – The city connections theme would provide a network of trails, paths and linkages to connect the downtown city centers present within the ADMP Update project area with one another and with other areas of high residential concentration. Flood control elements such as channels, detention/parks, etc., would be incorporated into, around and adjacent to any linkages where practical.

Natural Areas Hydrologic Theme – The ADMP Update project area is bounded on three sides by large natural areas. These include the Agua Fria River on the east, the Gila/Salt River on the south and the White Tank Mountains on the west. The natural areas theme would use a combination of trails, paths, channels and other linkages to connect the three natural areas together. These linkages would use as many existing natural corridors as possible to achieve the connections. Where such corridors do not exist, they could be recreated using natural landscaping and other such treatments. The natural areas theme would provide access to all three of the natural areas to all residents within the ADMP Update project area. This theme also presents opportunities for the incorporation of wildlife corridors along proposed linkages.

Transportation Hydrologic Theme – Several different types of transportation can be found within the ADMP Update project area. These include aircraft, automobiles and trains. This theme would place trails, paths, channels, parks and other linkages adjacent to the existing transportation modes identified above. Educational information regarding the different modes of transportation and how they operate could be placed along trails and within parks. This theme could also take advantage of retired facilities and convert them to recreational features such as is done in the rails to trails program.

Historic/Cultural Hydrologic Theme – The historic/cultural themes already present within the ADMP Update project area presents several opportunities for the combination of multi-use/educational areas with proposed flood control elements that already exist. A few of the ideas discussed included linkages along historic canals, railroads, cotton fields, rose fields, grape vineyards, and the White Tank Mountains. Another idea was to use interpretives showing Hohokam culture and information.

Two alternatives per theme were developed using opportunities and constraints described in the following paragraphs. An 11th alternative was added to show a schematic flood control concept not covered by the previous 10. The 11th alternative was not assigned to any single theme, but was a demonstration for just one possible combination of the themes already identified for presentation at Committee Meeting #1, Brainstorming.

For more detail regarding typical landscape themes, future landscape character and multi-use opportunities, refer to the Landscape Aesthetics Assessment and Multi-Use Opportunities Assessment. This report contains comprehensive information and sketches detailing the treatments and landscape character present and proposed for the ADMP Update project area.

Some of the opportunities and constraints that were considered are listed below:

- Incorporate recharge basins into proposed parks/detention basins.
- Use earthen-lined channels and landscape with natural vegetation.
- Use Jackrabbit Trail as an outfall corridor for WT FRS #3 and WT FRS #4.
- Use WT FRS #3 site as a regional recreational facility.
- Incorporate wildlife corridors with proposed pedestrian trails adjacent to earthen flood control channels.
- Use linkages to connect the Agua Fria and Gila rivers to the White Tank Mountains.
- Use existing landforms such as borrow pits for flood control.
- Use the existing ADOT detention basins for a regional link to divert flows from Bullard Wash.
- Use basins as a means of mitigation for other projects or restoration where practical.
- Use CAP water for recharge purposes.
- Tie proposed links and channels to the El Rio project.
- Use golf courses for flood control.
- Build a county lake in conjunction with a recharge program.
- Use abandoned railroad corridor as possible locations for flood control channels.
- Offer tax breaks to create improvements without having to buy land.
- Use first flush basins to improve stormwater runoff quality.

Figures are not included for these seed alternatives because they were modified in the development of the 10 alternatives shown at the neighborhood meetings described later in this section of the report.

3.1.3 First Committee Meeting and Brainstorming Session

The 11 seed alternatives discussed above were presented to the committee and stakeholders during the brainstorming meeting as seed ideas. The various agencies and stakeholders represented at the meeting included the following:

- Flood Control District of Maricopa County
- URS Corporation
- Roosevelt Irrigation District
- Town of Buckeye
- Dames & Moore
- Logan Simpson Design
- Maricopa County Department of Transportation
- Engineering and Environmental Consultants
- City of Surprise
- City of Goodyear

Directly following the presentation of a particular alternative, any and all comments/ideas/fatal flaws regarding the alternative were written down and noted on the alternative sketch displayed. In addition to the specific comments regarding each individual alternative, several general comments about the alternatives in general were made.

The general comments are listed below:

- The outfall from the channelization projects in El Mirage involving the Lower El Mirage Wash and the Lower El Mirage Tributary Wash should be channelized or somehow improved to convey the concentrated flow.
- Each alternative should show a small channel to relieve the ponded water in the sump area located on the east side of Luke AFB. This channel would drain south to Bullard Wash.
- Each alternative should show the small ditch/channel from the RID overchute southward to the existing ADOT basins.

- There should not be any proposed channels along Camelback Road east of Bullard Wash due to the existing ridge in that area that would require significant excavation to build such a structure.
- White Tanks Flood Retarding Structure (WT FRS) #3 should be replaced with a detention basin (based on the WT FRS #3 study by Dames & Moore).
- At least one alternative should consider using the existing Buckeye Irrigation District dewatering facilities along Watson/Rainbow road alignment(s) as an improved outfall facility for stormwater runoff.
- The alternatives should incorporate ground water recharge basins when practicable.
- The possibility of creating a channel to carry runoff out of the watershed along the contour that runs from the intersection of Jackrabbit Trail with Indian School Road should be considered. The channel could convey runoff to the existing Buckeye #3.
- The alternatives should consider the use of a kicker dike to divert water from the Waterfall and Cholla washes out of the watershed to the McMicken Dam (this will be studied as part of the WT FRS #3 study by Dames & Moore).
- There should be at least one alternative that considers a large west-east regional drain similar to the East Maricopa Drain.
- All of the alternatives should show a small channel along the existing AT&SF railroad tracks from Surprise/El Mirage south to the Dysart Drain. This channel would provide relief from ponding of runoff on the upstream side of the railroad tracks.
- Proposed north-south channels may experience scour problems due to the steep slopes.
- Drop structures may be required to keep the flow velocities within the channels down.
- Proposed west-east channels may experience excessive sediment deposition due to relatively flat slopes and potentially low flow velocities within the channels.
- The 300-foot right-of-way along the existing Loop 303 corridor is a major constraint to any proposed drainage channel adjacent to Loop 303.
- All of the alternatives need more detention basins.
- The ADOT basins are currently involved in litigation. In addition, waste sludge has been dumped into one or more of the basins.
- Existing stormwater flow breakouts along Jackrabbit Trail and the Beardsley Canal should be eliminated.

The following summarizes the comments made during the committee meeting and specific to each alternative.

Seed Alternative 1:

- The existing ADOT detention basins at I-10 were involved in litigation involving the developer SunCor, the City of Goodyear and ADOT. *This comment was made as a general statement, however it was agreed that regardless of the outcome, the ADOT basins would play an important role in flood control.*
- Sludge has been dumped into one or more of the ADOT basins and may pose an environmental hazard. *This will be analyzed in detail during the Level II and Level II phases, it is not perceived as a fatal flaw. The basins will remain a key part of the flood control solution.*
- Wal-Mart, located at the northeast corner of Dysart Road and I-10, will be expanding its facility south to the I-10 right-of-way line and may not allow room for an adequate outfall from the ADOT basins east to the Agua Fria River. *Review of the construction plans for the Wal-Mart expansion showed an approximately 20-foot wide access road behind the building. Outfall pipes from the ADOT basins could theoretically be placed through that area and therefore a corridor continued.*
- The City of Goodyear would like to use the Loop 303 corridor for its Master Plan for trails and parks. *This is a positive comment and the Loop 303 corridor is continuing to be shown as a potential channel alignment.*

Seed Alternative 2:

- The channel size required for the Loop 303 facility proposed by this alternative may be too big for available right-of-way. *Although the available right of way may be lacking this does not preclude an alternative involving a large north-south drain similar to the baseline alternative. The additional right of way required might, however, result in a capital cost difference that makes such an alternative less desirable.*
- There should be more west-east regional outfalls provided to minimize the required size of the Loop 303 channel. *More west-east channels were added to the Recommended Alternatives presented in Section 4.0.*

Seed Alternative 3:

- There should be no trails along the existing Dysart Drain. This area has safety issues involving the nearby gas facility and salt mines that pose security problems for Luke AFB. *Given the poor aesthetics along Dysart Drain, this alignment is not a good choice for a trail alignment. For this reason as well as the comment made, the proposed trail was removed along this facility.*
- This alternative does not provide enough outfalls. *More outfalls were added as part of the Combined Alternative #2.*
- The City of Goodyear would like to keep the Loop 303 corridor open for their trails and parks master plan. This alternative does not show use of this corridor from MC 85 to I-10. *All of the Combined Alternatives use the Loop 303 corridor to the Gila/Salt Rivers.*
- The level of flood protection along the Loop 303 Roadway is a potential issue. *This comment might affect the size of the facility but it would not eliminate the use of a facility.*
- Must it be 100-year, or something less? *Same as above.*

Seed Alternative 4:

- Issues regarding Loop 303. *The intent of this comment was not clear.*
- The future facility will be four lanes with at grade intersections. *This comment is not specific to any of the presented alternatives.*
- Is a channel along the Loop 303 a necessity? *If for nothing else, it was generally agreed that some type of channel (potentially very small) will be required to protect the roadway from flooding and cross drainage.*
- The channel shown along Bethany Home Road should be moved south to Camelback Road. SunCor is planning a future channel along Camelback, and we may be able to tie into it. *This channel was relocated to Camelback Road per the comment.*

Seed Alternative 5:

- This alternative may not show enough storage in the Waterfall/Cholla wash channels prior to combining with the Loop 303 channel. *This is a comment that cannot be evaluated until detailed calculations are run.*

- The WT FRS #3 study shows Waterfall and Cholla washes combining at the Beardsley Canal – we should be consistent with what it proposes. *The WT FRS #3 project by Dames & Moore has been coordinating closely with the ADMP Update team.*
- The channel along the Loop 303 alignment is not continuous. This is a flaw and should be corrected to show a continuous channel along this alignment. *A continuous channel is now shown on all alternatives.*

Seed Alternative 6:

- This alternative lacks outfalls. There are only two north-south outfalls shown and no new west-east outfalls proposed. *Outfalls were added.*
- The alternative does not use the ADOT basins. *Some alternatives excluded the basins in favor of other outfalls. The ADOT basins have been included as a part of each of the recommended alternatives in Section 4.0.*
- Camelback Road should be used instead of Indian School Road for a proposed west-east channel. *This has been incorporated into the alternatives; however, Indian School Road is being used by SunCor for the Palm Valley development and may continue to be a viable option.*
- Developers plan to abandon the existing Indian School Road channel and to build a new channel along Camelback as the area between the two roads develops. *Not necessarily, meetings with SunCor indicate that the channel may become permanent.*
- Use a kicker dike to divert water from Waterfall and Cholla washes out of the watershed to the McMicken Dam. *This issue will be explored by Dames & Moore as a part of the WT FRS #3 project.*

Seed Alternative 7:

- There were no specific comments mad for this alternative.

Seed Alternative 8:

- Add a channel/multi-use corridor along the Loop 303 alignment south of I-10. *See above.*
- Add a path along the Southern Pacific Railroad south of the ADOT basins to MC 85. *This is not a proposed channel alignment and therefore is unlikely to be constructed based upon its own merits.*

Seed Alternative 9:

- Use a channel along the contour that connects the intersection of Jackrabbit Trail and Indian School Road to the existing Buckeye #3 to convey runoff from the White Tank Mountains out of our watershed to the Hassayampa River. *This was incorporated into Combined Alternative #6.*
- This alternative shows too few outfalls. *All of the alternatives have incorporated several additional outfalls.*

Seed Alternative 10:

- This alternative shows too few outfalls. *See above.*

Seed Alternative 11:

- There were no specific comments made for this alternative.

Many of the comments made for earlier alternatives apply to portions of the later alternatives and were not re-stated by the individuals at the meeting. All comments received at the meeting were considered while refining the alternatives.

The committee recommended that five alternatives be prepared – one for each theme identified. In addition, the Four Basin and Channel Alternative in the "Drainage Channel Study for West Half of Estrella Freeway Loop 303 from Interstate 17 – Drainage Technical Memorandum," dated August 1998 (required as the baseline alternative for this study), was prepared. In accordance with comments received from FCDMC staff, another alternative was developed and based on the existing East Maricopa Drain flood control facility. This alternative features a large west-east regional drain and was referred to as the West Maricopa Drain alternative. Finally, three more alternatives were developed as combinations of the other alternatives and themes. This resulted in a total of 10 alternatives.

The refinements to the initial 11 seed alternatives took into account both the general and specific comments listed above and seed alternatives were prepared for presentation at the first neighborhood meetings held on March 7 and 9, 2000.

3.1.4 Combined Alternatives Presented at Neighborhood Meeting #1

The 10 alternatives presented at the first neighborhood meeting were very similar to those described above. The main difference was that previous alternatives were combined and refined

to provide a more optimal solution for a given theme. In addition, the baseline alternative and the West Maricopa drain alternative were presented. Although the expansion of the existing Wal-Mart located east of the ADOT detention basins will limit the option for an outfall from the ADOT detention basins east to the Agua Fria River, such an outfall is shown as part of this and several other combined alternatives. The thinking behind this was that the outfall may consist of a pipe or may be placed within ADOT right of way of I-10 and that the Wal-Mart expansion does not constitute a fatal flaw but a design constraint.

Other comments made during the brainstorming meeting regarding sludge potentially dumped in the ADOT detention basins and the litigation involving the ADOT detention basins are not considered fatal flaws but must be considered as the project moves forward if this facility is in fact going to be used.

Although a Phase I Environmental Site Assessment and report should be obtained if it exists or conducted if it does not for the ADOT Basins, any costs associated with the removal and disposal of the existing sludge pile referenced above is expected to be insignificant in comparison with the total project cost. The total project cost is expected to be on an order of magnitude that is measurable in the hundred-plus million-dollar range.

A brief description of the alternatives presented at the neighborhood meeting follows below. Each alternative is accompanied with a figure in this report for reference along with descriptions of the seed alternatives that were 'combined'. See the following Table(s) 3.1 – 3.3 for each alternative and its associated components as well as a listing of 'pros' and 'cons'. See Table 3.4 for the potential environmental impacts associated with each of the combined alternatives. See Table 3.5 for the potential historical and cultural impacts associated with each alternative. See Appendix A for an overlay of the proposed combined alternative(s) with the existing cultural and historical resources found within the study area.

Table 3.1

Proposed Combined Alternative Features

Combined Alternative Features

Alternative	Use existing ADOT basins	Use of existing borrow pit at Citrus	Proposed kicker dike at Cholla and Waterfall washes	Diversion dike White Tanks Mountains to Camelback channel	County lake/recharge basin	Channelization of Bullard Wash from existing outfall to LAFB	Channelization of Cholla Wash	Channelization of Waterfall Wash	WT#3 outfall channel to Buckeye FRS #3	Pump from WT#4 to Buckeye FRS#3	N-S channel along the Loop 303 corridor	N-S channel along the Estrella Pkwy
1	●	●				●					●	
2	●	●				●					●	
3	●	●	●			●	●	●			●	
4						●					●	●
5						●					●	●
6	●					●			●		●	●
7	●	●	●	●		●					●	●
8		●				●					●	●
9		●				●					●	
10		●	●		●	●			●	●	●	

Combined Alternative Features

Alternative	N-S channel along the AT&SF RxR	N-S outfall from WT#4 to Gila	N-S outfall channel from existing borrow pit to Gila River	N-S channel from ADOT basins to Gila River	N-S channel from WT#3 to Gila River along Jackrabbit	Containment of flow breaks along Jackrabbit Trail	Containment of flow breaks along 203rd Road north of WT#4	Containment of flow breaks along Beardsley north of WT#3	S-E outfall channel from WT#4 to Gila River	W-E channel along Peoria (discontinuous)	W-E channel along Camelback to Loop 303	W-E channel along Camelback (continuous)
1						●	●		●			
2		●	●	●							●	
3						●		●	●	●		●
4	●					●	●		●	●		
5		●				●						
6						●	●	●	●			
7	●	●				●		●				
8					●							
9		●				●		●				
10		●				●		●				

Table 3.1 (Cont.)

Combined Proposed Alternative Features

Combined Alternative Features

Alternative	W-E channel along Northern (discontinuous)	W-E channel along Camelback (discontinuous)	W-E channel along I-10 (continuous)	W-E channel along I-10 (discontinuous)	W-E channel along Cactus (continuous)	W-E channel along Cactus (discontinous)	W-E channel along Bethany (discontinous)	E-W channel along the RID canal (continuous)	E-W channel along the RID canal (discontinuous)	E-W channel along the BID canal (continuous)	Proposed park/detention at Beardsley and I-10	Proposed park/detention at Waddell and Loop 303
1	●	●	●		●			●				
2		●	●			●						
3				●					●			
4	●	●		●								
5	●			●			●				●	●
6		●		●				●				
7		●	●						●			
8		●		●				●		●		
9	●	●						●				
10	●	●		●					●			●

Combined Alternative Features

Alternative	Proposed park/detention at Bullard and I-10	Proposed park/detention at Reems and Peoria	Proposed park/detention at Bullard and Camelback	Proposed park/detention @ Reems and Cactus	Proposed park/detention at Loop 303 and Cactus	Proposed park/detention at Reems and Northern	Proposed park/detention at Loop 303 and Camelback	Proposed park/detention at Perryville and Bethany	Proposed park/detention at Broadway and Loop 303	Proposed park/detention at Perryville and Camelback	Proposed park/detention at Peoria and Loop 303	Proposed park/detention at Loop 303 and Indian School
1	●			●	●	●	●					
2	●				●							●
3		●	●		●		●		●	●	●	
4	●	●	●				●				●	
5	●								●		●	
6												
7			●		●							
8	●				●	●	●		●			
9	●		●		●	●	●	●				
10						●	●	●			●	

Table 3.1 (Cont.)

Combined Proposed Alternative Features

Combined Alternative Features

Alternative	Proposed park/detention at Northern and Loop 303	Proposed park/detention at Bethany Home and Loop 303	Proposed park/detention at Buckeye and Loop 303	Proposed park/detention at Camelback and AT&SF RxR	Proposed park/detention at Camelback and Beardsley	Proposed park/detention at Olive and Loop 303	Proposed park/detention at Glendale and Loop 303	Proposed park/detention at Loop 303 and Thomas	Proposed park/detention at Loop 303 and I-10	Proposed park/detention at Northern and AT&SF RxR	Proposed park/detention at Indian School and Jackrabbit	Proposed park/detention at McDowell and Beardsley
1									●			
2								●	●			
3												
4									●	●		
5	●	●	●					●	●			
6												
7				●	●	●	●		●			
8									●		●	●
9	●		●			●			●			
10	●								●		●	

Combined Alternative Features

Alternative	Proposed park/detention at RID and Jackrabbit	Proposed park/detention at Broadway and Jackrabbit	Proposed park/detention at Buckeye and Estrella	Proposed park/detention at Northern and Beardsley	Proposed park/detention at Lower Buckeye and Estrella
1					
2					
3					
4				●	●
5				●	
6					
7					
8	●	●		●	
9			●	●	
10				●	

Table 3.2

Alternative	"Pros" of Proposed Combined Alternative											
	Alternative provides strong multi-use and partnering potential	Eliminates flow breaks from the White Tanks Mountains along Beardsley Canal and Jackrabbit Trail	Diversion of flow from Bullard Wash to ADOT basins	Channel along the AT&SF Railroad relieves ponding	Opportunities for trails adjacent to channels connecting cities	Flow diversions from WT#3&4 makes conversion to detention easier	Alternative shows significant west-east flow diversions	Alternative shows significant number of proposed detention/park facilities	Proposed detention and/or channels will minimize Loop 303 channel	Runoff is removed from the Loop 303 watershed	Alternaitve uses existing borrow pit	Overland channels provide good trail corridors
1	●	●	●			●	●				●	●
2		●	●	●	●	●		●			●	
3	●	●	●			●	●	●		●		●
4	●	●				●	●					●
5		●				●		●	●			
6	●	●				●		●		●	●	●
7		●	●			●		●	●	●	●	
8		●					●	●			●	
9		●				●	●	●	●		●	
10	●		●			●	●	●	●	●	●	

Table 3.3

Combined Alternative "Cons"										
Alternative	Sludge dumped in the ADOT basins may require cleanup	Wal-Mart expansion may create a barrier to a proposed outfall channel	Too few west-east outfall channels	The ADOT basins are involved in litigation and may not be usable until it is resolved	Too few attenuation park/detention basins are shown	No runoff is diverted from WT#3 making conversion to detention ponds difficult	Lack of west-east collectors implies large channel in Loop 303 corridor	Overland flow paths may require more land acquisition or pass through existing development	Does not make significant use of existing flood control facilities	Large flow diversions from WT #3 will require large channels along Loop 303 and/or Bullard Wash
1	●	●		●	●					
2	●		●	●	●	●	●			●
3	●	●		●	●			●		
4			●		●			●	●	●
5							●	●	●	●
6			●			●	●	●		●
7	●	●	●	●		●				
8						●				●
9								●		
10	●	●		●				●		

Combined Alternative "Cons"			
Alternative	No runoff is diverted from WT#4 making conversion to detention ponds difficult	West-east channel along Camelback must cut through a large hill to outlet at the Agua Fria River	There are too few north-south channels
1	●		
2	●		
3	●	●	
4	●		
5			
6			●
7			
8	●		
9	●		
10			

Table 3.4

Combined Proposed Alternative Environmental Impacts

Combined Alternative	Potential Effects to Bald Eagle	Potential Effects to Yuma Clapper Rail	Potential Effects to Cactus Ferruginous Pygmy-owl	Potential Effects to Southwestern Willow Flycatcher	Potential impacts to Peregrine falcon	Potential Impacts to Sonoran desert tortoise	Potential to Impact Waters of the United States
Combined Alternative 1	●	●	●	●		●	●
Combined Alternative 2	●	●	●	●		●	●
Combined Alternative 3	●	●	●	●		●	●
Combined Alternative 4	●	●	●	●		●	●
Combined Alternative 5	●	●	●	●		●	●
Combined Alternative 6	●	●	●	●		●	●
Combined Alternative 7	●	●	●	●		●	●
Combined Alternative 8	●	●	●	●		●	●
Combined Alternative 9	●	●	●	●		●	●
Combined Alternative 10	●	●	●	●		●	●

1. Note: if a potential environmental impact is indicated above for a particular alternative, refer to the alternative descriptions in section 3.1.4 for detail.

Table 3.5

Proposed Combined Alternative Cultural/Historical Impacts

Combined Alternative	Potential Impacts[1]	
	Prehistoric Resources	Historic Resources
1	crosses edge of Morocco Ruin, Hohokam village, condition unknown crosses Van Liere site, Hohokam village, condition unknown crosses AZ T:11:5 (ASM), Hohokam artifact scatter, condition unknown crosses Canal Liberty system, condition unknown near AZ T:11:22 (ASM), Hohokam village, condition unknown	crosses Phoenix Main Line of Southern Pacific Railroad, eligible crosses and parallels Beardsley Canal ,eligible, crosses and parallels Roosevelt Canal, recommended eligible crosses Buckeye Canal, recommended eligible crosses AZ T:7:175 (ASM), historic trash, recommended ineligible crosses AT&SF railroad spur, recommended ineligible crosses Old Buckeye Canal, recommended ineligible near AZ T:11:37 (ASM), historic trash, recommended ineligible
2	crosses edge of Morocco Ruin, Hohokam village, condition unknown crosses AZ T:11:5 (ASM), Hohokam artifact scatter, condition unknown crosses Canal Liberty system, condition unknown near Quass Pueblo, Hohokam village, eligible, partially excavated near AZ T:7:68 (ASM), Archaic artifact scatter, recommended eligible near Brewster Ruin, Hohokam village, condition unknown near M-3, Hohokam village, condition, unknown	crosses Phoenix Main Line of Southern Pacific Railroad, eligible crosses and parallels Beardsley Canal ,eligible, crosses and parallels Roosevelt Canal, recommended eligible crosses Buckeye Canal, recommended eligible parallels Airline Canal, unevaluated crosses AT&SF railroad spur, recommended ineligible crosses Old Buckeye Canal, recommended ineligible near AZ T:11:44 (ASM), historic well, recommended potentially eligible near AZ T:11:37 (ASM), historic trash, recommended ineligible near AZ T:7:175 (ASM), historic trash, recommended ineligible
3	crosses AZ T:7:68 (ASM), Archaic artifact scatter, recommended eligible crosses AZ T:6:1 (ASM), Hohokam village, condition unknown crosses AZ T:6:7 (ASM), Hohokam village, condition unknown crosses edge of Morocco Ruin, Hohokam village, condition unknown crosses Canal Liberty system, condition unknown near AZ T:6:2 (ASM), Hohokam habitation, condition unknown near M-3, Hohokam village, condition unknown	crosses Phoenix Main Line of Southern Pacific Railroad, eligible crosses and parallels Beardsley Canal ,eligible, crosses and parallels Roosevelt Canal, recommended eligible crosses Buckeye Canal, recommended eligible crosses Airline Canal, unevaluated crosses AT&SF railroad spur, recommended ineligible crosses Old Buckeye Canal, recommended ineligible near AZ T:7:175 (ASM), historic trash, recommended ineligible near AZ T:11:37 (ASM), historic trash, recommended ineligible

Table 3.5

Proposed Combined Alternative Cultural/Historical Impacts

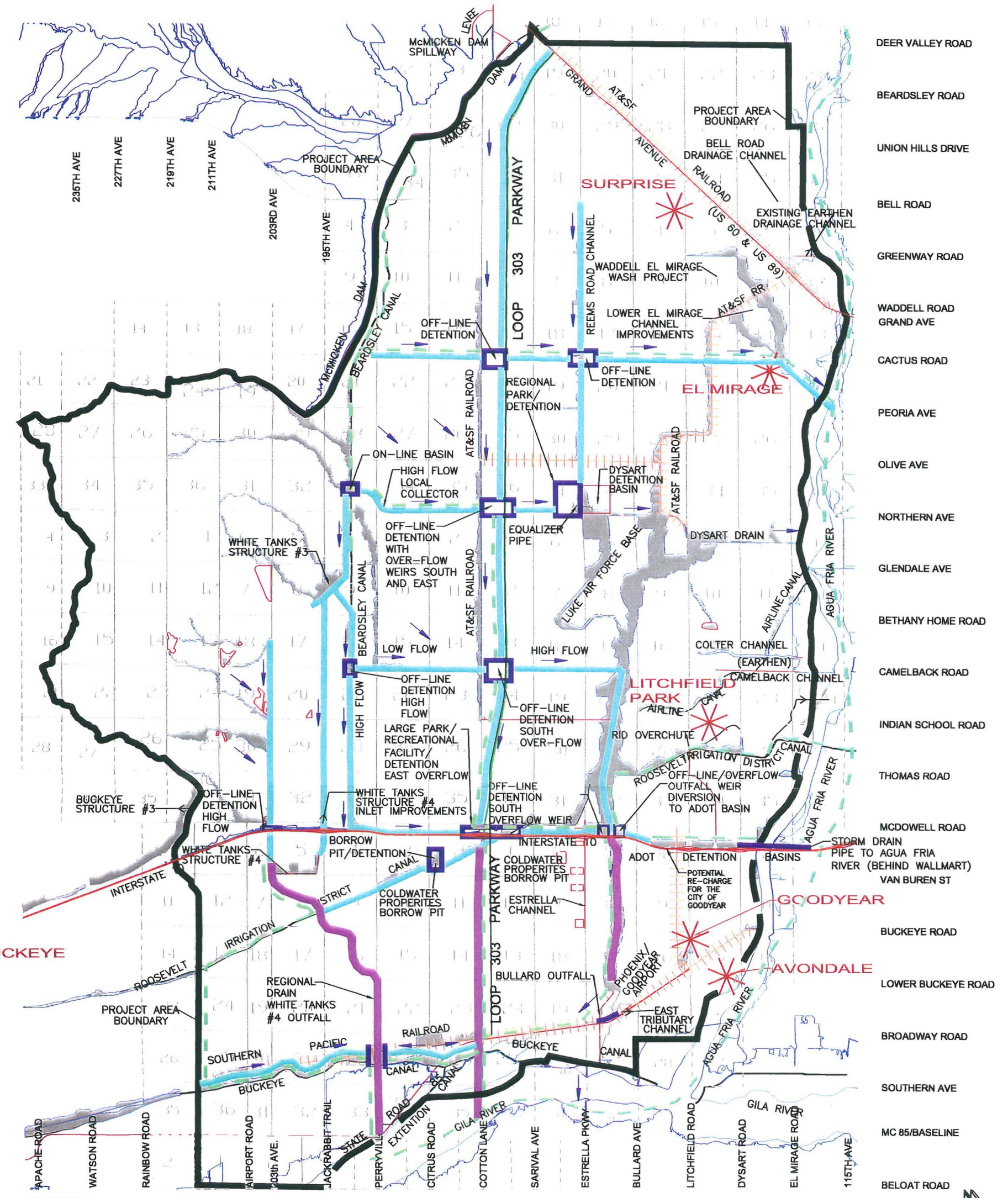
	Potential Impacts[1]	
	Prehistoric Resources	**Historic Resources**
4	crosses AZ T:7:68 (ASM), Archaic artifact scatter, recommended eligible crosses edge of Morocco Ruin, Hohokam village, condition unknown crosses Alkali Ruin, Hohokam village, condition unknown crosses Canal Liberty system, condition unknown	crosses Phoenix Main Line of Southern Pacific Railroad, eligible crosses and parallels Beardsley Canal ,eligible, crosses Roosevelt Canal, recommended eligible crosses Buckeye Canal, recommended eligible parallels Airline Canal, unevaluated crosses AT&SF railroad spur, recommended ineligible crosses Old Buckeye Canal, recommended ineligible near AZ T:7:175 (ASM), historic trash, recommended ineligible near AZ T:11:37 (ASM), historic trash, recommended ineligible
5	crosses AZ T:7:68 (ASM), Archaic artifact scatter, recommended eligible crosses edge of Morocco Ruin, Hohokam village, condition unknown crosses Alkali Ruin, Hohokam village, condition unknown crosses Canal Liberty system, condition unknown near Brewster Ruin, Hohokam village, condition unknown near AZ T:11:2 (PG), Hohokam village, condition unknown	crosses Phoenix Main Line of Southern Pacific Railroad, eligible crosses and parallels Beardsley Canal ,eligible, crosses Roosevelt Canal, recommended eligible crosses Buckeye Canal, recommended eligible parallels Airline Canal, unevaluated crosses AT&SF railroad spur, recommended ineligible crosses Old Buckeye Canal, recommended ineligible near AZ T:7:175 (ASM), historic trash, recommended ineligible
6	crosses AZ T:7:68 (ASM), Archaic artifact scatter, recommended eligible crosses edge of Morocco Ruin, Hohokam village, condition unknown crosses Canal Liberty system, condition unknown	crosses Phoenix Main Line of Southern Pacific Railroad, eligible crosses and parallels Beardsley Canal ,eligible, crosses and parallels Roosevelt Canal, recommended eligible crosses Buckeye Canal, recommended eligible parallels Airline Canal, unevaluated crosses AT&SF railroad spur, recommended ineligible crosses Old Buckeye Canal, recommended ineligible near AZ T:7:175 (ASM), historic trash, recommended ineligible near AZ T:11:37 (ASM), historic trash, recommended ineligible
7	crosses AZ T:7:68 (ASM), Archaic artifact scatter, recommended eligible crosses edge of Morocco Ruin, Hohokam village, condition unknown crosses Alkali Ruin, Hohokam village, condition unknown crosses AZ T:11:5 (ASM), Hohokam artifact scatter, condition unknown crosses Canal Liberty system, condition unknown near Brewster Ruin, Hohokam village, condition unknown near M-3, Hohokam village, condition, unknown	crosses Phoenix Main Line of Southern Pacific Railroad, eligible crosses and parallels Beardsley Canal ,eligible, crosses and parallels Roosevelt Canal, recommended eligible crosses Buckeye Canal, recommended eligible parallels Airline Canal, unevaluated crosses AT&SF railroad spur, recommended ineligible crosses Old Buckeye Canal, recommended ineligible near AZ T:7:175 (ASM), historic trash, recommended ineligible

Table 3.5

Proposed Combined Alternative Cultural/Historical Impacts

	Potential Impacts[1]	
	Prehistoric Resources	**Historic Resources**
8	crosses AZ T:7:68 (ASM), Archaic artifact scatter, recommended eligible crosses edge of Morocco Ruin, Hohokam village, condition unknown crosses Alkali Ruin, Hohokam village, condition unknown crosses Van Liere site, Hohokam village, condition unknown crosses Canal Liberty system, condition unknown near M-1, Hohokam village, condition, unknown	crosses Phoenix Main Line of Southern Pacific Railroad, eligible crosses and parallels Beardsley Canal ,eligible, crosses and parallels Roosevelt Canal, recommended eligible crosses Buckeye Canal, recommended eligible parallels Airline Canal, unevaluated crosses AT&SF railroad spur, recommended ineligible crosses Old Buckeye Canal, recommended ineligible near AZ T:7:175 (ASM), historic trash, recommended ineligible
9	crosses edge of Morocco Ruin, Hohokam village, condition unknown crosses Van Liere site, Hohokam village, condition unknown crosses Canal Liberty system, condition unknown near AZ T:11:2 (PG), Hohokam village, condition unknown near M-1, Hohokam village, condition, unknown near AZ T:7:68 (ASM), Archaic artifact scatter, recommended eligible	crosses Phoenix Main Line of Southern Pacific Railroad, eligible crosses and parallels Beardsley Canal ,eligible, crosses and parallels Roosevelt Canal, recommended eligible crosses Buckeye Canal, recommended eligible parallels Airline Canal, unevaluated crosses AT&SF railroad spur, recommended ineligible crosses Old Buckeye Canal, recommended ineligible near AZ T:7:175 (ASM), historic trash, recommended ineligible
10	crosses AZ T:7:68 (ASM), Archaic artifact scatter, recommended eligible crosses edge of Morocco Ruin, Hohokam village, condition unknown crosses AZ T:11:5 (ASM), Hohokam artifact scatter, condition unknown crosses Canal Liberty system, condition unknown near Brewster Ruin, Hohokam village, condition unknown	crosses Phoenix Main Line of Southern Pacific Railroad, eligible crosses and parallels Beardsley Canal ,eligible, crosses and parallels Roosevelt Canal, recommended eligible crosses Buckeye Canal, recommended eligible parallels Airline Canal, unevaluated crosses AT&SF railroad spur, recommended ineligible crosses Old Buckeye Canal, recommended ineligible near AZ T:7:175 (ASM), historic trash, recommended ineligible

1. The analysis of impacts is very preliminary because the condition of many recorded resources is unknown, the significance of most of the recorded resources has not been formally evaluated, and other resources could be identified with the area of potential effect. More detailed analyses should be pursued as planning continues and impact zones can be defined more precisely.
2. Note: if a potential environmental impact is indicated above for a particular alternative, refer to the alternative descriptions in section 3.1.4 for detail.



LEGEND:

- = PROPOSED LARGE REGIONAL OUTFALL CHANNEL
- = PROPOSED MEDIUM TO LARGE LOCAL COLLECTOR CHANNEL
- = PROPOSED DETENTION/RETENTION/PARK
- = DIRECTION OF FLOW
- = PROPOSED TRAIL LOCATION
- = PROJECT AREA BOUNDARY
- = PROPOSED LOOP 303 PARKWAY ALIGNMENT
- = EXISTING RAIL ROAD
- = EXISTING STRUCTURE OR FACILITY
- = FLOODPLAIN IDENTIFIED BY THE ORIGINAL WHITE TANKS ADMP, 1992

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MARICOPA COUNTY N.T.S.

COMBINED ALTERNATIVE #1

May 2003

Loop 303 Corridor/White Tanks ADMP Update

FIGURE 3.1

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3.1.4.1 Combined Alternative 1

Combined Alternative 1 was based on the Hydraulic water theme described in Section 3.1.2. See Figure 3.1 for a schematic representation of Combined Alternative 1. This alternative was developed from Seed Alternatives 1 and 2 described under Section 3.1.2 and comments made at the brainstorming meeting. The major components of this alternative are listed below:

- Use of the existing ADOT detention basins north of I-10 to store additional floodwater from the Bullard Wash.
- Proposed second outfall from the ADOT detention basins east to the Agua Fria River.
- Use of the existing borrow pit adjacent to Citrus Road south of I-10.
- Channelization of Bullard Wash all the way to Luke AFB from existing outfall.
- A channel along the southern portion of the Roosevelt Irrigation District Canal (RID).
- A channel along the Loop 303 corridor alignment.
- A channel along the north side of I-10 from the Beardsley Canal east to the ADOT detention basins.
- A channel along Cactus with a park/detention area at Loop 303 and a park/detention area at Reems, the channel ties into the El Mirage and Lower El Mirage Tributary improvement channels.
- A channel along Northern to a new park facility adjacent to Reems Road and west of the existing Falcon Dunes Golf Course.
- A channel along Camelback to the Bullard Wash, channel flows through a park/detention area at the intersection with Loop 303.
- Containment of flow breaks along the Beardsley Canal north of WT FRS #3, from Cholla Wash downstream.
- Containment of flow breaks along the Jackrabbit Trail alignment north of WT FRS #4 to WT FRS #3.
- Containment of flow breaks along the 203rd Avenue alignment north of WT FRS #4.
- A proposed southeast outfall channel from WT FRS #4 to the Gila River.

Combined Alternative 1 adds west-east collector channels and outfalls where the former water Seed Alternatives 1 and 2 did not have any significant west-east outfalls. According to comments

made during the brainstorming meeting, flows in the project area may require more attenuation than originally estimated. Combined Alternative 1 provides several additional park/detention areas over what was shown by the previous Seed Alternatives 1 and 2.

The following list of pros and cons for the previous Seed Alternatives 1 and 2 was developed based on review of the alternatives as well as comments from the brainstorming meeting.

Seed Alternative 1:

Some of the problems noted with Seed Alternative 1 are listed below:

- The alternative proposes use of the existing ADOT basins. A hazardous sludge has been dumped in one or more of the pits requiring cleanup before the basins can be used.
- The Wal-Mart expansion to the south has created a significant barrier to a west-east outfall proposed from the ADOT basins.
- This alternative fails to show any significant west-east outfall/collector channels.
- The ADOT basins are involved in litigation and may not be available for use right away.
- The alternative does not show very much attenuation through proposed park/detention areas. This may not be realistic with the volumes of runoff expected to occur in the study area.
- This alternative does not divert flow from either of the White Tanks dam structures. This is not conducive to possible conversion of either structure to a detention basin or combination of basins.
- The lack of west-east collectors implies a larger facility along the Loop 303 corridor where additional right-of-way may be difficult or expensive to obtain.
- There is no channel shown along the AT&SF Railroad south of El Mirage. This means ponding on the upstream side of the tracks will continue to occur.

The positive aspects of Seed Alternative 1 are listed below:

- There is some diversion of flow from the Loop 303 channel to the east along Northern Avenue – this will help keep the size of the proposed Loop 303 channel more manageable since the right-of-way in this area is limited.
- The elimination of flow breaks from the White Tank Mountains watershed along the Beardsley Canal and Jackrabbit Trail lowers current flood volumes in the southeastern areas of the project downstream.

- There is some diversion of flow from the Bullard Wash east to the ADOT basins – this will help keep the size of the proposed Loop 303 channel more manageable since the right-of-way in this area is limited.

Seed Alternative 2:

Some of the problems noted with Seed Alternative 2 are listed below:

- The alternative does not show very much attenuation through proposed park/detention areas. This may not be realistic with the volumes of runoff expected to occur in the study area.
- The large diversion of flow from the Waterfall and Cholla washes north of WT FRS #3 will result in a very large channel along Loop 303. In addition, the overland flow path of the proposed diversion channels may require more right-of-way than following a section line or road, or may interfere with planned/existing development.
- This alternative fails to show any significant west-east outfall/collector channels that allow flow diversions from either Loop 303 or Bullard Wash.
- This alternative does not make significant use of existing flood control facilities.
- The overland flow path shown for the outfall/collector channel from park/detention area shown at the northwest corner of Loop 303 and Camelback Road, cuts through an area that has been plated for development and/or is developed by Palm Valley. Right-of-way for this alignment is anticipated to be more expensive than one following a section line or roadway.
- The large diversion of water from the WT FRS #4 watershed east to the Loop 303 and the Bullard Wash alignment will result in very large channels along Loop 303 and Bullard Wash.
- There is no channel shown along the AT&SF Railroad south of El Mirage. This means ponding on the upstream side of the tracks will continue to occur.

The positive aspects of Seed Alternative 2 are listed below:

- The large amounts of floodwater diverted from both the WT FRS #3 and WT FRS #4 watersheds will aid in the conversion of each structure from a dam to a retention basin.
- The north-south channel alignments make use of existing crossing of I-10 and minimize the need for new west-east facilities.
- The large channel proposed along Loop 303 provides an excellent link between the northern portion of the watershed and the Salt/Gila River.

Combined Alternative 1 directly addresses comments made during the brainstorming meeting by:

- Providing west-east collector channels along Cactus Road, Camelback Road and I-10.
- Significantly increasing the number of park/detention areas for better peak flow attenuation.
- Decreasing the required size of the proposed channel along Loop 303 by diverting more flow east, directly to the Agua Fria River.
- Lowering the amount of peak attenuation required so that the flow capacity of the existing Bullard Wash outfall is not exceeded.

The potential environmental impacts of Combined Alternative 1 are briefly discussed below. The discussion is limited to those species that are federally listed as threatened or endangered, migratory (Peregrine Falcon), and highly sensitive (Sonoran desert tortoise).

The Alternative has been reviewed and has the potential to affect the Sonoran desert tortoise, Southwestern Willow Flycatcher, Cactus Ferruginous Pygmy-owl, and Yuma Clapper Rail. The proposed alternative would not have any impacts to the Peregrine Falcon.

In order to completely evaluate and make a determination on the potential effects/impacts to these species and their associated habitats (riparian habitat along the Gila River and Sonoran desert scrub) a qualified biologist would need to complete the following in a greater level of detail:

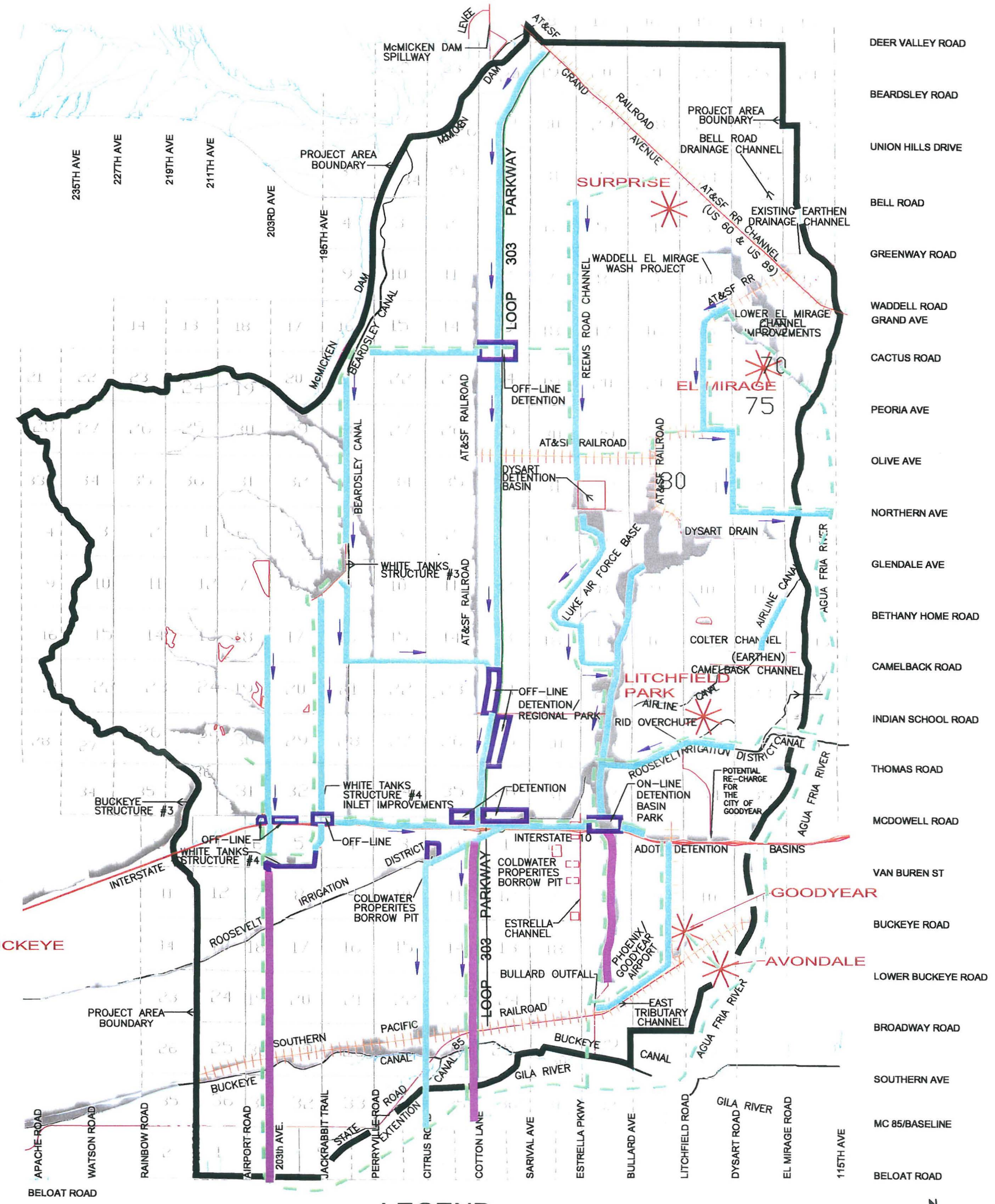
- Conduct site visit to completely evaluate the habitat suitability for each species
- Conduct a survey of the upland areas for desert tortoise.
- Evaluate the amount of water that would be entering the Gila River to determine how this addition of water would impact the existing habitat and the species associated with the habitat.
- Evaluate how much habitat will be lost in both the riparian habitat and the upland areas of the Sonoran desert scrub.
- Correspond with the Arizona Game and Fish Department and the US Fish and Wildlife Service on the potential for affects to these species.

The above steps are beyond the scope of this area drainage master plan, however, they will likely be required during final design of the proposed alternative facilities.

The potential cultural/historical impacts of Combined Alternative 1 are listed below:

- Could affect three known Hohokam village sites, an artifact scatter, and Canal Liberty system
- Would cross and/or parallel the historic Beardsley, Roosevelt, and Buckeye canals and Phoenix Main Line of Southern Pacific Railroad (as well as other historic resources that appear to lack historic significance)

As planning continues and more detailed designs are developed, intensive field surveys should be undertaken to ensure compliance with the Arizona Antiquities Act. Needs for right-of-way across any State Trust land or other state permits would entail requirements for the lead state agency to comply with the State Historic Preservation Act. Similarly, any federal permits would require compliance with Section 106 of the National Historic Preservation Act.



COMBINED ALTERNATIVE #2

May 2003

Loop 303 Corridor/White Tanks ADMP Update

FIGURE 3.2

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3.1.4.2 Combined Alternative 2

Combined Alternative 2 was based on the city connections theme described in Section 3.1.2. See Figure 3.2 for a schematic representation of the Combined Alternative 2. This alternative was developed based on Seed Alternatives 3 and 4 described under Section 3.1.2 and comments made at the brainstorming meeting. The major components of this alternative are listed below:

- Use of the existing borrow pit adjacent to Citrus Road south of I-10.
- A north-south outfall/collector channel from the existing borrow pit to the Gila River.
- Channelization of Bullard Wash all the way to Luke AFB from the existing Bullard Wash outfall.
- A continuous channel along the Loop 303 corridor alignment north and south of I-10.
- A channel along the north side of I-10 from the Beardsley Canal alignment east to a park/detention area adjacent to Loop 303 and continuing east to the Bullard Wash and the ADOT detention basins.
- A north-south outfall/collector channel from the ADOT detention basins along the existing Southern Pacific Railroad south and southwest to the Bullard Wash outfall.
- A west-east channel along Cactus Road from Beardsley Canal to Loop 303.
- A west-east channel/outfall from WT FRS #3 along Camelback to Loop 303.
- A proposed north-south outfall channel from WT FRS #4 to the Gila River.

Educational opportunities, facility treatments and aesthetics in general would be done in accordance with the city connections theme described in Section 3.1.2.

Combined Alternative 2 adds west-east and north-south collector channels and outfalls where the former city connection Seed Alternatives 3 and 4 did not have any significant west-east outfalls and too few north-south outfalls. According to comments made during the brainstorming meeting, flows in the project area may require more attenuation than originally estimated. Combined Alternative 2 provides additional park/detention areas over what was shown by the previous Seed Alternatives 3 and 4.

The following list of pros and cons for the previous Seed Alternatives 3 and 4 was developed based on review of the alternatives as well as comments from the brainstorming meeting.

Seed Alternative 3:

Some of the problems noted with Seed Alternative 3 are listed below:

- The overland flow path shown for the outfall/collector channel from WT FRS #4 may cut through areas that have been plated for development and/or currently contain development. Right-of-way for this alignment is anticipated to be more expensive than one following a section line or roadway.
- There is no corridor shown along Loop 303 south of I-10. This is contrary to future plans for trails and recreation in this area envisioned by the City of Goodyear.
- The trail proposed along the Dysart Drain may not be feasible due to the hazard posed by the extremely deep channel and relatively steep side slopes. In addition, pedestrian access through Luke AFB is not practical.
- This alternative fails to show any significant west-east outfall/collector channels.
- This alternative shows only two significant north-south outfall/collector channels. Given the lack of west-east channels shown, this would imply that the two north-south channels would be very large and expensive.
- The alternative does not show very much attenuation through proposed park/detention areas. This may not be realistic with the volumes of runoff expected to occur in the study area.
- This alternative does not divert flow from either of the White Tanks dam structures. This is not conducive to possible conversion of either structure to a detention basin or combination of basins.

The positive aspects of Seed Alternative 3 are listed below:

- The channel shown along the AT&SF Railroad from El Mirage southward is required to relieve ponding runoff along the upstream side of the tracks.
- The elimination of flow breaks from the White Tank Mountains watershed along the Beardsley Canal and Jackrabbit Trail lowers current flood volumes in the southeastern areas of the project downstream.
- The alternative shows a good system of trails that connect all of the major cities and population centers present within the study area.

Seed Alternative 4:

Some of the problems noted with Seed Alternative 4 are listed below:

- There is no corridor shown along Loop 303 south of I-10. This is contrary to future plans for trails and recreation in this area envisioned by the City of Goodyear.
- The trail proposed along the Dysart Drain may not be feasible due to hazards present within the area and adjacent to the drain. In addition, pedestrian access through Luke AFB is not practical.
- This alternative fails to show any significant west-east outfall/collector channels.
- This alternative shows only two significant north-south outfall/collector channels. Given the lack of west-east channels shown, this would imply that the two north-south channels would be very large and expensive.
- The alternative does not show very much attenuation through proposed park/detention areas. This may not be realistic with the volumes of runoff expected to occur in the study area.
- This alternative does not divert flow from the WT FRS #3. This is not conducive to possible conversion of the WT FRS #3 to a detention basin or combination of basins.
- The west-east channel shown along Bethany Home Road should move south to Camelback Road where the developer SunCor is planning a channel.

The positive aspects of Seed Alternative 4 are listed below:

- The west-east collector channel from the WT FRS #3 outlet diverts flow from the WT FRS #4 downstream. This is a positive element of the alternative if WT FRS #4 is to be converted to a detention basin in the future.
- The channel shown along the AT&SF Railroad from El Mirage southward is required to relieve ponding along the upstream side of the tracks.
- The elimination of flow breaks from the White Tank Mountains watershed along the Beardsley Canal and Jackrabbit Trail lowers current flood volumes in the southeastern areas of the project downstream.
- The alternative shows a good system of trails that connect all of the major cities and population centers present in the study area.

Combined Alternative 2 directly addresses comments made during the brainstorming meeting by:

- Providing west-east collector channels along Cactus Road, Camelback Road and I-10.
- Providing north-south collector channels along Loop 303 (north and south of I-10), and Citrus Road.
- Eliminating the trail along Dysart Drain

The potential environmental impacts of Combined Alternative 2 are briefly discussed below. The discussion is limited to those species that are federally listed as threatened or endangered, migratory (Peregrine Falcon), and highly sensitive (Sonoran desert tortoise).

The Alternative has been reviewed and has the potential to affect the Sonoran desert tortoise, Southwestern Willow Flycatcher, Cactus Ferruginous Pygmy-owl, and Yuma Clapper Rail. The proposed alternative would not have any impacts to the Peregrine Falcon.

In order to completely evaluate and make a determination on the potential effects/impacts to these species and their associated habitats (riparian habitat along the Gila River and Sonoran desert scrub) a qualified biologist would need to complete the following in a greater level of detail:

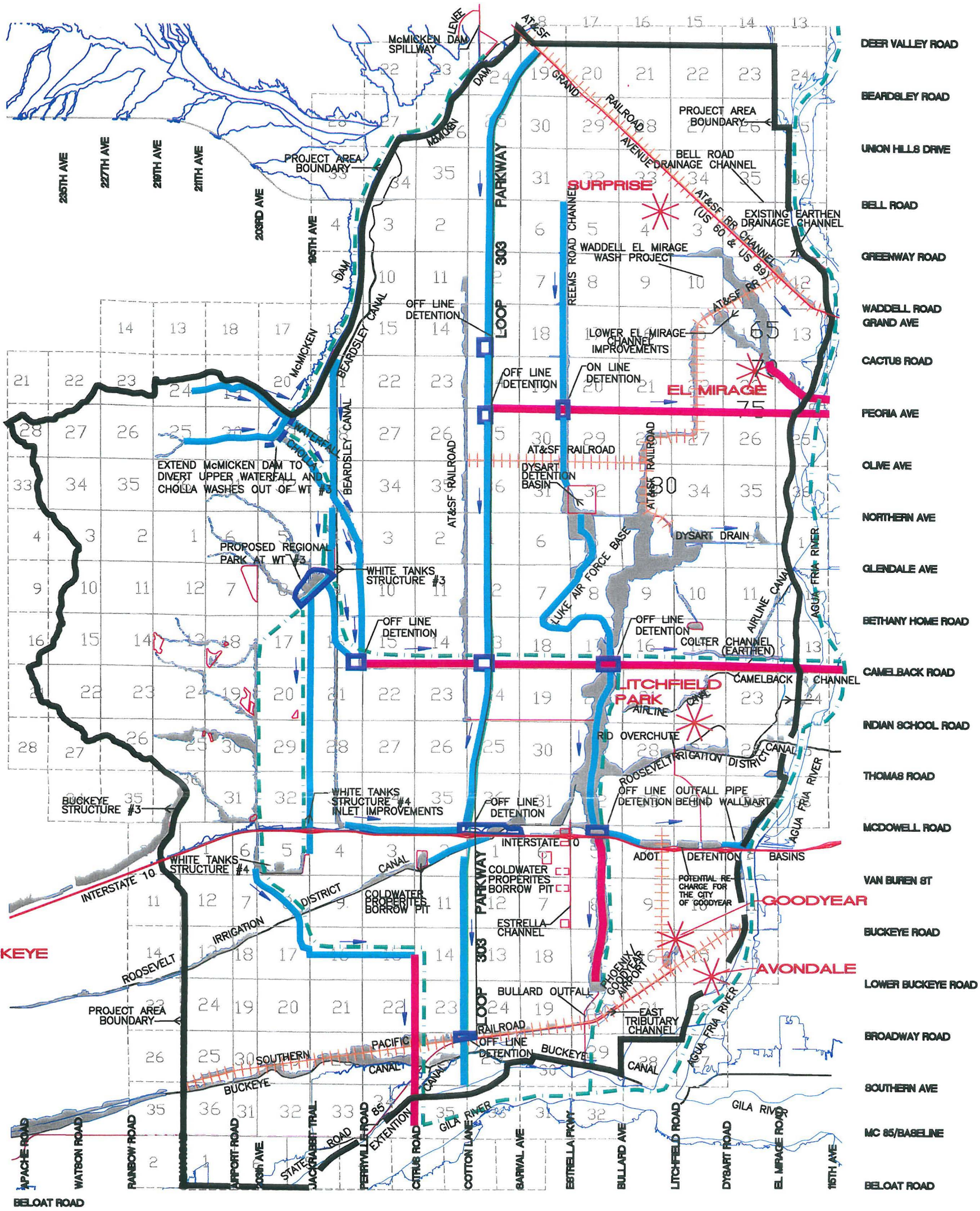
- Conduct site visit to completely evaluate the habitat suitability for each species
- Conduct a survey of the upland areas for desert tortoise.
- Evaluate the amount of water that would be entering the Gila River to determine how this addition of water would impact the existing habitat and the species associated with the habitat.
- Evaluate how much habitat will be lost in both the riparian habitat and the upland areas of the Sonoran desert scrub.
- Correspond with the Arizona Game and Fish Department and the US Fish and Wildlife Service on the potential for affects to these species.

The above steps are beyond the scope of this area drainage master plan, however, they will likely be required during final design of the proposed alternative facilities.

The potential cultural/historical impacts of Combined Alternative 2 are listed below:

- Could affect a known Hohokam village site, an artifact scatter, and Canal Liberty system (and is near three other Hohokam village sites and an Archaic artifact scatter)
- Would cross and/or parallel the historic Beardsley, Roosevelt, and Buckeye canals and Phoenix Main Line of Southern Pacific Railroad (as well as other historic resources that appear to lack historic significance)

As planning continues and more detailed designs are developed, intensive field surveys should be undertaken to ensure compliance with the Arizona Antiquities Act. Needs for right-of-way across any State Trust land or other state permits would entail requirements for the lead state agency to comply with the State Historic Preservation Act. Similarly, any federal permits would require compliance with Section 106 of the National Historic Preservation Act.



LEGEND:

- PROPOSED LARGE REGIONAL OUTFALL CHANNEL
- PROPOSED MEDIUM TO LARGE LOCAL COLLECTOR CHANNEL
- PROPOSED DETENTION/RETENTION/PARK
- DIRECTION OF FLOW
- PROPOSED TRAIL LOCATION
- PROJECT AREA BOUNDARY
- PROPOSED LOOP 303 PARKWAY ALIGNMENT
- EXISTING RAIL ROAD
- EXISTING STRUCTURE OR FACILITY
- FLOODPLAIN IDENTIFIED BY THE ORIGINAL WHITE TANKS ADMP, 1992

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MARICOPA COUNTY
N.T.S.

COMBINED ALTERNATIVE #3

May 2003

Loop 303 Corridor/White Tanks ADMP Update

FIGURE 3.3

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3.1.4.3 Combined Alternative 3

Combined Alternative 3 was based on the natural areas theme described in Section 3.1.2. See Figure 3.3 for a schematic representation of the Combined Alternative 3. This alternative was developed based on Seed Alternatives 5 and 6 described under Section 3.1.2 and comments made at the brainstorming meeting. The major components of this alternative are listed below:

- Channelization of Bullard Wash all the way to Luke AFB from the existing Bullard Wash outfall.
- A continuous channel along the Loop 303 corridor alignment north and south of I-10.
- A channel along the north side of I-10 from the Beardsley Canal alignment east to a park/detention area adjacent to Loop 303.
- A channel along the north side of I-10 from a proposed park/detention area at Bullard Wash east to the ADOT basins.
- A west-east outfall channel from the ADOT detention basins to the Agua Fria River.
- A west-east collector/outfall channel along Peoria Avenue from a proposed park/detention area at Loop 303 east to the Agua Fria River.
- A west-east collector/outfall channel along Camelback Road from WT FRS #3 to the Agua Fria River.
- A proposed southeast outfall channel from WT FRS #4 to the Gila River.
- A proposed channel from the I-10/RID crossing to the southwest to the existing borrow pit.
- Containment of flow along the Jackrabbit Trail alignment from WT FRS #3 south to WT FRS #4.
- Containment of flow along the Beardsley Canal alignment south to the WT FRS #3.
- A proposed kicker dike located in the upper Cholla and Waterfall washes that diverts flow from the upper reaches of the washes out of the watershed to the McMicken Dam.
- Channelization and diversion of the lower Cholla Wash to the southeast out of the WT FRS #3 watershed and into a proposed park/detention area at the northwest corner of Camelback Road and Perryville Road.

- Diversion of flow from the WT FRS #3 outlet out of the WT FRS #4 watershed to the proposed park/detention area at the northwest corner of Camelback Road and Perryville Road.

Educational opportunities, facility treatments and aesthetics in general, would be done in accordance with the natural areas theme described in Section 3.1.2.

Combined Alternative 3 adds a kicker dike in the upper watershed of WT FRS #3, makes greater use of the existing facilities already present in the project area and maintains a continuous channel along the Loop 303 corridor both north and south of I-10. According to comments made during the brainstorming meeting, flows in the project area may require more attenuation than originally estimated. Combined Alternative 3 provides additional park/detention areas over what was shown by the previous Seed Alternatives 5 and 6.

The following list of pros and cons for the previous Seed Alternatives 5 and 6 was developed based on review of the alternatives as well as comments from the brainstorming meeting.

Seed Alternative 5:

Some of the problems noted with Seed Alternative 5 are listed below:

- The overland flow path shown for the outfall/collector channel from WT FRS #4 is much longer than required and may cut through areas that have been plated for development and/or currently contain development. Right-of-way for this alignment is anticipated to be more expensive than one following a section line or roadway.
- There is no corridor shown along Loop 303 south of I-10. This is contrary to future plans for trails and recreation in this area envisioned by the City of Goodyear. The channel shown along Loop 303 north of I-10 is discontinuous.
- The trail proposed along the Dysart Drain may not be feasible due to hazards present within the immediate area and adjacent to the drain. In addition, pedestrian access through Luke AFB is not practical.
- This alternative shows only two significant north-south outfall/collector channels.
- The outfall/collector channel proposed along Camelback Road must cut through an existing 30-foot hill to daylight at the Agua Fria River.
- The diversion of flow in Cholla and Waterfall washes to Dysart Drain without additional detention is not practical.

- The separate channelization of Cholla and Waterfall washes east of the Beardsley Canal is wasteful and more expensive. Right-of-way requirements will be higher and the overland alignments may create conflicts with proposed and/or existing development.

The positive aspects of Seed Alternative 5 are listed below:

- There is a significant amount of flow diverted out of the WT FRS #3 watershed area. This is good for possible conversion of the WT FRS #3 dam to a basin.
- The diversion of flow from the WT FRS #3 outfall out of the WT FRS #4 watershed area is good for possible conversion of the WT FRS #4 dam to a basin.
- The elimination of flow breaks from the White Tank Mountains watershed along the Beardsley Canal and Jackrabbit Trail lowers current flood volumes in the southeastern areas of the project downstream.
- In general, the alternative seems to show an adequate number of park/detention areas.
- The alternative provides an adequate number of west-east outfall/collector channels.

Seed Alternative 6:

Some of the problems noted with Seed Alternative 6 are listed below:

- There is no corridor shown along Loop 303 south of I-10. This is contrary to future plans for trails and recreation in this area envisioned by the City of Goodyear.
- There is no channel shown along Loop 303 north of I-10.
- There are very few north-south outfall/collector channels.
- There are no west-east outfall/collector channels that go through to the Agua Fria River.
- The lack of outfalls may cause the outfalls shown to be too large and may cause the inflow to Bullard Wash to exceed the design capacity.
- The alternative does not show very much attenuation through proposed park/detention areas. This may not be realistic with the volumes of runoff expected to occur in the study area.
- The channel shown along Indian School Road is owned and maintained by SunCor. SunCor will be developing the property north of this channel to Camelback Road and will abandon this channel and build a new interceptor/collector channel along Camelback Road.

The positive aspects of Seed Alternative 6 are listed below:

- The west-east collector channel from the WT FRS #3 outlet diverts flow from the WT FRS #4 downstream. This is a positive element of the alternative if WT FRS #4 is to be converted to a detention basin in the future.
- The elimination of flow breaks from the White Tank Mountains watershed along the Beardsley Canal and Jackrabbit Trail lowers current flood volumes in the southeastern areas of the project downstream.
- The diversion of the Cholla and Waterfall washes from the WT FRS #3 watershed area is good for the potential conversion of the dam to a detention basin.

Combined Alternative 3 directly addresses comments made during the brainstorming meeting by:

- Added detention for Waterfall and Cholla washes prior to combining with the Loop 303 channel.
- Combines Cholla and Waterfall washes prior to Beardsley Canal.
- Providing west-east collector channels along Peoria Avenue, Camelback Road and I-10.
- Providing north-south continuous collector channels along Loop 303 (north and south of I-10).
- Provides several north-south outfalls.
- Removes channels proposed along Indian School Road.
- Providing a significant increase in the number of park/detention areas proposed for peak attenuation.
- Makes more use of existing land features for flood control such as the existing borrow pit.
- Diverts significant flow from the WT FRS #3 upper watershed to the McMicken Dam with a kicker dike.

The potential environmental impacts of Combined Alternative 3 are briefly discussed below. The discussion is limited to those species that are federally listed as threatened or endangered, migratory (Peregrine Falcon), and highly sensitive (Sonoran desert tortoise).

The Alternative has been reviewed and has the potential to affect the Sonoran desert tortoise, Southwestern Willow Flycatcher, Cactus Ferruginous Pygmy-owl, and Yuma Clapper Rail. The proposed alternative would not have any impacts to the Peregrine Falcon.

In order to completely evaluate and make a determination on the potential effects/impacts to these species and their associated habitats (riparian habitat along the Gila River and Sonoran desert scrub) a qualified biologist would need to complete the following in a greater level of detail:

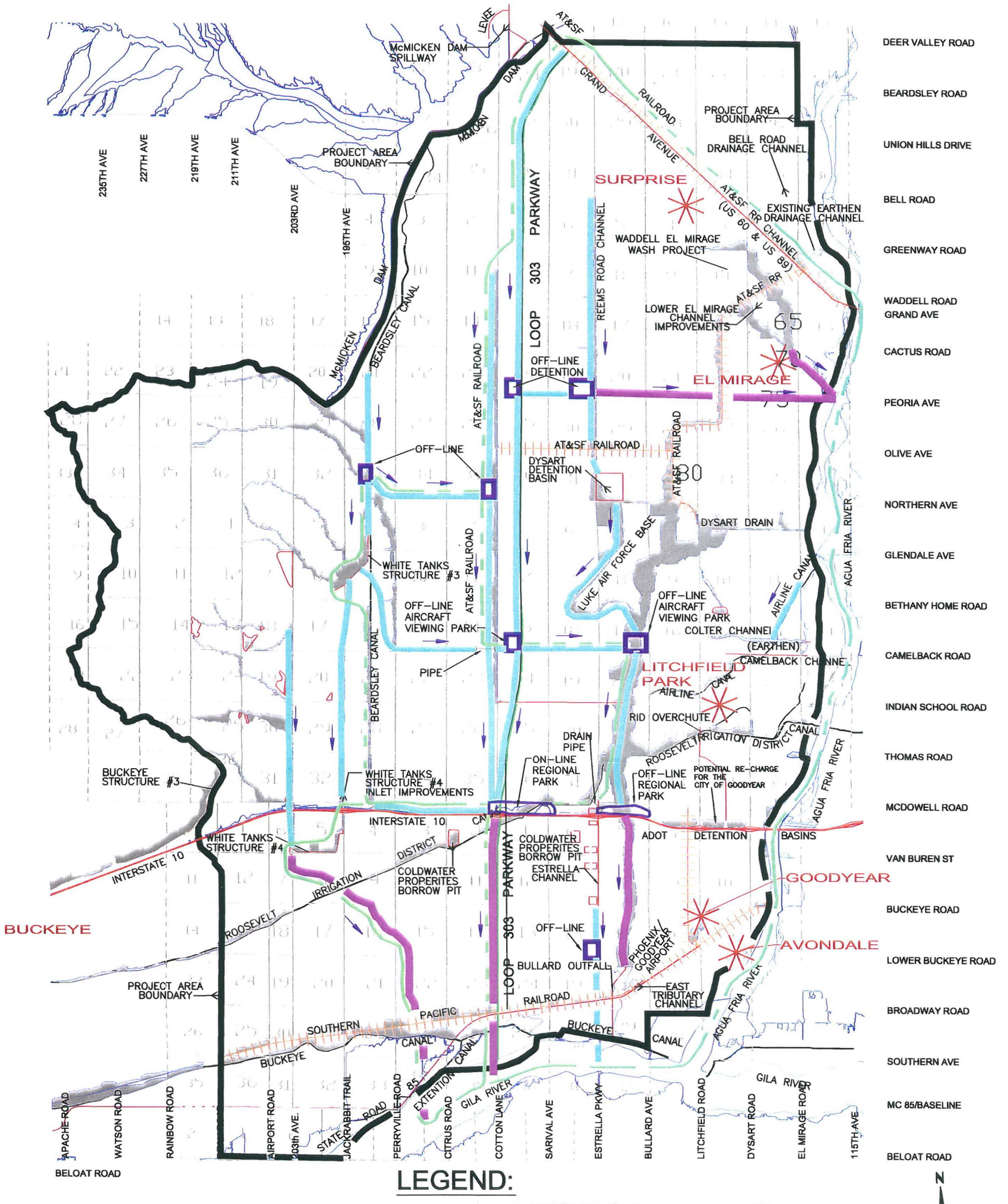
- Conduct site visit to completely evaluate the habitat suitability for each species
- Conduct a survey of the upland areas for desert tortoise.
- Evaluate the amount of water that would be entering the Gila River to determine how this addition of water would impact the existing habitat and the species associated with the habitat.
- Evaluate how much habitat will be lost in both the riparian habitat and the upland areas of the Sonoran desert scrub.
- Correspond with the Arizona Game and Fish Department and the US Fish and Wildlife Service on the potential for affects to these species.

The above steps are beyond the scope of this area drainage master plan, however, they will likely be required during final design of the proposed alternative facilities.

The potential cultural/historical impacts of Combined Alternative 3 are listed below:

- Could affect an Archaic artifact scatter, three known Hohokam village sites, and Canal Liberty system (and is near two other Hohokam village sites)
- Would cross and/or parallel the historic Beardsley, Roosevelt, Buckeye, and Airline canals and Phoenix Main Line of Southern Pacific Railroad (as well as other historic resources that appear to lack historic significance)

As planning continues and more detailed designs are developed, intensive field surveys should be undertaken to ensure compliance with the Arizona Antiquities Act. Needs for right-of-way across any State Trust land or other state permits would entail requirements for the lead state agency to comply with the State Historic Preservation Act. Similarly, any federal permits would require compliance with Section 106 of the National Historic Preservation Act.



LEGEND:

- = PROPOSED LARGE REGIONAL OUTFALL CHANNEL
- = PROPOSED MEDIUM TO LARGE LOCAL COLLECTOR CHANNEL
- = PROPOSED DETENTION/RETENTION/PARK
- = DIRECTION OF FLOW
- = PROPOSED TRAIL LOCATION
- = PROJECT AREA BOUNDARY
- = PROPOSED LOOP 303 PARKWAY ALIGNMENT
- = EXISTING RAIL ROAD
- = EXISTING STRUCTURE OR FACILITY
- = FLOODPLAIN IDENTIFIED BY THE ORIGINAL WHITE TANKS ADMP, 1992

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MARICOPA COUNTY
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COMBINED ALTERNATIVE #4

May 2003

Loop 303 Corridor/White Tanks ADMP Update

Flood Control District of Maricopa County

FIGURE 3.4

URS

3.1.4.4 Combined Alternative 4

Combined Alternative 4 was based on the transportation theme described in Section 3.1.2. See Figure 3.4 for a schematic representation of the Combined Alternative 4. This alternative was developed based on Seed Alternatives 7 and 8 described under Section 3.1.2 and comments made at the brainstorming meeting. The major components of this alternative are listed below:

- Channelization of Bullard Wash all the way to Luke AFB from the existing Bullard Wash outfall.
- A continuous channel along the Loop 303 corridor alignment north and south of I-10.
- A channel along the north side of I-10 from the Beardsley Canal alignment east to a park/detention area adjacent to Loop 303.
- A north-south channel along the Estrella Parkway to the Gila River.
- A large park/detention area adjacent to I-10 on the north in the Bullard Wash.
- A southeast overland outfall/channel from WT FRS #4 to the Gila River.
- A north-south collector channel along 203rd Avenue upstream of WT FRS #4.
- A north-south collector channel along Jackrabbit Trail from WT FRS #3 to WT FRS #4.
- A west-east collector/outfall channel along Peoria Avenue from a proposed park/detention area at Loop 303 east to the Agua Fria River.
- A west-east collector/outfall channel along Camelback Road from WT FRS #3 to the Agua Fria River.
- Channelization and diversion of the Cholla and Waterfall washes along Northern Avenue and into a proposed park/detention area at the northwest corner of Camelback Road and a proposed park/detention area at the northwest corner of Northern Avenue and the AT&SF Railroad.
- Diversion of flow from the WT FRS #3 outlet out of the WT FRS #4 watershed to the proposed west-east collector channel along Camelback Road.
- A proposed collector channel along the west side of the existing AT&SF Railroad south to the proposed park/detention area at Loop 303 and I-10.

Educational opportunities, facility treatments and aesthetics in general would be done in accordance with the natural areas theme described in Section 3.1.2.

Combined Alternative 4 adds a collector channel along the Cotton Lane/AT&SF Railroad, and maintains a continuous channel along the Loop 303 corridor both north and south of I-10. According to comments made during the brainstorming meeting, flows in the project area may require more attenuation than originally estimated. Combined Alternative 4 provides additional park/detention areas over what was shown by the previous Seed Alternatives 7 and 8.

The following list of pros and cons for the previous Seed Alternatives 7 and 8 was developed based on review of the alternatives as well as comments from the brainstorming meeting.

Seed Alternative 7:

Some of the problems noted with Seed Alternative 7 are listed below:

- The overland flow path shown for the outfall/collector channel from WT FRS #4 may cut through areas that have been plated for development and/or currently contain development. Right-of-way for this alignment is anticipated to be more expensive than one following a section line or roadway.
- This alternative does not provide enough west-east channel/outfalls to the Agua Fria River.
- Due to a lack of west-east channels, the Loop 303 channel will be very large.
- The alternative does not provide enough detention to sufficiently attenuate peak flow rates.
- The diversion of flow in Cholla and Waterfall washes to Loop 303 without additional detention is not practical.
- The separate channelization of Cholla and Waterfall washes east of the Beardsley Canal is wasteful and more expensive. Right-of-way requirements will be higher and the overland alignments may create conflicts with proposed and/or existing development.

The positive aspects of Seed Alternative 7 are listed below:

- There is a significant amount of flow diverted out of the WT FRS #3 watershed area. This is good for possible conversion of the WT FRS #3 dam to a basin.
- The elimination of flow breaks from the White Tank Mountains watershed along the Beardsley Canal and Jackrabbit Trail lowers current flood volumes in the southeastern areas of the project downstream.
- The west-east collector channel from the WT FRS #3 outlet diverts flow from the WT FRS #4 downstream. This is a positive element of the alternative if WT FRS #4 is to be converted to a detention basin in the future.

Seed Alternative 8:

Some of the problems noted with Seed Alternative 8 are listed below:

- There is no corridor shown along Loop 303 south of I-10. This is contrary to future plans for trails and recreation in this area envisioned by the City of Goodyear.
- There are very few west-east outfall/collector channels that go through to the Agua Fria River.
- The lack of outfalls may result in the channels shown to be too large and may cause inflow to Bullard Wash that exceeds its design capacity.
- The alternative does not show very much attenuation through proposed park/detention areas. This may not be realistic with the volumes of runoff expected to occur in the study area.

The positive aspects of Seed Alternative 8 are listed below:

- The elimination of flow breaks from the White Tank Mountains watershed along the Beardsley Canal and Jackrabbit Trail lowers current flood volumes in the southeastern areas of the project downstream.
- The diversion of the Cholla and Waterfall washes from the WT FRS #3 watershed area is good for the potential conversion of the dam to a detention basin.

Combined Alternative 4 directly addresses comments made during the brainstorming meeting by:

- Added detention for Waterfall and Cholla washes prior to combining with the Loop 303 channel.
- Combines Cholla and Waterfall washes prior to Beardsley Canal.
- Providing west-east collector channels along Peoria Avenue, Northern Avenue, Camelback Road and I-10.
- Providing north-south continuous collector channels along Loop 303 (north and south of I-10).

The potential environmental impacts of Combined Alternative 4 are briefly discussed below. The discussion is limited to those species that are federally listed as threatened or endangered, migratory (Peregrine Falcon), and highly sensitive (Sonoran desert tortoise).

The Alternative has been reviewed and has the potential to affect the Sonoran desert tortoise, Southwestern Willow Flycatcher, Cactus Ferruginous Pygmy-owl, and Yuma Clapper Rail. The proposed alternative would not have any impacts to the Peregrine Falcon.

In order to completely evaluate and make a determination on the potential effects/impacts to these species and their associated habitats (riparian habitat along the Gila River and Sonoran desert scrub) a qualified biologist would need to complete the following in a greater level of detail:

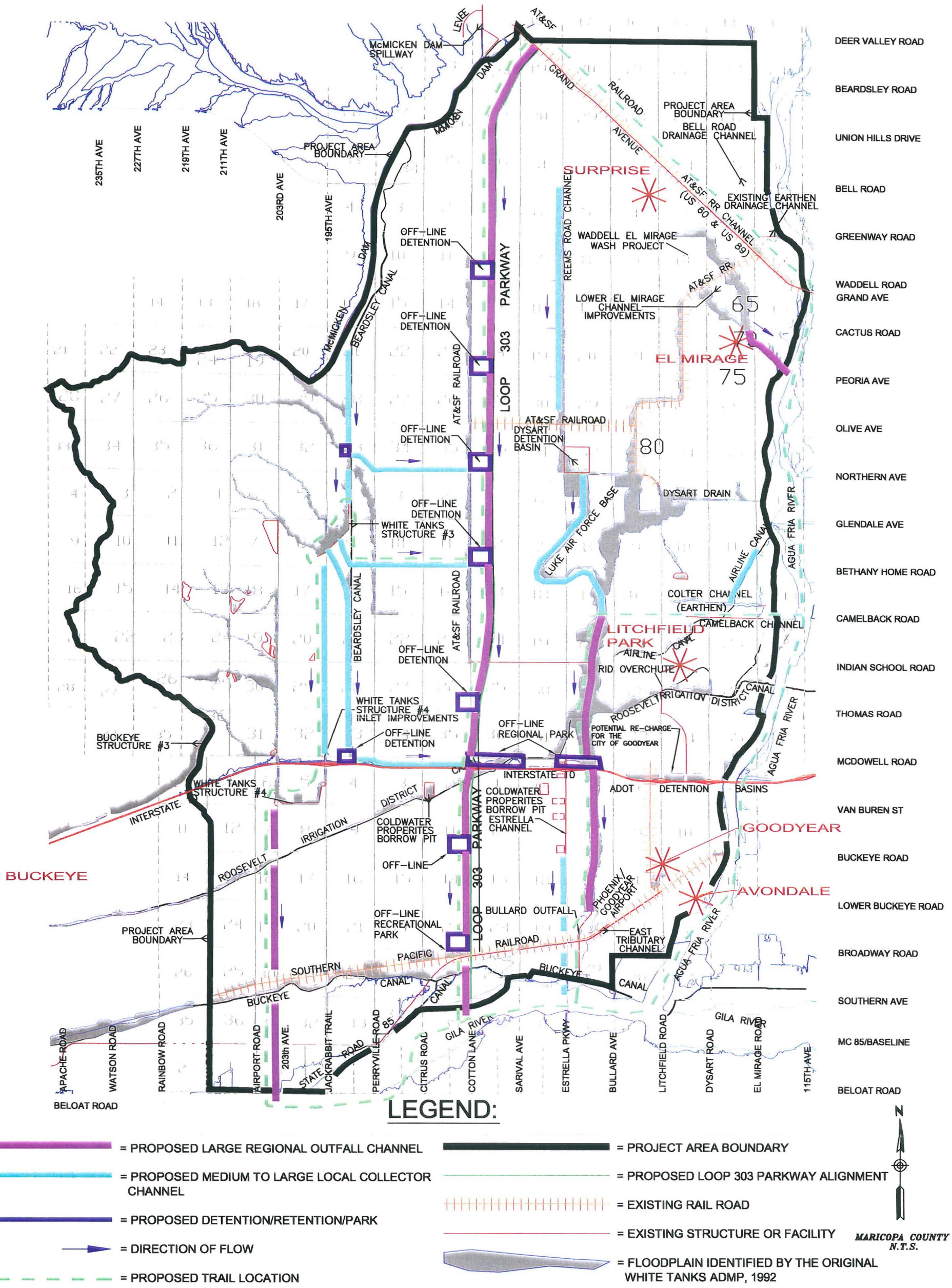
- Conduct site visit to completely evaluate the habitat suitability for each species
- Conduct a survey of the upland areas for desert tortoise.
- Evaluate the amount of water that would be entering the Gila River to determine how this addition of water would impact the existing habitat and the species associated with the habitat.
- Evaluate how much habitat will be lost in both the riparian habitat and the upland areas of the Sonoran desert scrub.
- Correspond with the Arizona Game and Fish Department and the US Fish and Wildlife Service on the potential for affects to these species.

The above steps are beyond the scope of this area drainage master plan, however, they will likely be required during final design of the proposed alternative facilities.

The potential cultural/historical impacts of Combined Alternative 4 are listed below:

- Could affect an Archaic artifact scatter, two known Hohokam village sites, and Canal Liberty system
- Would cross and/or parallel the historic Beardsley, Roosevelt, Buckeye, and Airline canals and Phoenix Main Line of Southern Pacific Railroad (as well as other historic resources that appear to lack historic significance)

As planning continues and more detailed designs are developed, intensive field surveys should be undertaken to ensure compliance with the Arizona Antiquities Act. Needs for right-of-way across any State Trust land or other state permits would entail requirements for the lead state agency to comply with the State Historic Preservation Act. Similarly, any federal permits would require compliance with Section 106 of the National Historic Preservation Act.



LEGEND:

- = PROPOSED LARGE REGIONAL OUTFALL CHANNEL
- = PROPOSED MEDIUM TO LARGE LOCAL COLLECTOR CHANNEL
- = PROPOSED DETENTION/RETENTION/PARK
- = DIRECTION OF FLOW
- = PROPOSED TRAIL LOCATION
- = PROJECT AREA BOUNDARY
- = PROPOSED LOOP 303 PARKWAY ALIGNMENT
- = EXISTING RAIL ROAD
- = EXISTING STRUCTURE OR FACILITY
- = FLOODPLAIN IDENTIFIED BY THE ORIGINAL WHITE TANKS ADMP, 1992

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MARICOPA COUNTY
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ALTERNATIVE #5

May 2003

Loop 303 Corridor/White Tanks ADMP Update

Flood Control District of Maricopa County

FIGURE 3.5

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3.1.4.5 Combined Alternative 5

Combined Alternative 5 is similar to the "Four Basin and Channel Alternative" presented in the "Drainage Channel Study for West Half of Estrella Freeway Loop 303 from Interstate 17 – Drainage Technical Memorandum." See Figure 3.5 for a schematic representation of Combined Alternative 5.

This alternative was included with the following components:

- Channelization of Bullard Wash all the way to Luke AFB from the existing Bullard Wash outfall.
- A very large, continuous, regional channel along the Loop 303 corridor alignment north and south of I-10.
- A channel along the north side of I-10 from the Beardsley Canal alignment east to a park/detention area adjacent to Loop 303.
- West-east channels along Northern Avenue and Bethany Home Road to the Loop 303 channel – these channels convey diverted flow from the White Tank Mountains Watershed.
- A small north-south channel along the Estrella Parkway to the Gila River.
- A large park/detention area adjacent to I-10 on the north in the Bullard Wash.
- A north-south outfall/collector channel from WT FRS #4 outlet to the Gila River.
- A north-south collector channel along Jackrabbit Trail from WT FRS #3 to WT FRS #4.
- Channelization and diversion of the Cholla and Waterfall washes from the White Tank Mountains watershed to the Loop 303 regional drain.
- Diversion of flow from the WT FRS #3 outlet out of the WT FRS #4 watershed along Bethany Home Road to the Loop 303 regional drain.

Educational opportunities, facility treatments and aesthetics in general would be done in accordance with the themes described in Section 3.1.2.

Combined Alternative 5 does not actually update a previous alternative as the revised Alternatives 1-4 did. It has been included as a baseline for comparison with all of the other alternatives developed.

Seed Alternative 5:

Some of the problems noted with Seed Alternative 5 are listed below:

- The alternative diverts large amounts of runoff from the White Tank Mountains watershed to the Loop 303 channel. This will result in a very large channel required and may exceed current ADOT right-of-way in the area.
- Due to the large volume of flow diverted to the Loop 303 drain, this channel would most likely be required to be a large, deep concrete structure.
- The Loop 303 drain would require large quantities of concrete and be very expensive.
- The Loop 303 drain would not be very aesthetic or conducive to multi-use park type facilities and would probably fail to attract many partners.

The positive aspects of Seed Alternative 5 are listed below:

- There is a significant amount of flow diverted out of the WT FRS #3 watershed area. This is good for possible conversion of the WT FRS #3 dam to a basin.
- The elimination of flow breaks from the White Tank Mountains watershed along the Beardsley Canal and Jackrabbit Trail lowers current flood volumes in the southeastern areas of the project downstream.
- The west-east collector channel from the WT FRS #3 outlet diverts flow from the WT FRS #4 downstream. This is a positive element of the alternative if WT FRS #4 is to be converted to a detention basin in the future.
- The regional drain at Loop 303 now cuts off a large volume of runoff previously intercepted by the Bullard Wash.
- Several park/detention basins along the channel may help reduce the required width of the facility.

Combined Alternative 5 does not directly addresses any comments made during the brainstorming meeting. It has been included to satisfy the requirements of the scope.

The potential environmental impacts of Combined Alternative 5 are briefly discussed below. The discussion is limited to those species that are federally listed as threatened or endangered, migratory (Peregrine Falcon), and highly sensitive (Sonoran desert tortoise).

The Alternative has been reviewed and has the potential to affect the Sonoran desert tortoise, Southwestern Willow Flycatcher, Cactus Ferruginous Pygmy-owl, and Yuma Clapper Rail. The proposed alternative would not have any impacts to the Peregrine Falcon.

In order to completely evaluate and make a determination on the potential effects/impacts to these species and their associated habitats (riparian habitat along the Gila River and Sonoran desert scrub) a qualified biologist would need to complete the following in a greater level of detail:

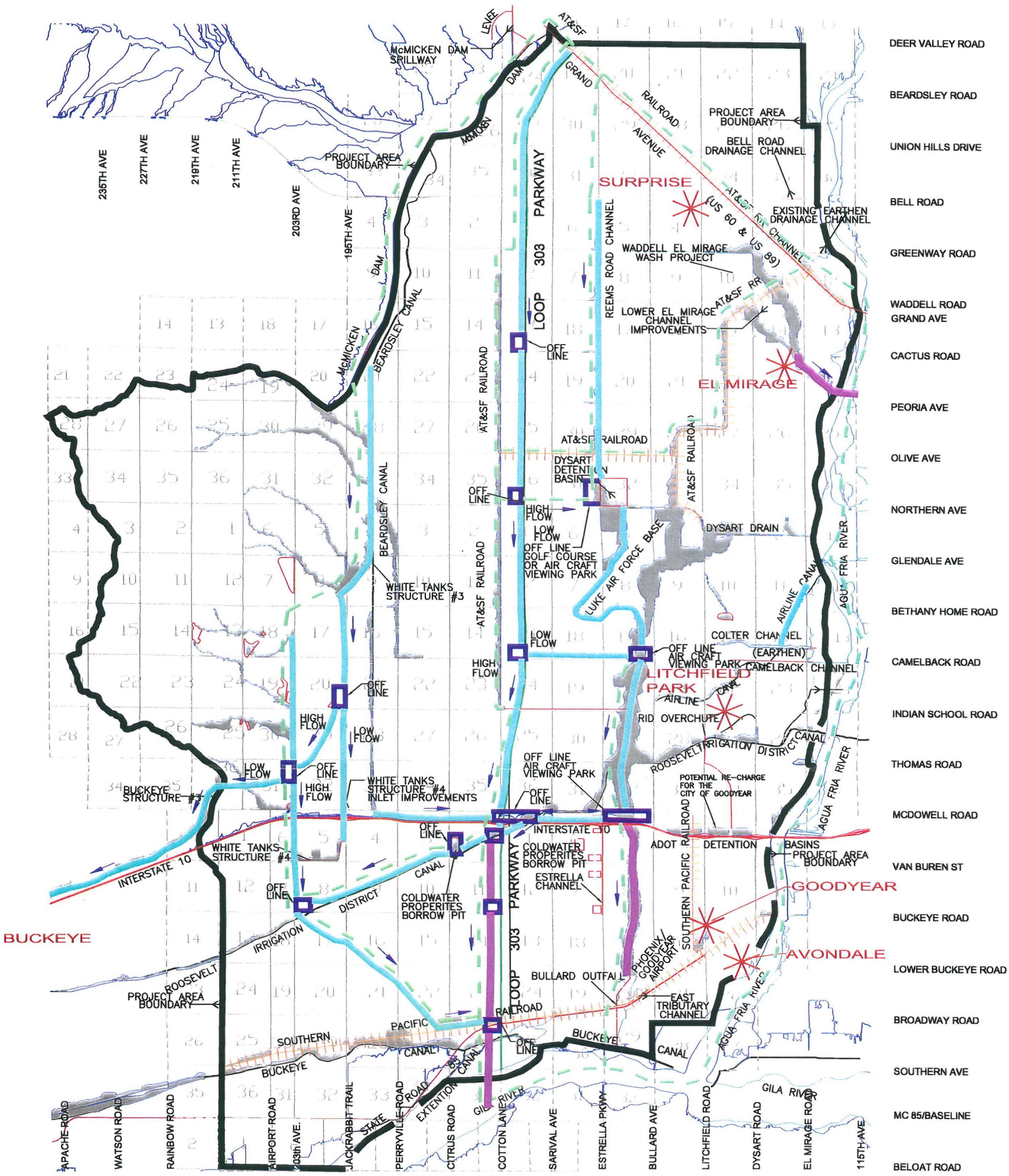
- Conduct site visit to completely evaluate the habitat suitability for each species
- Conduct a survey of the upland areas for desert tortoise.
- Evaluate the amount of water that would be entering the Gila River to determine how this addition of water would impact the existing habitat and the species associated with the habitat.
- Evaluate how much habitat will be lost in both the riparian habitat and the upland areas of the Sonoran desert scrub.
- Correspond with the Arizona Game and Fish Department and the US Fish and Wildlife Service on the potential for affects to these species.

The above steps are beyond the scope of this area drainage master plan, however, they will likely be required during final design of the proposed alternative facilities.

The potential cultural/historical impacts of Combined Alternative 5 are listed below:

- Could affect an Archaic artifact scatter, two known Hohokam village sites, and Canal Liberty system (and is near two other Hohokam village sites)
- Would cross and/or parallel the historic Beardsley, Roosevelt, Buckeye, and Airline canals and Phoenix Main Line of Southern Pacific Railroad (as well as other historic resources that appear to lack historic significance)

As planning continues and more detailed designs are developed, intensive field surveys should be undertaken to ensure compliance with the Arizona Antiquities Act. Needs for right-of-way across any State Trust land or other state permits would entail requirements for the lead state agency to comply with the State Historic Preservation Act. Similarly, any federal permits would require compliance with Section 106 of the National Historic Preservation Act.



LEGEND:

- = PROPOSED LARGE REGIONAL OUTFALL CHANNEL
- = PROPOSED MEDIUM TO LARGE LOCAL COLLECTOR CHANNEL
- = PROPOSED DETENTION/RETENTION/PARK
- = DIRECTION OF FLOW
- = PROPOSED TRAIL LOCATION
- = PROJECT AREA BOUNDARY
- = PROPOSED LOOP 303 PARKWAY ALIGNMENT
- = EXISTING RAIL ROAD
- = EXISTING STRUCTURE OR FACILITY
- = FLOODPLAIN IDENTIFIED BY THE ORIGINAL WHITE TANKS ADMP, 1992

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COMBINED ALTERNATIVE #6

May 2003

Loop 303 Corridor/White Tanks ADMP Update

Flood Control District of Maricopa County

FIGURE 3.6

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3.1.4.6 Combined Alternative 6

Combined Alternative 6 was based on the historic/cultural theme described in Section 3.1.2. See Figure 3.6 for a schematic representation of the Combined Alternative 6. This alternative was developed based on Seed Alternatives 9 and 10 described under Section 3.1.2 and comments made at the brainstorming meeting. The major components of this alternative are listed below:

- Channelization of Bullard Wash all the way to Luke AFB from the existing Bullard Wash outfall.
- A continuous channel along the Loop 303 corridor alignment north and south of I-10.
- A channel along the north side of I-10 from the Beardsley Canal alignment east to a park/detention area adjacent to Loop 303 and continuing east to the proposed park/detention area at Bullard Wash.
- Large park/detention area adjacent to I-10 on the north in the Bullard Wash.
- A southeast overland outfall/channel from WT FRS #4 to the Gila River.
- A north-south collector channel along 203rd Avenue and Jackrabbit Trail upstream of WT FRS #4.
- A north-south collector channel along Beardsley Canal upstream of WT FRS #3.
- A west-east channel along Camelback Road from a proposed park/detention area at Loop 303 east to a proposed park/detention area at Bullard Wash.
- A collector channel along the RID to the southwest south of I-10 from the RID crossing I-10 through the existing borrow pit to the outfall channel from WT FRS #4.
- Diversion of flow from the WT FRS #3 outlet out of the WT FRS #4 watershed along a proposed collector channel that parallels a contour from the intersection of Jackrabbit Trail and Indian School Road to the existing Buckeye #3.

Educational opportunities, facility treatments and aesthetics in general would be done in accordance with the historic/cultural theme described in Section 3.1.2.

Combined Alternative 6 adds a collector channel along the base of the White Tank Mountain from Jackrabbit Trail and Indian School Road out of the watershed to the existing Buckeye #3. The alternative also shows less overland flow paths as the original historic/cultural theme Seed Alternatives 9 and 10.

The following list of pros and cons for the previous Seed Alternatives 9 and 10 was developed based on review of the alternatives as well as comments from the brainstorming meeting.

Seed Alternative 9:

Some of the problems noted with Seed Alternative 9 are listed below:

- This alternative does not provide enough west-east collector channel/outfalls to the Agua Fria River.
- This alternative does not provide enough north-south collector channel/outfalls to the Gila River.
- The alternative does not provide enough detention to sufficiently attenuate peak flow rates.
- The alternative proposes to tie into the Indian School Road channel that is an interim channel and will eventually be moved north to Camelback Road.
- The overland outfall channel from the existing borrow pit may be crossing proposed or existing development. Right-of-way will probably be more expensive than that required for a channel adjacent to a section line or existing roadway.
- The trail proposed along the Dysart Drain may not be feasible due to hazards present within the area and adjacent to the drain. In addition, pedestrian access through Luke AFB is not practical.

The positive aspects of Seed Alternative 9 are listed below:

- The elimination of flow breaks from the White Tank Mountains watershed along the Beardsley Canal and Jackrabbit Trail lowers current flood volumes in the southeastern areas of the project downstream.
- A proposed pump in WT FRS #4 discharges stored runoff to the Buckeye #3 and out of the watershed.
- The alternative makes use of the existing borrow pit to attenuate peak runoff.
- There are few north-south channels crossing existing facilities such as the BID, RID, MC 85, I-10, etc.

Seed Alternative 10:

Some of the problems noted with Seed Alternative 10 are listed below:

- There is no corridor shown along Loop 303 south of I-10. This is contrary to future plans for trails and recreation in this area envisioned by the City of Goodyear.
- There are very few west-east outfall/collector channels that go through to the Agua Fria River.
- The lack of outfalls may result in the channels shown to be too large and may cause inflow to Bullard Wash that exceeds its design capacity.
- The alternative does not show very much attenuation through proposed park/detention areas. This may not be realistic with the volumes of runoff expected to occur in the study area.
- Waterfall and Cholla washes are channelized and continue overland separately to the southeast until they concentrate at Northern Avenue – right-of-way may be difficult and expensive to acquire.
- The trail proposed along the Dysart Drain may not be feasible due to hazards present within the area and adjacent to the drain. In addition, pedestrian access through Luke AFB is not practical.
- The outfall channel from WT FRS #4 is too long and may cut through areas of existing and/or proposed development. Right-of-way would be more difficult and expensive to obtain than for a straight channel alignment.
- The outfall channel from WT FRS #3 is too long and may cut through areas of existing and/or proposed development. Right-of-way would be more difficult and expensive to obtain than for a straight channel alignment.

The positive aspects of Seed Alternative 10 are listed below:

- The elimination of flow breaks from the White Tank Mountains watershed along the Beardsley Canal and Jackrabbit Trail lowers current flood volumes in the southeastern areas of the project downstream.
- The diversion of the Cholla and Waterfall washes from the WT FRS #3 watershed area is good for the potential conversion of the dam to a detention basin.
- The diversion of runoff from the WT FRS #3 outlet channel out of the WT FRS #4 watershed area is good for the potential conversion of the dam to a detention basin.

- The overland channels shown from WT FRS #3 and #4 outfalls and the overland alignments of Cholla and Waterfall washes are conducive to hiking/trails/biking and other multi-use applications. These alignments are also more flexible aesthetically.

Combined Alternative 6 directly addresses comments made during the brainstorming meeting by:

- The suggestion was made at the brainstorming meeting to run a channel along the contour from the intersection at Jackrabbit Trail and Indian School Road to the Buckeye #3.
- The trail along the Dysart Drain was removed.
- Another north-south collector channel was added along the Loop 303 alignment.

The potential environmental impacts of Combined Alternative 6 are briefly discussed below. The discussion is limited to those species that are federally listed as threatened or endangered, migratory (Peregrine Falcon), and highly sensitive (Sonoran desert tortoise).

The Alternative has been reviewed and has the potential to affect the Sonoran desert tortoise, Southwestern Willow Flycatcher, Cactus Ferruginous Pygmy-owl, and Yuma Clapper Rail. The proposed alternative would not have any impacts to the Peregrine Falcon.

In order to completely evaluate and make a determination on the potential effects/impacts to these species and their associated habitats (riparian habitat along the Gila River and Sonoran desert scrub) a qualified biologist would need to complete the following in a greater level of detail:

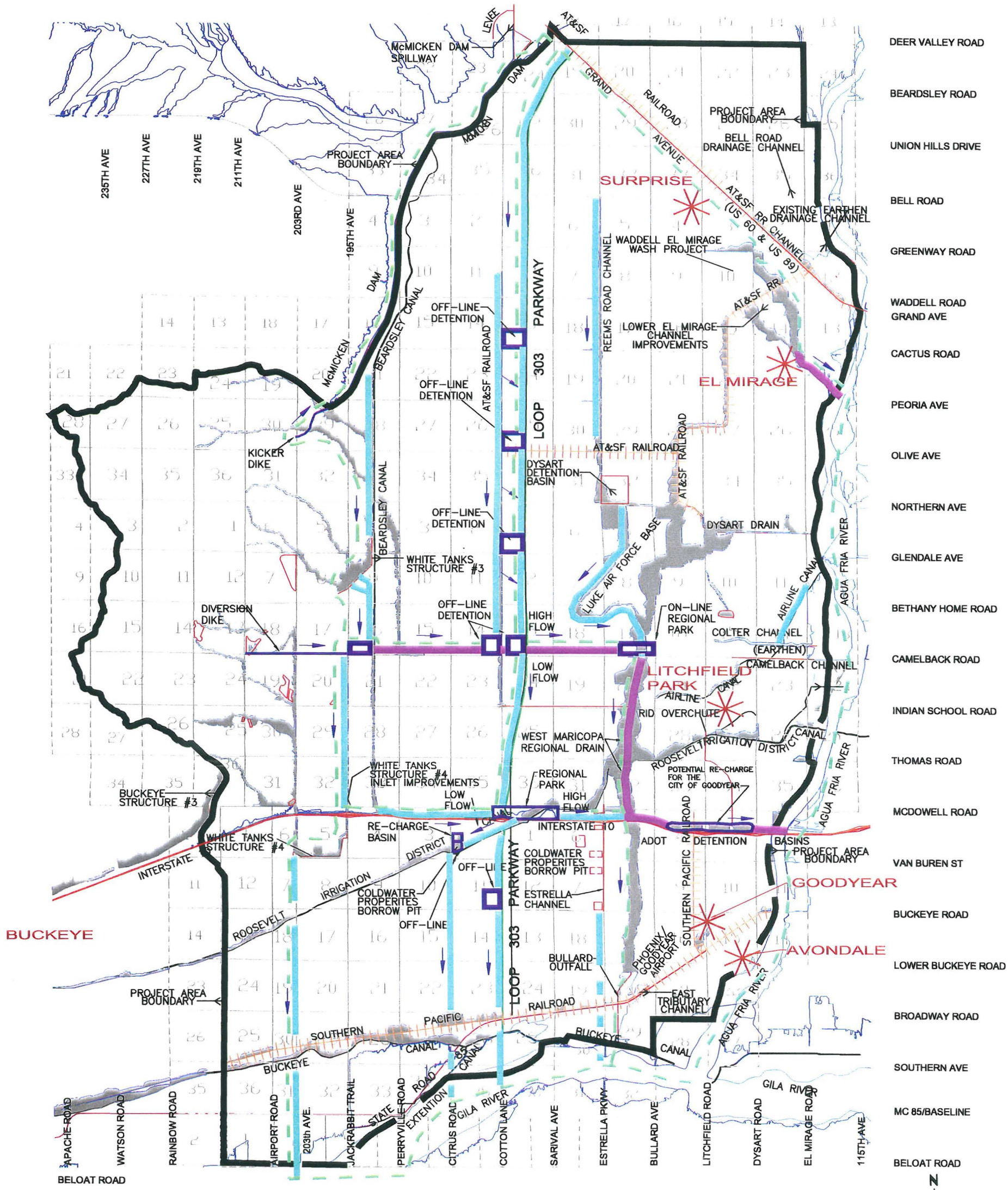
- Conduct site visit to completely evaluate the habitat suitability for each species
- Conduct a survey of the upland areas for desert tortoise.
- Evaluate the amount of water that would be entering the Gila River to determine how this addition of water would impact the existing habitat and the species associated with the habitat.
- Evaluate how much habitat will be lost in both the riparian habitat and the upland areas of the Sonoran desert scrub.
- Correspond with the Arizona Game and Fish Department and the US Fish and Wildlife Service on the potential for affects to these species.

The above steps are beyond the scope of this area drainage master plan, however, they will likely be required during final design of the proposed alternative facilities.

The potential cultural/historical impacts of Combined Alternative 6 are listed below:

- Could affect an Archaic artifact scatter, one known Hohokam village site, and Canal Liberty system
- Would cross and/or parallel the historic Beardsley, Roosevelt, Buckeye, and Airline canals and Phoenix Main Line of Southern Pacific Railroad (as well as other historic resources that appear to lack historic significance)

As planning continues and more detailed designs are developed, intensive field surveys should be undertaken to ensure compliance with the Arizona Antiquities Act. Needs for right-of-way across any State Trust land or other state permits would entail requirements for the lead state agency to comply with the State Historic Preservation Act. Similarly, any federal permits would require compliance with Section 106 of the National Historic Preservation Act.



LEGEND:

- = PROPOSED LARGE REGIONAL OUTFALL CHANNEL
- = PROPOSED MEDIUM TO LARGE LOCAL COLLECTOR CHANNEL
- = PROPOSED DETENTION/RETENTION/PARK
- = DIRECTION OF FLOW
- = PROPOSED TRAIL LOCATION
- = PROJECT AREA BOUNDARY
- = PROPOSED LOOP 303 PARKWAY ALIGNMENT
- = EXISTING RAIL ROAD
- = EXISTING STRUCTURE OR FACILITY
- = FLOODPLAIN IDENTIFIED BY THE ORIGINAL WHITE TANKS ADMP, 1992

COMBINED ALTERNATIVE #7

May 2003

Loop 303 Corridor/White Tanks ADMP Update

FIGURE 3.7

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3.1.4.7 Combined Alternative 7

Combined Alternative 7 was based on the West Maricopa Drain theme described in Section 3.1.2. See Figure 3.7 for a schematic representation of the Combined Alternative 7. This alternative was developed based on comments made at the brainstorming meeting. FCDMC staff suggested a West Maricopa Drain alternative by using the East Maricopa Drain as an example. The major components of this alternative are listed below:

- A large west-east earthen drainage channel from the proposed park/detention area at the northwest corner of the Beardsley Canal and Camelback Road to a proposed park/detention area in the Bullard Wash. The channel turns south and continues down the Bullard Wash alignment to I-10. At I-10, the channel turns east and outfalls to the ADOT detention basins. This channel is referred to as the West Maricopa Drain by this alternative.
- Channelization of Bullard Wash all the way to Luke AFB from the existing Bullard Wash outfall.
- A continuous channel along the Loop 303 corridor alignment north and south of I-10.
- A channel along the north side of I-10 from the Beardsley Canal alignment east to a park/detention area adjacent to Loop 303 and continuing east to the West Maricopa Drain.
- A north-south channel along the Estrella Parkway to the Gila River.
- A north-south outfall/channel from WT FRS #4 to the Gila River.
- A north-south collector channel along Jackrabbit Trail upstream of WT FRS #4.
- A north-south collector channel along Beardsley Canal upstream of WT FRS #3.
- A collector channel along the RID to the southwest south of I-10 from the RID crossing I-10 to the existing borrow pit.
- Diversion of flow from the WT FRS #3 outlet out of the WT FRS #4 watershed and into the West Maricopa Drain.
- A diversion dike directing runoff from the White Tank Mountains into the West Maricopa Drain just downstream of WT FRS #3.
- A north-south channel along the west side of the AT&SF Railroad adjacent to Cotton Lane.
- A kicker dike on the upper Cholla and Waterfall washes diverts flow out of the WT FRS #3 watershed and into the McMicken Dam.

Facility treatments and aesthetics in general would be done in accordance with any one (or combination of) the themes described in Section 3.1.2.

Since the West Maricopa Drain alternative is based on a suggestion from the brainstorming meeting, there were no specific comments to address in preparing for the first neighborhood meeting. Some of the pros and cons of the alternative noted by the project team after its completion are listed below:

Some of the problems noted with Combined Alternative 7 are listed below:

- Since the main channel in this alternative provides drainage relief for over half of the project area, it will be a very large, expensive channel.
- Large regional drains can be expensive to operate and maintain.
- The right-of-way required for the regional drain would be extensive and expensive.

The positive aspects of Combined Alternative 7 are listed below:

- The elimination of flow breaks from the White Tank Mountains watershed along the Beardsley Canal and Jackrabbit Trail lowers current flood volumes in the southeastern areas of the project downstream.
- A proposed kicker dike in the WT FRS #3 watershed will remove a significant volume of runoff to the McMicken Dam making the conversion of WT FRS #3 to a detention basin more feasible.
- A proposed diversion dike in the WT FRS #4 watershed will remove a significant volume of runoff to the West Maricopa Drain and make the conversion of WT FRS #4 more feasible.
- The combination of detention and large flow diversions to the West Maricopa Drain will result in a small channel along Loop 303.
- The alternative used the existing borrow pit for flood control and recharge.
- The alternative provides several outfalls for existing and proposed development to tie into.
- The large earthen drain/channel would provide good partnering, multi-use and aesthetic potential.

Combined Alternative 7 has many positive features, however, high capital costs and large amounts of right-of-way are anticipated making it less feasible than some of the other

alternatives. If enough partners were found to help spread capital costs, this alternative may become more attractive.

The potential environmental impacts of Combined Alternative 7 are briefly discussed below. The discussion is limited to those species that are federally listed as threatened or endangered, migratory (Peregrine Falcon), and highly sensitive (Sonoran desert tortoise).

The Alternative has been reviewed and has the potential to affect the Sonoran desert tortoise, Southwestern Willow Flycatcher, Cactus Ferruginous Pygmy-owl, and Yuma Clapper Rail. The proposed alternative would not have any impacts to the Peregrine Falcon.

In order to completely evaluate and make a determination on the potential effects/impacts to these species and their associated habitats (riparian habitat along the Gila River and Sonoran desert scrub) a qualified biologist would need to complete the following in a greater level of detail:

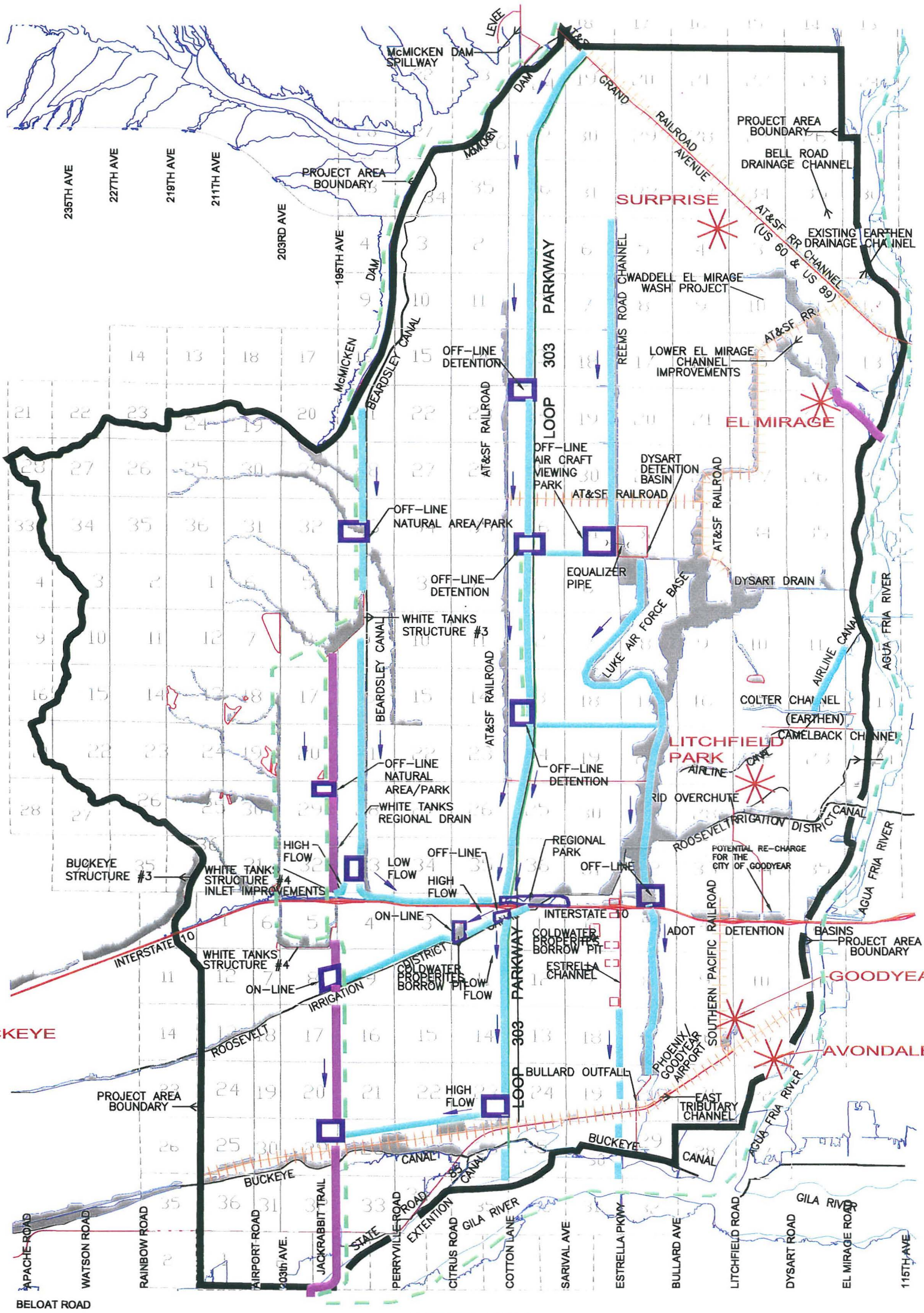
- Conduct site visit to completely evaluate the habitat suitability for each species
- Conduct a survey of the upland areas for desert tortoise.
- Evaluate the amount of water that would be entering the Gila River to determine how this addition of water would impact the existing habitat and the species associated with the habitat.
- Evaluate how much habitat will be lost in both the riparian habitat and the upland areas of the Sonoran desert scrub.
- Correspond with the Arizona Game and Fish Department and the US Fish and Wildlife Service on the potential for affects to these species.

The above steps are beyond the scope of this area drainage master plan, however, they will likely be required during final design of the proposed alternative facilities.

The potential cultural/historical impacts of Combined Alternative 7 are listed below:

- Could affect an Archaic artifact scatter, two known Hohokam village sites, a Hohokam artifact scatter, and Canal Liberty system (and is near two other Hohokam village sites)
- Would cross and/or parallel the historic Beardsley, Roosevelt, Buckeye, and Airline canals and Phoenix Main Line of Southern Pacific Railroad (as well as other historic resources that appear to lack historic significance)

As planning continues and more detailed designs are developed, intensive field surveys should be undertaken to ensure compliance with the Arizona Antiquities Act. Needs for right-of-way across any State Trust land or other state permits would entail requirements for the lead state agency to comply with the State Historic Preservation Act. Similarly, any federal permits would require compliance with Section 106 of the National Historic Preservation Act.



COMBINED ALTERNATIVE #8

May 2003

Loop 303 Corridor/White Tanks ADMP Update

FIGURE 3.8

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3.1.4.8 Combined Alternative 8

Combined Alternative 8 was based on the White Tanks Regional drain theme described in Section 3.1.2. See Figure 3.8 for a schematic representation of the Combined Alternative 8. This alternative was developed based on Seed Alternative 11 described under Section 3.1.2 and comments made at the brainstorming meeting. The major components of this alternative are listed below:

- A large north-south earthen drainage channel from the WT FRS #3 south to the Gila River.
- Channelization of Bullard Wash all the way to Luke AFB from the existing Bullard Wash outfall.
- A continuous channel along the Loop 303 corridor alignment north and south of I-10.
- A channel along the north side of I-10 from the Beardsley Canal alignment east to a park/detention area adjacent to Loop 303.
- A north-south channel along the Estrella Parkway to the Gila River.
- A north-south collector channel along Beardsley Canal from the McMicken Dam south to the proposed park/detention area just north of I-10.
- A collector channel along the RID to the southwest south of I-10 from the RID crossing I-10 through the existing borrow pit to the White Tanks drain channel.
- A high flow diversion channel from the proposed park/detention area at the northwest corner of MC 85 and Loop 303.

Facility treatments and aesthetics in general, would be done in accordance with any one (or combination of) the themes described in Section 3.1.2.

This alternative was not altered significantly from the original version described in Section 3.1.2. Some of the pros and cons of the original Seed Alternative 11 that were noted at the brainstorming meeting are presented below:

Seed Alternative 11:

Some of the problems noted with Seed Alternative 11 are listed below:

- There is no north-south channel shown along the Loop 303 alignment.
- Large regional drains can be expensive to operate and maintain.

- The right-of-way required for the regional drain would be extensive and expensive.
- There are no west-east channels shown.

The positive aspects of Seed Alternative 11 are listed below:

- The elimination of flow breaks from the White Tank Mountains watershed along the Beardsley Canal and Jackrabbit Trail lowers current flood volumes in the southeastern areas of the project downstream.
- The combination of detention and large drain channel along the base of the White Tank Mountains will result in a small channel along Loop 303.
- The alternative uses the existing borrow pit for flood control and recharge.
- The alternative provides several outfalls for existing and proposed development to tie into.
- The large earthen drain/channel would provide good partnering, multi-use and aesthetic potential.

In response to some of the negative comments regarding the original Seed Alternative 11, Combined Alternative 8 has been modified. The first major change was to add a small roadside channel with detention along the Loop 303 alignment and remove the one originally shown along the AT&SF Railroad. The second change was the addition of high flow, west-east diversion channels from the Loop 303 channel to the Dysart drain and the Bullard Wash. These changes were made to ensure adequate flood protection for the Loop 303 roadway, to provide a north-south outfall to the Gila River south of I-10 and to shrink the required channel cross section along the Loop 303 alignment.

The potential environmental impacts of Combined Alternative 8 are briefly discussed below. The discussion is limited to those species that are federally listed as threatened or endangered, migratory (Peregrine Falcon), and highly sensitive (Sonoran desert tortoise).

The Alternative has been reviewed and has the potential to affect the Sonoran desert tortoise, Southwestern Willow Flycatcher, Cactus Ferruginous Pygmy-owl, and Yuma Clapper Rail. The proposed alternative would not have any impacts to the Peregrine Falcon.

In order to completely evaluate and make a determination on the potential effects/impacts to these species and their associated habitats (riparian habitat along the Gila River and Sonoran desert scrub) a qualified biologist would need to complete the following in a greater level of detail:

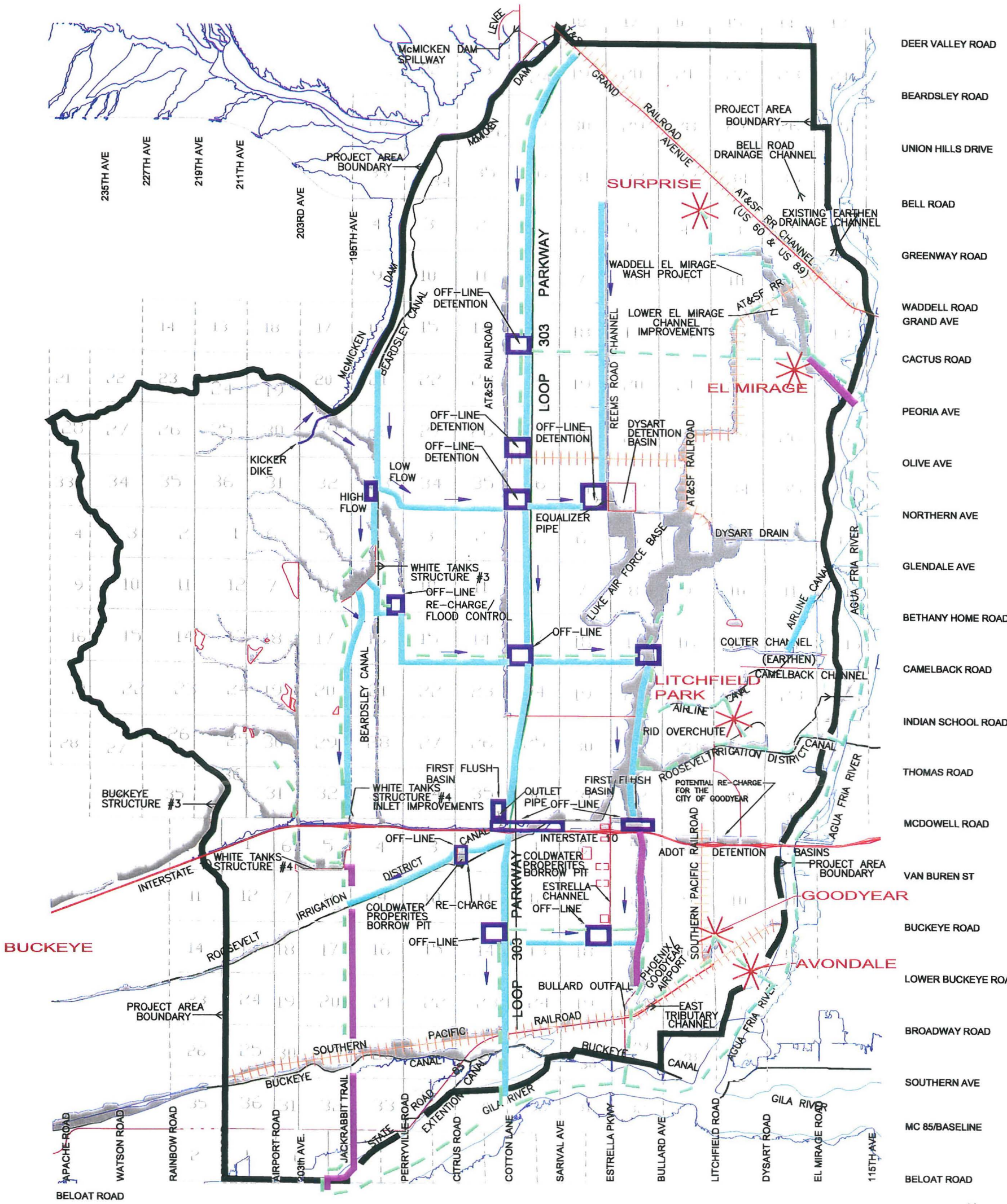
- Conduct site visit to completely evaluate the habitat suitability for each species
- Conduct a survey of the upland areas for desert tortoise.
- Evaluate the amount of water that would be entering the Gila River to determine how this addition of water would impact the existing habitat and the species associated with the habitat.
- Evaluate how much habitat will be lost in both the riparian habitat and the upland areas of the Sonoran desert scrub.
- Correspond with the Arizona Game and Fish Department and the US Fish and Wildlife Service on the potential for affects to these species.

The above steps are beyond the scope of this area drainage master plan, however, they will likely be required during final design of the proposed alternative facilities.

The potential cultural/historical impacts of Combined Alternative 8 are listed below:

- Could affect an Archaic artifact scatter, three known Hohokam village sites, and Canal Liberty system (and is near another Hohokam village site)
- Would cross and/or parallel the historic Beardsley, Roosevelt, Buckeye, and Airline canals and Phoenix Main Line of Southern Pacific Railroad (as well as other historic resources that appear to lack historic significance)

As planning continues and more detailed designs are developed, intensive field surveys should be undertaken to ensure compliance with the Arizona Antiquities Act. Needs for right-of-way across any State Trust land or other state permits would entail requirements for the lead state agency to comply with the State Historic Preservation Act. Similarly, any federal permits would require compliance with Section 106 of the National Historic Preservation Act.



LEGEND:

- = PROPOSED LARGE REGIONAL OUTFALL CHANNEL
- = PROPOSED MEDIUM TO LARGE LOCAL COLLECTOR CHANNEL
- = PROPOSED DETENTION/RETENTION/PARK
- = DIRECTION OF FLOW
- = PROPOSED TRAIL LOCATION
- = PROJECT AREA BOUNDARY
- = PROPOSED LOOP 303 PARKWAY ALIGNMENT
- = EXISTING RAIL ROAD
- = EXISTING STRUCTURE OR FACILITY
- = FLOODPLAIN IDENTIFIED BY THE ORIGINAL WHITE TANKS ADMP, 1992

N

MARICOPA COUNTY
N.T.S.

COMBINED ALTERNATIVE #9

May 2003

Loop 303 Corridor/White Tanks ADMP Update

Flood Control District of Maricopa County

FIGURE 3.9

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3.1.4.9 Combined Alternative 9

Combined Alternative 9 is not based on any single seed alternative previously presented. This alternative was prepared to illustrate another of several combinations that is possible in using combinations of multiple themes described in Section 3.1.2 with one or more of the flood control concepts presented by each of the previous alternatives. In this case, Combined Alternative 9 combines the City Connection theme with the water theme. See Figure 3.9 for a schematic representation of Combined Alternative 9. The major components of this alternative are listed below:

- A north-south channel from the McMicken dam to the WT FRS #3.
- A north-south channel from the WT FRS #3 outlet to the WT FRS #4.
- A north-south outlet channel from the WT FRS #4 to the Gila River.
- Channelization of Bullard Wash all the way to Luke AFB from the existing Bullard Wash outfall.
- A continuous channel along the Loop 303 corridor alignment north and south of I-10.
- A west-east channel from the outlet of the WT FRS #3 to the Loop 303 channel and the Bullard Wash along Camelback Road.
- A west-east channel along Northern Avenue to Reems Road.
- A collector channel along the RID to the southwest south of I-10 from the RID crossing I-10 through the existing borrow pit to the WT FRS #4 outlet channel.

Facility treatments and aesthetics in general would be done in accordance with any one (or combination of) the themes described in Section 3.1.2.

The potential environmental impacts of Combined Alternative 9 are briefly discussed below. The discussion is limited to those species that are federally listed as threatened or endangered, migratory (Peregrine Falcon), and highly sensitive (Sonoran desert tortoise).

The Alternative has been reviewed and has the potential to affect the Sonoran desert tortoise, Southwestern Willow Flycatcher, Cactus Ferruginous Pygmy-owl, and Yuma Clapper Rail. The proposed alternative would not have any impacts to the Peregrine Falcon.

In order to completely evaluate and make a determination on the potential effects/impacts to these species and their associated habitats (riparian habitat along the Gila River and Sonoran

desert scrub) a qualified biologist would need to complete the following in a greater level of detail:

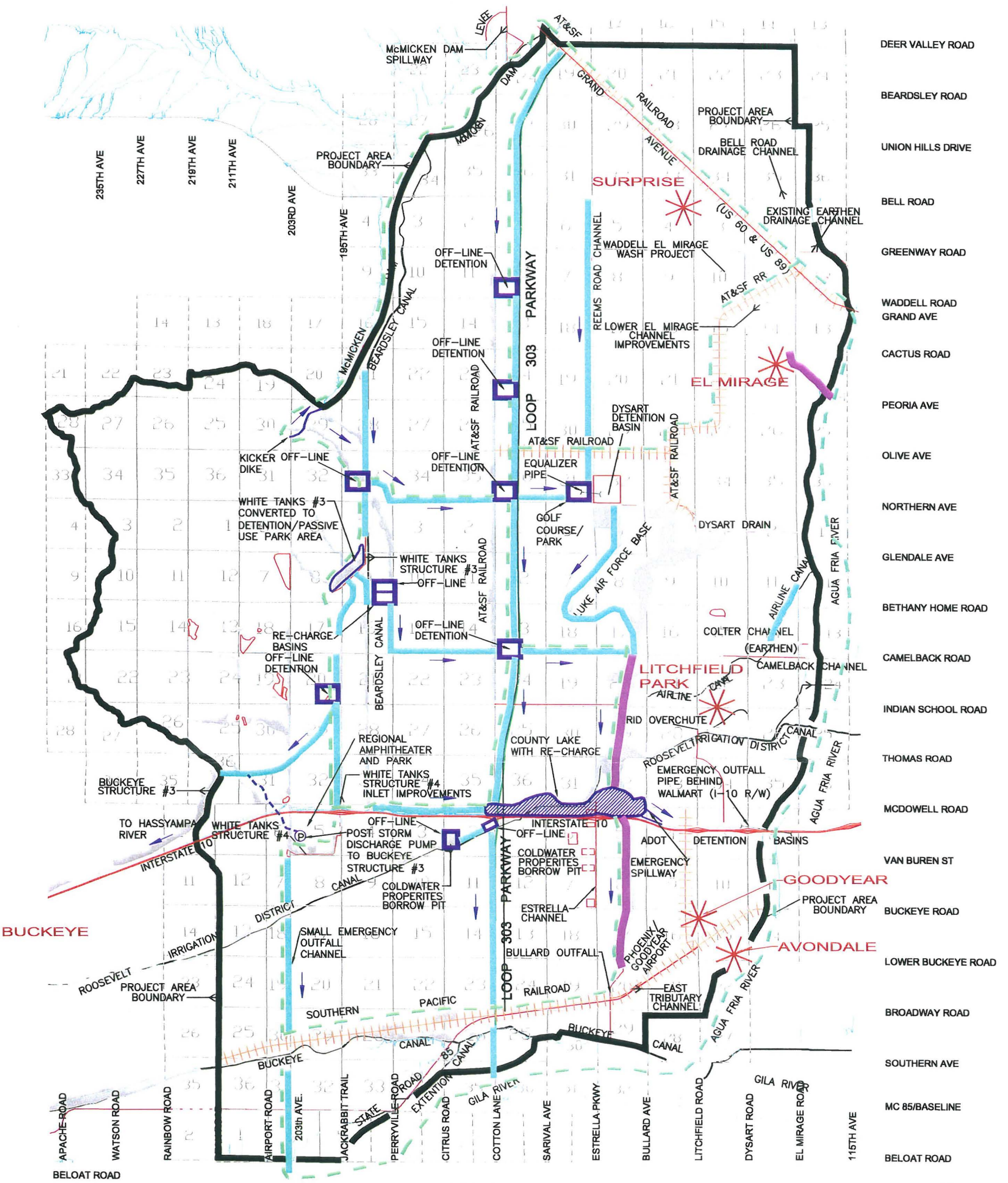
- Conduct site visit to completely evaluate the habitat suitability for each species
- Conduct a survey of the upland areas for desert tortoise.
- Evaluate the amount of water that would be entering the Gila River to determine how this addition of water would impact the existing habitat and the species associated with the habitat.
- Evaluate how much habitat will be lost in both the riparian habitat and the upland areas of the Sonoran desert scrub.
- Correspond with the Arizona Game and Fish Department and the US Fish and Wildlife Service on the potential for affects to these species.

The above steps are beyond the scope of this area drainage master plan, however, they will likely be required during final design of the proposed alternative facilities.

The potential cultural/historical impacts of Combined Alternative 9 are listed below:

- Could affect two known Hohokam village sites, and Canal Liberty system (and is near an Archaic artifact scatter and two other Hohokam village sites)
- Would cross and/or parallel the historic Beardsley, Roosevelt, Buckeye, and Airline canals and Phoenix Main Line of Southern Pacific Railroad (as well as other historic resources that appear to lack historic significance)

As planning continues and more detailed designs are developed, intensive field surveys should be undertaken to ensure compliance with the Arizona Antiquities Act. Needs for right-of-way across any State Trust land or other state permits would entail requirements for the lead state agency to comply with the State Historic Preservation Act. Similarly, any federal permits would require compliance with Section 106 of the National Historic Preservation Act.



COMBINED ALTERNATIVE #10

May 2003

Loop 303 Corridor/White Tanks ADMP Update

Flood Control District of Maricopa County

FIGURE 3.10

URS

3.1.4.10 Combined Alternative 10

Like Combined Alternative 9, Combined Alternative 10 is not based on any single seed alternative previously presented. This alternative was prepared to illustrate another of several combinations that is possible in using combinations of multiple themes described in Section 3.1.2 with one or more of the flood control concepts presented by each of the previous alternatives. In addition, Combined Alternative 10 introduces the flood control concept of a county lake/recharge facility that was suggested during the brainstorming meeting. Combined Alternative 10 combines the transportation theme with the natural area theme. See Figure 3.10 for a schematic representation of Combined Alternative 10. The major components of this alternative are listed below:

- A proposed county lake/recharge basin north of I-10 from Loop 303 to the Bullard Wash.
- An emergency outfall channel from the proposed county lake east to the ADOT detention basins.
- A north-south channel from the McMicken dam along the Beardsley Canal to the WT FRS #3.
- A kicker dike on the upper Cholla and Waterfall washes to divert runoff to the McMicken Dam from the WT FRS #3 watershed.
- A west-east collector channel from a proposed park/detention area north of Northern Avenue to a park/detention area adjacent to the existing Falcon Dunes Golf Course and the Dysart Drain.
- A north-south channel from the WT FRS #3 outlet to a proposed park/detention area at the northwest corner of Indian School Road and Jackrabbit Trail.
- A west-east channel from the WT FRS #3 outlet to a proposed park/detention area at the northwest corner of Loop 303 and Camelback Road, continuing east to the Bullard Wash.
- An east-west channel along the contour from the northwest corner of Indian School Road and Jackrabbit Trail out of the watershed to the Buckeye #3.
- A north-south channel along Jackrabbit Trail from the northwest corner of Indian School Road and Jackrabbit Trail south to WT FRS #4.
- A north-south outlet channel from WT FRS #4 to the Gila River.
- Channelization of Bullard Wash all the way to Luke AFB from the existing Bullard Wash outfall.

- A continuous channel along the Loop 303 corridor alignment north and south of I-10.
- A collector channel along the RID to the southwest south of I-10 from the RID crossing I-10 to the existing borrow pit.
- A west-east channel along the north side of I-10 from the Beardsley Canal east to the proposed county lake.

Facility treatments and aesthetics in general, would be done in accordance with any one (or combination of) the themes described in Section 3.1.2.

The potential environmental impacts of Combined Alternative 10 are briefly discussed below. The discussion is limited to those species that are federally listed as threatened or endangered, migratory (Peregrine Falcon), and highly sensitive (Sonoran desert tortoise).

The Alternative has been reviewed and has the potential to affect the Sonoran desert tortoise, Southwestern Willow Flycatcher, Cactus Ferruginous Pygmy-owl, and Yuma Clapper Rail. The proposed alternative would not have any impacts to the Peregrine Falcon.

In order to completely evaluate and make a determination on the potential effects/impacts to these species and their associated habitats (riparian habitat along the Gila River and Sonoran desert scrub) a qualified biologist would need to complete the following in a greater level of detail:

- Conduct site visit to completely evaluate the habitat suitability for each species
- Conduct a survey of the upland areas for desert tortoise.
- Evaluate the amount of water that would be entering the Gila River to determine how this addition of water would impact the existing habitat and the species associated with the habitat.
- Evaluate how much habitat will be lost in both the riparian habitat and the upland areas of the Sonoran desert scrub.
- Correspond with the Arizona Game and Fish Department and the US Fish and Wildlife Service on the potential for affects to these species.

The above steps are beyond the scope of this area drainage master plan, however, they will likely be required during final design of the proposed alternative facilities.

The potential cultural/historical impacts of Combined Alternative 10 are listed below:

- Could affect an Archaic artifact scatter, one known Hohokam village site, a Hohokam artifact scatter, and Canal Liberty system (and is near another Hohokam village site)
- Would cross and/or parallel the historic Beardsley, Roosevelt, Buckeye, and Airline canals and Phoenix Main Line of Southern Pacific Railroad (as well as other historic resources that appear to lack historic significance)

As planning continues and more detailed designs are developed, intensive field surveys should be undertaken to ensure compliance with the Arizona Antiquities Act. Needs for right-of-way across any State Trust land or other state permits would entail requirements for the lead state agency to comply with the State Historic Preservation Act. Similarly, any federal permits would require compliance with Section 106 of the National Historic Preservation Act.

3.1.4.11 Neighborhood Meeting

The first neighborhood meetings were held from 6:00-8:00 P.M. on March 7 and 9, 2000, to present opportunities for the public to identify issues and concerns related to the 10 combined alternatives proposed with the Loop 303 Corridor/White Tanks ADMP Update. One meeting was located at the Surprise Elementary School in the northern portion of the project area while the other was located at the Estrella Mountain Community College in the southern portion of the project area.

In addition to the presentation of the combined alternatives at the first neighborhood meeting, a questionnaire was prepared and distributed at the meetings by Logan Simpson Design. The results of the questionnaire were used in combination with verbal comments by stakeholders, FCDMC staff and concerned citizens to further refine the presented alternatives and narrow the number considered from 10 to 3.

Seventeen (17) people filled out the questionnaire. This represented approximately 71% of the total number of people (24 +/-) in attendance for the two nights combined. The results of the questionnaire showed that the alternatives most favored by the public were the combined alternatives 7, 3, and 6 described above. Approximately 31% of the people who filled out questionnaires preferred Combined Alternative 7 compared with approximately 11% who favored Combined Alternative 3 and approximately 6% who favored Combined Alternative 6.

The most commonly stated reason for the preference of these alternatives was their conformance with a more natural/historic drainage pattern of bringing runoff north of I-10 east to the Agua Fria River.

The alternatives most disliked by those who filled out questionnaires were combined alternatives 5, 2 and 4 discussed above. Approximately 26% of the people who filled out questionnaires disliked Combined Alternative 5 compared with approximately 18% who disliked Combined Alternative 2 and approximately 18% who disliked Combined Alternative 4. The most common complaint stated in regard to these alternatives was the large channel shown along the Loop 303 alignment and that there are too many north-south outfalls. See Table 3.6 for the results of the questionnaire evaluations reported above.

Interestingly, very few comments, if any, were made regarding the themes presented and/or the different aesthetic treatments that were presented. The main concerns expressed were in regard to the flood control concepts and how they would be implemented relative to existing facilities and new development.

3.1.5 Environmental and Socioeconomic Summary

3.1.5.1 Ecological

The ecological and cultural aspects of the project area environment are characterized in the previously prepared Data Collection Report. The environmental overview in the Data Collection Report can be consulted for more detailed description of the affected environment and information about the data and references on which the overview was based.

3.1.5.2 Historical

The approximately 220-square-mile project area is a landscape that has been inhabited for thousands of years. The first occupants, who arrived at least 12,000 years ago, undoubtedly had some impact on the environment of the region they hunted game and collected native plant

Table 3.6

RESULTS OF PUBLIC SENSING

Loop 303 Corridor/White Tanks Area Drainage Master Plan Update

N = DISLIKED
Y = LIKED

Comment Sheet No.	1	2	3	4	5	6	7
1	N	N	Y	N	N	N	Y
2	N	N	Y	N	N		Y
3						N	
4			Y		N		Y
5			Y		N		Y
6	N	N	Y	N	N	N	Y
7			Y			N	Y
8			Y		N		Y
9			Y		N		Y
10					Y		
11	N	N	N	N	N	N	Y
12	Y	N	N	N	Y	Y	
13	N	N	N	N	Y	Y	Y
14	Y		Y		N	Y	
15						Y	Y
16	Y	Y					
17	Y	Y	Y	Y			

RESULTS:

Alternative	Likes	Alternative	Dislikes
7	11	5	9
1	4	2	6
2	2	4	6
3	10	1	5
4	1	6	5
5	3	3	3
6	4	7	0

Favorite Alternative =	**7**	**31%**
Least Favorite Alternative =	**5**	**26%**

Alternative Ranking for **"Likes"**

Alternative #	% total likes
7	**31%**
3	**11%**
6	**6%**
1	**29%**
5	**3%**
2	**9%**
4	**11%**

Alternative Ranking for **"DisLikes"**

Alternative #	% total dislikes
5	**26%**
2	**18%**
4	**18%**
1	**15%**
6	**15%**
3	**9%**
7	**0%**

foods, but the impacts of the climate changes wrought by the waning of the last Ice Age were much more profound.

Approximately 2,000 years ago, native peoples that archaeologists call Hohokam altered the landscape more significantly as they developed canal systems and grew crops such as corn, beans, squash, and cotton in extensive irrigated fields. The Hohokam population grew to thousands of residents living in villages scattered across the valleys of the Gila, Salt, and Agua Fria rivers. The Hohokam significantly altered the local landscape within a mile or two of the major rivers and also altered uplands areas where other non-riverine villages were located. The Hohokam way of life lasted for more than a millennium. During the long occupation, the Hohokam experienced many damaging floods, but there is no evidence that they ever engineered any types of flood control facilities. Major flood damage of their irrigation systems may have contributed to the demise of the Hohokam.

When European explorers entered the region, they found it unoccupied on a permanent basis, because it was a "no-man's land" between the Pima and their enemies, the Yavapai and Apache. During the three to four centuries since the Hohokam abandoned their irrigation networks, the land must have re-vegetated with native species. However, the first settlers after the United States acquired the land were able to follow the alignments of some of the ancient canals and began a new era of agricultural development.

3.1.5.3 Cultural

Agricultural fields, watered with extensive canal systems to deliver surface water from large storage reservoirs, as well as deep wells that tap ground water, today dominate much of the study area. Only the White Tank Mountains on the western edge of the study area remain largely undeveloped, although the mountain has been scarred by use as a proving ground by the Caterpillar Tractor Company.

Several small towns and cities dot the area, but they are rapidly being transformed into larger, urban communities as residential and commercial development expands on the western edge of the Phoenix metropolitan area. The expansion of population and infrastructure demands a more coherent approach to flood control. Because of the extent of prior development, implementation of flood control projects is unlikely to have major environmental impacts. The potential to satisfactorily mitigate any identified adverse impacts is high, and no fatal environmental flaws have been identified for any of the alternatives under consideration. As a result, consideration of environmental factors typically was not a crucial consideration in evaluating and choosing among the alternatives.

3.1.5.4 Permits/Environmental

The extent of environmental analysis that will be required during subsequent stages of project planning will vary with the extent of requirements to comply with various federal or state regulations. There appears to be little potential for needing to acquire rights-of-way across federal lands, which would lead to a need to conduct an environmental analysis in compliance with the National Environmental Policy Act (NEPA). However, any federal funding for the project would also entail such a requirement. If a NEPA document were required, scoping with the lead federal agency would be required to determine whether an environmental assessment or more complex environmental impact statement would be warranted.

All alternatives considered are likely to require a permit from the US Army Corps of Engineers in compliance with Section 404 of the Clean Water Act. Such a permit will require delineation of jurisdictional waters of the United States, as well as biological and cultural resource surveys. The extent of disturbance within jurisdictional waters will need to be calculated to determine whether a selected plan, or perhaps elements of the plan, could be constructed under a nationwide permit or whether an individual permit would be required. Obtaining an individual permit requires more time, consideration of alternatives, and certification under Section 401 of the Clean Water Act, a program administered by the Arizona Department of Environmental Quality.

3.1.5.5 Socioeconomic Summary

Enhanced flood protection would have positive socioeconomic impacts. Other positive impacts would result from the multiple uses, particularly for recreational uses, that some of the facilities would have.

Negative impacts would derive primarily from acquiring rights-of-way for the various facilities. Taking of rights-of-way across undeveloped desert lands would have relatively minor economic or social impacts. Most of the project area is productive agricultural land, much of which is being redeveloped for residential and commercial uses. Taking of residences or business would be adverse impacts. Throughout the planning process, efforts have been made to identify alternatives that minimize residentially and commercially developed areas to reduce right-of-way costs and socioeconomic impacts on area residents. The area is urbanizing rapidly, and future planning should work to identify and acquire specific rights-of-way that minimize impacts on residential and commercial properties.

3.2 MATRIX DEVELOPMENT AND ALTERNATIVE EVALUATION

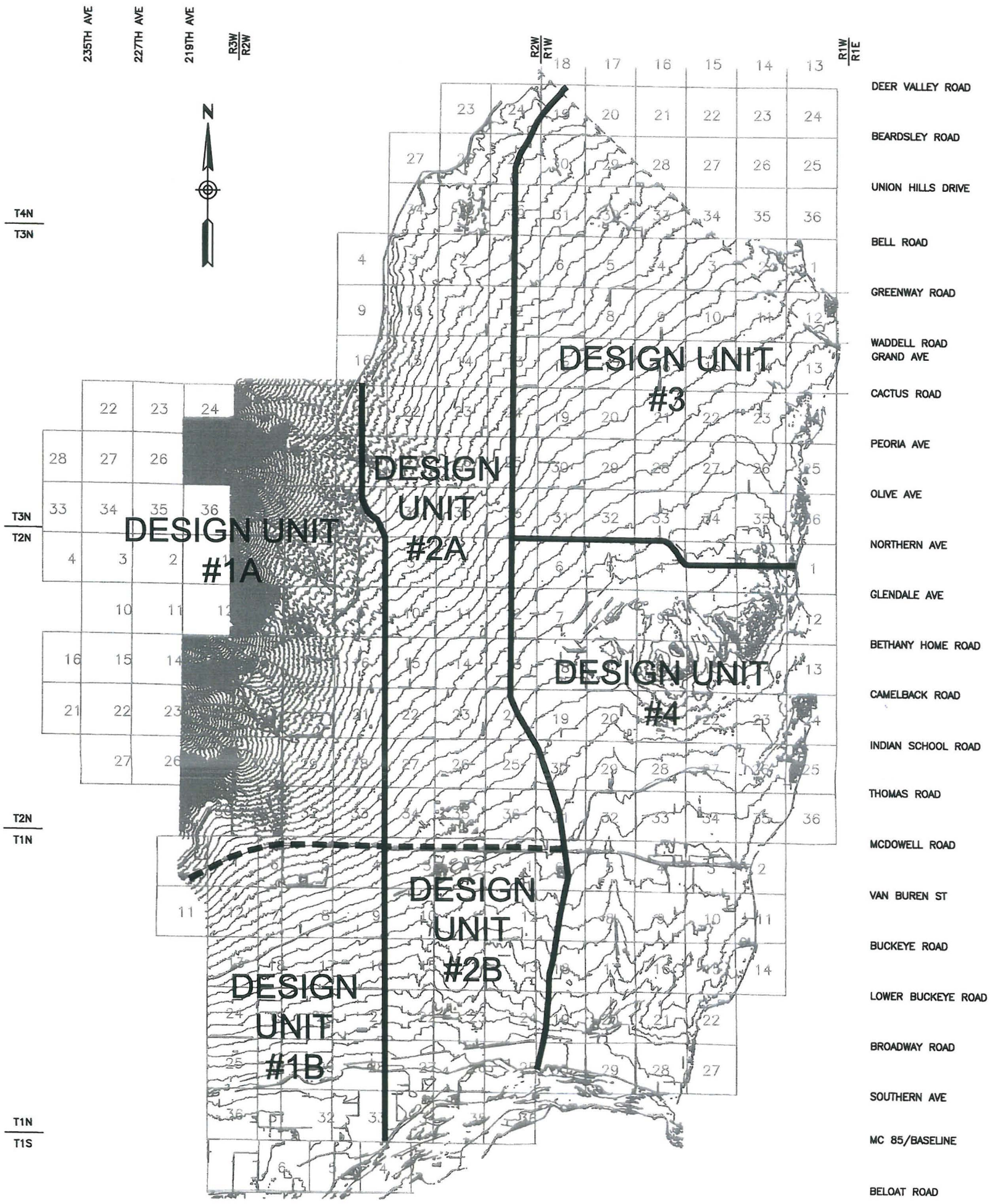
Due to the size of the study area and the large number of combinations of flood control options possible, there are virtually an infinite number of solutions to the ADMP Update project. However, not all of these solutions will be practical, meet all of the objectives of the project or be cost effective. The next step is to select alternatives from the 10 developed after the brainstorming meeting recommended for further study.

In our effort to meet this goal, the project team developed a set of criterion by which each alternative could be evaluated relative to all of the others. The top three would then be chosen for further study in the Level II analysis. A matrix methodology was developed to qualitatively compare each of the alternatives.

3.2.1 In-House Analysis and Design Units

Based on all of the comments regarding the proposed flood control alternatives received to date, it was obvious that there were both positive and negative aspects to each of the alternatives presented so far. This lead to the realization that the positive aspects of an individual alternative could be combined with those from another alternative in an infinite number of ways to produce several new alternatives. In an attempt to simplify this analysis, the ADMP Update study area was divided into smaller "design units." Several of the conceptual options for flood control presented by the proposed alternatives described in previous sections were applied to each individual design unit and evaluated using the weighted matrix mentioned in Section 3.1. The top three conceptual options proposed per design unit were then combined with those in adjacent design units in the most logical way possible to create three feasible alternatives. See Figure 3.11 for an illustration of the design units described above.

LOOP 303 PROJECT AREA AND DESIGN UNITS



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Flood Control District of Maricopa County

P:\FCDMC\E152600\SUBMITTALS\RE-SUBMIT\LEVEL I\5-2003\CAD\FIGURE 3-1.DWG

Figure 3.11
June 2004

The pros and cons of each alternative received from the brainstorming meeting and the first neighborhood meeting were written down as presented in Section 3.1. In addition, the public sensing forms were evaluated and considered in the preparation of the flood control options proposed in each design unit.

The two most common issues regarding the alternatives presented at the first neighborhood meeting recorded on the public sensing questionnaires were the following:

- There was too much diversion of stormwater runoff in the north-south direction and not enough preservation of the historical flow paths that would direct more runoff from west to east to the Agua Fria River.
- The channel proposed along Loop 303 was too large.

These issues were stated in regard to Alternatives 2, 4 and 5 which were the most controversial of all the presented alternatives. Conversely, the most common aspects complimented regarding the presented alternatives at the first neighborhood meeting were the following:

- Most of the stormwater runoff was kept north of I-10 and pushed east to the Agua Fria.
- Camelback Road was a good west-east route for stormwater runoff and the west-east conveyances would help reduce the size of any channel required adjacent to Loop 303.
- West to east routing of stormwater runoff north of I-10 would help to minimize negative impacts to existing developments south of I-10 by off site stormwater runoff.

The above remarks were made regarding Alternatives 3, 6 and 7 which were the alternatives preferred by those attending the first neighborhood meeting.

One final comment made after the first neighborhood meeting by a member of the FCDMC staff prompted the inclusion of another flood control concept that is presented in Option D of Design Unit 1B described below. This concept involves the conveyance of outflow from WT FRS #4 and stormwater runoff in an east to west channel along the existing RID Canal. This channel would outlet to an existing dewatering ditch at either Rainbow Road or Watson Road and would be conveyed south to the Gila River. The Buckeye Irrigation District (BID) may want to use this as a north-south linkage to the El Rio project that will be located downstream and adjacent to the Gila River. In addition, the BID has expressed interest in using the existing de-watering facility as a multi-use promenade.

An attempt was made to eliminate or minimize the negative aspects of each alternative specific to each design unit while preserving its positive aspects. This process led to the development of several conceptual flood control options proposed for each design unit. Each proposed design unit and the proposed flood control option are briefly summarized below.

Development of Design Units

The design units were developed to provide a simplification in the evaluation of the 10 alternatives. It was apparent from initial evaluation of the 10 alternatives, comments from the stakeholders and comments from the first neighborhood meetings that no individual alternative was perceived as a 'stand alone' alternative. In other words, it became clear that certain aspects of individual alternatives were positive and others were negative. By combining the positive aspects of a particular alternative with those of another, new alternatives could be developed that would minimize the negative aspects found within some areas of the 10 alternatives already defined.

Given the above information a virtually infinite number of combinations of alternatives would be possible. The result is a major difficulty in developing a single set of 3 alternatives recommended for further evaluation under Level II. Simply stated, the difficulty realized with the analysis was the challenge of how to combine the different components of the alternatives and in what order or manor should this occur.

In order to prepare a defendable evaluation of any proposed combination of the currently defined 10 alternatives over some other combination that could be developed, the Design Unit concept was implemented.

From inspection of the 10 alternatives developed to date, the concept of Design Units recognizes that in any given area within the project area there are generally 3 ways to handle the storm water runoff. The first way is to convey the water in north-south channels. The second way was to convey the water in west-east channels. The final method was to use diagonal channels (where practical) and/or some combination of the north-south & west-east channels. In some areas there were other components proposed but only as a part of one of the three overall methods for conveying runoff listed above. Therefore, each Design Unit below presents options for flood control that are linked to the 10 alternatives in a conceptual manor but not on an individual basis. Since there are 10 alternatives and three basic ways to handle the runoff, each option presented by a given design unit may be found in one or more of the 10 alternatives currently defined. This allows different combinations of positive components found within 1 alternative to be made with those of any of another.

This approach evaluates each option identified within a Design Unit against the other options identified for the same Design Unit. From the matrix, the top 3 options are selected and rated from 1 to 3 based on the score given by the matrix. Upon completion of the evaluation of each Design Unit, the #1 options from each Design Unit are combined and used to define Recommended Alternative #1. Similarly, the #2 and #3 scoring options from each Design Unit will be combined and used to define Recommended Alternatives #2 and #3.

Design Unit 1A – Design Unit 1A is located in the White Tank Mountains and is bounded on the north by the McMicken Dam and White Tank Mountains ridgeline, on the west by the White Tank Mountains ridgeline, on the south by I-10 and on the east by the Beardsley Canal and Perryville Road alignments. Design Unit 1A was evaluated for five options labeled A, B, C, D and E.

Option A consists of leaving the WT FRS #3 in place, conveying stormwater runoff west-east along Camelback Road and Northern Avenue and conveying stormwater runoff north-south along Jackrabbit Trail.

Option B consists of replacing the existing WT FRS #3 with a detention basin, conveying stormwater runoff west-east on Camelback Road and Northern Avenue, and conveying stormwater runoff north-south on Jackrabbit Trail.

Option C consists of leaving the WT FRS #3 in place and conveying all stormwater runoff north to south along Jackrabbit Trail.

Option D consists of replacing the existing WT FRS #3 with a detention basin and conveying all stormwater runoff norths to south along Jackrabbit Trail.

Finally, Option E consists of the diversion of stormwater runoff to the Hassayampa River, diversion of runoff from the existing WT FRS #3 to the McMicken Dam using a kicker dike and conveying runoff north to south along Jackrabbit Trail.

Design Unit 1B – Design Unit 1B is located immediately southeast of the White Tank Mountains. Design Unit 1B is bounded on the north by Design Unit 1A, on the east by Perryville Road, on the west by Dean Road and on the south by the Gila River. Design Unit 1B was evaluated for four options labeled A, B, C and D.

Option A consists of leaving the existing WT FRS #4 in place, conveying stormwater runoff north-south to the Gila River from WT FRS #4, conveying stormwater runoff east to west along

I-10 to tie into a channel proposed along the RID canal and conveying runoff north-south along Jackrabbit Trail to the inlet of WT FRS #4.

Option B consists of replacing the existing WT FRS #4 with a detention basin, conveying stormwater runoff from north-south to the Gila River from WT FRS #4, conveying stormwater runoff east to west along I-10 to tie into a channel proposed along the RID canal and conveying runoff north-south along Jackrabbit Trail to the inlet of the WT FRS #4.

Option C consists of replacing the existing WT FRS #4 with a detention basin and conveying runoff diagonally, overland across sections to the southeast and into the Gila River.

Option D consists of leaving the existing WT FRS #4 in place, conveying stormwater runoff from WT FRS #4 west along the RID to Watson and/or Rainbow road(s) and then south along existing dewatering facilities and conveying stormwater runoff north-south along Jackrabbit Trail to the existing WT FRS #4 inlet.

Design Unit 2 – Design Unit 2 (2A and 2B) is located east of and adjacent to Design Unit 1. Design Unit 2 is bounded on the north by the McMicken Dam, on the east by Loop 303, on the west by Design Unit 1 and on the south by the Gila River. Design Unit 2 was evaluated for five options labeled A, B, C, D and E.

Option A consists of the construction of a large north-south regional drain along the west side of the Loop 303 corridor. This would be a very wide earthen/natural type channel with a large hydraulic capacity. Option A minimizes the use of detention facilities and proposes drop structures to control channel velocities.

Option B consists of the construction of a north-south regional drain along the Loop 303 corridor. Unlike Option A, Option B would maximize the use of detention facilities to keep the channel cross section along Loop 303 more manageable. Option B does not propose the use of the existing borrow pits.

Option C consists of several west-east channels. Option C maximizes the use of detention facilities and does not proposed a major channel along the Loop 303 corridor. The west-east channels would be located along Northern Avenue, Camelback Road and I-10. The area south of I-10 proposes the use of the existing borrow pits and a channel along the Loop 303 corridor to the Gila River.

Option D consists of a large west-east regional drain extending from the WT FRS #3 east to the Agua Fria River. This regional drain maximizes the use of detention along its alignment to

mitigate cross section size and consists of a wide earthen/natural channel. The drain accepts flow from several north-south "feeders." The area south of I-10 drains to a north-south drainage channel along the Loop 303 corridor and uses the existing borrow pits to store runoff. This option also proposes the use of some existing railroad track corridors for north-south channels.

Option E consists of several smaller channels placed at right angles to form a grid system of north-south and west-east conveyances. The channels are placed at approximately 3-mile intervals throughout the design unit. Proposed alignment corridors for these channels are west to east along Northern Avenue, Camelback Road and I-10. Proposed north-south alignment corridors are proposed along the Loop 303 corridor, Jackrabbit Trail, Cotton Lane and the Bullard Wash.

Design Unit 3 – Design Unit 3 is bounded on the north by Grand Avenue, on the east by the Agua Fria River, on the west by Design Unit 2 and on the south by Design Unit 4. Since most of the required flood control for the area covered by Design Unit 3 has already been planned and is currently under construction, there were very few flood control options available for this area. Therefore, Design Unit 3 was evaluated for only one option labeled A.

Option A consists of small north-south channels, minimal detention, no west-east channels and maximizing the use of the proposed El Mirage Drainage Improvements.

Design Unit 4 – Design Unit 4 is bounded on the north by Design Unit 3, on the west by Design Unit 2, on the south by the Gila River and on the east by the Agua Fria River. Design Unit 4 was evaluated for two options labeled A and B.

Option A consists of light use of the existing ADOT detention basins using a relatively small pipe to bleed stormwater runoff back into the Bullard Wash after the peak flow has passed. Option A also proposes to move stormwater runoff west to east along Camelback Road and north-south in the Bullard Wash with some diversion of flow to the existing ADOT detention basins. Option A also accommodates drainage from Litchfield Park into Bullard Wash. Option A proposes to enforce retention/detention requirements on proposed adjacent and upstream development.

Option B consists of minimizing the retention/detention requirements in developments adjacent to the Bullard Wash in an effort to prevent the direct combination of peak discharges from proposed developments along the wash with those generated further upstream. Option B also proposes a light use of the ADOT detention basins with a post peak bleed back to Bullard Wash. Option B proposes to move stormwater runoff west-east along Camelback Road and north-south

within the Bullard Wash with a diversion of high flow into the existing ADOT detention basins. Option B also accommodates drainage from Litchfield Park into Bullard Wash.

Both Options A and B will seek to divert large volumes of stormwater runoff to the existing ADOT detention basins. The size and number of outlets possible from the detention facilities will limit the magnitude of the diversion. It appears that one such outlet could consist of a large diameter pipe constructed east to the Agua Fria River and placed beneath the pavement of the existing expanded Wal-Mart just east of Dysart Road.

3.2.2 Development of Analysis Criteria and Weighted Matrix

The next phase of the Level I alternatives analysis was to develop a comprehensive list of criteria by which each option proposed in a given design unit could be measured. These criterion were developed and weighted relative to one another based upon the following information:

- Opportunities and constraints identified within the watershed in the Data Collection Report
- Comments made at the first committee/stakeholders meeting
- Comments made at the first neighborhood meeting
- An evaluation of the scope of work and its primary objectives

Using the above list as a source to draw on during an open forum/meeting held at the URS office with the project team and a member of the FCDMC staff, the matrix criterion was determined and listed. Once the criterion was listed it was given a relative importance and used to define/develop the weighted matrix presented in this section. Each flood control option proposed within the individual design units was given a score for each of the defined criterion. This score was then agreed upon by those present at the meeting and entered into the weighted matrix.

The individual criterion developed and a brief description of each is listed below:

Utility Conflicts – The alternative that minimizes major utility conflicts will be more cost effective since relocations will be less. The alternatives should avoid conflicts with existing channels, retention basins, overhead utilities and major underground utilities.

Biological Conflicts – Activity in areas where endangered species, sensitive vegetation or riparian habitats may require special permits or cause costly delays to construction activities should be avoided.

Archeological Conflicts – Proposed alternative alignments and construction activity associated with an alternative should avoid identified archeological sites. These sites may contain pottery shards, ancient/historic ruins and other important historic/prehistoric artifacts. This type of conflict can cause project delays and other unbudgeted costs.

Hazardous Waste Conflicts – Construction activity associated with an alternative should avoid areas containing leaking underground storage tanks (LUST), landfills, etc. These types of conflicts can lead to mixing pollutants with stormwater and can pose serious health hazards and/or result in the introduction of pollutants in the groundwater table.

Land Subsidence Areas – Alternatives that minimize the number of structures passing through areas experiencing significant amounts of subsidence are preferred. Subsidence areas will require designs that can continue to function even when significant subsidence occurs. These designs require different materials (flexible to resist cracking), excessive capacities (to account for lost conveyance), etc. Such designs are more expensive than their conventional counterparts.

Right-of-Way Requirements – The alternative should minimize the amount of right-of-way acquisition required for proposed flood control elements. This can significantly reduce the cost of a project. This can also help keep a project from experiencing time delays caused by legal issues that may arise in trying to acquire right-of-way.

Project Cost – The preferred alternatives will minimize capital costs.

Constructibility – Alternatives which minimize "out of the ordinary" construction techniques, traffic impacts, etc., will be preferable. Easily constructed alternatives will be built faster and cheaper since contractors will not be forced to use unfamiliar techniques or exotic materials to do the job.

Flood Control – The preferred alternative will provide the highest level of flood protection possible given all of the constraints. The alternative will handle stormwater relatively efficiently and will alleviate/solve as many known flooding problems as possible.

Implementation – The easier it is to implement a design including the interim design, the more economically practical it will be. Also, it is important to have an alternative that provides a plan for smooth transitions from one phase to another as the watershed develops. An alternative should provide a plan for flood protection at during interim phases prior to full buildout.

Opportunity for Partnering – If proposed components of an alternative can be built as part of other improvements already planned or being planned and designed by a different agency, there

may be opportunities for sharing cost and partnering. These types of opportunities may be difficult to predict without detailed knowledge of planned city improvements; however, it must be evaluated based upon the best and most current information available.

Aesthetics/Landscape Character – High priority has been placed on creating an effective regional flood control solution that incorporates and maintains aesthetically pleasing landscape character. Based upon this fact, the alternatives with superior aesthetic qualities will be preferred.

Multi-Use Opportunities – This criterion goes along with the aesthetic criterion listed above. In addition to aesthetics, a high priority for multi-use facilities has been identified. Based on this, alternatives that incorporate parks and/or other multi-use facility with flood control will be preferred.

Effectiveness of an Alternative Relative to Existing Private Development – The preferred alternative will provide an efficient outfall for adjacent development. In addition, the alternative will tie existing flood control discontinuities together so that they function as one system.

Adjacent Land Use and Zoning Regulations – The preferred alternative will not require significant rezoning for construction. The more compliant a proposed alternative is with current zoning regulations, the quicker and more cost effectively it can be implemented.

Facility Maintenance – The preferred alternative should propose facilities whose maintenance requirements are minimal. This will keep long-term maintenance costs associated with the continued function of a facility down over the course of its useful life.

Extent of Use of Existing Facilities – The preferred alternative should incorporate to the largest extent possible any existing flood control facilities already existing within the project area. This will keep costs down and result in a more efficient flood control system.

Environmental Permits and Approvals – The preferred alternative will minimize environmental impacts to and around the immediate and surrounding area. For example, construction activities in existing natural washes will requirement 401/404 permits and could delay construction.

After the completion of the above list of criteria, it was decided that at the Level I phase of this project there is not enough known information to adequately evaluate each alternative to the level of detail required by the above criteria. Therefore, the above criteria were combined into broad/general "catch all" categories that can be easily weighted based upon available data.

The following categories were created from the list above. Each was assigned a relative weighted value of importance in percent and placed within the weighted evaluation matrix. The options in

each Design Unit were given a rating from 1 to 5 (1 = Poor, 5 = Excellent) for each category described below. The matrix computed an overall score for each option evaluated and the top three scores per Design Unit were used in developing the final three combined alternatives.

The categories used in the weighted matrix and a brief summary of each are listed below:

Permits – This category was created to include the environmental permits and approvals, biological and archeological conflict criteria. This category was assigned a weighted importance of 5% relative to all other categories.

Environment – This category was created to include the hazardous waste conflicts criteria and was assigned a relative weighted importance of 10%.

Aesthetics/Multi-Use – This category was created to include the aesthetics/landscape character and multi-use opportunity criteria. This category was assigned a relative weighted importance of 15%.

Partnering Potential – This category was created to include the opportunity for partnering criteria. This category was assigned a relative weighted importance of 10%.

Constructibility – This category was created to include the implementation, constructibility, utility conflicts, land subsidence areas, and adjacent land use and zoning regulations criteria. This category was assigned a relative weighted importance of 8%.

Flood Reduction – This category was created to include the flood control and effectiveness of alternative in relation to existing private development criteria. This category was assigned a relative weighted importance of 20%.

Traffic – This category was added after the development of the criteria listed above. This category was assigned a relative weighted importance of 2%.

Right-of-Way – This category was created to include the right-of-way criterion. This category was assigned a relative weighted importance of 10%.

Extent to Which Existing Facilities Are Used – This category was created to include the extent of use of existing facilities criterion. This category was assigned a relative weighted importance of 5%.

Capital Cost – This category was created for the capital cost criterion listed above. This category was assigned a relative weighted importance of 10%.

Operation & Maintenance – This category was created to include the facility maintenance criterion. This category was assigned a relative weighted importance of 5%.

The matrices used in the above analysis are shown on Tables 3.5-3.8. The results of the matrix analysis were used for selecting the three preferred alternatives discussed in Section 4.0.

Table 3.7

Alternatives Selection Matrix
Design Unit 1A 1B

Loop 303 Corridor/White Tanks Area Drainage Master Plan Update

Relative Importance (1 - 5)[2]	5%	10%	15%	10%	8%	20%	2%	10%	5%	10%	5%	
Scoring Values[1]	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	
Option[5]	Permits	Environment[4]	Aesthetics/ Multi Use	Partnering Potential	Constructability	Flood Reduction	Traffic	R/W	Extent to Which Existing Facilities are Used	Capital Cost	Operation & Maintenance	Alternative Weighted Average
Option A - DU**1A**	2.00	**3.50**	2.00	2.00	3.00	5.00	3.00	3.00	4.00	3.00	1.00	**3.1**
Option B - DU**1A**	2.00	**3.50**	5.00	2.50	4.00	5.00	2.00	1.50	4.00	1.00	2.50	**3.4**
Option C - DU**1A**	3.00	**3.50**	3.00	2.00	4.00	5.00	4.00	3.00	4.00	2.50	3.50	**3.5**
Option D - DU**1A**	2.00	**3.50**	3.50	2.00	4.00	5.00	4.00	3.00	4.00	1.00	3.00	**3.3**
Option A - DU**1B**	2.00	**4.00**	5.00	3.00	4.50	5.00	3.00	1.00	5.00	3.00	3.00	**3.8**
Option B - DU**1B**	2.00	**4.00**	5.00	3.00	3.00	5.00	3.00	1.00	5.00	3.00	3.00	**3.7**
Option C - DU**1B**	5.00	**4.00**	5.00	2.00	5.00	5.00	3.00	1.00	5.00	3.00	2.50	**3.8**
Option D - DU**1B**	2.00	**4.00**	5.00	3.00	5.00	5.00	3.00	2.00	5.00	3.00	3.00	**3.9**
Option E - DU**1A**	2.00	**2.00**	5.00	4.00	1.00	5.00	5.00	1.50	4.00	2.00	2.50	**3.3**

1. Scoring Explanation:

1 = Poor Value
2 = Below Average
3 = Average Value
4 = Above Average
5 = Excellent Value

2. The relative importance is a measure of how important each category is relative to all of the other categories (1 = unimportant, 5 = very important)

Table 3.8

Alternatives Selection Matrix
Design Unit 2A 2B

Loop 303 Corridor/White Tanks Area Drainage Master Plan Update

Relative Importance (1 - 5)[2]	5%	10%	15%	10%	8%	20%	2%	10%	5%	10%	5%	
Scoring Values[1]	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	
Option	Permits	Environment	Aesthetics/ Multi Use	Partnering Potential	Constructability	Flood Reduction	Traffic	R/W	Extent to Which Existing Facilities are Used	Capital Cost	Operation & Maintenance	Alternative Weighted Average
Option **A**	2.00	**4.00**	5.00	4.00	2.50	5.00	1.00	2.00	1.00	2.00	2.50	**3.4**
Option **B**	3.00	**4.00**	5.00	5.00	3.00	5.00	3.00	2.00	1.00	3.00	2.50	**3.8**
Option **C**	4.00	**4.00**	4.00	5.00	3.00	5.00	3.50	4.00	4.00	4.00	3.00	**4.2**
Option **D**	4.00	**4.00**	5.00	5.00	2.50	5.00	2.50	1.00	2.00	1.50	2.50	**3.6**
Option **E**	4.00	**4.00**	5.00	5.00	4.00	5.00	2.00	3.50	4.00	3.00	2.00	**4.2**

1. Scoring Explanation:
   - 1 = Poor Value
   - 2 = Below Average
   - 3 = Average Value
   - 4 = Above Average
   - 5 = Excellent Value
2. The relative importance is a measure of how important each category is relative to all of the other categories (1 = unimportant, 5 = very important)

Table 3.9

Alternatives Selection Matrix
Design Unit 3

Loop 303 Corridor/White Tanks Area Drainage Master Plan Update

Relative Importance (1 - 5)[2]	5%	10%	15%	10%	8%	20%	2%	10%	5%	10%	5%	
Scoring Values[1]	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	
Option	Permits	Environment	Aesthetics/ Multi Use	Partnering Potential	Constructability	Flood Reduction	Traffic	R/W	Extent to Which Existing Facilities are Used	Capital Cost	Operation & Maintenance	Alternative Weighted Average
Option **A**	4.00	**4.00**	4.00	4.00	5.00	5.00	3.00	2.00	5.00	2.50	2.50	**3.9**

1. Scoring Explanation:

1 = Poor Value
2 = Below Average
3 = Average Value
4 = Above Average
5 = Excellent Value

2. The relative importance is a measure of how important each category is relative to all of the other categories (1 = unimportant, 5 = very important)

Table 3.10

Alternatives Selection Matrix
Design Unit 4

Loop 303 Corridor/White Tanks Area Drainage Master Plan Update

Relative Importance[2]	5%	10%	15%	10%	8%	20%	2%	10%	5%	10%	5%	
Scoring Values[1]	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5	
Option	Permits	Environment	Aesthetics/ Multi Use	Partnering Potential	Constructability	Flood Reduction	Traffic	R/W	Extent to Which Existing Facilities are Used	Capital Cost	Operation & Maintenance	Alternative Weighted Average
Option **A**	5.00	**4.00**	5.00	5.00	4.00	5.00	4.00	4.00	4.00	3.50	2.50	**4.4**
Option **B**	5.00	**4.00**	5.00	5.00	4.50	5.00	4.00	4.50	4.00	4.00	2.50	**4.5**

1. Scoring Explanation:
   - 1 = Poor Value
   - 2 = Below Average
   - 3 = Average Value
   - 4 = Above Average
   - 5 = Excellent Value
2. The relative importance is a measure of how important each category is relative to all of the other categories (1 = unimportant, 5 = very important)

4.0 RECOMMENDED ALTERNATIVES

4.1 SELECTION OF THE RECOMMENDED ALTERNATIVES

Three new and distinct flood control alternatives for the ADMP Update project area were proposed as a result of the matrix evaluation. Each of these alternatives represents a combination of the options identified for the design units in Section 3.2. To avoid confusion with earlier alternatives, these alternatives will be referred to as the Recommended alternatives.

For each design unit, the top three options are listed in order of their scores. For Design Unit 1A, Options C, B and D scored the highest. For design Unit 1B, Options D, C and A scored the highest. For Design Unit 2, Options E, C and B scored the highest. Design Unit 3 was not an issue since only one option, Option A, was considered. Finally, Design Unit 4 was scored and Option B scored higher than Option A. Since there were only two options considered with Design Unit 4 (Options A and B), Option B was used for Recommended Alternative 1 and Option A was used or Recommended Alternatives 2 and 3. Refer to Section 3.2 for detailed descriptions of each option per design unit.

Each alternative derived from the above evaluation and procedure is described below in detail.

4.1.1 General Description of the Recommended Alternatives

Although the Recommended alternatives listed below were developed based upon the methods and procedures described above, they are not necessarily the only or best alternatives available. These alternatives may change or require further modifications upon review by the FCDMC staff. Each Recommended alternative will be described in detail below.

See Table 4.1 for the recommended and baseline alternative cultural/historical impacts. See Appendix A for an overlay of the recommended and baseline alternative(s) with the existing cultural and historical resources found within the study area. For a description of the environmental impacts associated with each recommended alternative, refer to Section 5.0 of this report.

For a description of the landscape character and multi-use features of each recommended alternative, refer to Section 6.0 of this report.

Table 4.1

Recommended and Baseline Alternative Cultural/Historical Impacts

	Potential Impacts[1]	
	Prehistoric Resources	**Historic Resources**
Baseline Alternative	crosses edge of Morocco Ruin, Hohokam village, condition unknown crosses Canal Liberty system, condition unknown	crosses Phoenix Main Line of Southern Pacific Railroad, eligible crosses Roosevelt Canal, recommended eligible crosses Buckeye Canal, recommended eligible crosses Old Buckeye Canal, recommended ineligible crosses AT&SF spur, recommended ineligible
Recommended Alternatives		
1	crosses edge of Morocco Ruin, Hohokam village, condition unknown crosses Van Liere site, Hohokam village, condition unknown crosses Canal Liberty system, condition unknown near AZ T:7:68 (ASM), Archaic artifact scatter, recommended eligible near M-1, Hohokam village, condition unknown near AZ T:11:2 (PG), Hohokam village, condition unknown	crosses Phoenix Main Line of Southern Pacific Railroad, eligible crosses and parallels Beardsley Canal ,eligible, crosses Roosevelt Canal, recommended eligible crosses Buckeye Canal, recommended eligible crosses AT&SF railroad spur, recommended ineligible crosses Old Buckeye Canal, recommended ineligible crosses AZ T:10:90 (ASM), historic trash, recommended ineligible near AZ T:7:175 (ASM), historic trash, recommended ineligible
2	crosses edge of Morocco Ruin, Hohokam village, condition unknown crosses Canal Liberty system, condition unknown near AZ T:7:68 (ASM), Archaic artifact scatter, recommended eligible	crosses Phoenix Main Line of Southern Pacific Railroad, eligible crosses and parallels Beardsley Canal ,eligible, crosses and parallels Roosevelt Canal, recommended eligible crosses Buckeye Canal, recommended eligible crosses AT&SF railroad spur, recommended ineligible crosses Old Buckeye Canal, recommended ineligible near AZ T:7:175 (ASM), historic trash, recommended ineligible
3	crosses Canal Liberty system, condition unknown near AZ T:11:2 (PG), Hohokam village, condition unknown	crosses Phoenix Main Line of Southern Pacific Railroad, eligible crosses and parallels Beardsley Canal ,eligible, crosses and parallels Roosevelt Canal, recommended eligible crosses Buckeye Canal, recommended eligible crosses AT&SF railroad spur, recommended ineligible crosses Old Buckeye Canal, recommended ineligible near AZ T:7:175 (ASM), historic trash, recommended ineligible

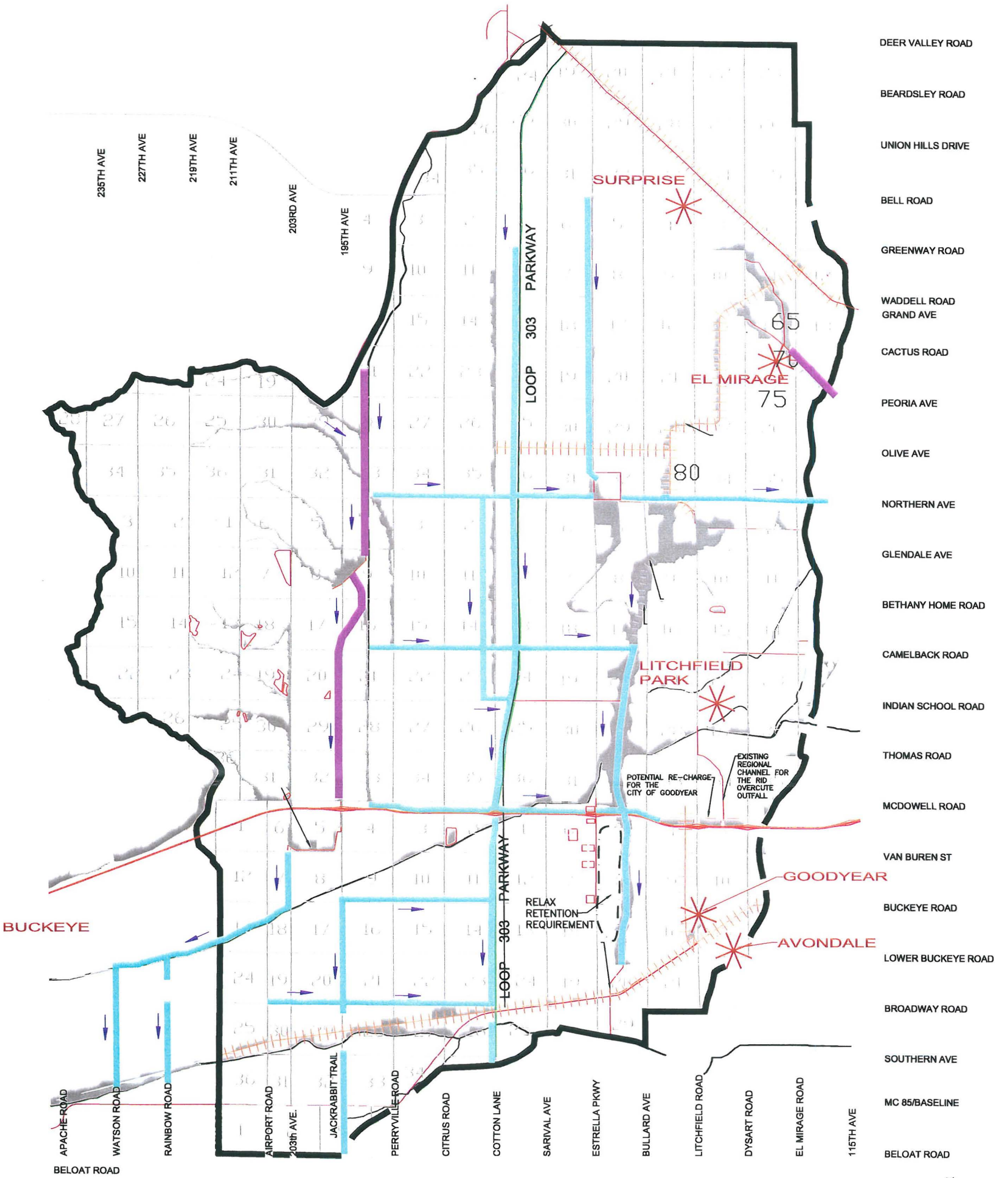
1. The analysis of impacts is very preliminary because the condition of many recorded resources is unknown, the significance of most of the recorded resources has not been formally evaluated, and other resources could be identified with the area of potential effect. More detailed analyses should be pursued as planning continues and impact zones can be defined more precisely.
2. Note: if a potential environmental impact is indicated above for a particular alternative, refer to the alternative descriptions in section 3.1.4 for detail.

Recommended Alternative 1

Recommended Alternative 1 consists of Option C from Design Unit 1A, Option D from Design Unit 1B, Option E from Design Unit 2, Option A from Design Unit 3 and Option B from Design Unit 4. See Figure 4.1 for a detailed illustration of Recommended Alternative 1. This alternative consists of the following flood control elements:

Hydraulic Features

- Containment of flow breaks along the Beardsley Canal north of White Tanks Flood Retarding Structure #3 (WT FRS #3). The first break occurs near Olive Avenue and the second occurs near Northern Avenue.
- Containment of flow breaks along Jackrabbit Trail from WT FRS #3 just north of Bethany Home Road south to WT FRS #4 at Van Buren Street.
- A north-south outlet channel from WT FRS #4 along 203rd Avenue to a proposed east-west channel along the RID Canal.
- Proposed north-south channels at either Watson Road and/or Rainbow Road to the Gila River. These channels will extend from the existing Roosevelt Irrigation District Canal south to the Gila River.
- A proposed west-east channel along the north side of I-10 from the Beardsley Canal to the existing ADOT detention basins.
- A proposed west-east channel along Northern Avenue to the existing golf course/detention basin at the northeast corner of Reems Road and Northern Avenue. The channel continues east to the Agua Fria River.
- A proposed north-south channel along the west side of the existing AT&SF Railroad adjacent to Cotton Lane from Northern Avenue to Indian School Road.
- A proposed channel along the west side of Loop 303 from Bell Road to the Gila River.
- A proposed west-east channel along Camelback Road to the Bullard Wash from approximately the Beardsley Canal.
- Channelization of the Reems Road floodplain from Bell Road south to the Dysart Drain.
- A small channel to relieve ponding along the upstream side of the existing AT&SF Railroad from Waddell Road south to Northern Avenue between Bullard Avenue and Dysart Road.



LEGEND:

- = PROPOSED LARGE REGIONAL OUTFALL CHANNEL
- = PROPOSED MEDIUM TO LARGE LOCAL COLLECTOR CHANNEL
- = PROPOSED DETENTION/RETENTION/PARK
- = DIRECTION OF FLOW
- = PROPOSED TRAIL LOCATION
- = PROJECT AREA BOUNDARY
- = PROPOSED LOOP 303 PARKWAY ALIGNMENT
- = EXISTING RAIL ROAD
- = EXISTING STRUCTURE OR FACILITY
- = FLOODPLAIN IDENTIFIED BY THE ORIGINAL WHITE TANKS ADMP, 1992

N

MARICOPA COUNTY
N.T.S.

RECOMMENDED ALTERNATIVE #1

May 2003

Loop 303 Corridor/White Tanks ADMP Update

Flood Control District of Maricopa County

FIGURE 4.1

URS

- A small north-south channel to relieve ponding at a sump caused by subsidence just east of Luke Air Force Base (Luke AFB). This low spot is generally located north of Bethany Home Road and West of Litchfield Road.
- A proposed channel along the historic Bullard Wash alignment from the existing Bullard Wash outfall to Camelback Road.
- A proposed north-south channel along Jackrabbit Trail from Buckeye Road to the Gila River.
- A proposed west-east channel along Buckeye Road form Jackrabbit Trail to the proposed channel along Loop 303.
- A proposed west-east channel along Broadway Road from Airport Road to the existing Bullard Wash outfall channel.
- A proposed outfall channel from the El Mirage drainage improvements to the Agua Fria River. The channel would start near the intersection of Cactus Road and El Mirage Road and proceed downstream to the river.
- A channel along Waddell road from approximately Litchfield Road to Dysart Road.

In addition to the flood control elements proposed above, Recommended Alternative 1 proposes to relax the retention requirements for developments adjacent to Bullard Wash south of I-10. The reason for this variance is to ensure that the peak discharges from the developments will be conveyed within the channel during the rising limb of the hydrograph and not coincide with peak discharges generated further upstream.

The potential cultural/historical impacts of Recommended Alternative 1 are listed below:

- Could affect two known Hohokam village sites, and Canal Liberty system (and is near an Archaic artifact scatter, and two other Hohokam village sites)
- Would cross and/or parallel the historic Beardsley, Roosevelt, Buckeye, and Airline canals and Phoenix Main Line of Southern Pacific Railroad (as well as other historic resources that appear to lack historic significance)

As planning continues and more detailed designs are developed, intensive field surveys should be undertaken to ensure compliance with the Arizona Antiquities Act. Needs for right-of-way across any State Trust land or other state permits would entail requirements for the lead state agency to comply with the State Historic Preservation Act. Similarly, any federal permits would require compliance with Section 106 of the National Historic Preservation Act.

Landscape/Multi-Use/Aesthetic Features

- Railroad theme along Cotton Lane channel from Northern Avenue to Indian School Road. This theme will use lighting styles simulating lanterns, walls and dividers built from railroad ties and seating elements similar to furniture found in train stations.
- Jackrabbit Trail and several other channels proposed in Planned Area Developments will use the Urban Theme. Elements such as low block and stucco walls, concrete path/trails and colors associated with adjacent developments. Mixes of native and exotic plant material will be used with turf to blend with neighborhoods.
- The Broadway Road channel could use the cultural theme. Use interpretive features to explain early canal systems.
- Multi-use in ADOT basins to include wildlife habitat, trails, turf/open-space, golf courses, soccer/softball fields, etc.

For more detail, see the "Landscape Aesthetics Assessment and Multi-Use Opportunities Assessment," by Logan Simpson Design, inc., dated April 2000.

The overall concept of Recommended Alternative 1 is to create a grid system (backbone) of channels that provides multiple outfalls to both the Agua Fria and the Gila rivers for existing and future development.

Just a few of the existing/proposed developments that will be served by some of the proposed outfall channels associated with Recommended Alternative 1 are listed below:

White Tanks #4 Outfall Channel:

- DMB/Caterpillar property
- Various planned developments downstream of WT FRS #4

Beardsley Canal Channel(s):

- Clearwater Farms
- Camelback Farms
- Waddell Ranches
- Sierra Montana

Northern Avenue Channel:

- Clearwater Farms
- Sierra Montana
- Ranch Gabriella
- Mountain Gate

Loop 303 Channel:

- Clearwater Farms
- Palm Valley & Pebble Creek
- Legacy Parc
- North Ranch
- Bell West Ranch
- Mountain Vista Ranch
- Greenway Parc
- Tash Subdivision
- Wild Flower Ranch
- Canyon Trails
- Pueblo Verde
- Cotton Flower
- Estrella Vista Sarival Gardens

I-10 Channel:

- Canada Village
- Perryville Prison
- Palm Valley & Pebble Creek

Bullard Wash Channel(s):

- Palm Valley & Pebble Creek
- Litchfield Park
- Wave Acres
- Ranch Mirage
- Centerra

- City Center
- Estrella Aerospace Center
- Luke AFB

Broadway Road Channel:

- Blue Horizon
- Other planned development

El Mirage Drainage Improvements Outfall Channel:

- West Point Towne Center
- MHE
- Royal Ranch
- Ashton Ranch

These are just of few of the developments that would benefit from the proposed regional flood control system associated with Recommended Alternative 1. This list is not at all comprehensive and continues to grow daily as development in the project area continues.

According to the matrix evaluations, there was no difference in overall weightings when the existing White Tanks structures were replaced with detention basin(s). The pros and cons associated with each option effectively cancelled each other out and produced a similar score in the weighted matrix. Therefore, either a flood retarding structure or basin can be assumed for the purposes of this level of detail in any of the Recommended alternatives.

The extension of the proposed Northern Avenue channel east to the Agua Fria River was added since the original concept showed the channel along Camelback Road. This was not a practical location since placing the channel adjacent to the Camelback Road alignment would require a large cut through an existing hill southeast of Luke AFB.

The positive aspects for Recommended Alternative 1 are listed below:

- Provides a large number of outfalls for existing and proposed development.
- The large number of outfall channels should limit the size of the channel required adjacent to Loop 303.
- Since there are several parallel channels proposed at relatively short distances, each channel size should not be very large.

- The alternative makes use of the existing ADOT detention basins.
- The alternative provides an outlet for the existing WT FRS #4.
- The alternative eliminates flow breaks from the White Tank Mountains watershed along the Beardsley Canal and Jackrabbit Trail.
- Proposed use of the existing BID's dewatering facilities along Rainbow and Watson roads may provide partnering opportunities.

The negative aspects for Recommended Alternative 1 are listed below:

- The large number of channels proposed on the grid system could result in greater disruption to traffic flow than the other proposed Recommended alternatives.
- The alternative does not divert any volume of flow out of either of the existing White Tanks structures or watersheds. This could make the potential conversion to detention basins more difficult.
- Due to the large number of facilities proposed, the number of lineal feet of channels requiring operation and maintenance will be very high relative to the other proposed Recommended alternatives.

In regard to some of the comments received by stakeholders and FCDMC staff, Recommended Alternative 1 performs fairly well. One of the most frequent comments received regarding the alternatives presented at the first brainstorming meeting was the lack of north-south and west-east outfalls. This alternative has added four north-south outfalls and three west-east outfalls. In addition, this Recommended alternative provides an outfall from the existing WT FRS #4 and makes use of the existing ADOT detention basins. The alternative does not directly address an outfall from the ADOT detention basins to the Agua Fria River since the design and alignment for such an outfall is beyond the scope of this report. It appears from a preliminary review of the plans for the expansion of the existing Wal-Mart south to the I-10 freeway right-of-way that there may be room to place a pipe under ground behind the proposed building. Other alignments could include north of Wal-Mart and south of I-10.

Recommended Alternative 1 has addressed the two most common complaints on the public sensing questionnaires. The first concern was that there were too many north-south diversions that cut off the historic flow patterns north of I-10 from a general west-east direction. Recommended Alternative 1 has proposed several west-east outlet channels and minimizes the number of north-south channel crossings at I-10. The second major concern was that the channel proposed along the Loop 303 corridor would be too large. With the increased number of west-

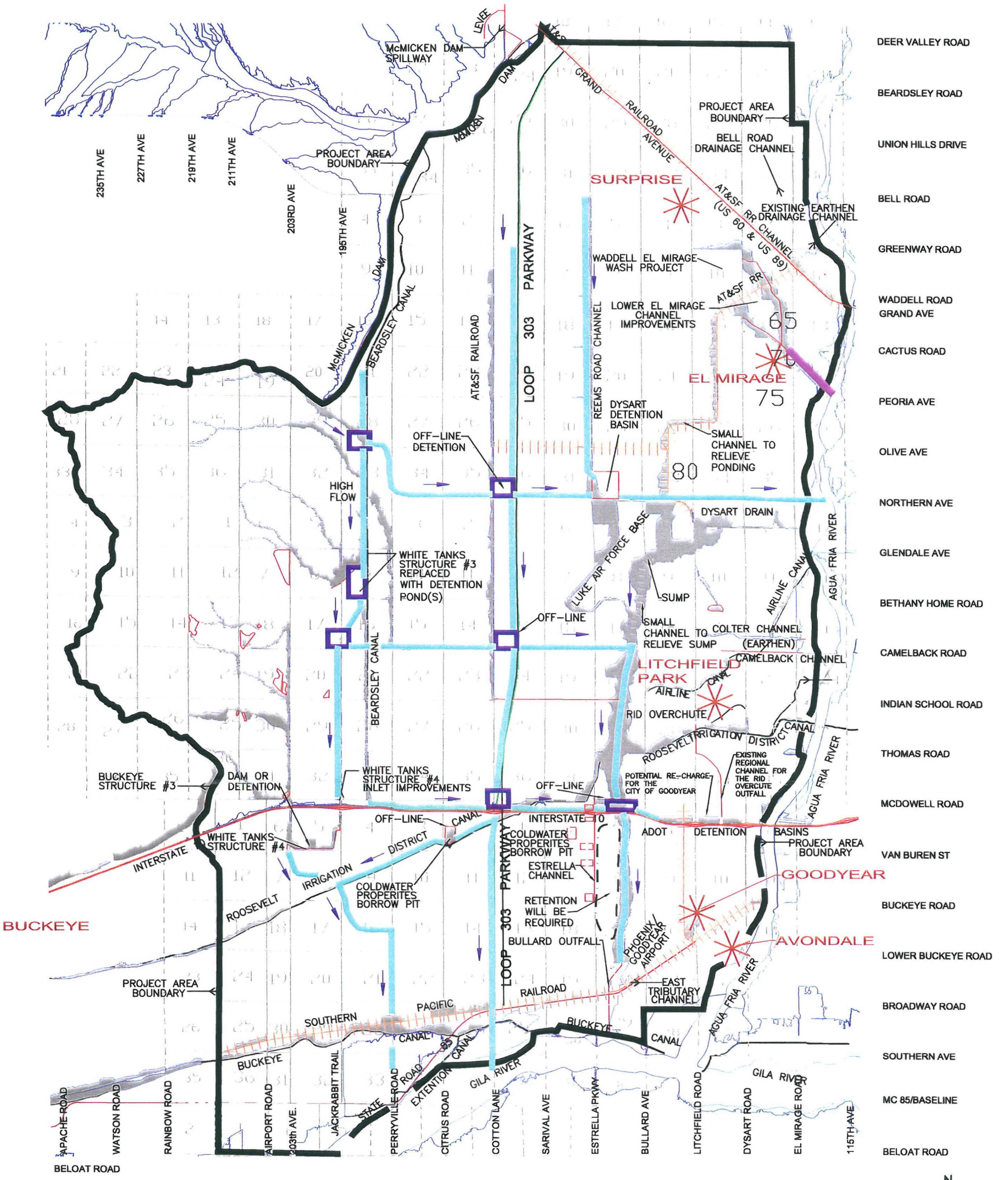
east channels, the size of the channel proposed along Loop 303 should not be as large as with prior alternatives.

Existing utility data in the project area has been collected and documented. All information received is shown on the Level III 15% conceptual design plans. Due to the multiple alternatives presented at this level there are too many proposed alignments (subject to change) to evaluate in detail. Therefore, quarter section maps covering virtually the entire project area would be required for such a detailed utility analysis. This would result in a massive amount of data. At this level of analysis the budget and scope do not support the amount of time and effort that would be required to evaluate this quantity of information. Further, the locations of telephone, cable and other such utilities are not viewed as a possible cause for a 'fatal flaw' with a given alternative. At this level, only general comments regarding the Recommended alternatives and existing utilities can be made. Only major potential utility conflicts visible and noted in the field are mentioned here.

The following utilities were observed during field reconnaissance. There are overhead power lines located along the east side of Cotton Lane; this should not impact proposed facilities on the west side of the roadway. Overhead power lines are present on the west side of Jackrabbit Trail and could hinder the placement of a proposed facility on that side of the road. Overhead telephone present along the south side of Northern Avenue should not adversely impact the proposed west-east channel along the north side of the roadway.

Recommended Alternative 2

Recommended Alternative 2 consists of Option B from Design Unit 1A, Option C from Design Unit 1B, Option C from Design Unit 2, Option A from Design Unit 3 and Option A from Design Unit 4. See Figure 4.2 for a detailed illustration of Recommended Alternative 2. This alternative consists of the following flood control elements:



LEGEND:

- = PROPOSED LARGE REGIONAL OUTFALL CHANNEL
- = PROPOSED MEDIUM TO LARGE LOCAL COLLECTOR CHANNEL
- = PROPOSED DETENTION/RETENTION/PARK
- = DIRECTION OF FLOW
- = PROPOSED TRAIL LOCATION
- = PROJECT AREA BOUNDARY
- = PROPOSED LOOP 303 PARKWAY ALIGNMENT
- = EXISTING RAIL ROAD
- = EXISTING STRUCTURE OR FACILITY
- = FLOODPLAIN IDENTIFIED BY THE ORIGINAL WHITE TANKS ADMP, 1992

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MARICOPA COUNTY N.T.S.

RECOMMENDED ALTERNATIVE #2

May 2003

Loop 303 Corridor/White Tanks ADMP Update

FIGURE 4.2

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Hydraulic Features

- Containment of flow breaks along the Beardsley Canal north of WT FRS #3 from approximately Peoria Avenue to just south of Glendale Avenue.
- Containment of flow breaks along Jackrabbit Trail from WT FRS #3 south to WT FRS #4. WT FRS #3 is located just south of Glendale Avenue and WT FRS #4 is located at Van Buren Street.
- A diagonal outlet channel from WT FRS #4 across Sections 8 and 16 to a proposed north-south channel along Perryville Road.
- A proposed west-east channel along the north side of I-10 from the Beardsley Canal to the existing ADOT detention basins.
- A proposed west-east channel along Northern Avenue to the existing golf course/detention basin at the northeast corner of Reems Road and Northern Avenue. The channel continues east to the Agua Fria River. This channel serves as an outlet and collector from a proposed park/detention area at the Beardsley Canal north of WT FRS #3.
- A proposed channel along the west side of Loop 303 from Bell Road to the Gila River. South of Southern Avenue.
- A proposed west-east channel along Camelback Road to the Bullard Wash. This channel serves as an outlet and collector from a proposed park/detention area at the northeast corner of Jackrabbit Trail and Camelback Road.
- Channelization of the Reems Road floodplain. From Bell Road south to Dysart Drain located at the intersection of Northern Avenue and Reems Road.
- A small channel to relieve ponding along the upstream side of the existing AT&SF Railroad from Waddell Road south to Northern Avenue. The channel is located between Bullard Avenue and Dysart Road.
- A small north-south channel to relieve ponding at a sump caused by subsidence just east of Luke AFB. The low spot is generally located north of Bethany Home Road and West of Litchfield Road.
- A proposed channel along the historic Bullard Wash alignment from the existing Bullard Wash outfall to Camelback Road.

- A proposed outfall channel from the El Mirage drainage improvements to the Agua Fria River. The channel would start near the intersection of Cactus Road and El Mirage Road and proceed downstream to the river.
- A proposed southwest channel along the north side of the existing RID Canal south of I-10. From I-10 to the southwest to Airport Road.
- A channel along Waddell road from approximately Litchfield Road to Dysart Road.
- Use of the existing Coldwater Properties borrow pit south of I-10 just east of Citrus Road.
- A channel along Waddell road from approximately Litchfield Road to Dysart Road.
- Several multi-use detention or retention park areas for the attenuation of peak discharges. These basins might be located as follows:
  - Northwest corner of Olive Avenue and Beardsley Canal
  - Northwest corner of Bethany Home Road and Beardsley Canal
  - Northwest corner of Jackrabbit Trail and Camelback Road
  - Northwest corner of Loop 303 and Northern Avenue
  - Northwest corner of Loop 303 and Camelback Road
  - Northwest corner of the Loop 303 and McDowell Road
  - The north side of I-10 at the intersection of the existing Bullard Wash and I-10
- Conversion of the existing WT FRS #3 from a dam to a detention basin(s).

Recommended Alternative 2 does not propose a relaxing of the retention requirements for developments adjacent to Bullard Wash south of I-10. Instead, Recommended Alternative 2 provides several park/detention areas that will help to cut the peak discharges entering the Bullard Wash. In addition, there are flow diversions away from the Bullard Wash by using the existing ADOT detention basins and by routing flow to the southwest in the proposed channel paralleling the existing RID canal south of I-10.

The potential cultural/historical impacts of Recommended Alternative 2 are listed below:

- Could affect one known Hohokam village site, and Canal Liberty system (and is near an Archaic artifact scatter)

- Would cross and/or parallel the historic Beardsley, Roosevelt, and Buckeye canals and Phoenix Main Line of Southern Pacific Railroad (as well as other historic resources that appear to lack historic significance)

As planning continues and more detailed designs are developed, intensive field surveys should be undertaken to ensure compliance with the Arizona Antiquities Act. Needs for right-of-way across any State Trust land or other state permits would entail requirements for the lead state agency to comply with the State Historic Preservation Act. Similarly, any federal permits would require compliance with Section 106 of the National Historic Preservation Act.

Landscape/Multi-Use/Aesthetic Features

- Use of six themes with transition zones along Loop 303. Themes to be used include Urban, Neighborhood, Agricultural and Industrial.
- Use the Sonoran desert theme along the Beardsley Canal north of WT FRS #3. Native trees, shrubs and grasses will be used along trail. Stabilized decomposed granite paths will be constructed.
- Use of the Urban theme south of WT FRS #3 along Beardsley Canal.
- WT FRS #3 will be a transition zone between the Sonoran desert theme and the Urban theme.
- Use Desertscrub and Neighborhood theme along portions of the Northern Avenue channel.
- Use of Agricultural and Industrial themes along portions of the Northern Avenue channel.
- Use of the Aircraft theme along the Northern Avenue channel adjacent to Luke AFB.
- Incorporate multi-uses into the ADOT detention basins including a regional park, soccer/softball, golf courses, etc.
- Provide a combination of multi-use facilities within the WT FRS #3 and WT FRS #4 structures. Include a regional sports complex, regional equestrian center, turf/open-space, BMX course, a large water feature and a wildlife habitat.
- Provide several trails along existing and new channel. Trails provide connections to the Agua Fria River and the Gila River.
- Provide interpretive facilities adjacent to Luke AFB describing various aircraft.
- Provide interpretive facilities adjacent to the Gila and Agua Fria rivers describing native vegetation and wildlife.

For more detail, see the "Landscape Aesthetics Assessment and Multi-Use Opportunities Assessment," by Logan Simpson Design, inc., dated April 2000.

The overall concept of Recommended Alternative 2 is to create a flood control system that will attenuate peak discharge increases due to development through the use of several park/detention areas while maintaining the historic flow patterns in the ADMP Update project area.

The park/detention area proposed at the intersection of the Beardsley Canal and Olive Avenue was proposed as part of a development in that area. The extension of the proposed Northern Avenue channel all the way east to the Agua Fria River was added since the original concept showed the channel along Camelback Road. This was not a practical location since placing the channel adjacent to the Camelback Road alignment would require cutting through a large existing hill southeast of Luke AFB.

Just a few of the existing/proposed developments that will be served by some of the proposed outfall channels associated with Recommended Alternative 2 are listed below:

White Tanks #4 Outfall Channel:

- DMB/Caterpillar property
- Blue Horizon
- Various planned developments downstream of WT FRS #4

Beardsley Canal Channel(s):

- Clearwater Farms
- Camelback Farms
- Waddell Ranches
- Sierra Montanna

Northern Avenue Channel:

- Clearwater Farms
- Sierra Montana
- Ranch Gabriella
- Mountain Gate

Loop 303 Channel:

- Clearwater Farms
- Palm Valley & Pebble Creek
- Legacy Parc
- North Ranch
- Bell West Ranch
- Mountain Vista Ranch
- Greenway Parc
- Tash Subdivision
- Wild Flower Ranch
- Canyon Trails
- Pueblo Verde
- Cotton Flower
- Estrella Vista Sarival Gardens

Camelback Road Channel:

- Clearwater Farms
- Montana Farms
- Camelback Farms
- Palm Valley & Pebble Creek
- Litchfield Park
- Wigwam Creek

I-10 Channel:

- Perryville Prison
- Palm Valley & Pebble Creek

Bullard Wash Channel(s):

- Palm Valley & Pebble Creek
- Litchfield Park
- Wave Acres
- Ranch Mirage

- Centerra
- City Center
- Estrella Aerospace Center
- Luke AFB

El Mirage Drainage Improvements Outfall Channel:

- West Point Towne Center
- MHE
- Royal Ranch
- Ashton Ranch

These are just of few of the developments that would benefit from the proposed regional flood control system associated with Recommended Alternative 2. This list is not at all comprehensive and continues to grow daily as development in the project area continues.

The positive aspects for Recommended Alternative 2 are listed below:

- Provides an adequate number of outfalls for existing and proposed development.
- The large number of park/detention areas will help attenuate increases in peak discharges.
- The flow diversion from the WT FRS #3 at Northern Avenue will lower the amount of storage volume required within the proposed replacement basin.
- The alternative makes use of the existing ADOT detention basins.
- The alternative provides an outlet for the existing WT#4.
- The alternative eliminates flow breaks from the White Tank Mountains watershed along the Beardsley Canal and Jackrabbit Trail.
- The large number of west-east channels and park/detention areas should help to minimize the required size of the channel proposed along the Loop 303 corridor.
- The alternative makes use of the existing Coldwater Properties borrow pit south of I-10 and east of Citrus Road.
- The diversion of flow from the WT FRS #4 along Camelback Road would help facilitate the conversion of the existing WT FRS #4 to a detention basin if that becomes a priority in the future.

The negative aspects for Recommended Alternative 2 are listed below:

- The conversion of the existing WT FRS #3 from a dam to a detention basin will be very expensive and will require additional right-of-way for placement of the new facility.
- The alignment for the proposed outlet channel from the existing WT FRS #4 crosses overland through sections instead of following section lines. This could cause conflicts with existing or proposed development. This may also make right-of-way acquisition more difficult.

In regard to some of the comments received by stakeholders and FCDMC staff, Recommended Alternative 2 performs fairly well. Like Recommended Alternative 1, Recommended Alternative 2 provides more north-south and west-east outfalls. In addition, this alternative proposes several park/detention areas that would attenuate peak discharges and bring down the size of required channel cross sections. Recommended Alternative 2 also provides an outfall from the existing WT FRS #4 and makes use of the existing ADOT detention basins. The alternative does not directly address an outfall from the ADOT detention basins to the Agua Fria River since the design and alignment for such an outfall is beyond the scope of this report. It appears from a preliminary review of the plans for the expansion of the existing Wal-Mart south to the I-10 freeway right-of-way that there may be room to place a pipe under ground behind the proposed building. Other outfall alignments could also be considered as stated in Recommended Alternative 1.

Recommended Alternative 2 has addressed the two most common complaints on the public sensing questionnaires. The first concern was that there were too many north-south diversions that cut off the historic flow patterns north of I-10 from a general west-east direction. Recommended Alternative 2 has proposed major west-east outlet channels and park/detention areas that will minimize the number of north-south channel crossings of I-10. The second major concern noted was that the channel proposed along the Loop 303 corridor would be too large. With the added west-east channels and park/detention areas, the size of the channel proposed along Loop 303 should not be as large as with prior alternatives.

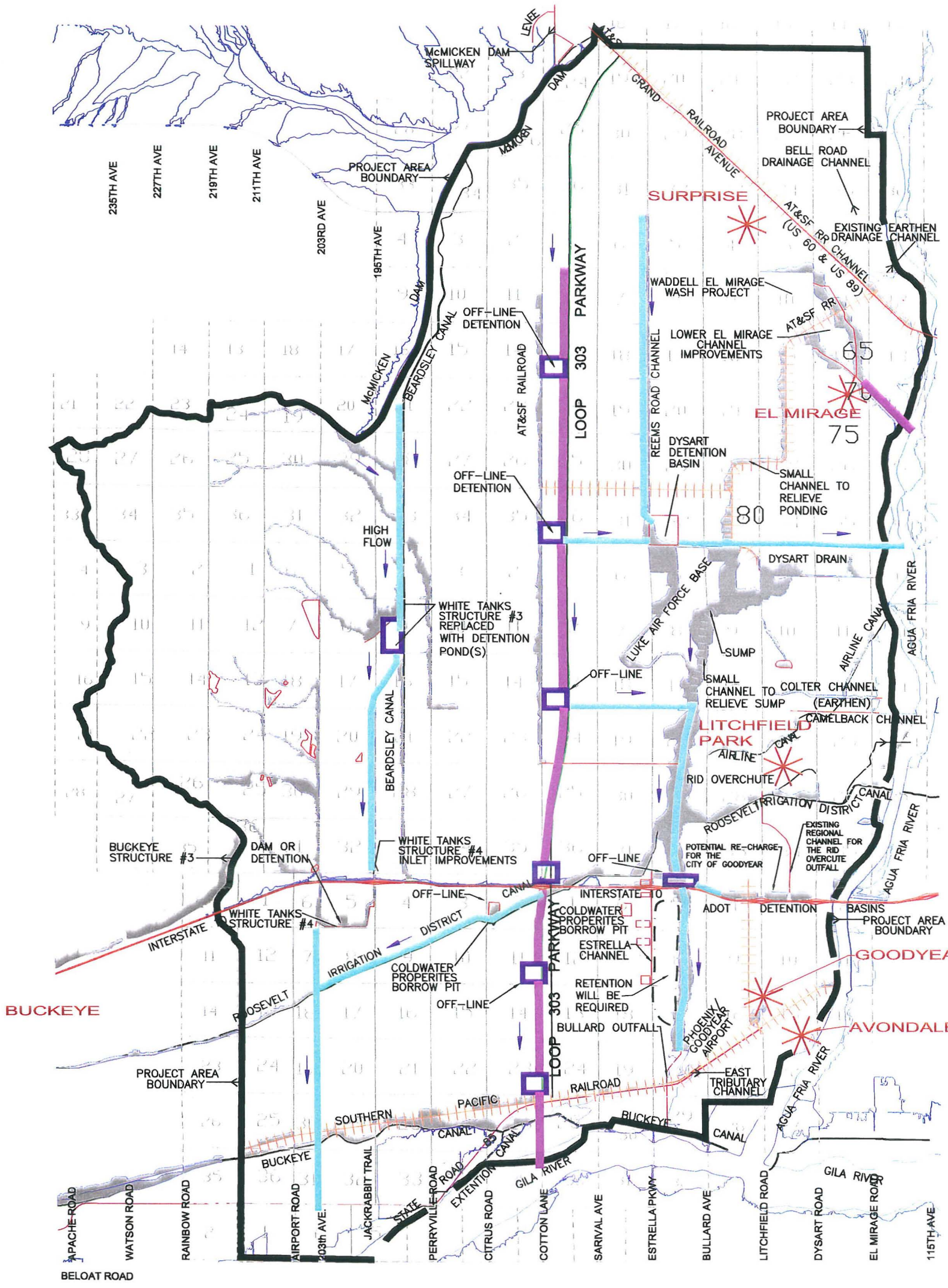
The following utilities were observed during field reconnaissance. Overhead power lines are present on the west side of Jackrabbit Trail and could hinder the placement of a proposed facility on that side of the road. Overhead telephone lines are present along the south side of Northern Avenue and should not adversely impact the proposed west-east channel along the north side of the roadway.

Recommended Alternative 3

Recommended Alternative 3 consists of Option D from Design Unit 1A, Option A from Design Unit 1B, Option B from Design Unit 2, Option A from Design Unit 3 and Option A from Design Unit 4. See Figure 4.3 for a detailed illustration of Recommended Alternative 3. This alternative consists of the following flood control elements:

Hydraulic Features

- Containment of flow breaks along the Beardsley Canal north of WT FRS #3 from approximately Peoria Avenue to just south of Glendale Avenue.
- Containment of flow breaks along Jackrabbit Trail from WT FRS #3 south to WT FRS #4. WT FRS #3 is located just south of Glendale Avenue and WT FRS #4 is located at Van Buren Street.
- A north-south outlet channel from WT FRS #4 along 203rd Avenue to the Gila River.
- A proposed west-east channel along Northern Avenue from the Loop 303 channel to the existing golf course/detention basin at the northeast corner of Reems Road and Northern Avenue. The existing channel continues east to the Agua Fria River.
- A proposed channel along the west side of Loop 303 from Bell Road to the Gila River. This would be a very large, wide, earthen channel.
- A proposed west-east channel along Camelback Road from Loop 303 to Bullard Wash.
- Channelization of the Reems Road floodplain. From Bell Road south to Dysart Drain located at the intersection of Northern Avenue and Reems Road.
- A small channel to relieve ponding along the upstream side of the existing AT&SF Railroad from Waddell Road south to Northern Avenue. The channel is located between Bullard Avenue and Dysart Road.
- A small north-south channel to relieve ponding at a sump caused by subsidence just east of Luke AFB. The low spot is generally located north of Bethany Home Road and West of Litchfield Road.
- A proposed channel along the historic Bullard Wash alignment from the existing Bullard Wash outfall to Camelback Road.



LEGEND:

- = PROPOSED LARGE REGIONAL OUTFALL CHANNEL
- = PROPOSED MEDIUM TO LARGE LOCAL COLLECTOR CHANNEL
- = PROPOSED DETENTION/RETENTION/PARK
- = DIRECTION OF FLOW
- = PROPOSED TRAIL LOCATION
- = PROJECT AREA BOUNDARY
- = PROPOSED LOOP 303 PARKWAY ALIGNMENT
- = EXISTING RAIL ROAD
- = EXISTING STRUCTURE OR FACILITY
- = FLOODPLAIN IDENTIFIED BY THE ORIGINAL WHITE TANKS ADMP, 1992

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MARICOPA COUNTY
N.T.S.

RECOMMENDED ALTERNATIVE #3

May 2003

Loop 303 Corridor/White Tanks ADMP Update

Flood Control District of Maricopa County

FIGURE 4.3

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- A proposed outfall channel from the El Mirage drainage improvements to the Agua Fria River. The channel would start near the intersection of Cactus Road and El Mirage Road and proceed downstream to the river.
- A proposed southwest channel along the north side of the existing RID canal south of I-10. This channel would connect the Loop 303 corridor with the WT FRS #4 outlet channel.
- A short diversion channel north of I-10 from the Bullard Wash terminating at the existing ADOT detention basins. Basins may be improved to handle increased inflow (Level II Phase A).
- Several multi-use detention or retention park areas for the attenuation of peak discharges. These basins might be located as follows:
  - Northwest corner of Cactus Road and Loop 303
  - Northwest corner of Bethany Home Road and Beardsley Canal
  - Northwest corner of Northern Avenue and Loop 303
  - Northwest corner of Camelback Road and Loop 303
  - Northwest corner of McDowell Road and Loop 303
  - Northwest corner of Buckeye Road and Loop 303
  - Northwest corner of Broadway Road and Loop 303
  - The north side of I-10 at the intersection of the existing Bullard Wash and I-10
- Conversion of the existing WT FRS #3 from a dam to a detention basin(s).

Recommended Alternative 3 does not propose a relaxing of the retention requirements for developments adjacent to Bullard Wash south of I-10. Instead, Recommended Alternative 3 provides several park/detention areas and upstream west-east diversion channels that will help to cut the peak discharges in the Bullard Wash outfall downstream. In addition, there will be a flow diversion from the Bullard Wash to the existing ADOT detention basins north of I-10.

The potential cultural/historical impacts of Recommended Alternative 3 are listed below:

- Could affect Canal Liberty system (and is near one Hohokam village site)
- Would cross and/or parallel the historic Beardsley, Roosevelt, and Buckeye canals and Phoenix Main Line of Southern Pacific Railroad (as well as other historic resources that appear to lack historic significance)

As planning continues and more detailed designs are developed, intensive field surveys should be undertaken to ensure compliance with the Arizona Antiquities Act. Needs for right-of-way across any State Trust land or other state permits would entail requirements for the lead state agency to comply with the State Historic Preservation Act. Similarly, any federal permits would require compliance with Section 106 of the National Historic Preservation Act.

Landscape/Multi-Use/Aesthetic Features

- Use of six themes with transition zones along Loop 303. Themes to be used include, Urban, Neighborhood, Agricultural and Industrial.
- Use the Sonoran desert theme along the Beardsley Canal north of WT FRS #3. Native trees, shrubs and grasses will be used along trail. Stabilized decomposed granite paths will be constructed.
- Use of the Urban theme south of WT FRS #3 along Beardsley Canal.
- WT FRS #3 will be a transition zone between the Sonoran desert theme and the Urban theme
- Apply the Neighborhood theme to the detention basin at Northern Avenue and Loop 303.
- Use a Recreational theme for the detention basin proposed at Camelback Road and Loop 303. Incorporate viewing aircraft viewing areas and related interpretive information.
- Use the Railroad theme in the proposed detention basin at Broadway Road and Loop 303. Use railroad ties, ramada structures and lantern type lighting fixtures to mimic the feel of a railroad station.
- Use the Urban theme along the channel proposed adjacent to the RID canal.
- Develop a local community park within the proposed detention basins located at Bullard Wash and I-10. Use turf open-space, soccer fields and baseball/baseball fields. Incorporate court sports such as basketball, volleyball, etc.
- Apply a combination of golf course and field sports within the existing ADOT and Dysart detention basins.
- Provide a combination of multi-use facilities within the WT FRS #3 and WT FRS #4 structures. Include a regional sports complex, regional equestrian center, turf/open-space, BMX course, a large water feature and a wildlife habitat.
- Provide several trails along existing and new channel. Trails provide connections to the Agua Fria River and the Gila River.
- Provide interpretive facilities adjacent to Luke AFB describing various aircraft.

- Provide interpretive facilities adjacent to the Gila and Agua Fria rivers describing native vegetation and wildlife.

For more detail, see the "Landscape Aesthetics Assessment and Multi-Use Opportunities Assessment," by Logan Simpson Design, inc., dated April 2000.

The overall concept of Recommended Alternative 3 is to create a flood control system that will attenuate peak discharges by using a combination of a medium to large channels adjacent to Loop 303 with some west-east flow diversion channels to mitigate the size of the required cross section. Proposed park/detention areas will also help to keep the channel cross section required along Loop 303 manageable. Although this concept is similar to the baseline alternative described by the scope of work, it does take additional steps to divert more flow to the Agua Fria River and incorporates more park/detention facilities to help reduce the peak discharges conveyed south to the Gila River.

Just a few of the existing/proposed developments that will be served by some of the proposed outfall channels associated with Recommended Alternative 3 are listed below:

White Tanks #4 Outfall Channel:

- DMB/Caterpillar property
- Various planned developments downstream of WT FRS #4

Beardsley Canal Channel(s):

- Clearwater Farms
- Camelback Farms
- Waddell Ranches
- Sierra Montanna

Northern Avenue Channel:

- Ranch Gabriella
- Mountain Gate

Loop 303 Channel:

- Clearwater Farms
- Palm Valley & Pebble Creek
- Sierra Montana

- Legacy Parc
- North Ranch
- Bell West Ranch
- Mountain Vista Ranch
- Greenway Parc
- Tash Subdivision
- Wild Flower Ranch
- Canyon Trails
- Pueblo Verde
- Cotton Flower
- Estrella Vista Sarival Gardens
- Canada Village
- Perryville Prison

Bullard Wash Channel(s):

- Palm Valley & Pebble Creek
- Litchfield Park
- Wave Acres
- Ranch Mirage
- Centerra
- City Center
- Estrella Aerospace Center
- Luke AFB

El Mirage Drainage Improvements Outfall Channel:

- West Point Towne Center
- MHE
- Royal Ranch
- Ashton Ranch

Camelback Road Channel:

- Palm Valley & Pebble Creek
- Litchfield Park

These are just of few of the developments that would benefit from the proposed regional flood control system associated with Recommended Alternative 3. This list is not at all comprehensive and continues to grow daily as development in the project area continues.

The positive aspects for Recommended Alternative 3 are listed below:

- Provides an adequate number of outfalls for existing and proposed development.
- The large number of park/detention areas will help attenuate increases in peak discharges.
- The alternative makes use of the existing ADOT detention basins.
- The alternative provides an outlet for the existing WT FRS #4.
- The alternative eliminates flow breaks from the White Tank Mountains watershed along the Beardsley Canal and Jackrabbit Trail.
- The proposed west-east diversion channels and park/detention areas should help to minimize the required size of the channel proposed along the Loop 303 corridor.
- The alternative is more consistent with the baseline alternative.

The negative aspects for Recommended Alternative 3 are listed below:

- The conversion of the existing WT FRS #3 from a dam to a detention basin will be costly and may require additional right-of-way for placement of the new facility. Since there is no proposed diversion of flow from the WT FRS #3, the proposed detention basin(s) may be more costly than with Recommended Alternative 2.
- There are no west-east flow diversions from the White Tank Mountains; this will lead to larger channel sections along the Beardsley Canal and Jackrabbit Trail.
- This alternative proposes a large, wide earthen facility along Loop 303 that will require substantial right-of-way and be difficult to operate and maintain.

In regard to some of the comments received by stakeholders and FCDMC staff, Recommended Alternative 3 performs decently but not as well as Recommended Alternatives 1 and 2. Like Recommended Alternatives 1 and 2, Recommended Alternative 3 provides more north-south and west-east outfalls. Unlike Recommended Alternatives 1 and 2, however, the west-east channels

proposed with Recommended Alternative 3 do not extend west of the Loop 303. This leads to more flow going south from the White Tank Mountains watershed.

Recommended Alternative 3 proposes several park/detention areas along the channel adjacent to Loop 303. This would reduce peak flows conveyed south and the required channel section. Like Recommended Alternatives 1 and 2, Recommended Alternative 3 also provides an outfall from the existing WT FRS #4 and makes use of the existing ADOT detention basins.

The alternative does not directly address an outfall from the ADOT detention basins to the Agua Fria River since the design and alignment for such an outfall is beyond the scope of this report. It appears from a preliminary review of the plans for the expansion of the existing Wal-Mart south to the I-10 freeway right-of-way that there may be room to place a pipe under ground behind the proposed building. Outfall alignment north of the Wal-Mart development and south of I-10 will be considered also.

Recommended Alternative 3 has addressed the two most common complaints on the public sensing questionnaires noted above. The first concern was that there were too many north-south diversions that cut off the historic flow patterns north of I-10 from a general west-east direction. Recommended Alternative 3 has proposed some west-east outlet channels and park/detention areas that will minimize the number of north-south channel crossings of I-10. The second major concern noted was that the channel proposed along the Loop 303 corridor would be too large. With the added west-east diversion channels and park/detention areas, the size of the channel proposed along Loop 303 should not be as large as with the baseline alternative.

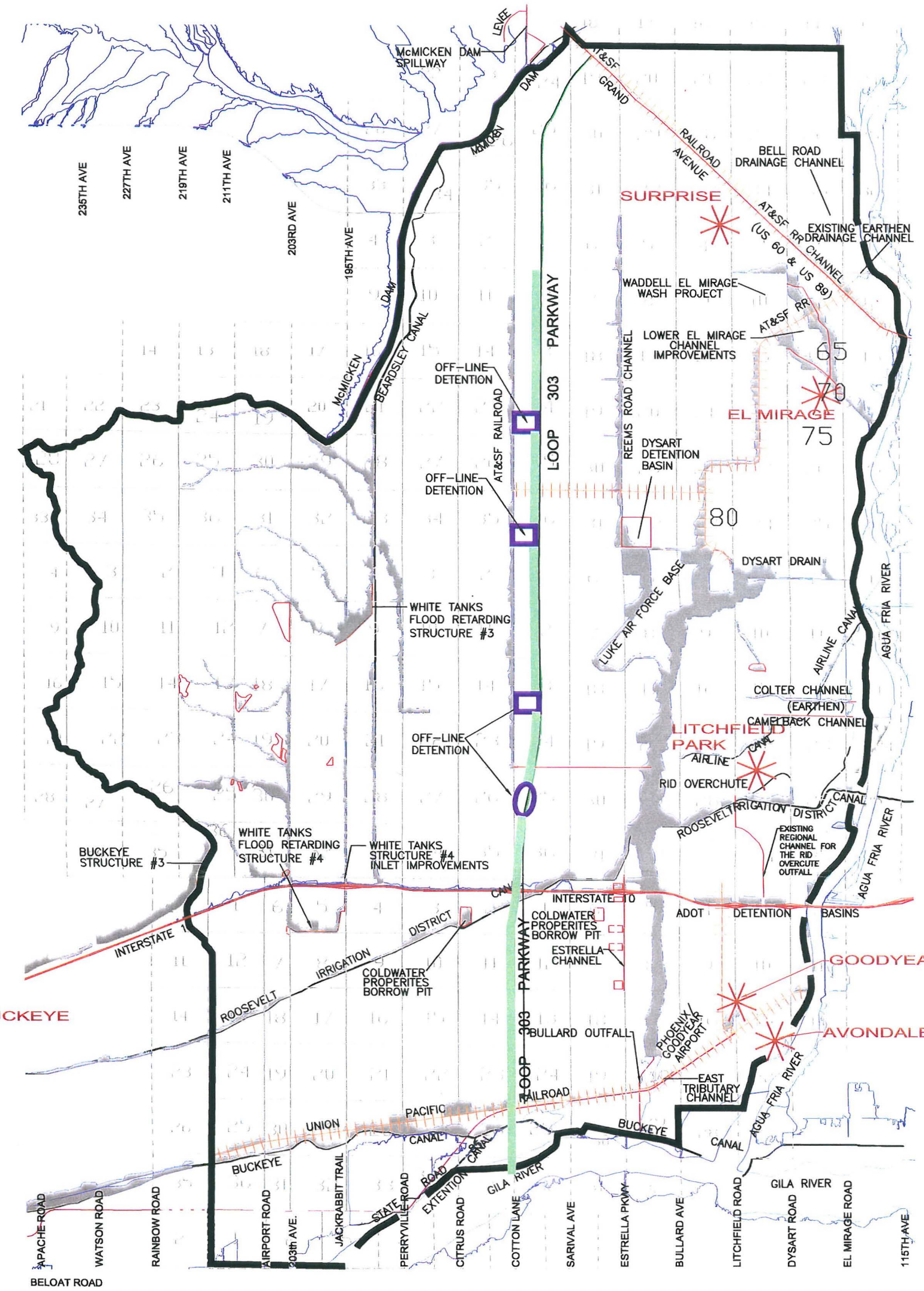
The following utilities were observed during field reconnaissance. Overhead power lines are present on the West Side of Jackrabbit Trail and could hinder the placement of a proposed facility on that side of the road. Overhead telephone lines are present along the south side of Northern Avenue and should not adversely impact the proposed west-east channel along the north side of the roadway.

The extent and location of major underground utilities present within the ADMP Update project area is not yet known. A comprehensive list of utility owners for the entire ADMP Update project area has been compiled and will be used to secure quarter section maps specific to the areas where flood control facilities and alignments are being proposed. Using these maps, more detailed utility information will be gathered and evaluated during the Level II phase of the project.

Baseline Alternative

The baseline alternative for comparison with the three Recommended alternatives presented above is the proposed four basin and channel alternative from the "Drainage Channel Study for West Half of Estrella Freeway Loop 303 from Interstate 17 – Drainage Technical Memorandum." See Figure 4.4 for a detailed illustration of the baseline alternative. This alternative consists of the following flood control elements:

- A large regional drainage channel along the Loop 303 corridor.
- Four large detention basins with one located at each of the following roads: Peoria Avenue, Northern Avenue, Camelback Road and one between Indian School Road and Thomas Road.
- A proposed box culvert crossing at each street.
- The alternative proposes no flood control facilities in any other part of the ADMP Update project area.



LEGEND:

- = PROPOSED LARGE REGIONAL OUTFALL CHANNEL
- = PROPOSED MEDIUM TO LARGE LOCAL COLLECTOR CHANNEL
- = PROPOSED SMALL COLLECTOR CHANNEL
- = DIRECTION OF FLOW
- = PROPOSED LARGE, MEDIUM OR SMALL BASIN/PARK
- = PROJECT AREA BOUNDARY
- = PROPOSED LOOP 303 PARKWAY ALIGNMENT
- = EXISTING RAIL ROAD
- = EXISTING STRUCTURE OR FACILITY
- = FLOODPLAIN IDENTIFIED BY THE ORIGINAL WHITE TANKS ADMP, 1992

N

MARICOPA COUNTY
N.T.S.

BASELINE ALTERNATIVE

May 2003

Loop 303 Corridor/White Tanks ADMP Update

Flood Control District of Maricopa County

FIGURE 4.4

URS

The baseline alternative is a variation of the solution first presented in the original White Tanks/Agua Fria Area Drainage Master Study by the WLB Group. The WLB Group proposed a large concrete lined drainage channel adjacent to the Loop 303. This channel was 145 feet wide at its largest cross section and had no detention basins proposed with it. The baseline alternative, proposed by DeLeuw Cather & Company, shows a similar channel but with four detention basins that would significantly reduce the channel cross-section width. The DeLeuw Cather & Company report shows preliminary channel hydraulic capacity calculations based on the following input. The parameters documented in the Technical Memorandum are as follows:

- Base Width = 60 feet
- Max Depth = 7 feet
- Slope = 0.002 ft/ft
- Side Slope = 2:1
- Top Width = 88 feet
- Manning's = 0.02 (indicates a smooth surface such as concrete)
- Max Q = 5,475 cfs
- Velocity = 10.6 ft/sec

Since it is very unlikely that this channel will be constructed with a concrete lining, the top width is expected to increase significantly as the use of more aesthetically pleasing materials are typically rougher and less efficient for the conveyance of stormwater. The decreased efficiency of the cross section would likely increase the required bottom width of the channel to approximately 100 feet or more for a 7-foot maximum flow depth. This would result in a top width on the order of 130 feet or more. These numbers are assuming a material whose roughness is approximately n = 0.033. Since the actual value could be higher, the channel section dimensions shown above could also be higher and detailed analysis would be required to determine actual channel sections.

The positive aspects for the baseline alternative are listed below:

- The alternative is consistent with those presented and recommended under previous studies.
- The alternative serves as a large regional drain providing an outfall for adjacent development.

- The alternative could be modified to incorporate parks and trails.
- Construction costs for the channel could possibly be shared with MCDOT in conjunction with future planned improvements to the existing Loop 303 facility.

The negative aspects for the baseline alternative are listed below:

- The alternative does not address other areas of the ADMP Update project area or attempt to tie existing flood control facilities into one cohesive system.
- The alternative recommends a concrete lined channel, which is not consistent with the aesthetic/multi-use components of the ADMP Update. If the alternative is modified to propose a more aesthetic channel lining, a larger channel than is desired along the Loop 303 corridor may result.
- This alternative increases the amount of offsite flow affecting development south of I-10 by diverting existing overland easterly flows south. For this reason, the alternative is not popular with area developers.
- This alternative does not provide an adequate outfall for development east of Loop 303.
- This alternative does not address the comments made at the first brainstorming meeting by FCDMC staff that there needs to be more west-east outfalls.
- This alternative does not provide for an outfall at WT FRS #4.

The baseline alternative does not seem to adequately address the objectives that have been stated as part of the ADMP Update project. The alternative does not relieve area-wide flooding problems, provide an outlet for all area development, promote aesthetics or multi-use facilities or incorporate existing flood control structures into a single system of flood control. Given these problems, the alternative is not a feasible solution as is. It would require significant modification and would have to be re-evaluated based upon these modifications.

The potential cultural/historical impacts of the Baseline Alternative are listed below:

- Could affect a known Hohokam village site, and Canal Liberty system
- Would cross and/or parallel the historic Beardsley, Roosevelt, and Buckeye canals and Phoenix Main Line of Southern Pacific Railroad (as well as other historic resources that appear to lack historic significance)

As planning continues and more detailed designs are developed, intensive field surveys should be undertaken to ensure compliance with the Arizona Antiquities Act. Needs for right-of-way across any State Trust land or other state permits would entail requirements for the lead state agency to comply with the State Historic Preservation Act. Similarly, any federal permits would require compliance with Section 106 of the National Historic Preservation Act.

5.0 ENVIRONMENTAL IMPACTS OF COMBINED ALTERNATIVES

5.1 ENVIRONMENTAL IMPACT OF RECOMMENDED ALTERNATIVES

See Table 5.1 for a summary of the Recommended and Baseline Alternative Environtal impacts.

Recommended Alternative 1

Ecological Resources Summary

The proposed structures for this alternative will be located mostly within agricultural areas or urban developments. These areas could include wetlands created by accumulation of irrigation water in small basins. Altering or removing these wetlands during placement of flood control structures may require mitigation and will likely impact wildlife that is dependent on water. Impacts to sensitive species including great egret (*Ardea alba*), snowy egret (*Egretta thula*), belted kingfisher (*Alcyon ceryle*), and lowland leopard frog (*Rana yavapaiensis*) are possible.

Small areas of undeveloped Lower Colorado River Valley (LCR) subdivision of Sonoran Desert are present along the proposed structures. Sensitive habitat elements that could be present within this natural vegetation area include xeroriparian washes and saguaros (*Carnegiea gigantea*). Xeroriparian washes could support large microphyllus trees and a diverse complement of shrubs. Such areas could provide habitat for the endangered cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*). Large washes could also support Sonoran desert tortoise (*Gopherus agassizii*). Saguaros are also abundant in the transition zone between the LCR and the Arizona Upland subdivision of the Sonoran Desert. Saguaro fruit and flowers are a major food source for the endangered lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*). If saguaros are removed, foraging habitat for this bat could be impacted.

This alternative includes several outfalls to the Gila River. These outfalls could impact riparian areas along the Gila River. Effects to riparian areas could potentially impact several special status species of animals including great egret, snowy egret, western yellow-billed cuckoo (*Coccyzus americanus*), belted kingfisher, southwestern willow flycatcher (*Empidonax trailli extimus*), and lowland leopard frog.

Table 5.1

Recommended and Baseline Alternative Environmental Impacts

Alternative	Potential Effects to Bald Eagle	Potential Effects to Yuma Clapper Rail	Potential Effects to Cactus Ferruginous Pygmy-owl	Potential Effects to Southwestern Willow Flycatcher	Potential impacts to Peregrine falcon	Potential Impacts to Sonoran desert tortoise	Potential to Impact Waters of the United States
Recommended Alternative 1	●	●	●	●		●	●
Recommended Alternative 2	●	●	●	●		●	●
Recommended Alternative 3	●	●	●	●		●	●
Base Alternative	●	●	●	●			●

1. Note: if a potential environmental impact is indicated above for a particular alternative, refer to the alternative descriptions in section 3.1.4 for detail.

Most impacts to sensitive species are expected to be minor. Any impacts to wetlands or riparian areas are likely to require mitigation associated with a permit from the US Army Corps of Engineers under Section 404 of the Clean Water Act. Mitigation could require the revegetation of riparian areas impacted by outfalls as well as creating additional riparian or wetland areas. Such mitigation measures are also likely to mitigate for impacts to sensitive species of wildlife that utilize riparian areas. Surveys for sensitive species that potentially occur in other habitat types should be completed. If these species are present, mitigation measures should be developed to minimize impacts to such species.

Cultural Resources Summary

The majority of the facilities of Recommended Alternative 1 are in upland areas that have been intensively developed for agriculture or are being redeveloped for residential and commercial uses. There are likely to be few significant archaeological and historical resources in these areas. However, the Beardsley Canal and Roosevelt Irrigation District Canal, which would be paralleled by some of the plan facilities, are of historic age and probably would require evaluation and assessment of impacts at later stages of project planning. Some archaeological sites also have been recorded in the undeveloped area at the head of Bullard Wash south of Luke AFB, where a small channel is proposed to relieve ponding due to subsidence.

The most potential for impacts are along the north-south channels along Jackrabbit Road and Loop 303 because they cross the Hohokam irrigation system known as Canal Liberty, as well as the historic Buckeye Canal. The Jackrabbit Road channel would cross three major canal alignments in this system, and perhaps three Hohokam village sites (Van Liere, M-1, and M-4). The Loop 303 channel would cross one or two major Hohokam canal alignments and a Hohokam village site know as the Morocco Ruin, which also was the site of a historic stage station. The channels along Watson Road or Rainbow Road appear to be to the west of the Canal Liberty system. Although archaeological sites could be expected anywhere along the margins of the Gila River, the potential is small for encountering buried Hohokam canals and major Hohokam sites in this area. However, the historic Buckeye Canal would be crossed again.

These archaeological resources are obscured and perhaps destroyed by modern development. Archaeological testing may be required in these areas during later stages of project planning. The archaeological studies required for the Bullard Wash Outfall through the Canal Liberty system and the Hohokam village known as Alkali Ruin was of modest scope.

Recommended Alternative 2

Ecological Resources

This alternative, like Recommended Alternative 1, places most flood control structures in agricultural areas and urban developments. Impacts to biological resources are expected to be similar to those described for Recommended Alternative 1. Potential impacts to riparian areas will occur in fewer locations along the Gila River, but each individual impact could be larger than each impact in Recommended Alternative 1.

Cultural Resources

As for Recommended Alternative 1, the majority of the facilities of Recommended Alternative 2 are in upland areas that have been intensively developed for agriculture or are being redeveloped for residential and commercial uses. There are likely to be few significant archaeological and historical resources in these areas. However, the Beardsley Canal would be paralleled and the Roosevelt Irrigation District Canal would be crossed. Both are of historic age and probably would require evaluation and assessment of impacts at later stages of project planning. Some archaeological sites also have been recorded in the undeveloped area at the head of Bullard Wash south of Luke AFB, where a small channel is proposed to relieve ponding due to subsidence.

The most potential for impacts are along the north-south channels along Perryville Road and Loop 303 because they cross the Hohokam irrigation system known as Canal Liberty, as well as the historic Buckeye Canal. The Perryville Road channel would cross three major canal alignments in this system, but does not cross any major known Hohokam village sites. The Loop 303 channel would cross one or two major Hohokam canal alignments and a Hohokam village site know as the Morocco Ruin, which also was the site of a historic stage station. These archaeological resources are obscured and perhaps destroyed by modern development. Archaeological testing may be required in these areas during later stages of project planning. The archaeological studies required for the Bullard Wash Outfall through the Canal Liberty system and the Hohokam village known as Alkali Ruin was of modest scope.

Recommended Alternative 3

Ecological Resources

This alternative, like Recommended Alternatives 1 and 2, places most flood control structures in agricultural areas and urban developments. Impacts to biological resources are expected to be similar to those described for Recommended Alternative 1. Potential impacts to riparian areas

will occur in the same number of locations along the Gila River as for Recommended Alternative 2. A large disturbance to the riparian area at the Loop 303 outfall would occur with this alternative.

Cultural Resources

As for Recommended Alternatives 1 and 2, the majority of the facilities of Recommended Alternative 3 are in upland areas that have been intensively developed for agriculture or are being redeveloped for residential and commercial uses. There are likely to be few significant archaeological and historical resources in these areas. However, the Beardsley Canal and Roosevelt Irrigation District Canal each would be paralleled for approximately 4 miles. Both are of historic age and probably would require evaluation and assessment of impacts at later stages of project planning. Some archaeological sites also have been recorded in the undeveloped area at the head of Bullard Wash south of Luke AFB, where a small channel is proposed to relieve ponding due to subsidence.

The most potential for impacts are along the north-south channels along 207th Avenue (Tuthill Road) and Loop 303 because they cross the Hohokam irrigation system known as Canal Liberty, as well as the historic Buckeye Canal. The 207th Avenue channel would be near the western end of the Canal Liberty system, but crosses one or two major canal alignments in this system and one artifact scatter. The Loop 303 channel would cross one or two major Hohokam canal alignments and a Hohokam village site know as the Morocco Ruin, which also was the site of a historic stage station. These archaeological resources are obscured and perhaps destroyed by modern development. Archaeological testing may be required in these areas during later stages of project planning. The archaeological studies required for the Bullard Wash Outfall through the Canal Liberty system and the Hohokam village known as Alkali Ruin was of modest scope.

Alternative 4 – Baseline

Ecological Resources

As with the other three Recommended alternatives, the Baseline Alternative places most flood control structures in agricultural and urban areas. Impacts to biological resources would be concentrated along the large flood control structure proposed along Loop 303. This structure would require a large outfall to the Gila River, creating the largest single impact to riparian areas proposed by any of the Recommended alternatives. Although impacts to biological resources would be more concentrated than for other alternatives, the overall impacts are expected to be similar to those of the other alternatives.

Cultural Resources

As for Recommended Alternatives 1, 2 and 3, the majority of the facilities of Alternative 4, the baseline plan, are in upland areas that have been intensively developed for agriculture or are being redeveloped for residential and commercial uses. Cultural resource surveys along the Loop 303 corridor from I-10 north to Grand Avenue identified only two archaeological sites. One, designated AZ T:7:46 (ASM), was a cluster of fewer than 10 flaked and ground stone tools that were completely collected. The other, designated AZ T:7:142 (ASM), is a scatter of flaked and ground stone tools and two clusters of rocks that may be remnants of hearths.

The portion of the baseline plan south of I-10 has not been surveyed for cultural resources but would cross the Roosevelt Irrigation District Canal and the Buckeye Canal. Both are of historic age and would require evaluation and assessment of impacts at later stages of project planning.

The Loop 303 channel also would cross one or two major Hohokam canal alignment and a Hohokam village site know as the Morocco Ruin, which also was the site of a historic stage station. These archaeological resources are obscured and perhaps destroyed by modern development. Archaeological testing may be required in these areas during later stages of project planning. The archaeological studies required for the Bullard Wash Outfall through the Canal Liberty system and the Hohokam village known as Alkali Ruin was of modest scope.

6.0 LANDSCAPE CHARACTER/MULTI-USE

6.1 LANDSCAPE CHARACTER AND MULTI-USE FEATURES OF EACH RECOMMENDED ALTERNATIVE

Sample sketches of a few of the themes discussed below were presented at the second neighborhood meeting(s) (8/28/01 and 8/30/01). A few of these sketches are provided at the end of this section for reference. See also, section 2.4.3 of the Level II Phase II Alternatives Analysis Report (Volume III), for the detailed sketches showing the themes considered.

Recommended Alternative 1

Several channels are proposed as a part of this alternative. This provides the opportunity for many connecting trails, both north to south and east to west. In addition to the many channels, existing basins (Dysart Detention Basin and ADOT Detention Basins) and WT FRS #3 and WT FRS #4 are also utilized. Portions of existing AT&SF railway corridors are also proposed for the incorporation of flood control structures as a part of this alternative.

The size, shape, configuration, and materials of the proposed flood control facilities have not been determined at this point in the study. It is anticipated that the proposed channel facilities would be earthen lined when possible and would have a meandering low flow channel and varying side slopes. Concrete or hardened slopes would be used minimally and only when necessary.

Future Desired Landscape Character of Recommended Alternative

The future desired landscape character of Recommended Alternative 1 is diverse. The existing and proposed facilities proposed in Recommended Alternative 1 pass through many different types of desired future landscape characters. Future desired landscape characters in which the facilities are located within include Rural/Farmland/Ag, Industrial, Commercial, RV Multi-Family, P.A.D., Neighborhood, Desertscrub, and Native Landscape. Please refer to the "Landscape Aesthetics Assessment and Multi-Use Opportunities Assessment" report regarding descriptions of the future desired landscape characters.

Several design themes were developed as part of the Landscape Aesthetics Assessment and Multi-Use Opportunities Assessment phase of the project. These themes and their associated descriptions can be found in the "Landscape Aesthetics Assessment and Multi-Use Opportunities Assessment" document. Three proposed channel alignments occur outside of the project limits.

The future desired landscape character for these channels would be determined at the time of design should this alternative be selected. Based upon the proposed desired future landscape characters for the project area, these three channels would be developed with Urban and Native Landscape themes.

It is envisioned that a railroad theme would be incorporated into the channel design along Cotton Lane from Northern Avenue to Indian School Road. This theme would incorporate elements of the railway into the various structures and amenities. For example, lighting in this area may use fixtures that resemble lanterns that were used in the past. Structures such as walls or dividers would be built out of railroad ties or elements that resemble the ties. Seating elements could mimic furniture that would have been found in a train station. The path/trail that would be incorporated into the cross-section could be constructed so that it looks like it has been constructed on an abandoned railway bed. These are only a few ideas and elements that would be implemented into an area that is associated with the railroad.

A majority of the channels in this alternative occur within areas that would be developed as Planned Area Developments. An urban theme would be incorporated into these areas. This theme would create well-organized, repetitive pattern of elements. These elements would include hardscape elements such as low block and stucco walls, concrete path/trail, and incorporate tile materials and colors associated with the adjacent developments. Also, a mixture of native and exotic plant material would be used along with turf to blend the channel with the surrounding neighborhoods. An example would be along Jackrabbit Trail from WT FRS #3 to McDowell Road. The northern reaches of this channel would potentially utilize more native plant material and then transition to a mix of exotic and native plant material as it proceeds south to McDowell Road. Seating elements and walls would be concrete block and stucco construction. Lighting for the areas would be more contemporary and would blend with the surrounding area. There is the potential that art elements could be incorporated into the area. Earth berming could also be an element utilized in this area to break up the flat plane of the corridor.

A cultural theme could potentially be incorporated into the channel that parallels Broadway Road. Several cultural sites occurred in this general area. Interpretive features explaining the early canals and other items could be incorporated.

These themes, in addition to others, would be applied to the various channels depending upon their location in the project area. By responding to the surrounding character or future desired character, the proposed flood control facility would provide visual continuity and establish a sense of place.

Since the channels pass through several different future desired landscape characters, transition zones would be created so that there would be a smooth transition from one future desired landscape character to another. The length or size of these transition zones will depend upon what future desired landscape characters are adjacent to each other and the types of materials being used.

Multi-Use Features

Multi-use features of Recommended Alternative 1 include trails, WT FRS #3 and WT FRS #4, interpretive features, and the development of detention basins.

Detention Basins: Existing basins (Dysart Detention Basin and the ADOT Detention Basins) are utilized as flood control components as part of this alternative. The Dysart Detention Basin has been developed as a multi-use facility. When not acting as a flood control facility, it functions as the Falcon Dunes Golf Course. The ADOT basins are currently used as detention basins only. As a part of this alternative, these basins could be developed and provide a number of different types of multi-use experiences. Examples of these multi-use experiences include the development as a wildlife habitat with trails passing through, development of turf open-space, a regional park that would be the home of soccer/softball field complex, developed as a golf course, or a combination of these ideas and others. These are only examples of what types of multi-use activities could occur. During the design of this alternative, should it be accepted, various types of multi-use activities would be explored for incorporation into the development of the basins.

WT FRS #3 and WT FRS #4: The WT FRS #3 and WT FRS #4 are incorporated into this alternative. WT FRS #3 is currently being reviewed as part of another study. Proposed alternatives for this facility include upgrading the existing dam structure to removing the structure and constructing large detention basins that would be developed as a regional park. If the existing dam structure was upgraded the existing native vegetation could remain and multi-use trails could be incorporated and provide a connection to White Tanks Regional Park.

WT FRS #4 is a large structure that could be developed as a regional park facility that provides a number of multi-use opportunities. Potential multi-use opportunities envisioned for this facility include the development of a BMX course, a large water feature, turf open-space, and softball/soccer facility, to wildlife habitat. The specific types of multi-use features, to be included as part of this facility, would be determined during the design process.

Trails: Trails for Recommended Alternative 1 provide both north-south and east-west alignments. These trails follow the existing and new channels located throughout the project area. The channel and associated trail proposed along Northern Avenue would provide access

from the White Tank Mountains to the Agua Fria River. The channel and associated trail along the Loop 303 would provide a connection from the north end of the project site to the Gila River. A portion of the AT&SF Railroad corridor from Northern Avenue to Indian School Road would also be utilized as a trail corridor. Minor loop trail systems could be provided in the southern portions of this alternative.

Interpretive Facilities: Several interpretive features would be incorporated into this alternative. Channels that occur adjacent to or within the railway corridors, such as the stretch of railroad between Northern Avenue and Indian School Road, provide an opportunity to interpret the use of the railroads in the area. This could occur through the type materials and amenities used in the development of the channel or trail to the use of signage providing information.

Channels and basins located adjacent to Luke AFB or within the flight path could provide interpretive information regarding the Air Base. This information could be through signage describing the various aircraft and information about Luke AFB to creating various elements in the landscape that help interpret various elements of the Air Base.

Outfall facilities at the Gila and Agua Fria rivers provide opportunities for interpretive features. Elements to be interpreted include the rivers, native vegetation, and wildlife. This could be accomplished through signage along a trail to a combination of signage and viewing areas of the river and potential wildlife.

Pros and Cons

Several miles of new multi-use trail would be available due to the number of channels within this alternative. These new trails provide both north-south and east-west access. Unfortunately, these new trails do not provide for a loop trail system or connections from/to the White Tank Mountains, Gila River, and Agua Fria River. Trails provide access to the Agua Fria and Gila rivers at the outfalls.

This alternative provides for the upgrade and incorporation of existing detention basins. These basins will provide potential regional parks that provide open-space and recreational opportunities.

Advantages:

1. Several miles of channel that would include new multi-use trail.
2. Incorporates existing ADOT basins, WT FRS #3 and WT FRS #4, and Dysart Detention Basin for multi-use opportunities.

3. Provides west-east and north-south trails.
4. Provides opportunities for interpretive features.
5. Incorporates some of the existing railway corridors.

Disadvantages:

1. Does not provide for major loop trails system.
2. Provides few connections between the White Tank Mountains Regional Park, the Gila River, and the Agua Fria River.
3. Does not provide a large amount of basins for park facilities.

Recommended Alternative 2

A combination of channels and basins are proposed as a part of this alternative. This provides for both multi-use trails adjacent to the channels and the development of open-space/parks within the basins. In addition to the proposed channels and basins, existing basins (Dysart Detention Basin and ADOT Detention Basins) and WT FRS #4 are also utilized. WT FRS #3 is converted into a detention basin.

The size, shape, configuration, and materials of the proposed flood control facilities have not been determined at this point in the study. It is anticipated that the proposed channel facilities would be earthen lined when possible and would have a meandering low flow channel and varying side slopes. Concrete or hardened slopes would be used minimally and only when necessary.

Future Desired Landscape Character of Recommended Alternative

The future desired landscape character of Recommended Alternative 2 is diverse. The existing and proposed facilities proposed in Recommended Alternative 2 pass through many different types of desired future landscape characters. Future desired landscape characters in which the facilities are located within include Rural/Farmland/Ag, Industrial, Commercial, RV Multi-Family, P.A.D., Neighborhood, Desertscrub, and Native Landscape. Please refer to the "Landscape Aesthetics Assessment and Multi-Use Opportunities Assessment" report regarding descriptions of the future desired landscape characters.

As mentioned previously, the channels in this alternative pass through many different types of desired future landscape characters. For example, the Loop 303 channel passes through six different future landscape characters. The predominant future landscape character along the

Loop 303 is the Planned Area Development (P.A.D.). These areas mainly occur at the north and south ends of the project area. These areas would be developed with an urban theme. The urban theme would respond to elements commonly found in a P.A.D. Elements such as block and stucco walls, tile roofs, turf, mixture of native and exotic trees with exotic being predominant, and concrete paths/trails. The lighting for the area would be contemporary and would possibly utilize low bollards in lieu of pole-mounted lights.

The next largest future landscape character unit along the Loop 303 would be that of the neighborhood. This unit occurs from Peoria Avenue to Camelback Road. The neighborhood theme would play off of the "residential yard." Elements used in this theme would not be as refined as those used in the urban theme. Structures would be comprised mainly of brick masonry units and wood. The path/trail in this theme would be mainly constructed of stabilized decomposed granite. Large shade trees would be the predominant plant material in this unit.

Other future landscape character units that are along the Loop 303 channel include Rural/Farmland/Ag, Commercial, Native, and Industrial. Several transition zones will need to be created due to the number of different future landscape character units along the Loop 303. This is also true for the other channels located within the project area. What occurs in these transition zones depends upon the type of units that are adjacent to each other. The transition from an urban theme to a neighborhood theme would be very simple to achieve and would not require a long transition area. On the other hand, the transition from an agricultural theme to an urban theme could require a longer/larger transition zone. A challenge will be what treatment will be utilized when more than two future landscape characters are involved. For instance, at Camelback Road and the Loop 303, P.A.D. is to the south of Camelback Road, Neighborhood is to the northwest and Agricultural is to the northeast. This condition also occurs, with other future landscape characters, at other locations along the Camelback channel and McDowell Road channel. These transition zones will need to be reviewed and explored during the design process to see what elements need to be used so that smooth transitions occur.

The Beardsley Canal channel from Cactus Road to WT FRS #3 would be developed to reflect a Sonoran Desert Theme. This theme would reinforce the Desertscrub plant community. The plant material used would be native trees, shrubs, and grasses. Stabilized decomposed granite paths would be utilized instead of concrete. From WT FRS #3 to I-10, the Beardsley Canal channel would reflect an urban theme. The transition zone between these two units would occur at the proposed WT FRS #3 detention basin. This detention basin could be developed based upon the Sonoran Desert theme or the Recreational theme or it could be a combination of both themes.

The Northern Avenue channel includes Desertscrub and Neighborhood future landscape character units as well as Agricultural and Industrial future landscape character units. This channel provides the opportunity to incorporate an Agricultural theme by possibly creating tree windrow plantings from Sarival Avenue to the west edge of Luke AFB. This would respond to the adjacent agricultural fields and be reminiscent of former tree plantings found in the project area. This channel also provides the opportunity to incorporate elements relating to Luke AFB. Some sections of the channel adjacent to the Air Base could be developed with an aircraft theme. Various interpretive areas could be developed as well as viewing areas could be located adjacent to the path.

The remaining channels in this alternative would follow the treatments and transitions previously discussed.

Multi-Use Features

Multi-use features of Recommended Alternative 2 include trails, WT FRS #3 and WT FRS #4, interpretive features, and the development of new and existing detention basins.

Detention Basins: New detention basins are proposed throughout this alternative. Based upon the size of these basins, it appears that they would function as local neighborhood/community parks. These detention basins could incorporate turf open-space capable of facilitating soccer and softball/baseball. These detention basins could also be graded with various levels. This would allow the potential for portions of the basin to be utilized during flood events. Various court sports (basketball, volleyball, etc.) could also be incorporated into the development of the basins. Various structures are typical of detention basins from side-weir structures to headwalls. These structures could be designed to offer multi-use features. Multi-use features could be designing a side-weir structure to double as a performance area to side-weir and headwall structures being utilized as art elements in the landscape.

Existing basins (Dysart Detention Basin and the ADOT Detention Basins) are utilized as flood control components as part of this alternative. The Dysart Detention Basin has been developed as a multi-use facility. When not acting as a flood control facility, it functions as the Falcon Dunes Golf Course. The ADOT basins are currently used as detention basins only. As a part of this alternative, these basins could be developed and provide a number of different types of multi-use experiences. Examples of these multi-use experiences include the development as a wildlife habitat with trails passing through, development of turf open-space, a regional park that would be the home of soccer/softball field complex, developed as a golf course, or a combination of these ideas and others. These are only examples of what types of multi-use activities could occur.

During the design of this alternative, should it be accepted, various types of multi-use activities would be explored for incorporation into the development of the basins.

WT FRS #3 and WT FRS #4: The WT FRS #3 structure is converted from a dam structure to a detention basin as a part of this alternative. This new detention basin could be developed to provide a number of different multi-use opportunities. One direction of development could be to provide a regional sports complex providing soccer and softball/baseball fields. Another direction could be to develop a regional equestrian center. From this location, equestrian trail connections could be established into the White Tank Mountains. Another direction could be to provide turf open-space. Another treatment for this basin would be to incorporate the different activities previously discussed and potentially others to provide opportunities for the many different users.

WT FRS #4 is a large structure that could be developed as a regional park facility that provides a number of multi-use opportunities. Potential multi-use opportunities envisioned for this facility include the development of a BMX course, a large water feature, turf open-space, and softball/soccer facility, to wildlife habitat. The specific types of multi-use features, to be included as part of this facility, would be determined during the design process.

Trails: Trails for Recommended Alternative 2 provide both north-south and east-west alignments. These trails follow the existing and new channels located throughout the project area. Three connections to the Gila River are provided by this alternative as well as two connections to the Agua Fria River.

Interpretive Facilities: Several interpretive features would be incorporated into this alternative. Channels and basins located adjacent to Luke AFB or within the flight path could provide interpretive information regarding the Air Base. This information could be through signage describing the various aircraft and information about Luke AFB to creating various elements in the landscape that help interpret various elements of the Air Base.

Outfall facilities at the Gila and Agua Fria rivers provide opportunities for interpretive features. Elements to be interpreted include the rivers, native vegetation, and wildlife. This could be accomplished through signage along a trail to a combination of signage and viewing areas of the river and potential wildlife.

Pros and Cons

Several new basins are proposed throughout the project area. However, because of facility needs, the basins are predominantly located in the middle and southern portions of the project area.

Depending upon an individual's point of view, the conversion of WT FRS #3 from its existing state to a detention basin is either an advantage or disadvantage. In converting the structure to a detention basin, hundreds of acres of native habitat will be destroyed. However, developing the basin as a regional sports complex might be an advantage. Miles of new multi-use trail would be available due to the number of channels within this alternative. These new trails provide both north-south and east-west access. Unfortunately, these new trails do not provide for a major loop trail system or connections to the White Tank Mountains. Trails provide access to the Agua Fria and Gila rivers at the outfalls.

This alternative provides for the upgrade and incorporation of existing detention basins. These basins will provide potential regional parks that provide open-space and recreational opportunities.

Advantages:

1. Provides several new basins to be developed as community/neighborhood parks.
2. Provides for several new miles of multi-use trails.
3. Incorporates existing ADOT basins, WT FRS #4, and Dysart Detention Basin for multi-use opportunities.
4. Provides west-east and north-south trails.
5. Provides opportunities for interpretive features.

Disadvantages:

1. Does not provide for major loop trails system.
2. Does not incorporate railway corridors.
3. Destroys native habitat to create a detention basin.

Recommended Alternative 3

A combination of channels and basins are proposed as a part of this alternative. This provides for both multi-use trails adjacent to the channels and the development of open-space/parks within the basins. In addition to the proposed channels and basins, existing basins (Dysart Detention Basin and ADOT Detention Basins) and WT FRS #4 are also utilized. WT FRS #3 is converted into a detention basin.

The size, shape, configuration, and materials of the proposed flood control facilities have not been determined at this point in the study. It is anticipated that the proposed channel facilities would be earthen lined when possible and would have a meandering low flow channel and varying side slopes. Concrete or hardened slopes would be used minimally and only when necessary.

Future Desired Landscape Character of Recommended Alternative

The future desired landscape character of Recommended Alternative 3 is diverse. The existing and proposed facilities proposed in Recommended Alternative 3 pass through many different types of desired future landscape characters. Future desired landscape characters in which the facilities are located within include Rural/Farmland/Ag, Industrial, Commercial, RV Multi-Family, P.A.D., Neighborhood, Desertscrub, and Native Landscape. Please refer to the "Landscape Aesthetics Assessment and Multi-Use Opportunities Assessment" report regarding descriptions of the future desired landscape characters.

As in Recommended Alternative 2, the Loop 303 passes through six different future landscape character units. The themes identified in Alternative 2 for the Loop 303 would apply in this alternative. The difference in this alternative is that detention basins are provided in six different locations. The basin identified at Cactus Road and the Loop 303 is within the industrial future landscape character unit. It is envisioned that this basin would be developed with a recreational theme but would respond to the surrounding industrial area. Simple but bold patterns of elements would be incorporated into any structures in and adjacent to the basin. Large bold groupings of trees and shrubs would also be used around the perimeter of the basin.

The basin located at Northern Avenue and Loop 303 is within the neighborhood future landscape character unit. This basin would be developed with a recreational theme that coordinates with the surrounding neighborhood theme. Whereas the previous basin located in the industrial area would incorporate bold patterns of elements, the basins located in the neighborhood area would have large shade trees and elements arranged in informal patterns. It is envisioned that this basin would have the feel of a neighborhood/community park.

The basin located at Camelback Road and Loop 303 is adjacent to three different types of future landscape character units. As in the other basins, this basin would be developed with a recreational theme. One aspect that makes this basin unique is that it is on the flight path for Luke AFB. Elements of the Aircraft theme could be incorporated into this basin. Viewing areas with interpretive information could be incorporated into the design. Art elements using pieces of aircraft or ramada structures representing hanger facilities could be elements that are also

incorporated into the design. This basin has many opportunities due to its location in the project area and its surrounding land uses.

The basin located at Broadway Road and Loop 303, like the previous basin, has many opportunities to be unique. As in the other basins, this basin would be developed with a recreational theme. Because of its location adjacent to the railroad, elements of the railroad theme could be incorporated into the structures of the basin. For example, any retaining walls could be constructed of railroad ties and ramada structures could incorporate elements of old train stations. Lighting in the area could be fashioned after train lanterns. These are only a few examples of how the railroad theme could be incorporated into a basin with a recreational theme.

The channel proposed adjacent to the RID Canal is located within a P.A.D. This channel would be developed with an urban theme. In addition to the urban theme, cultural and historic/heritage themes would also be incorporated in various locations. Various elements, such as historic uses of the canals, could be interpreted.

The Beardsley Canal channel and the WT FRS #3 Detention Basin would be developed as identified in Recommended Alternative 2.

Since the channels pass through several different future desired landscape characters, transition zones would be created so that there would be a smooth transition from one future desired landscape character to another. The length or size of these transition zones will depend upon what future desired landscape characters are adjacent to each other and the types of materials being used.

The remaining channels in this alternative would follow the treatments and transitions previously discussed in this Recommended Alternative as well as the other Recommended Alternatives.

Multi-Use Features

Multi-use features of Recommended Alternative 3 include trails, WT FRS #3 and WT FRS #4, interpretive features, and the development of new and existing detention basins.

Detention Basins: New detention basins are proposed along the Loop 303 alignment and one basin is proposed at Bullard Wash and I-10. Based upon the size of these basins, it appears that they would function as local community parks. These detention basins could incorporate turf open-space capable of facilitating soccer and softball/baseball. These detention basins could also be graded with various levels. This would allow the potential for portions of the basin to be utilized during flood events. Various court sports (basketball, volleyball, etc.) could also be

incorporated into the development of the basins. Various structures are typical of detention basins from side-weir structures to headwalls. These structures could be designed to offer multi-use features. Multi-use features could be designing a side-weir structure to double as a performance area to side-weir and headwall structures being utilized as art elements in the landscape.

Existing basins (Dysart Detention Basin and the ADOT Detention Basins) are utilized as flood control components as part of this alternative. The Dysart Detention Basin has been developed as a multi-use facility. When not acting as a flood control facility, it functions as the Falcon Dunes Golf Course. The ADOT basins are currently used as detention basins only. As a part of this alternative, these basins could be developed and provide a number of different types of multi-use experiences. Examples of these multi-use experiences include the development as a wildlife habitat with trails passing through, development of turf open-space, a regional park that would be the home of soccer/softball field complex, developed as a golf course, or a combination of these ideas and others. These are only examples of what types of multi-use activities could occur. During the design of this alternative, should it be accepted, various types of multi-use activities would be explored for incorporation into the development of the basins.

WT FRS #3 and WT FRS #4: The WT FRS #3 structure is converted from a dam structure to a detention basin as a part of this alternative. This new detention basin could be developed to provide a number of different multi-use opportunities. One direction of development could be to provide regional sports complex providing soccer and softball/baseball fields. Another direction could be to develop a regional equestrian center. From this location, equestrian trail connections could be established into the White Tank Mountains. Another direction could be to provide turf open-space. Another treatment for this basin would be to incorporate the different activities previously discussed and potentially others to provide opportunities for the many different users.

WT FRS #4 is a large structure that could be developed as a regional park facility that provides a number of multi-use opportunities. Potential multi-use opportunities envisioned for this facility include the development of a BMX course, a large water feature, turf open-space, and softball/soccer facility, to wildlife habitat. The specific types of multi-use features, to be included as part of this facility, would be determined during the design process.

Trails: Trails for Recommended Alternative 3 provides predominantly north-south alignments. These trails follow the existing and new channels located in the project area. Three connections to the Gila River are provided by this alternative as well as two connections to the Agua Fria River. No loop trail system is provided by this alternative. In addition, there is no connection from the White Tank Mountains to the Agua Fria River.

Interpretive Facilities: Several interpretive features would be incorporated into this alternative. Channels and basins located adjacent to Luke AFB or within the flight path could provide interpretive information regarding the Air Base. This information could be through signage describing the various aircraft and information about Luke AFB to creating various elements in the landscape that help interpret various elements of the Air Base.

Outfall facilities at the Gila and Agua Fria rivers provide opportunities for interpretive features. Elements to be interpreted include the rivers, native vegetation, and wildlife. This could be accomplished through signage along a trail to a combination of signage and viewing areas of the river and potential wildlife.

Pros and Cons

New basins are proposed mainly along the alignment of Loop 303. Depending upon an individual's point of view, the conversion of WT FRS #3 from its existing state to a detention basin is either an advantage or disadvantage. In converting the structure to a detention basin, hundreds of acres of native habitat will be destroyed. However, developing the basin as a regional sports complex might be an advantage. New multi-use trails would be available adjacent to the new channels. These new trails provide predominantly north-south access with little west-east access. In addition, these new trails do not provide for a major loop trail system or connections from/to the White Tank Mountains. Trails provide access to the Agua Fria and Gila rivers at the outfalls.

This alternative provides for the upgrade and incorporation of existing detention basins. These basins will provide potential regional parks that provide open-space and recreational opportunities.

Advantages:

1. Provides new basins to be developed as community parks.
2. Provides for new miles of multi-use trails.
3. Incorporates existing ADOT basins, WT FRS #4, and Dysart Detention Basin for multi-use opportunities.
4. Provides north-south trails.
5. Provides opportunities for interpretive features.

Disadvantages:

1. Does not provide for major loop trails system.
2. Does not incorporate railway corridors.
3. Does not connect White Tank Mountains Regional Park to the Agua Fria River.
4. Destroys native habitat to create a detention basin.
5. Majority of new detention basins is located adjacent to busy freeway.

Recommended Alternative 4 – Baseline Alternative

This alternative consists of a major channel facility adjacent to the Loop 303 with four detention basins incorporated into the flood control facility. This alternative provides for limited multi-use incorporation. No other flood control facilities are proposed for the project area.

The proposed corridor for the facility is approximately 145 feet in width. The shape, configuration, and materials of the proposed flood control facility have not been determined at this point in the study. It is anticipated that the proposed channel facility would be earthen lined when possible and would have a meandering low flow channel and varying side slopes. Concrete or hardened slopes would be used minimally and only when necessary.

Future Desired Landscape Character of Recommended Alternative

The future desired landscape character of Recommended Alternative 4 is diverse. The existing and proposed facilities proposed in Recommended Alternative 4 pass through many different types of desired future landscape characters. Future desired landscape characters in which the facilities are located within include Rural/Farmland/Ag, Industrial, Commercial, RV Multi-Family, P.A.D., Neighborhood, Desertscrub, and Native Landscape. Please refer to the "Landscape Aesthetics Assessment and Multi-Use Opportunities Assessment" report regarding descriptions of the future desired landscape characters.

As in Recommended Alternatives 2 and 3, the Loop 303 passes through six different future landscape character units. The themes identified in Alternatives 2 and 3 for the Loop 303 would apply in this alternative. The difference in this alternative is that detention basins are provided in four different locations. Again, these basins would be developed as recreational basins but would incorporate elements of the surrounding future landscape characters and any other themes as appropriate, such as the aircraft theme around Luke AFB.

Since the channel passes through several different future desired landscape characters, transition zones would be created so that there would be a smooth transition from one future desired landscape character to another. The length or size of these transition zones will depend upon what future desired landscape characters are adjacent to each other and the types of materials being used.

Multi-Use Features

Multi-use features of Recommended Alternative 4 include trails, interpretive features, and the development of new detention basins.

Detention Basins: New detention basins are proposed along the Loop 303 alignment. Based upon the size of these basins, it appears that they would function as local community parks. These detention basins could incorporate turf open-space capable of facilitating soccer and softball/baseball. These detention basins could also be graded with various levels. This would allow the potential for portions of the basin to be utilized during flood events. Various court sports (basketball, volleyball, etc.) could also be incorporated into the development of the basins. Various structures are typical of detention basins from side-weir structures to headwalls. These structures could be designed to offer multi-use features. Multi-use features could be designing a side-weir structure to double as a performance area to side-weir and headwall structures being utilized as art elements in the landscape.

Trails: Trails for Recommended Alternative 4 follow the proposed channel alignment adjacent to the Loop 303. No west-east trails are proposed as a component of this project.

Interpretive Facilities: Few interpretive features would be incorporated into this alternative. Channels and basins located adjacent to Luke AFB or within the flight path could provide interpretive information regarding the Air Base. This information could be through signage describing the various aircraft and information about Luke AFB to creating various elements in the landscape that help interpret various elements of the Air Base.

Pros and Cons

A new channel and basins are proposed along the alignment of Loop 303. A trail would be incorporated into this facility and parallel the Loop 303. This trail would connect the proposed basins and the facilities outfall at the Gila River. No provisions are made for west-east connections or connections to the White Tank Mountains, Gila River, or the Agua Fria River.

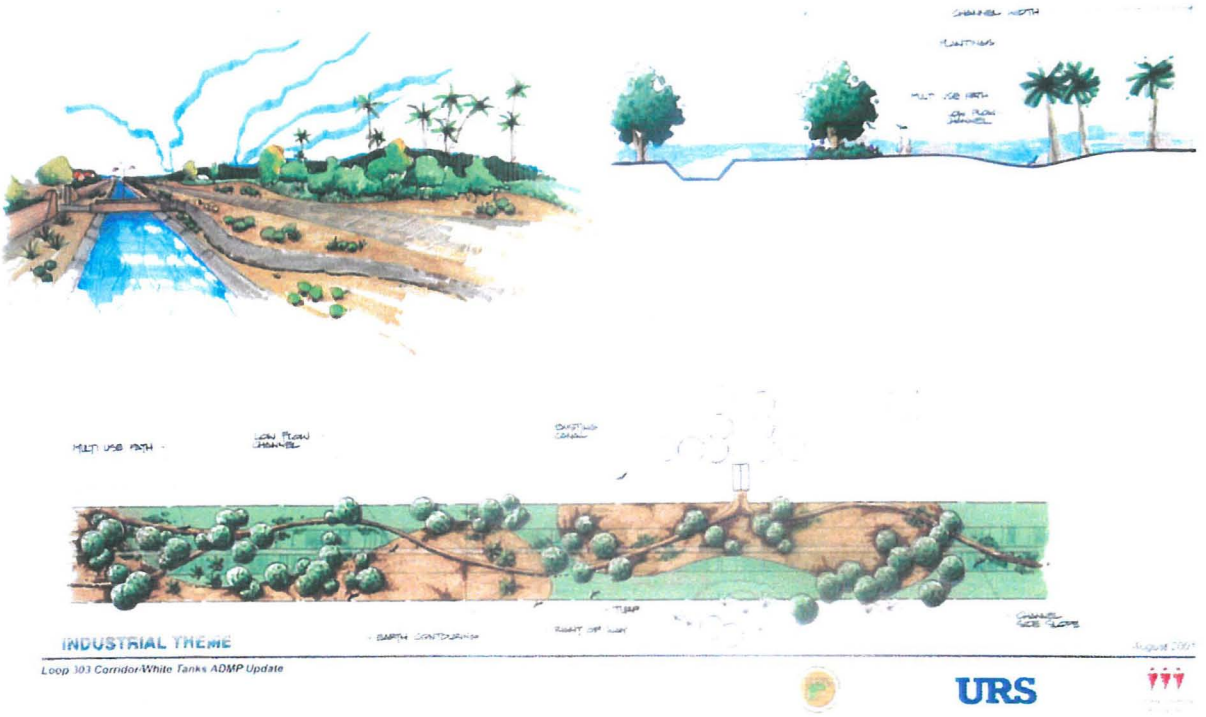
Advantages:

1. Provides new basins to be developed as community parks.
2. Provides north-south trail.

Disadvantages:

1. Does not provide for major loop trails system.
2. Does not incorporate railway corridors.
3. Does not connect White Tank Mountains Regional Park, the Gila River, and the Agua Fria River.
4. Does not provide west-east trail connections.
5. Provides limited interpretive features.
6. Does not upgrade existing facilities.
7. Provides minimal multi-use opportunities for the project area.

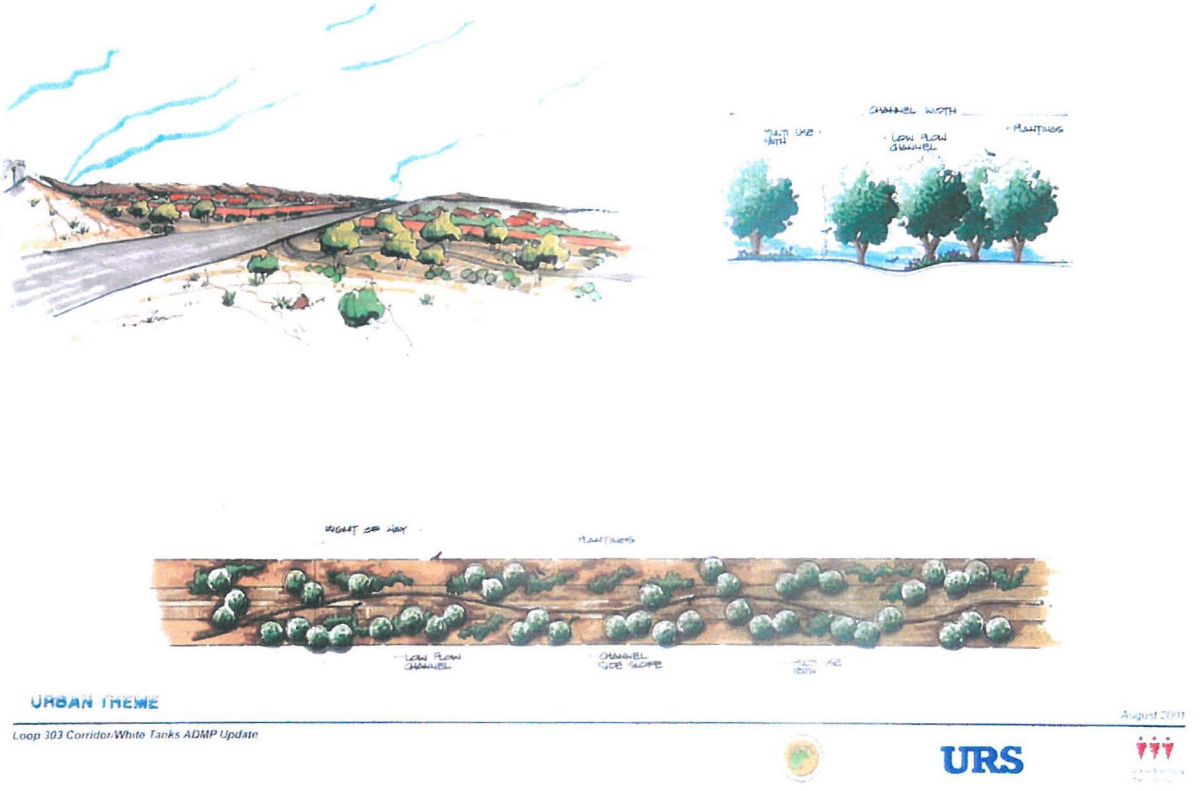
- Industrial Theme:



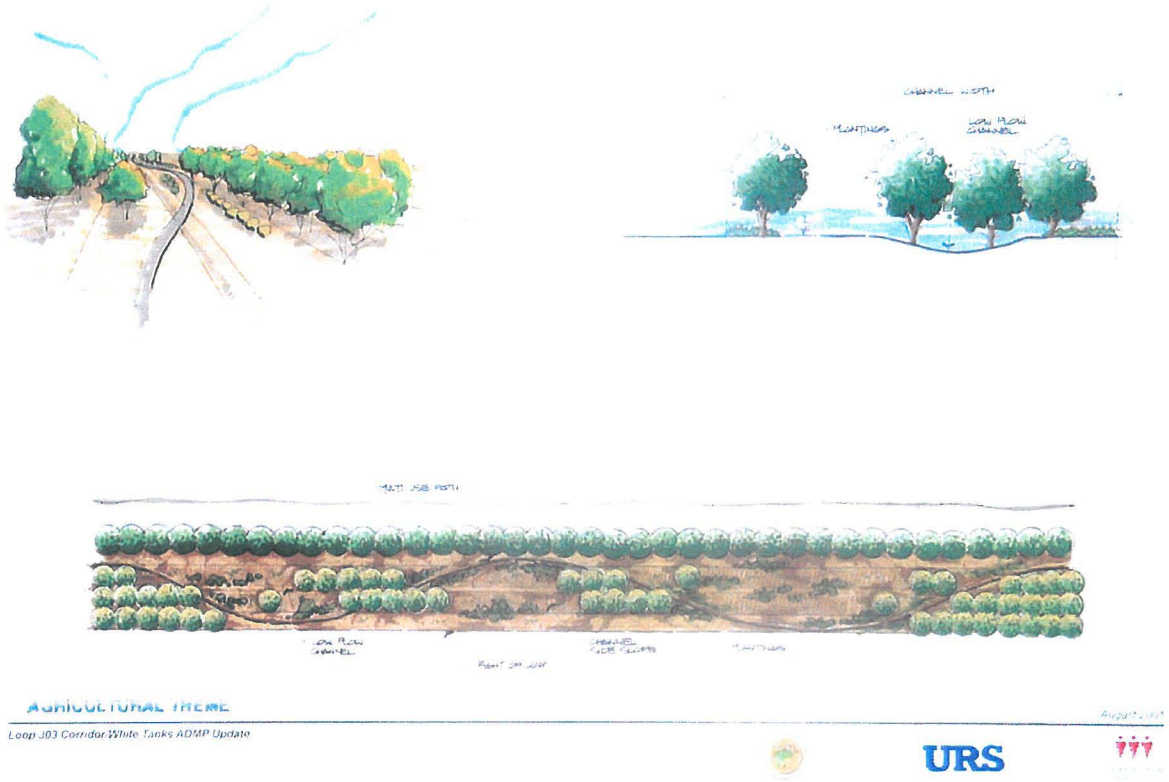
- Recreation Theme:

- Sonoran Theme:

- Urban Theme:


CHANNEL WIDTH
LOW FLOW CHANNEL
PLANTINGS
PLANTINGS
LOW FLOW CHANNEL
CHANNEL SIDE SLOPE
URBAN THEME
Loop 303 Corridor/White Tanks ADMP Update
August 2003
URS

- Agriculture Theme:



7.0 COST ESTIMATE

The following section contains a brief discussion regarding the estimated relative cost of each of the three proposed combined alternatives. We define relative cost as a rating of the anticipated cost associated with a particular alternative relative to the other two. These costs are qualitative and are intended for comparison purposes only. At this level of detail, many factors that could significantly affect the final cost for each of the three combined alternatives are not yet known. The intent is to apply reasonable engineering judgment and experience to arrive at a rating for each alternative relative to the other two. These ratings will simply be stated as High Cost, Medium Cost and Low Cost. Ratings will be prepared for five major project components and a total cost category. The results of the ratings can be found in Table 7.1.

Land acquisition costs are very difficult to determine in an area as dynamic and changing as the ADMP Update project area. Land prices are sensitive to many factors including at a minimum the following:

- ***Current Land Use*** – Is the land developed, undeveloped or in a planning stage? Are there plans for commercial and/or private use in the future? Will buildings or homes have to be purchased?
- ***Land Value*** – Is the land valuable for farming, residential/commercial/industrial development?
- ***Current Land Ownership*** – Is the land publicly or privately held?

It is clear that given the diversity found within the ADMP Update project area, land acquisition prices may vary significantly from one area to another as well as from one week to the next. Therefore, the research and effort required for up-to-date and area-specific land prices is beyond the scope of this level of analysis. In lieu of detailed site-specific information, land acquisition costs published in the East Mesa Area Drainage Master Plan and the Maryvale Area Drainage Master Study were consulted for an average number per acre. The results showed that land acquisition costs in the Maryvale study were extremely high compared with those reported in the East Mesa ADMP. This was assumed to be due to the fact that, currently, Maryvale is much more developed than East Mesa. Therefore, a weighted average number was developed and used based upon data found within the East Mesa ADMP. This number was used consistently throughout the project area and will only be used at this level of the analysis to draw comparisons between the three alternatives.

TABLE 7.1

Loop 303 ADMP
Level I
Relative Alternative Cost Analysis

Cost Component	Combined Alternative #1			Combined Alternative #2			Combined Alternative #3			Baseline[1]			
	Cost Evaluation			Cost Evaluation			Cost Evaluation			Cost Evaluation			
	High	Medium	Low	High	Medium	Low	High	Medium	Low	High	Medium	Low	Very Low
Relative cost of culvert crossings	X					X		X					X
Relative land acquisition for channels	X				X				X				X
Relative land acquisition for basins			X		X		X						X
Relative construction cost for channels	X				X				X				X
Relative construction cost for basins			X		X		X						X
Total Estimated Relative Cost:	X				X				X				X

1. The Baseline Alternative is an order of magnitude lower than the other alternatives. The baseline will cost approximately 20% of the total cost estimated for the other alternatives.

Detailed research involving land acquisition costs specific to the ADMP Update project area will be conducted during future cost estimates.

7.1 RELATIVE COST RATING METHOD

At this level of analysis, there are too many unknown factors present to justify the time and effort associated with a detailed cost estimate. Just a few examples of the unknowns at this level include:

- Exact channel geometry (rectangular, trapezoidal, etc.)
- Proposed channel lining (earth, shotcrete, concrete stabilized alluvium, etc.)
- Exact amount of required right-of-way for channels and basins
- Variations in land acquisition costs throughout the project area
- Number and type of culverts required for each alternative
- Channel drop structures required
- Length and type of storm drain required
- Channel inlets/outlets
- Basin inlets/outlets
- Earthwork quantities
- Developing trails systems
- Cost of implementing themes
- Mitigation costs
- Costs associated with geotechnical conditions at sites

Further, this type of estimate is beyond the scope/intent of the Level I portion of the analysis. This portion of the project is meant as another tool or guide to use when making the final selection of a preferred alternative. It is meant to provide a feel for the relative cost of the given flood control solutions to one another, not a definitive construction cost to be used for budgeting.

In order to simplify this part of the analysis and make it meaningful, several assumptions must be made and consistency must be maintained from the evaluation of one alternative to another.

7.2 QUANTITY ESTIMATES

Detention Basin Size Estimates

The method used to determine the amount of area required for each proposed park/detention basin was based upon available peak discharge and time of concentration data. Since the revised model for the existing conditions hydrology was not yet available, peak flow rates and time of concentration estimates were obtained using the hydrology presented in the original White Tanks ADMP by The WLB Group. Using an estimated peak discharge and corresponding time to concentration at a proposed detention basin location, a triangular hydrograph was developed from which an approximate inflow volume was calculated. Since the proposed detention basin locations are significantly different from those shown in the WLB plan, very few direct comparisons between model hydrographs and the estimated hydrographs were possible. One such location for this type of comparison was made at the existing WT FRS #3. At this location, the hydrograph reported by the WLB model showed a sharp peak with a narrow base. This generally results in lower total volume estimates than those obtained by the triangular hydrographs described above. If actual hydrographs at other locations are similar, there could be a tendency for detention basin area footprint estimates to be larger than required for runoff storage. It is anticipated that any over estimates in volume will be offset by the removal of transmission losses from the current model as part of recent revisions being done by EEC as well as the fact that no freeboard requirements within the basins were considered. It should also be noted that compliance with the scope of work for this project requires aesthetically pleasing facilities which would probably result in landscaping features such as berming, non-symmetric basin, vegetation, trees, and recreational amenities that could significantly reduce detention basin storage.

Once the inflow volumes were determined, a maximum allowable outflow was proposed and the information was entered into the PondPack v.7 program by Haestad Methods, Inc. to determine a volume required to achieve the desired attenuation in peak flow. Each basin was sized based on 4:1 maximum side slopes and various depths until a reasonable balance between area and depth was obtained.

Land acquisition requirements were based upon the footprint areas calculated without regard to existing right-of-way that may be available for use.

By applying the same methods for volume requirement estimates throughout the project area for all three alternatives, a good feel for the relative cost was attained.

Proposed Channel Footprint Estimates

Again, due to the lack of more up-to-date data at the time of this analysis, the peak flow rates reported by the WLB model were used for rough estimates of required channel sizes. The following channel characteristics were used in conjunction with area slope estimates obtained from topographic base mapping to determine channel footprint requirements for each alternative:

- Maximum channel side slopes used were 3:1.
- Channel roughness was based on non-concrete lining, n = 0.03.
- Maximum channel depths were limited to 8 feet.

No freeboard was considered while sizing the channels; however, this should not affect relative differences since it represents a constant number. Using the peak flow estimates and the above constraints, the top width of each channel was approximated with the manning equation.

Land acquisition requirements were based upon the footprint areas calculated without regard to existing right-of-way that may be available for use.

Proposed lengths of channels were measured directly from each of the three alternative exhibits.

Proposed Channel Construction Cost

The cost associated with the construction of trails is indirectly included with channel estimates. Approximately one half of the total length of proposed channels associated with the East Mesa ADMP included an equestrian trail. Although the Maryvale channels did not indicate the inclusion of such costs, the construction estimates associated with its channels were higher than those obtained from the East Mesa ADMP. Therefore, the higher of the two costs was used. Any trails proposed outside of channel right-of-way would be additional to the total cost. These quantities are not expected to change the order of magnitude of the cost estimates. Specific themes/features (i.e., educational, recreation, etc.) will be developed during Level II and III analysis.

Proposed Culvert Crossing Quantity Estimates

The total number of major culvert crossings of existing or proposed facilities required for each alternative was estimated and categorized by type. Anticipated culvert crossings were separated into six categories. Each category represented a minimum required length for the culvert to cross. The number of culverts required for the channel crossing in question was based upon the bottom width of each proposed channel. The six crossing types considered were:

- Major roadway crossing
- Highway crossing
- State Road crossing
- Canal crossing
- Railroad crossing
- Channel crossing

A price per foot of culvert required was obtained from the ADOT Construction Cost 1999 and 1998. The highest average cost was selected and used for all of the alternatives.

7.3 RELATIVE COST ESTIMATE AND RESULTS

The results of the relative cost estimate are shown in Table 7.1. Combined Alternative 1 was significantly higher in relative cost to either Combined Alternative 2 or Combined Alternative 3. Combined Alternatives 2 and 3 were very close in relative cost; however, Combined Alternative 3 showed a lower overall cost.

Due to the large number of channels proposed with Combined Alternative 1, this alternative showed the highest relative cost in the culvert crossings, land acquisition for channels and construction cost for channels.

Although Combined Alternative 3 generally shows lower relative costs than Combined Alternative 2, Combined Alternative 2 is more compliant with public opinion expressed to date. This is due to the smaller channel proposed along the Loop 303 corridor. Combined Alternative 3 proposes a much larger channel adjacent to the Loop 303 corridor, which has been openly criticized by much of the public. Combined Alternative 2 proposes much larger flow diversions to the east and adds an additional west-to-east channel along I-10.

A more detailed cost estimate will follow this one in the Level II Alternatives Analysis Report.

8.0 REFERENCES

Section 2.0 Introduction

Loop 303 Corridor/White Tanks Area Drainage Master Plan Update – Draft Data Collection Report, URS Greiner Woodward Clyde, February 2000.

White Tanks/Agua Fria Area Drainage Master Plan (WTAF ADMP), completed by The WLB Group, Inc., March 1995.

Drainage Channel Study for West Half of Estrella Freeway Loop 303 from Interstate 17, Technical Memorandum, dated August 1998, by DeLeuw Cather & Company.

Section 3.0 Project Alternatives

Loop 303 Corridor/White Tanks Area Drainage Master Plan Update – Draft Data Collection Report, URS Greiner Woodward Clyde, February 2000.

Drainage Channel Study for West Half of Estrella Freeway Loop 303 from Interstate 17, Technical Memorandum, dated August 1998, by DeLeuw Cather & Company.

Landscape Aesthetics Assessment and Multi-Use Opportunities Assessment, Logan Simpson Design Inc., April 17, 2000.

Section 4.0 Recommended Alternatives

Plans for the Construction of the Site Improvements for Wal-Mart Store Expansion, 955 East Rancho Santa Fe Blvd., Avondale, Arizona, by Unaway Associates West Inc, 11/99.

Drainage Channel Study for West Half of Estrella Freeway Loop 303 from Interstate 17, Technical Memorandum, dated August 1998, by DeLeuw Cather & Company.

Section 5.0 Environmental Impacts of Combined Alternatives

Loop 303 Corridor/White Tanks Area Drainage Master Plan Update – Draft Data Collection Report, URS Greiner Woodward Clyde, February 2000.

Section 6.0 Landscape Character/Multi-Use

Landscape Aesthetics Assessment and Multi-Use Opportunities Assessment, Logan Simpson Design Inc., April 17, 2000.

Arizona Department of Transportation Construction Cost 1998 and 1999.

Hawes Road Channel Improvements, Draft Conceptual Hydrologic/Alternatives Analysis Report, Engineering Division Flood Control District of Maricopa County, 8/99.

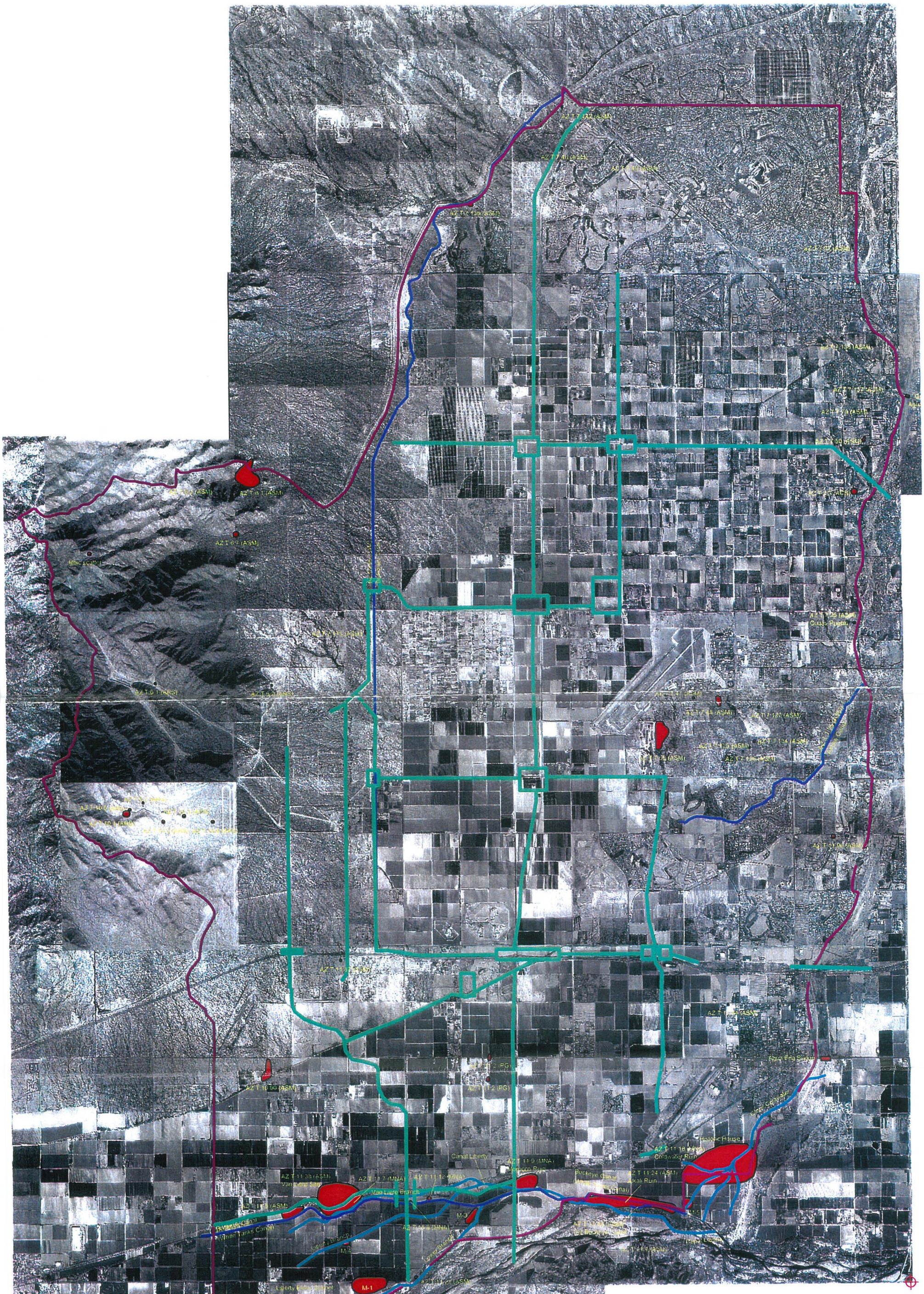
Maryvale Area Drainage Master Study Floodplain Mitigation Study, Wood, Patel & Associates, Inc., 12/97, Appendix B.

East Mesa Area Drainage Master Plan, Dibble & Associates in association with Hoskin Engineering Consultants, 7/98.

White Tanks/Agua Fria Area Drainage Master Study, Part A, Flood Study Technical Data Notebook, Flood Control District of Maricopa County, prepared by The WLB Group, October 1992.

White Tanks/Agua Fria Area Drainage Master Study, Part B, Area Drainage Master Plan, Flood Control District of Maricopa County, prepared by The WLB Group, December 1994.

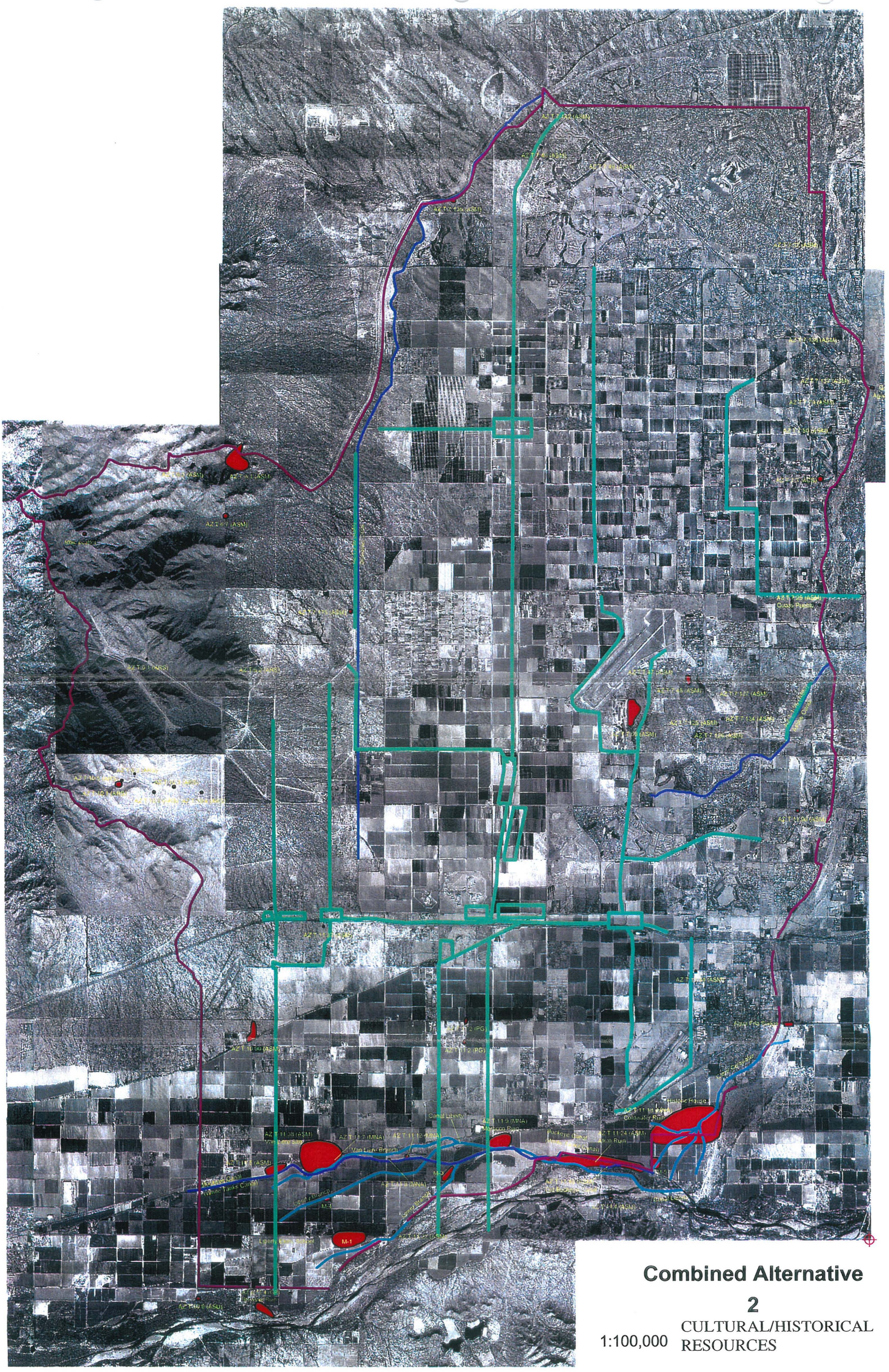
Appendix A



Combined Alternative 1

1:100,000

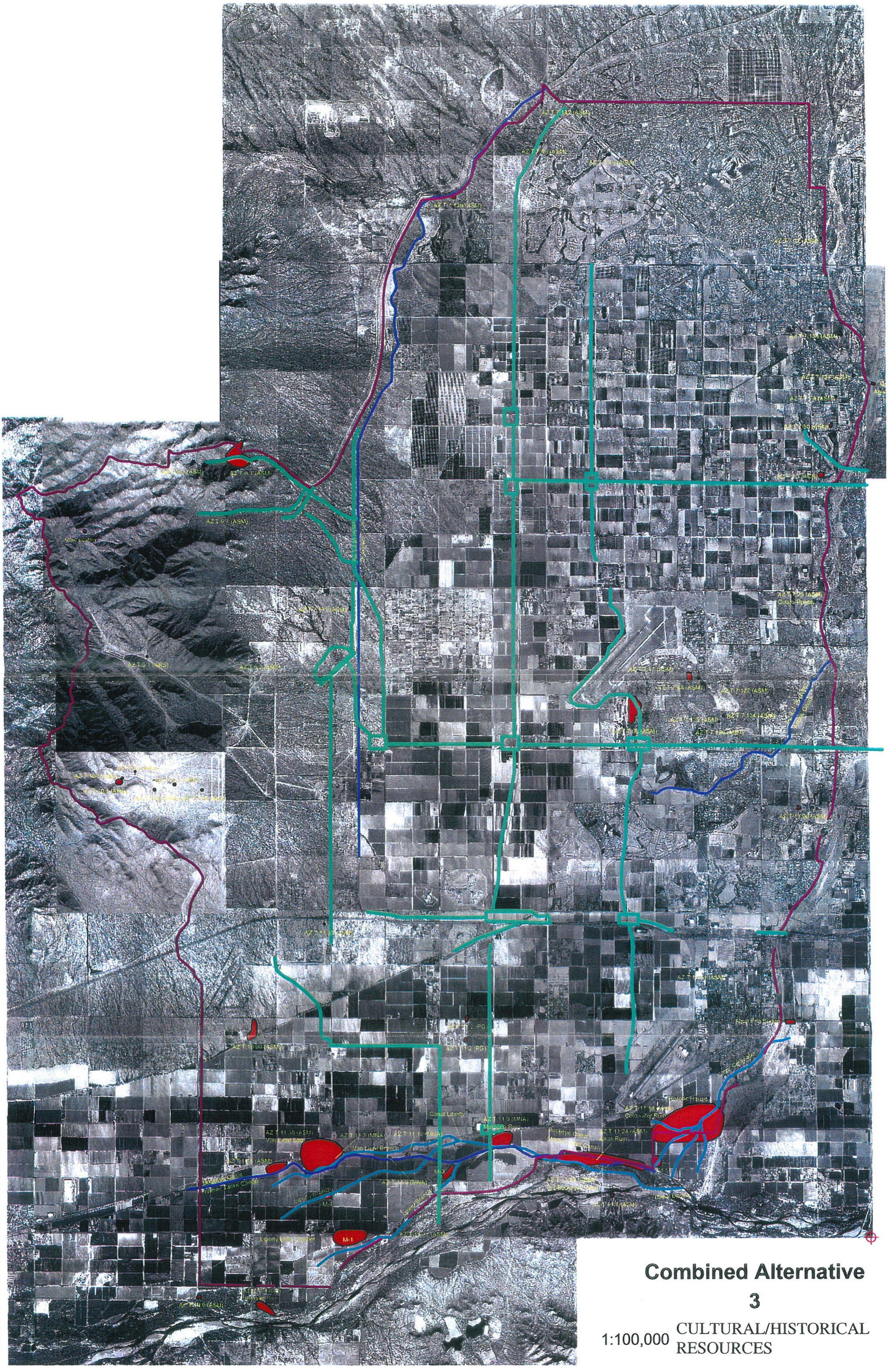
CULTURAL/HISTORICAL RESOURCES



Combined Alternative 2

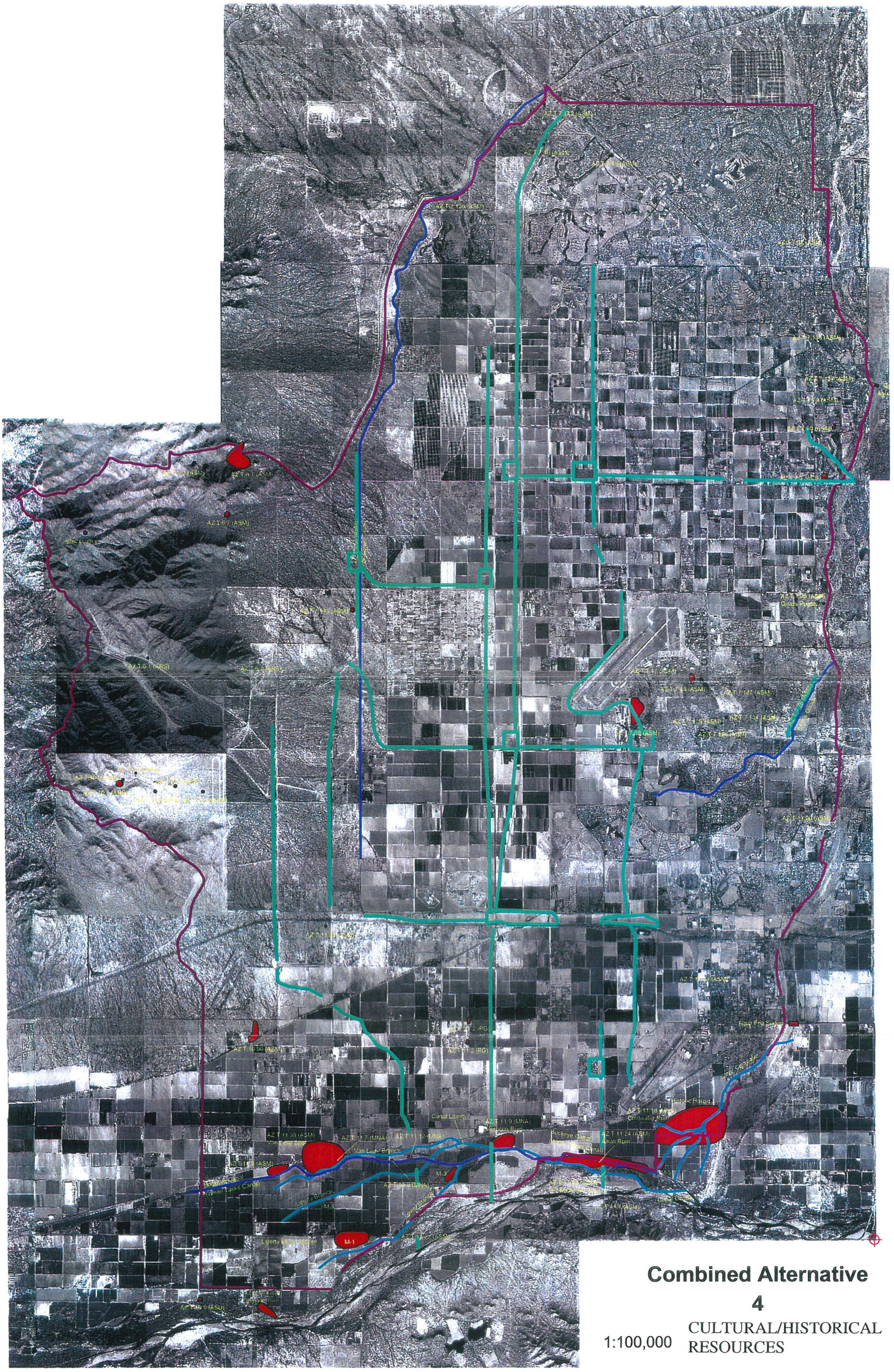
1:100,000

CULTURAL/HISTORICAL RESOURCES



Combined Alternative 3

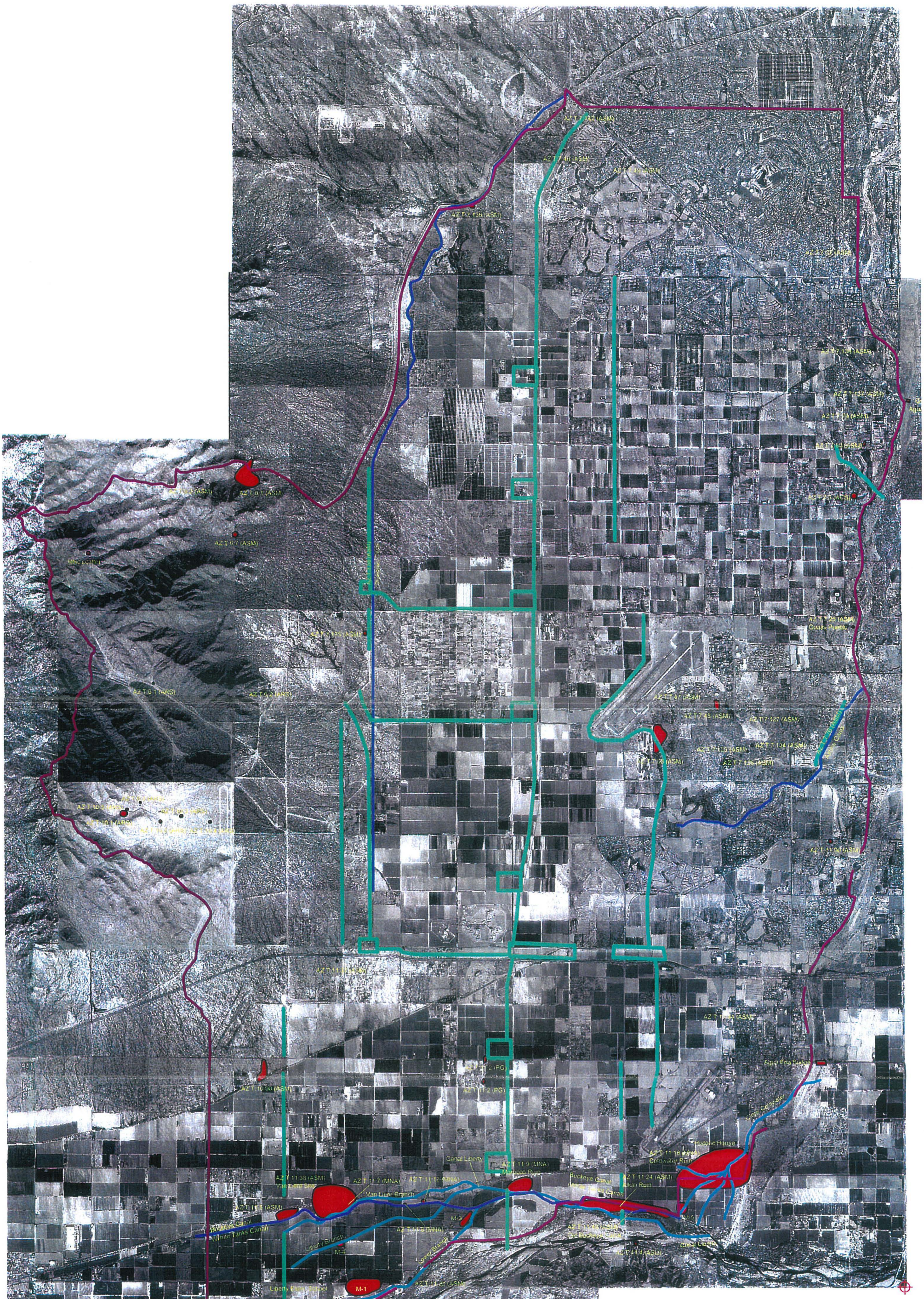
1:100,000 CULTURAL/HISTORICAL RESOURCES



Combined Alternative 4

1:100,000

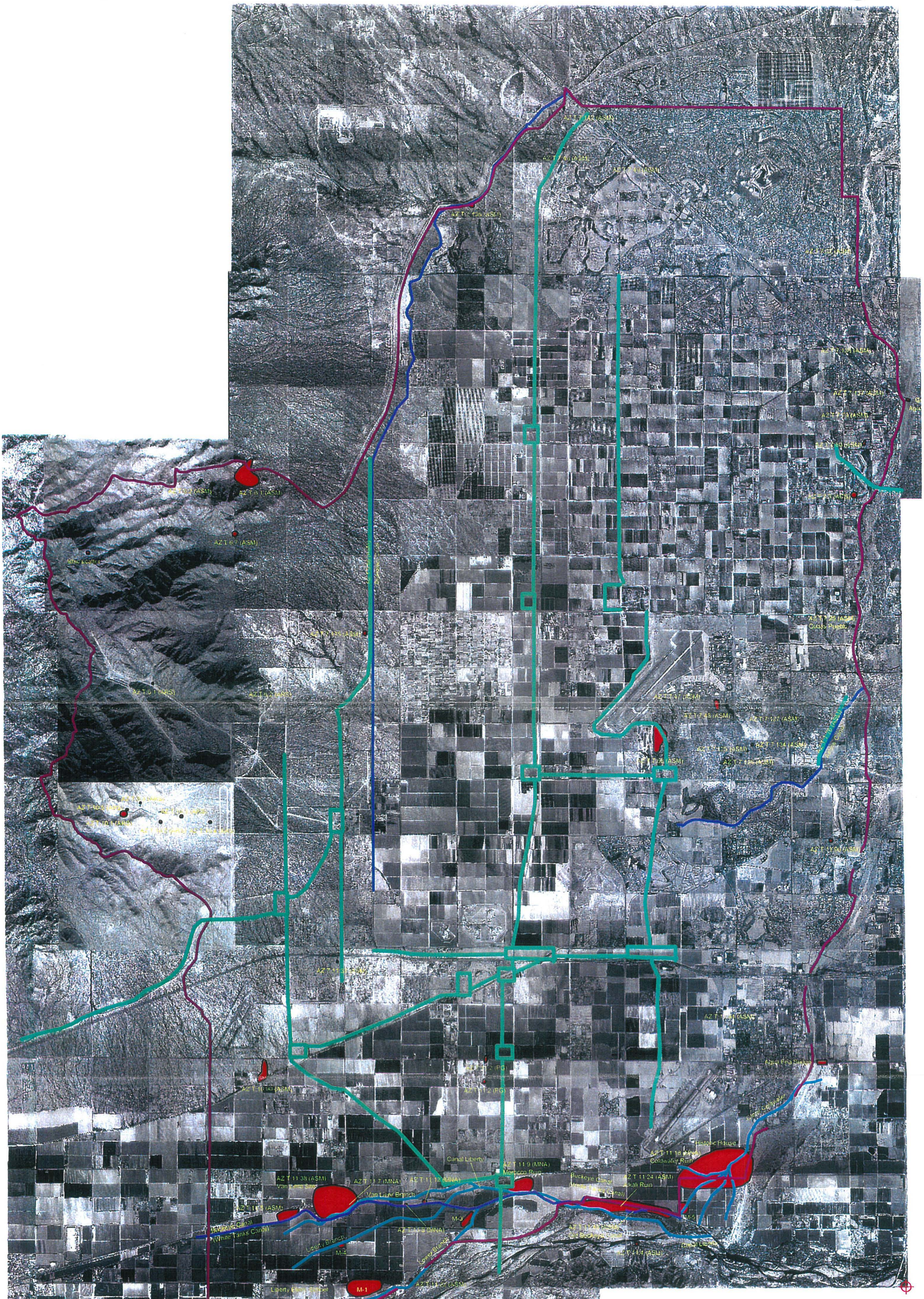
CULTURAL/HISTORICAL RESOURCES



Combined Alternative 5

1:100,000

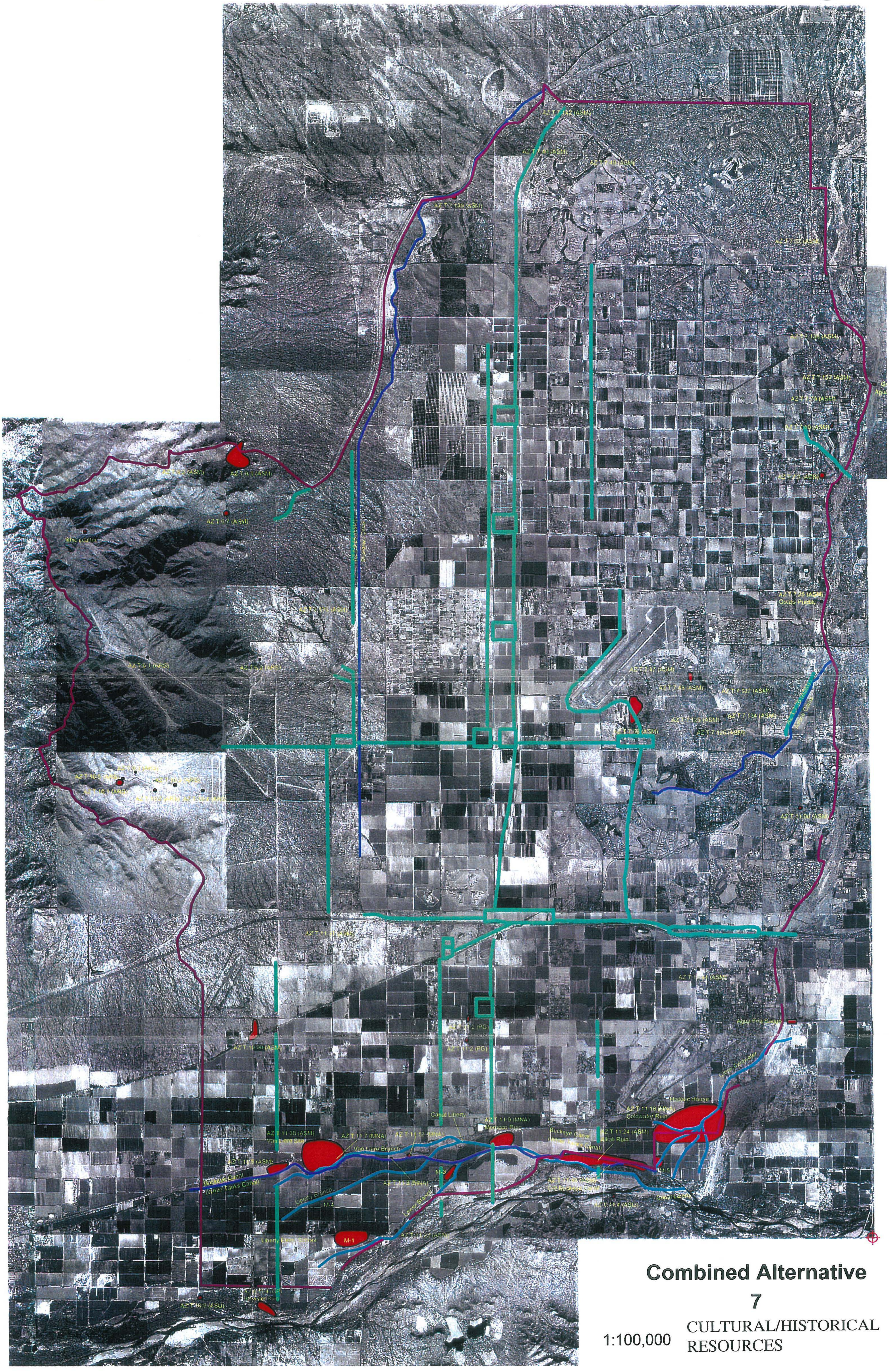
CULTURAL/HISTORICAL RESOURCES



Combined Alternative 6

1:100,000

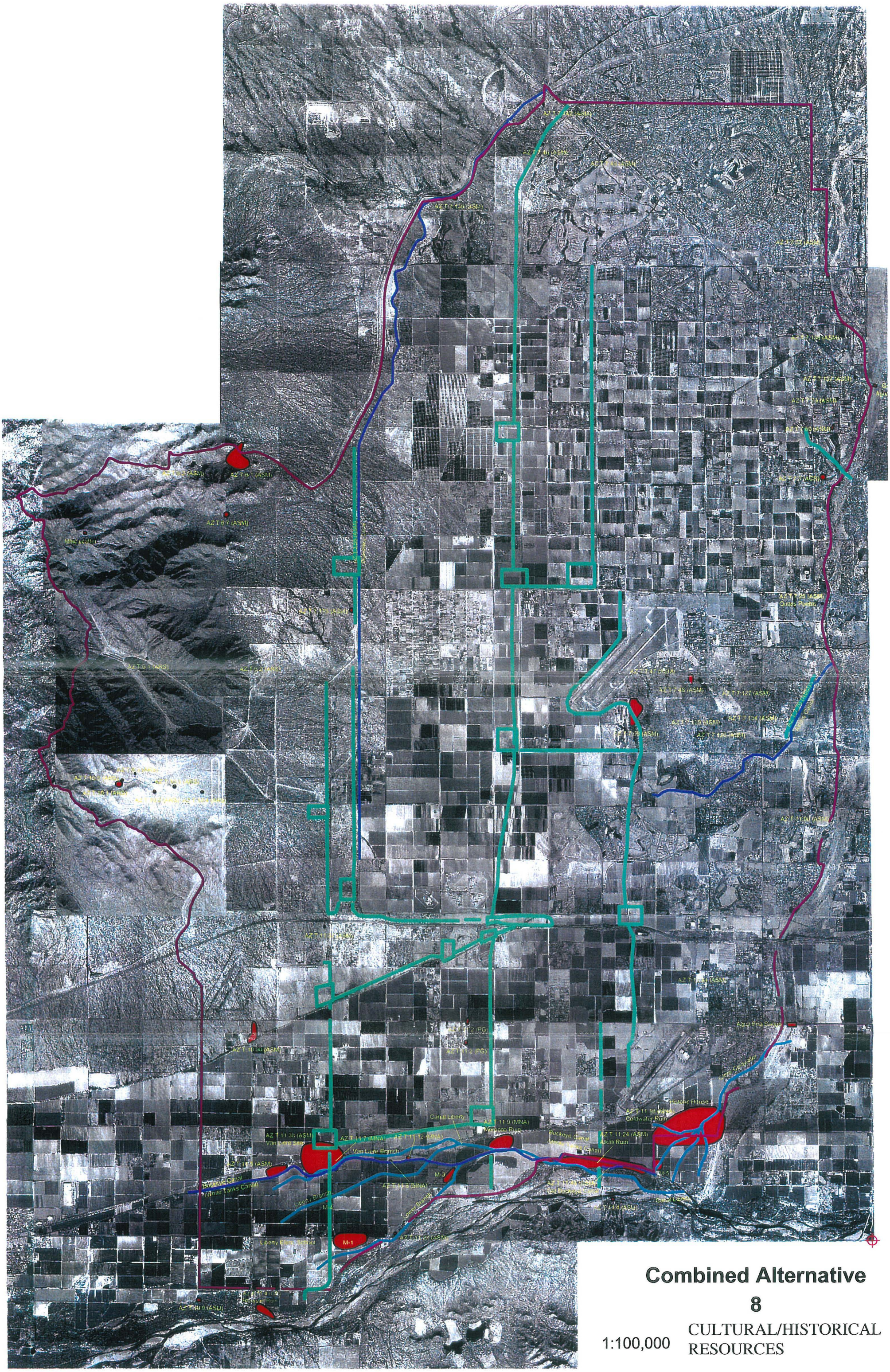
CULTURAL/HISTORICAL RESOURCES



Combined Alternative

7

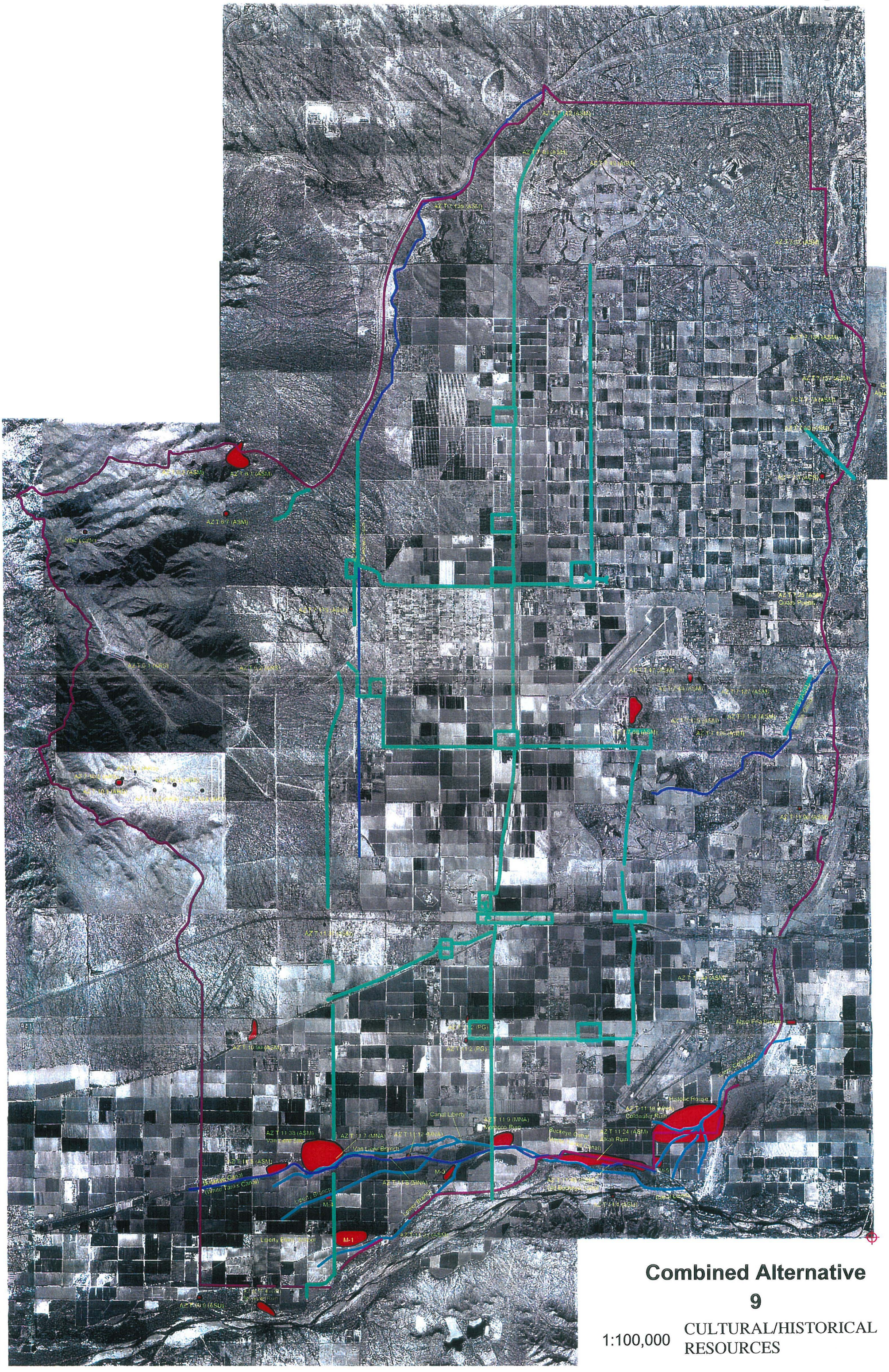
1:100,000 CULTURAL/HISTORICAL RESOURCES



Combined Alternative 8

1:100,000

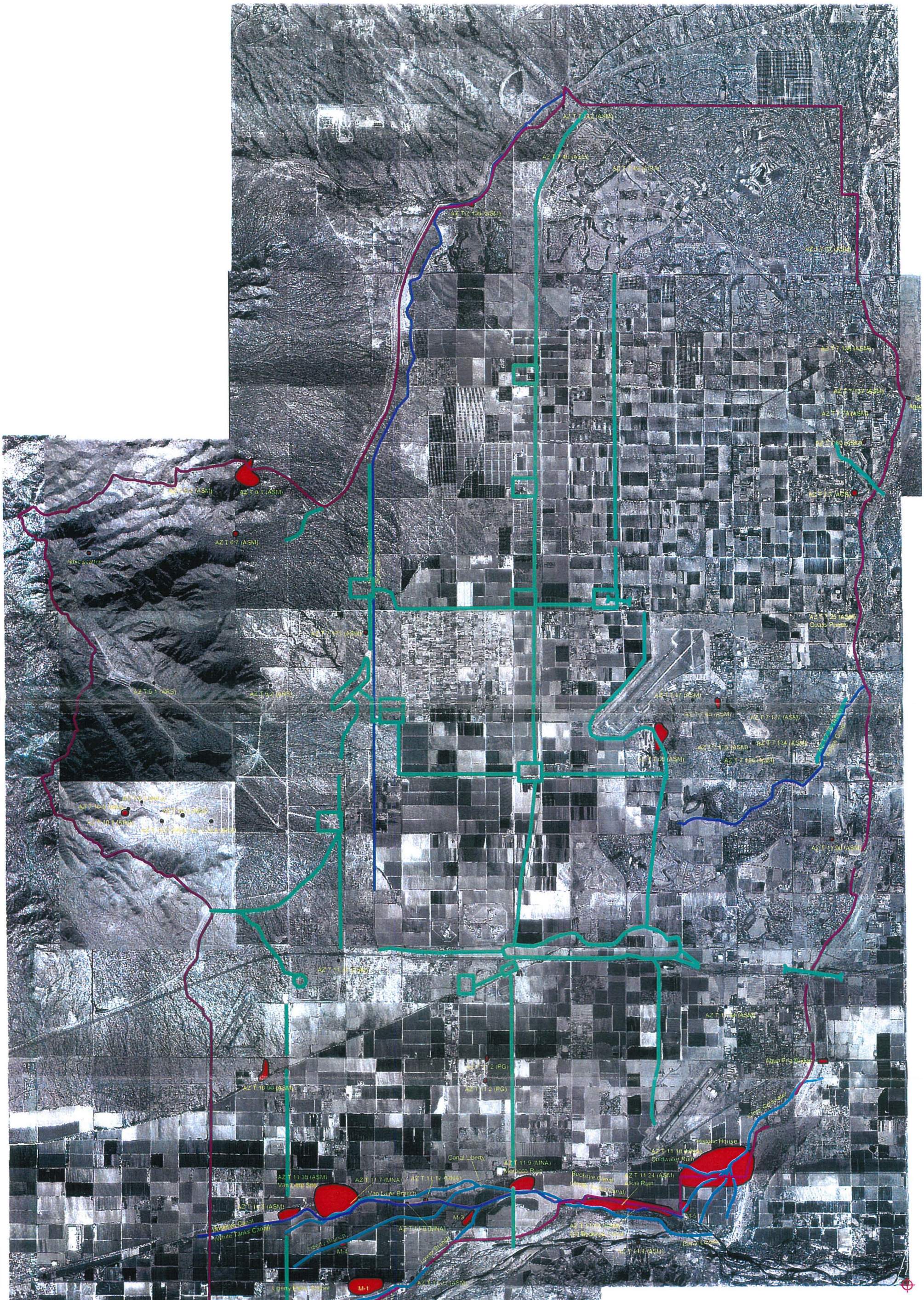
CULTURAL/HISTORICAL RESOURCES



Combined Alternative 9

1:100,000

CULTURAL/HISTORICAL RESOURCES



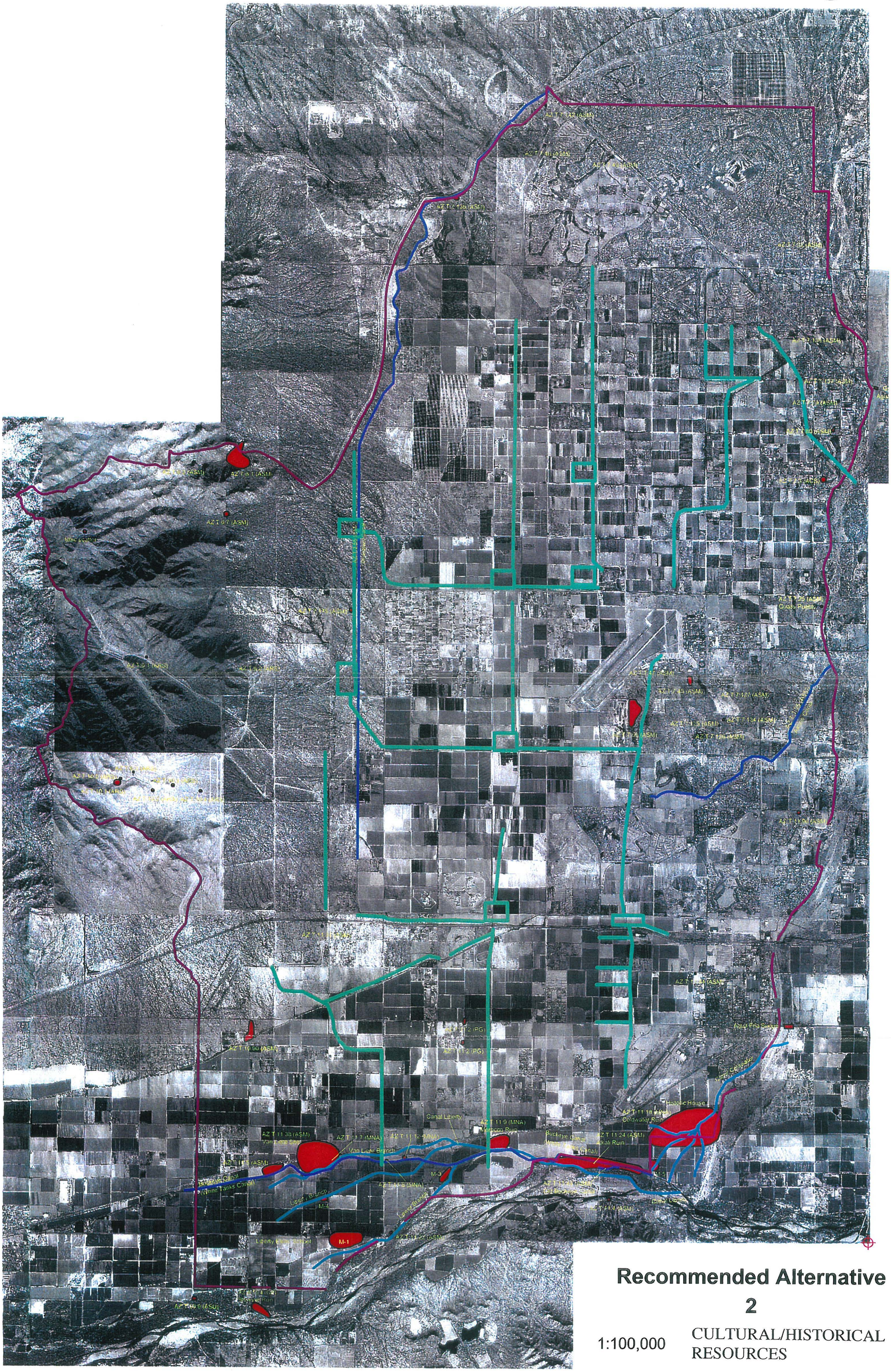
Combined Alternative 10

1:100,000 CULTURAL/HISTORICAL RESOURCES

Recommended Alternative 1

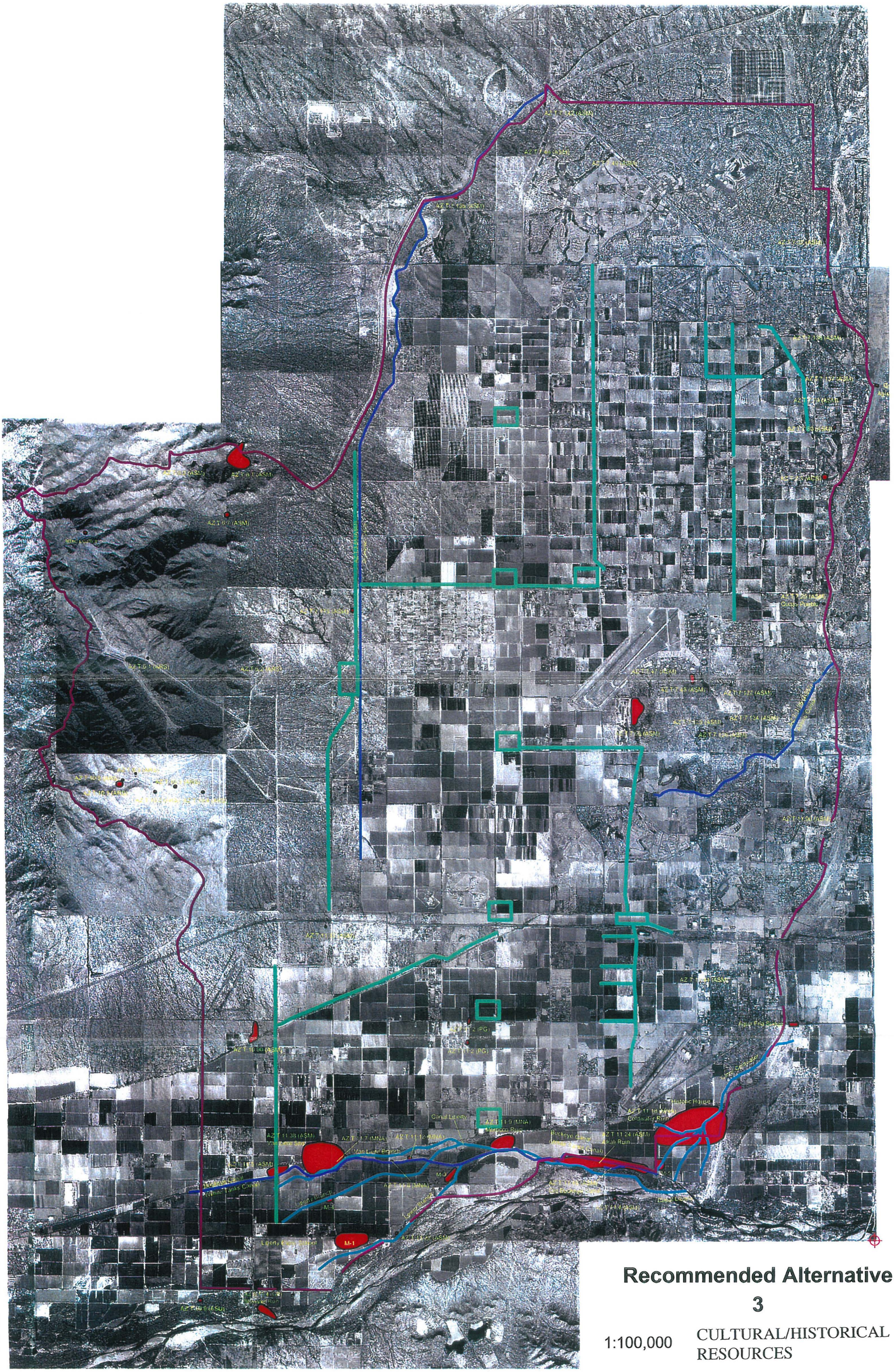
1:100,000

CULTURAL/HISTORICAL RESOURCES



Recommended Alternative 2

1:100,000 CULTURAL/HISTORICAL RESOURCES

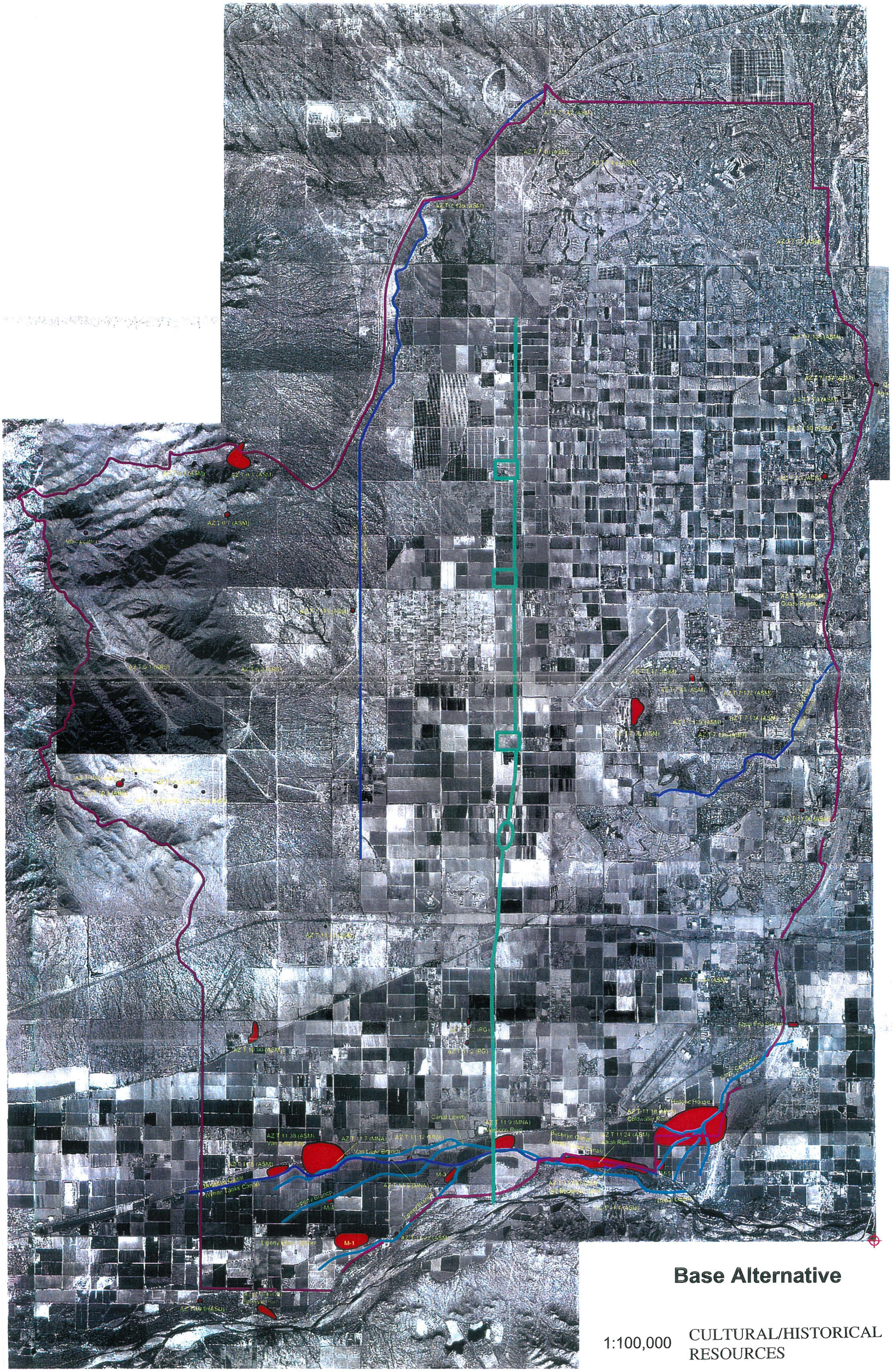


Recommended Alternative

3

1:100,000

CULTURAL/HISTORICAL RESOURCES



Base Alternative

1:100,000 CULTURAL/HISTORICAL RESOURCES