Lee Moore Wash Basin

Management Study

Prepared by:

Pima County Regional Flood Control District

This Special Study replaces the previous Special Study 10 – (12/2/88)

Lee Moore Wash Watershed

Prepared for Pima County Department of Transportation and
Flood Control District, Planning Division

Principal investigator: Jonathan Fuller

Pima County Regional Flood Control District
September 2009

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Overview

Project Purpose and Need

Pima County Regional Flood Control District has completed the Lee Moore Wash Basin Management Study to identify the drainage and flooding hazards within the watershed and develop alternatives to address those hazards. A Basin Management Study is a comprehensive study that estimates flood and erosion potential for a watershed, maps watercourses, identifies existing and potential problems and develops preliminary solutions and standards for sound floodplain and stormwater management.

The initial effort collected data to identify known flooding hazards and map floodplains. This included researching historical flooding data and current land-use plans, as well as gathering information from stakeholders and the public.

The team then formulated a floodplain management approach consisting of structural and non-structural alternative solutions to reduce or eliminate flooding hazards, which were further compared and evaluated to develop a set of preferred alternatives.

With the study complete, the District now has a comprehensive assessment of flood and erosion hazards. The strategies in the plan should reduce damages to property or loss of life from drainage issues and stormwater flooding.

Scope of Work:

- **Data Collection:** Develop a data base of existing land use and drainage information.
- **Hydrology and Hydraulics:** Determine quantity and limits of stormwater runoff.
- **Floodplain Mapping:** Delineate 100-year floodplains.
- **Public Involvement:** Regular open house meetings to inform and obtain public input.
- **Stakeholder Involvement:** Facilitate meetings to inform and include stakeholder concerns.
- **Environmental Considerations:** Biological and cultural resources.
- **Erosion Hazards:** Identify problem areas for scour and sedimentation.
- **Rules of Development:** Provide management guidelines for future development.
- **Schedule:** Completion anticipated in Summer 2008.

Lee Moore Wash
Basin Management Study
Summer 2008

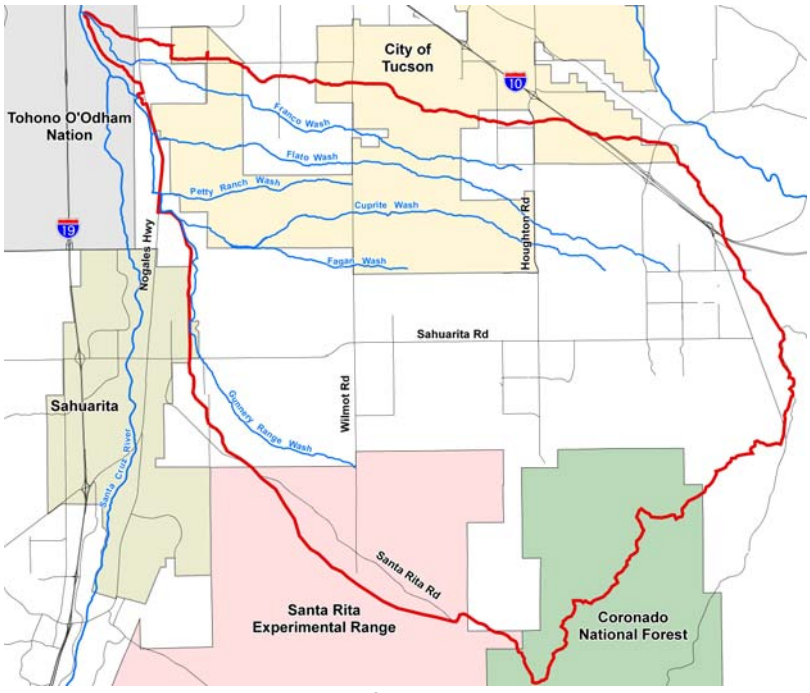
Project Overview and Status:

Pima County Regional Flood Control District is conducting the Lee Moore Wash Basin Management Study (LMWBMS) to identify the drainage and flooding hazards within the watershed and develop alternatives to address those hazards. A Basin Management Study is a comprehensive study that estimates flood and erosion potential for a watershed, maps watercourses, identifies existing and potential problems and develops preliminary solutions and standards for sound floodplain and stormwater management.

To date we have collected data, identified known flooding hazards and mapped floodplains. This included researching historical flooding data and current land-use plans, as well as gathering information from stakeholders and the public.

The project team then formulated a range of structural and non-structural alternative solutions to reduce or eliminate flooding hazards. These will be presented to stakeholders and the public for their input and they will also be evaluated by the project team using a set of project specific performance criteria. After considering the input from the stakeholders and public and evaluating these alternatives they will be refined to develop a set of recommended alternatives.

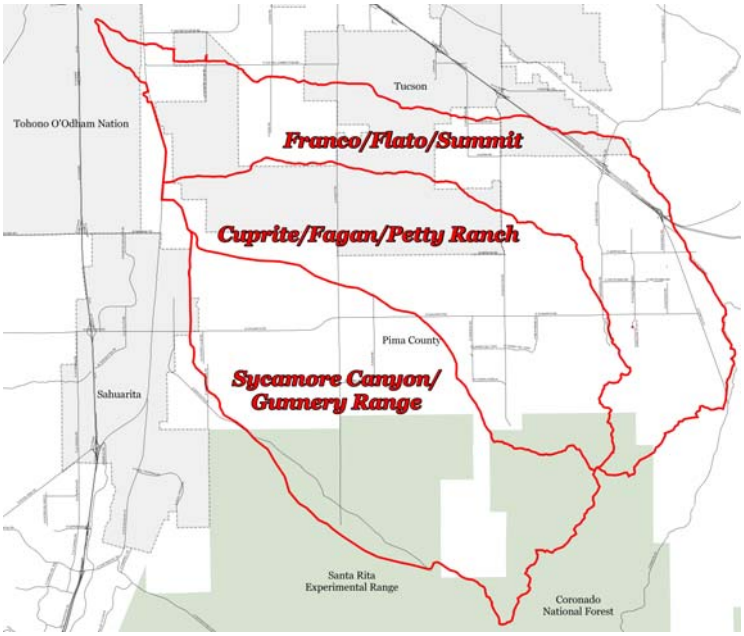
When the study is completed, the District will have a comprehensive floodplain management approach to reducing flood and erosion hazards. Once implemented, the strategies in the plan will reduce damages to property or loss of life from drainage issues and stormwater flooding. This phase of the project will be completed in the winter of 2008/09.



Project Area

Project Area:

The total project watershed is approximately 213 square miles, including parts of unincorporated Pima County, City of Tucson, Town of Sahuarita, Coronado National Forest, and Arizona State Trust Lands.



Planning Areas:

In order to effectively manage the large study area, the LMWBMS study area is divided into four planning areas. The planning areas are defined by the current and proposed land uses, the types of flooding problems in the area, sub-watershed boundaries, and the 100-year floodplain limits. The planning areas are described below.

Area-Wide Lee Moore Wash Watershed

The Lee Moore Wash watershed is situated in the southeast portion of the Tucson basin, with headwaters situated in the Santa Rita Mountains. The watershed is comprised of eight sub-watersheds characterizing the three general planning areas described below. Drainage patterns trend west-northwesterly to the Lee Moore Wash channel situated along the western extent of the study area. The Santa Cruz River floodplain borders the western boundary of the Lee Moore Wash watershed.

Franco/Flato/Summit Area

The Franco, Flato and Summit watersheds represent the northernmost portion of the project, and generally exhibit the most topographically defined watershed area, allowing floodplain mapping using one-dimensional HEC-HMS and HEC-RAS hydrologic/hydraulic modeling techniques. This area encompasses the most developed watersheds within the project, with additional development planned in the near future.

Cuprite/Fagan/Petty Ranch Area

The Cuprite, Fagan and Petty Ranch watersheds represent the central portion of the project, and are characterized predominantly by poorly defined watershed boundaries and distributary flow networks. Thus, hydrologic and hydraulic evaluations for floodplain mapping within this area was performed using two-dimensional FLO-2D modeling techniques. There is existing development within the central portion of the area, generally situated along the Sahuarita Road corridor.

Sycamore Canyon and Gunnery Range Area

The Sycamore Canyon and Gunnery Range watersheds represent the southernmost portion of the project, and similar to the Cuprite/Fagan/Petty Ranch area, are characterized predominantly by poorly defined watershed boundaries requiring the use of the two-dimensional FLO-2D modeling for floodplain mapping. This area also displays some limited existing development, again centered along the Sahuarita Road corridor. A significant portion of the upstream area is comprised of the Santa Rita Experimental Range, Coronado National Forest, and/or other federal holdings. Much of the downstream area is situated within the Town of Sahuarita Air Force Range planning area.

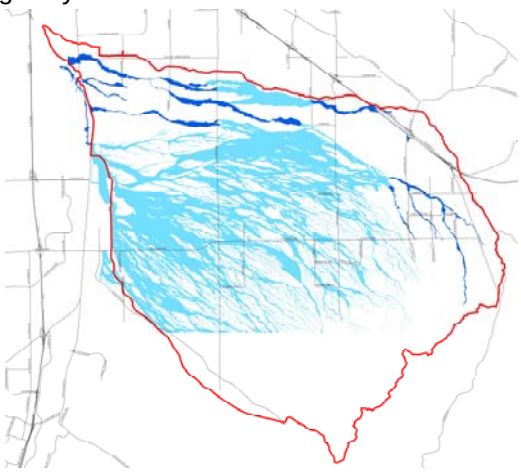
Flooding and Erosion Issues:

Area-Wide Lee Moore Wash Watershed

- Undersized culvert crossings
- Roadway flooding
- Stock pond failure/downstream flooding potential
- Floodplain encroachments/obstructions – walls, fill, debris
- Localized erosion/sedimentation – driveways, road crossings, head cutting, channel migration, culverts
- Drainage complaints

Franco/Flato/Summit Area

- Old Vail Connection access – Franco Wash crossing
- Flooding on Franco Wash – Country Club Road to Nogales Highway
- Floodplain encroachments/obstructions – walls, fill, debris
- Lack of all-weather roadway access
- Diversion structures along main branch of Flato Wash
- Lack of drainage system in the Summit area
- Drainage complaints in developed areas



Mapped Floodplains

Cuprite/Fagan/Petty Ranch Area

- Lack of all-weather roadway access
- Shallow sheet flooding
- Drainage complaints in the Corona de Tucson area
- Drainage complaints in the area east of Wilmot Road/Sahuarita Road intersection

Sycamore Canyon and Gunnery Range Area

- Lack of all-weather roadway access
- Shallow sheet flooding
- Drainage complaints in the area east of Country Club Road/Sahuarita Road intersection
- Drainage complaints in the area east of Wilmot Road/Sahuarita Road intersection

Alternatives:

Alternatives were developed to mitigate flooding hazards that are impacting current residents and future land use plans. The flood mitigation alternatives are organized into four general categories, which are Non-Structural, Structural,LMWBMS Guidelines, and No-Action Alternatives.

The proposed alternatives will consider both environmental resources and multi-use opportunities. The alternatives considered and to be evaluated include: flow corridor preservation, rules of development, channels, roadway realignment, culverts, detention basins, floodplain land acquisition, LMWBMS guidelines, floodplain delineation and no-action.

Various alignments are being considered for the structural alternatives. All alternatives are being evaluated by a multi-disciplinary team of professionals including representatives from the City of Tucson, Town of Sahuarita and the State Land Department.

Alternatives evaluations are being developed using objective performance criteria for the five categories of:

- Public Safety and Flood Hazard Mitigation
- Environmental Resources
- Planning/Infrastructure
- Sustainability
- Implementation

After the alternatives evaluations are completed, costs will be applied and the Recommended Alternatives will be developed.

Next Steps:

The LMWBMS team will complete the alternatives evaluation, which will include descriptions, cost estimates, opportunities, and constraints. Each alternative will be evaluated using the performance criteria developed by the study team. Based on the outcome of the evaluation, the study team will conduct a workshop to develop the recommended alternatives, incorporating comments received from the stakeholder/public meetings.
Once the recommended alternatives have been chosen, the Lee Moore Wash study team will further develop the recommended plan. These efforts will include preliminary drawings of the elements of the plan, cost estimates for plan implementation, conceptual drawings of the structural alternatives and proposed multi-use opportunities associated with each alternative. The District will then schedule the final public meetings to present the recommended plan.

Multi-use opportunity examples

Your Input:

This project is strongly supported by the Pima County Board of Supervisors, the City of Tucson and the Town of Sahuarita.

It is important that the stakeholders stay involved in the process as they have valuable knowledge and multiple responsibilities within the watershed that could significantly influence the project's success. We invite and encourage your support of this study. Please stay involved by visiting our website, talking to the study team and attending future stakeholder meetings.

For more information contact:
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LEE MOORE WASH
BASIN MANAGEMENT STUDY

Stakeholder Workgroup Meeting

February 13, 2008

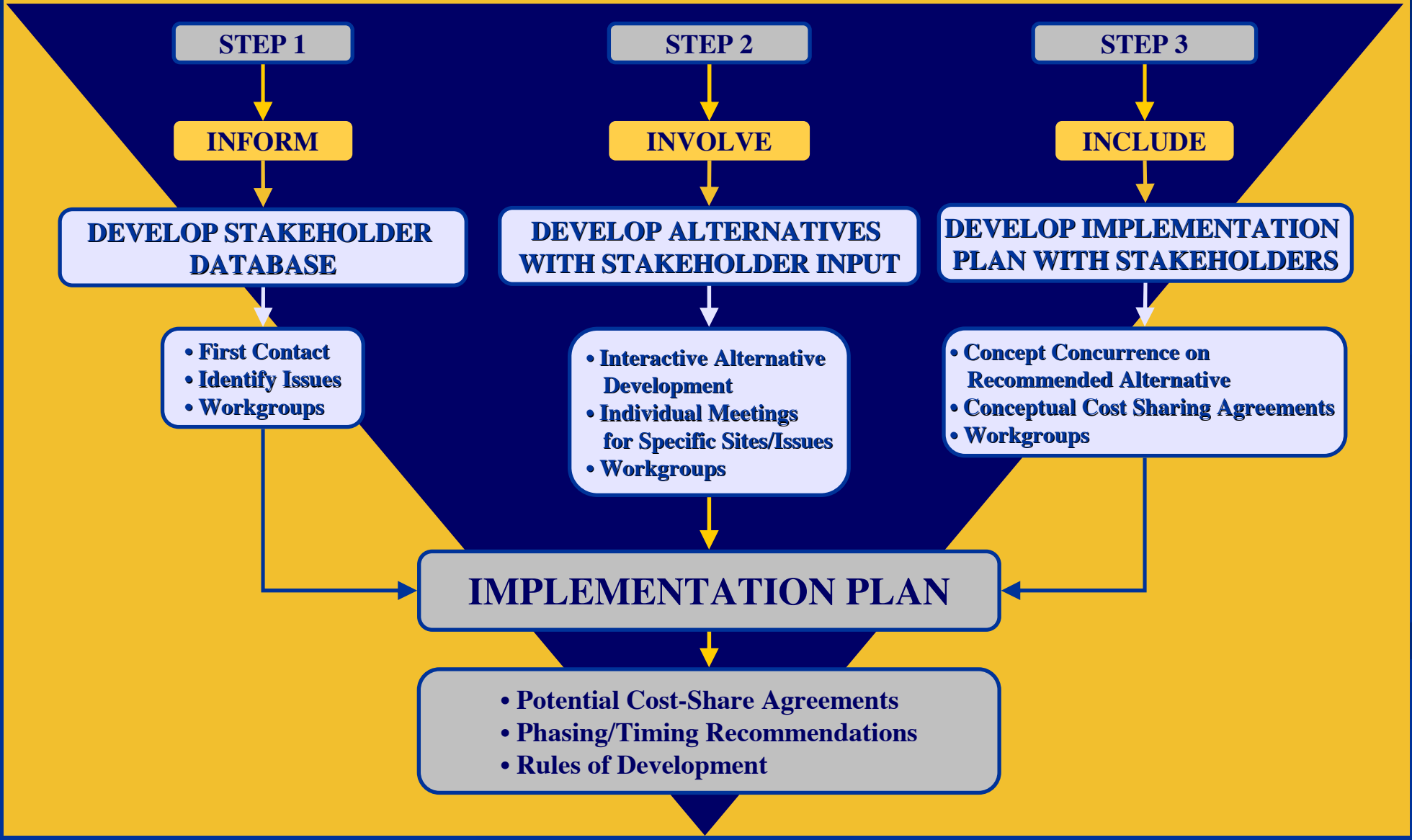
Pima County Regional
FLOOD CONTROL
DISTRICT

AGENDA

- Introductions
- Meeting Purpose
- Project Update
- Existing Conditions
- Draft Floodplains
- Schedule
- Stakeholder Feedback

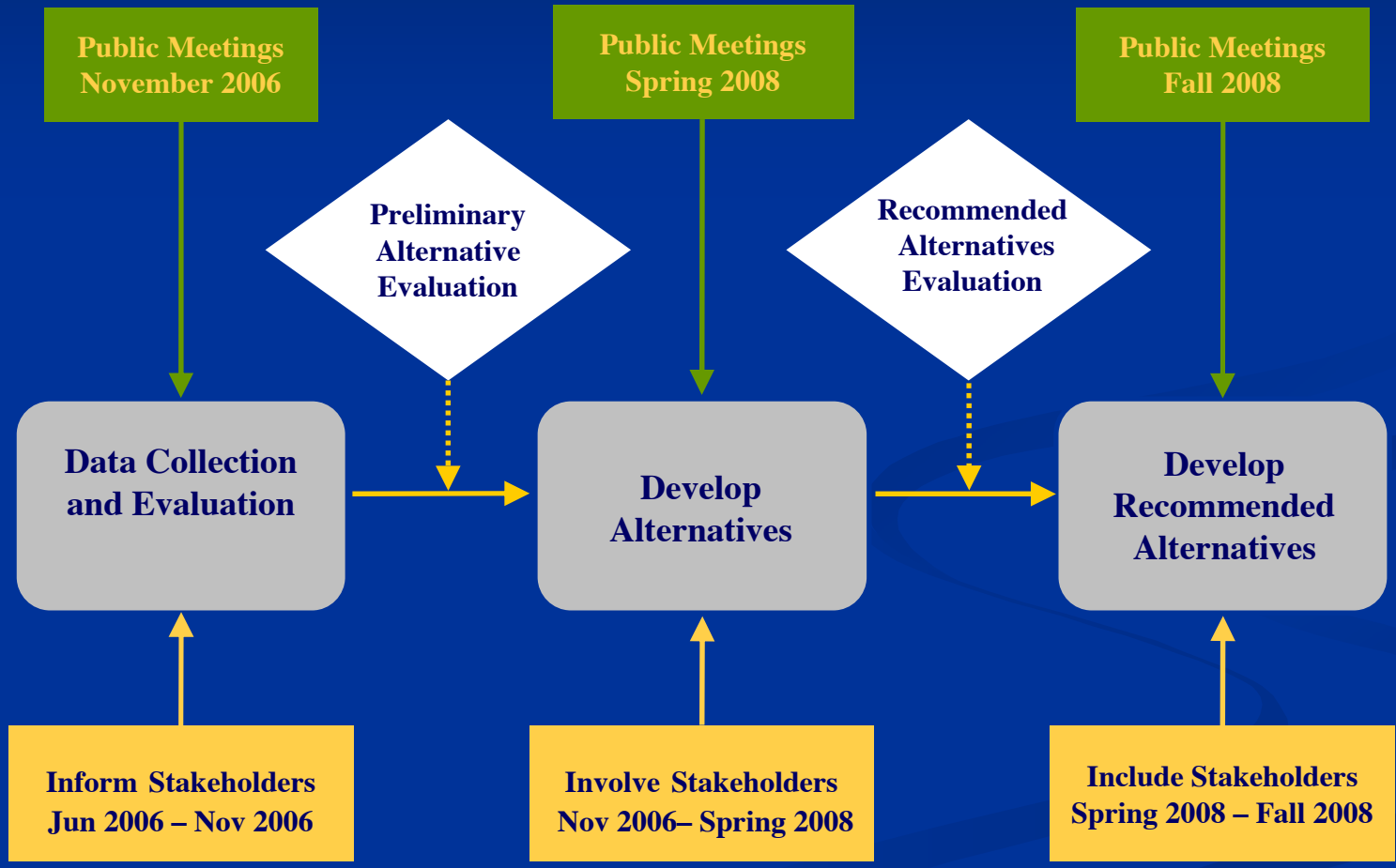
LEE MOORE WASH BASIN MANAGEMENT STUDY

STAKEHOLDER PLAN



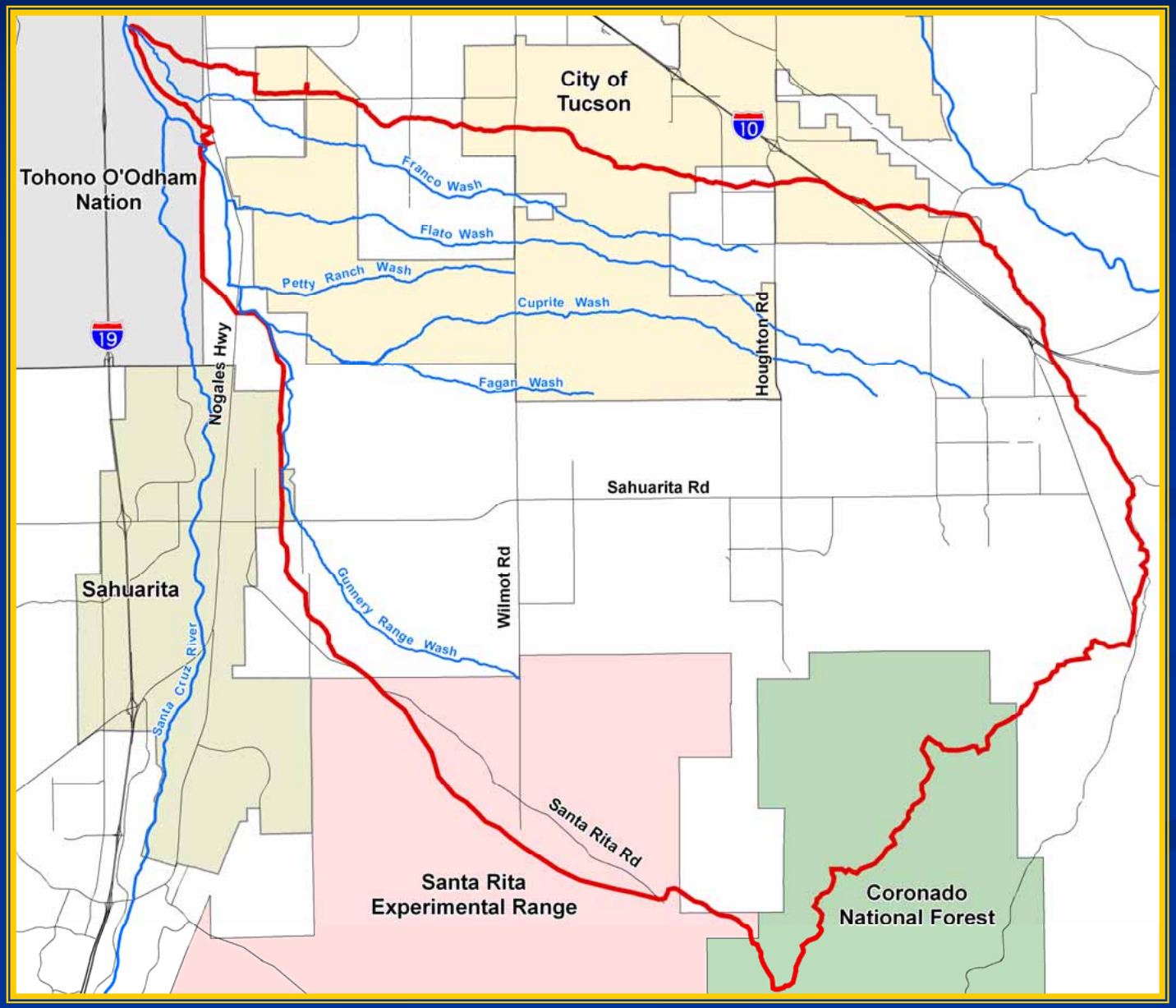
LEE MOORE WASH BASIN MANAGEMENT STUDY

ALTERNATIVES DEVELOPMENT PROCESS



LEE MOORE WASH BASIN MANAGEMENT STUDY

VICINITY



PROJECT UPDATE

- Project Description
- Data Collection/Existing Conditions Evaluation
- Public/Stakeholder Involvement
- Summit Area Study
- Hydrology& Hydraulics
- Floodplain Delineations
- Alternatives Development

LEE MOORE WASH BASIN MANAGEMENT STUDY

DATA COLLECTION/EXISTING CONDITIONS EVALUATION

TASKS

- Data Collection
- Existing Condition Evaluation
- Public/ Stakeholder Involvement

OUTCOMES

- Problem Identification
- Drainage Facility Inventory

TIMELINE

- June 2006 – November 2007

DATA COLLECTION/EXISTING CONDITIONS EVALUATION

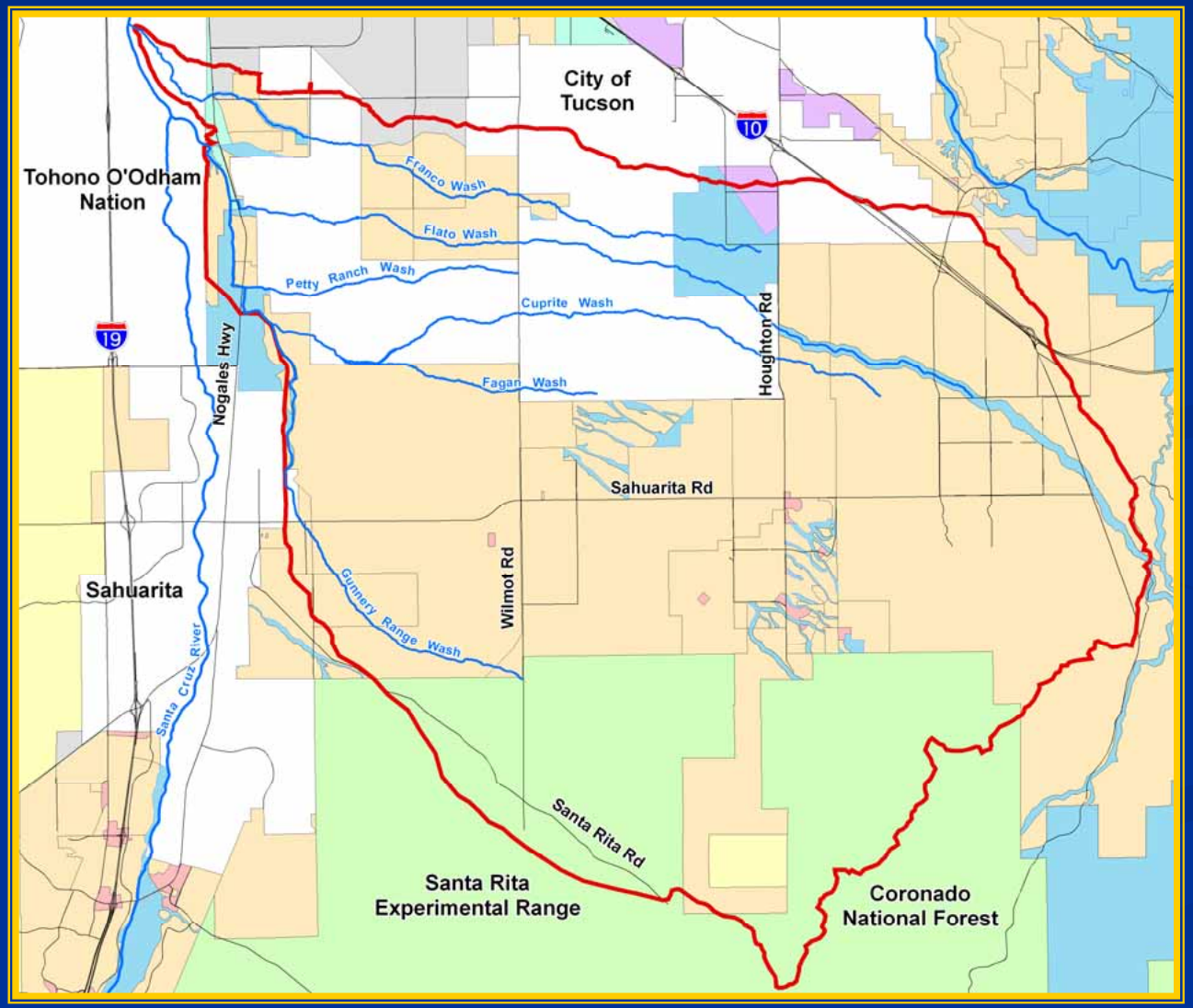
OUTCOMES

- Existing Land Uses
- Proposed Land Uses
- Environmentally Sensitive Lands
- Regional Transportation
- Existing Drainage Conditions
- Geomorphic Setting
- Hydrogeology

LEE MOORE WASH BASIN MANAGEMENT STUDY

DATA COLLECTION/EXISTING CONDITIONS EVALUATION

Existing Land Uses



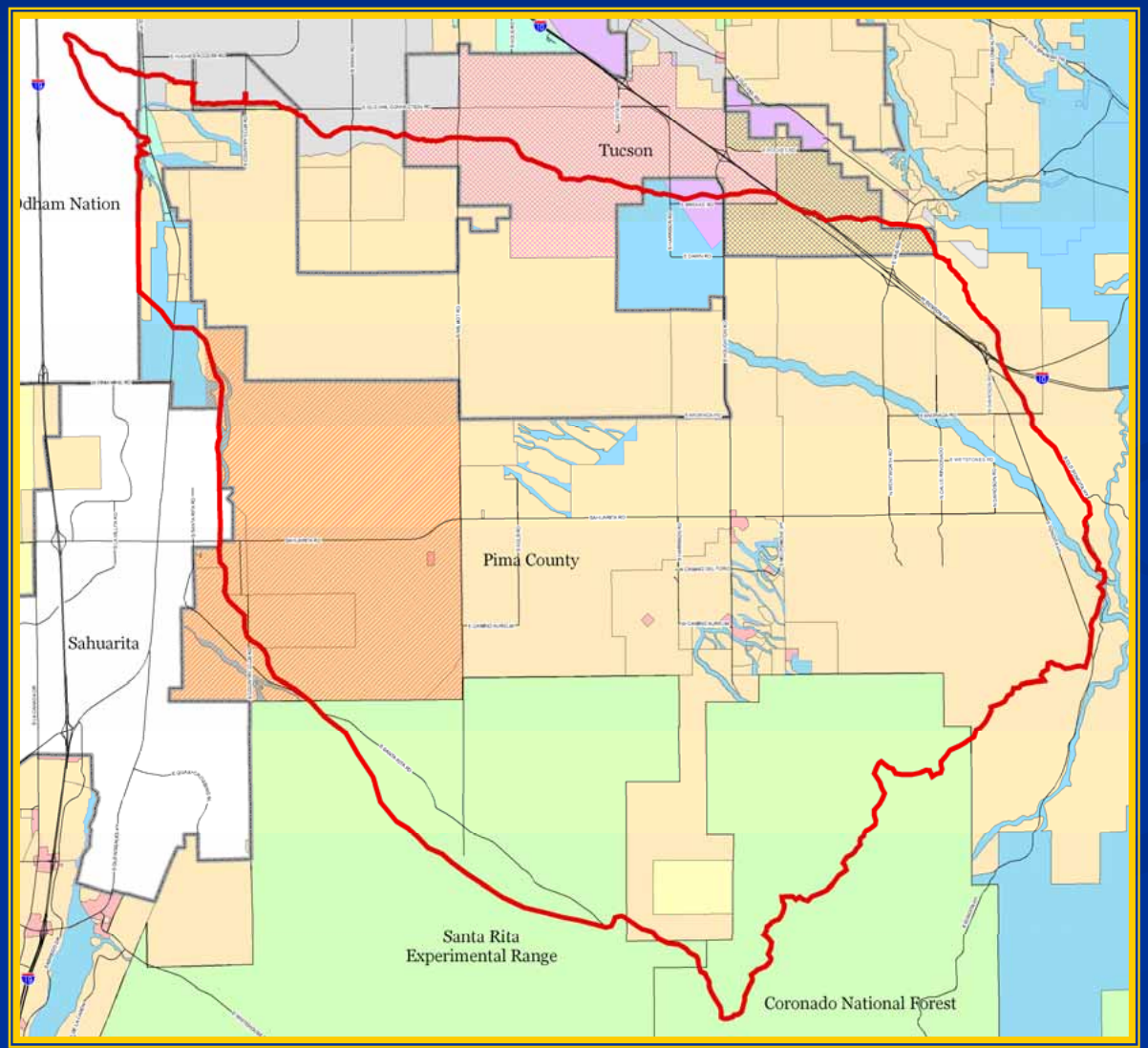
Legend

- Residential
- Industrial
- Activity Center
- Multifunctional Corridor
- Military Airport
- Resource Productive
- Resource Transition
- Public Preserves

LEE MOORE WASH BASIN MANAGEMENT STUDY

DATA COLLECTION/EXISTING CONDITIONS EVALUATION

Proposed Land Uses



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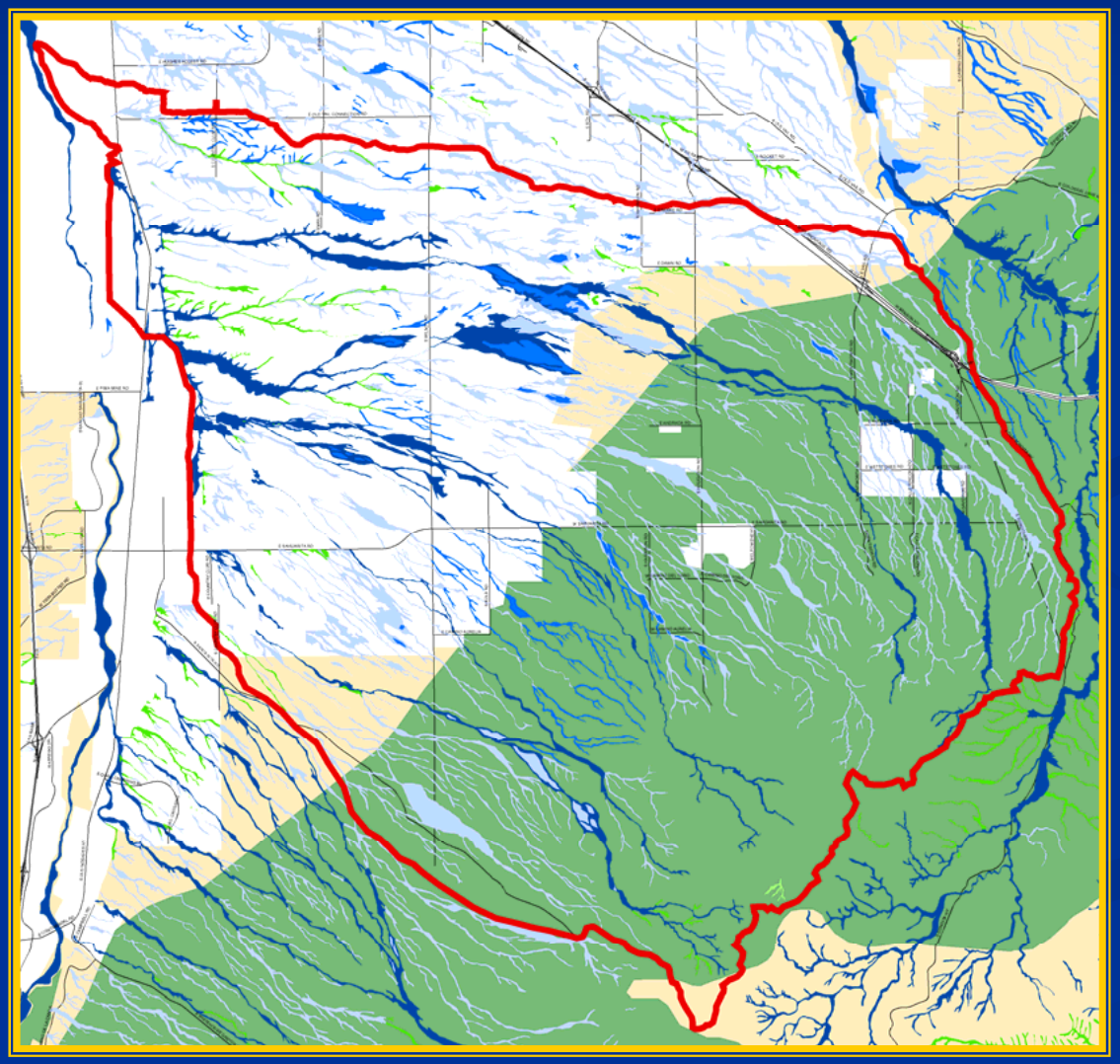
DATA COLLECTION/EXISTING CONDITIONS EVALUATION

Environmentally Sensitive Lands



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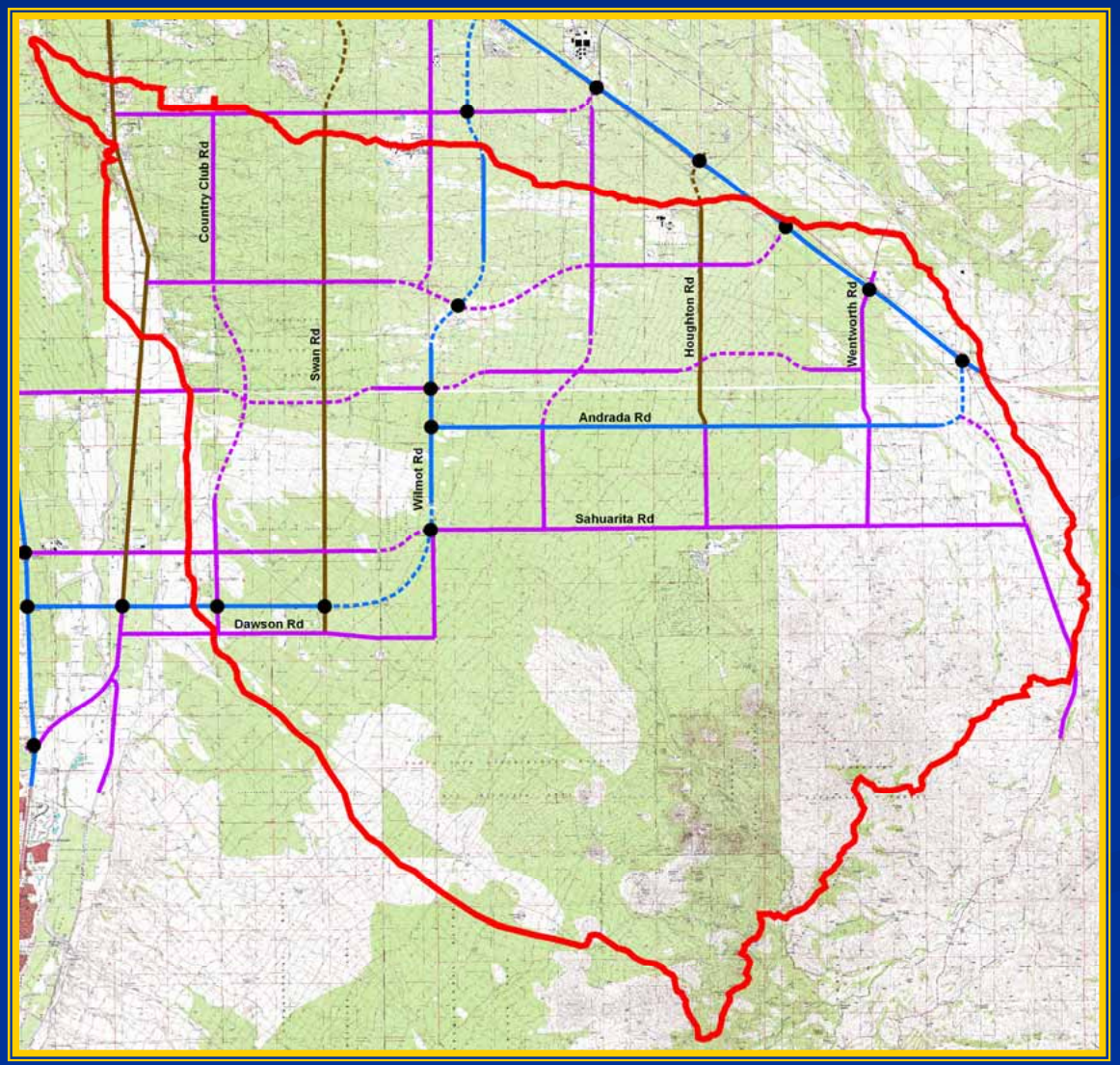
DATA COLLECTION/EXISTING CONDITIONS EVALUATION

Regional Transportation



Legend

- Service Interchange

Conceptual Alignments

- Arterial (150-foot ROW)
- Parkway (300-foot ROW)
- Parkway (150-foot ROW)

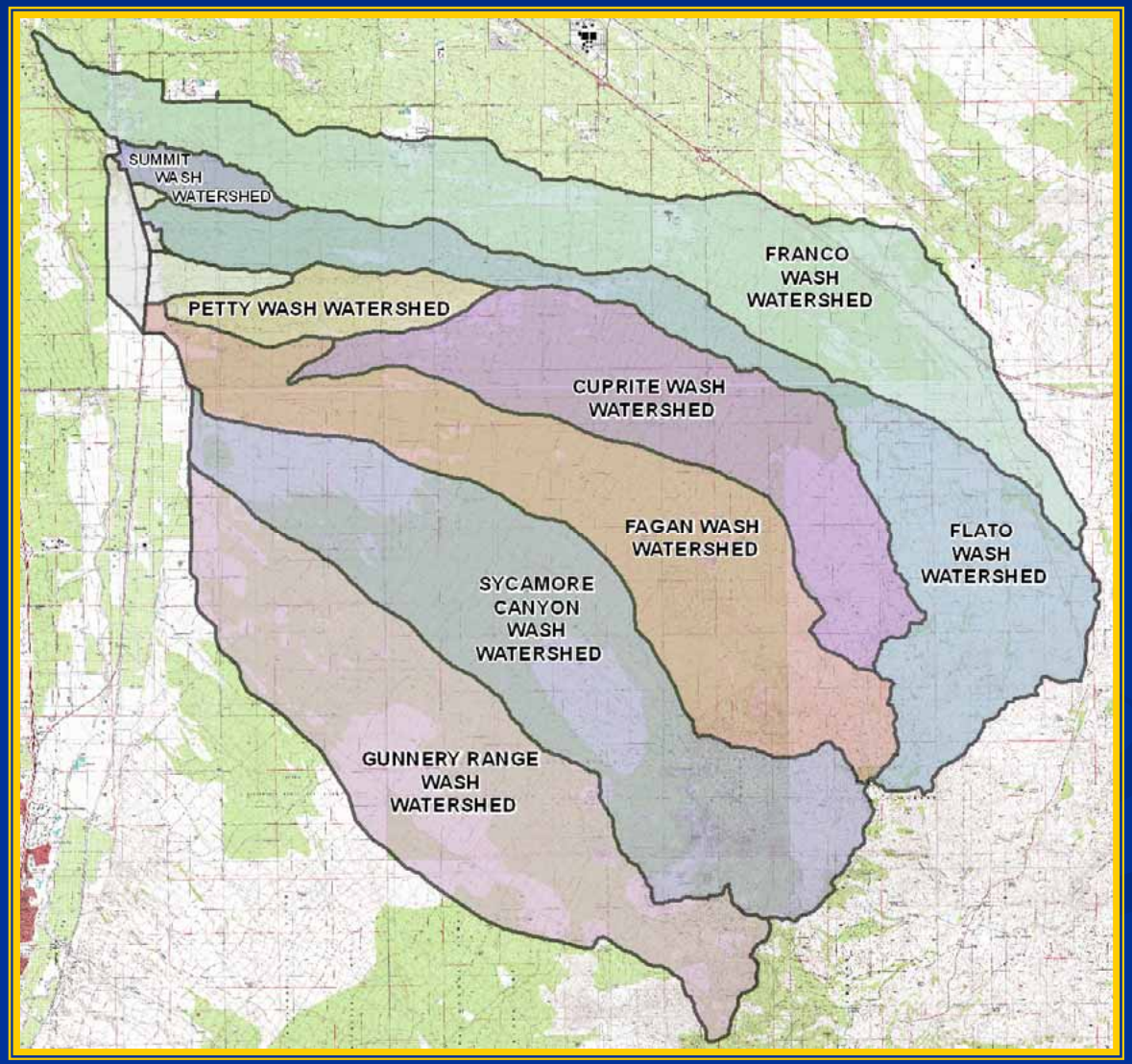
Alignments to be Determined

- Arterial (150-foot ROW)
- Parkway (300-foot ROW)
- Parkway (150-foot ROW)

LEE MOORE WASH BASIN MANAGEMENT STUDY

DATA COLLECTION/EXISTING CONDITIONS EVALUATION

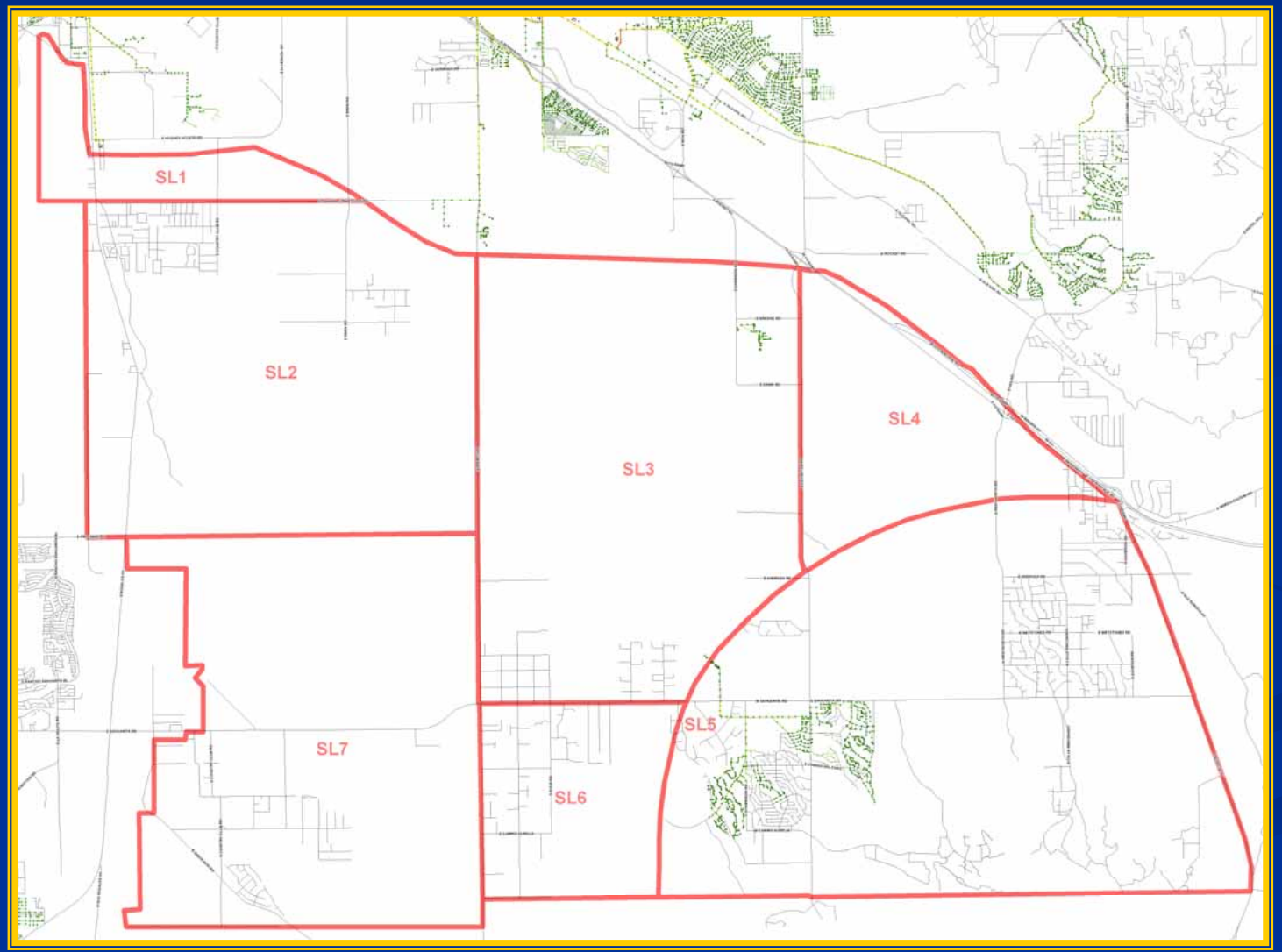
Existing Drainage Conditions



LEE MOORE WASH BASIN MANAGEMENT STUDY

DATA COLLECTION/EXISTING CONDITIONS EVALUATION

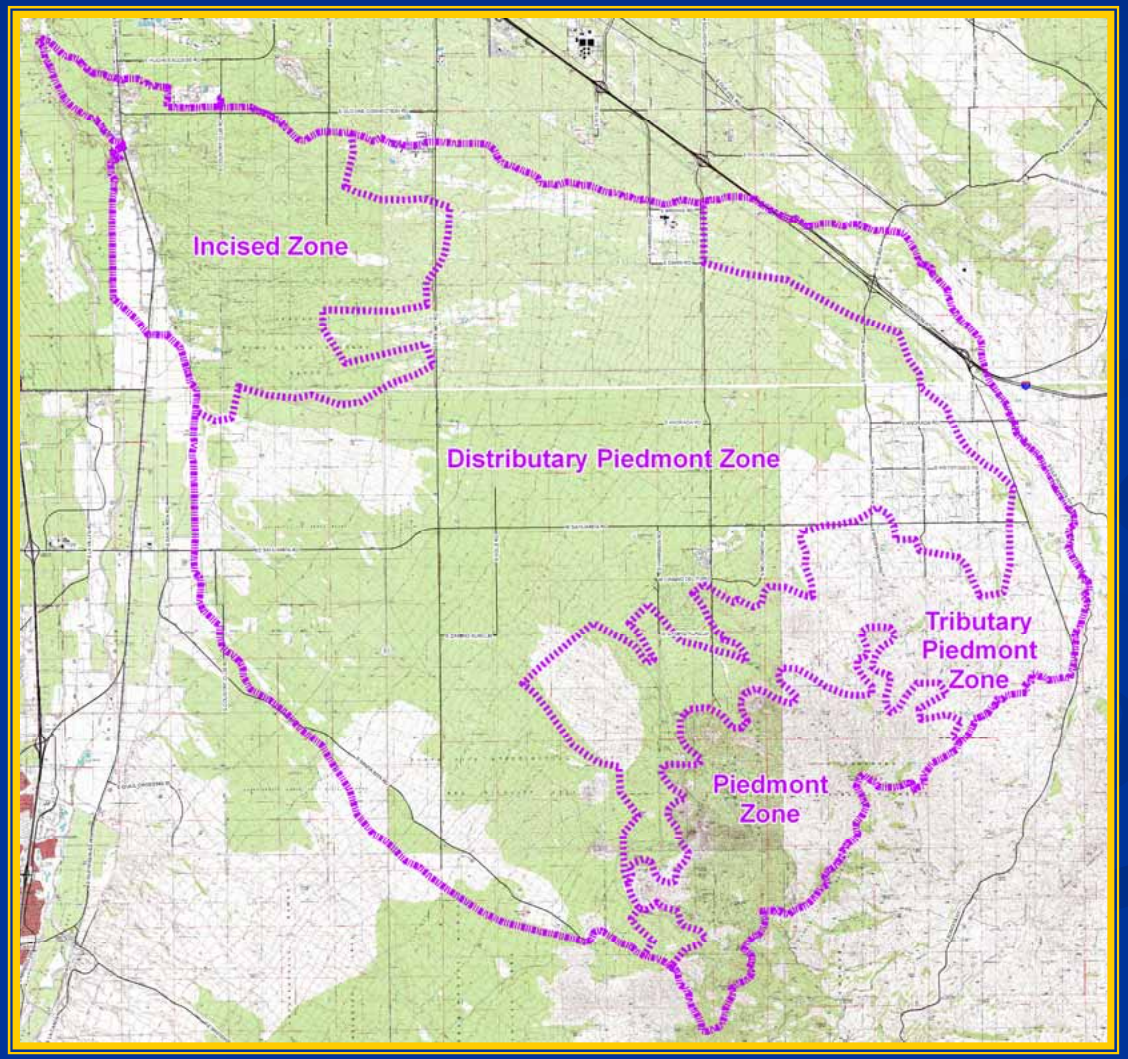
Existing Sewer Infrastructure



LEE MOORE WASH BASIN MANAGEMENT STUDY

DATA COLLECTION/EXISTING CONDITIONS EVALUATION

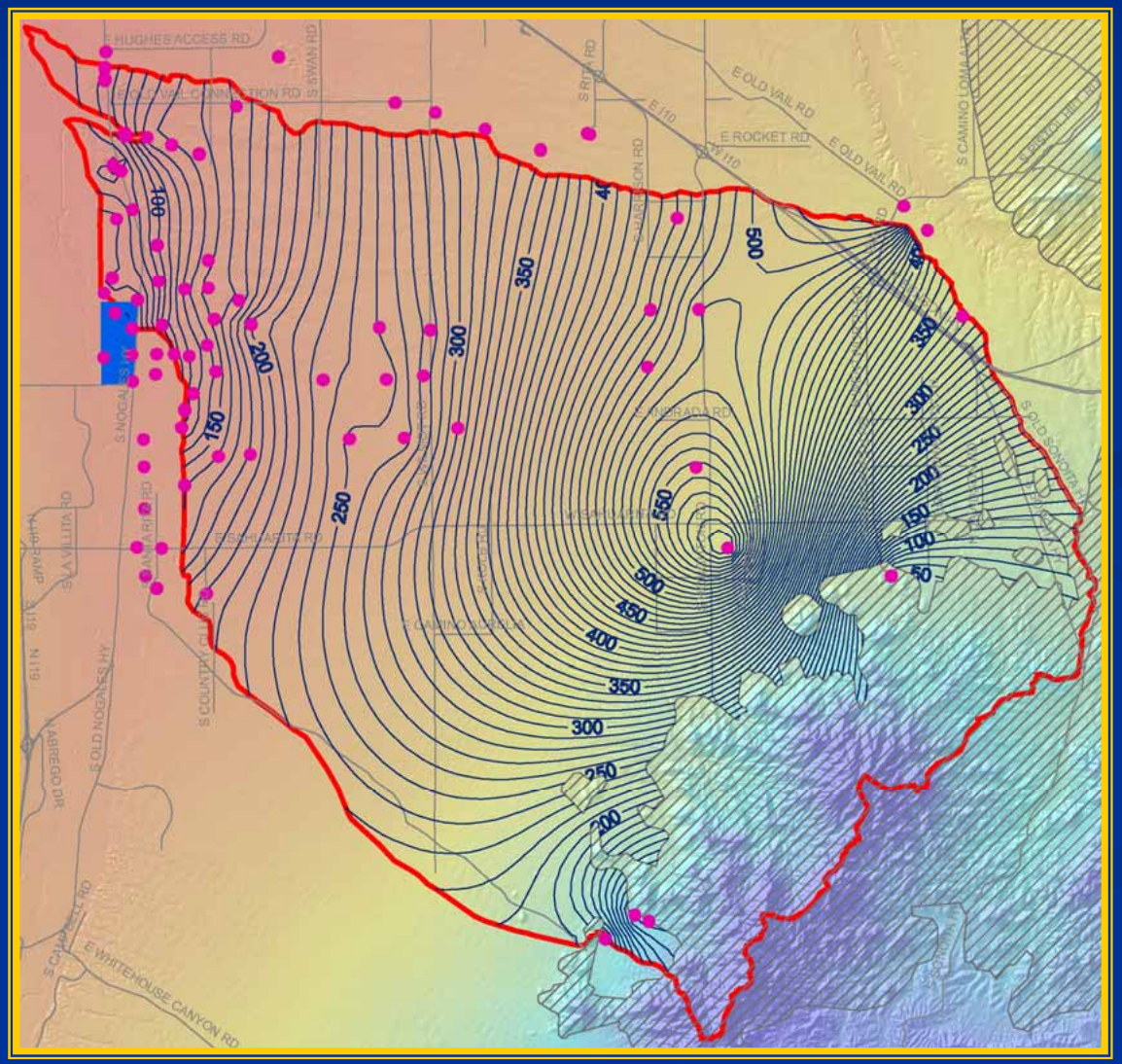
Geomorphic Setting



LEE MOORE WASH BASIN MANAGEMENT STUDY

DATA COLLECTION/EXISTING CONDITIONS EVALUATION

Hydrogeology



Legend

- Study Area
- Major Streets
- Surface Bedrock

Ground Surface Elevation
(feet above mean sea level)

- High : 6632
- Low : 2445
- GWSI Wells with 2005-6 Water Levels
- Pima Mine Road Recharge Project
- Depth to Water 2005-6

LEE MOORE WASH BASIN MANAGEMENT STUDY

FLOODPLAIN DELINEATION

DATA

- 2005/2002 PAG
- Orthophotos
- Elevation Data
- USGS

HYDROLOGY

- HEC-HMS
- FLO-2D

HYDRAULICS

- HEC-RAS
- FLO-2D

GEOMORPHIC ANALYSIS

MAPPING

LEE MOORE WASH BASIN MANAGEMENT STUDY

PRELIMINARY ALTERNATIVES

DRAFFT FLOODPLAINS

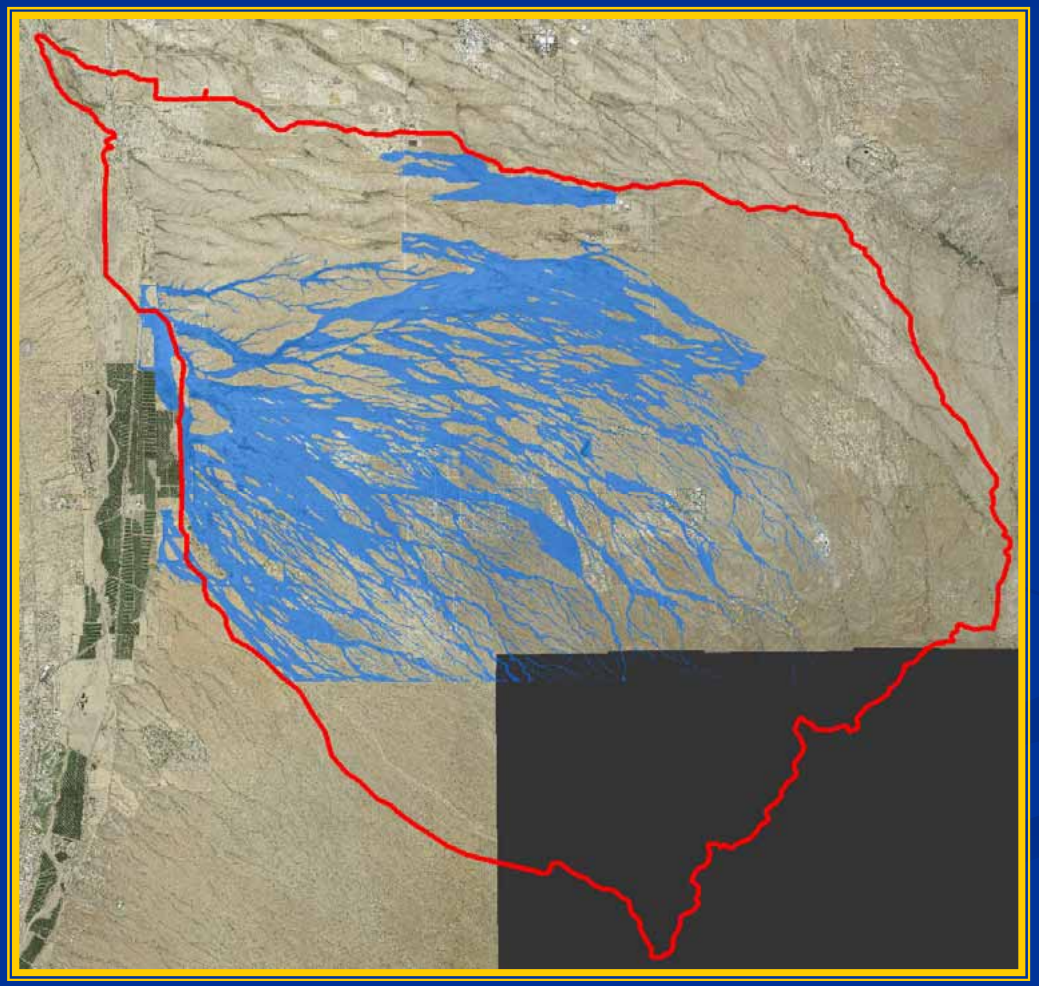
- HEC-RAS (One Dimensional)

LEE MOORE WASH BASIN MANAGEMENT STUDY

PRELIMINARY ALTERNATIVES

DRAFT FLOODPLAINS

- FLO-2D (Two Dimensional)



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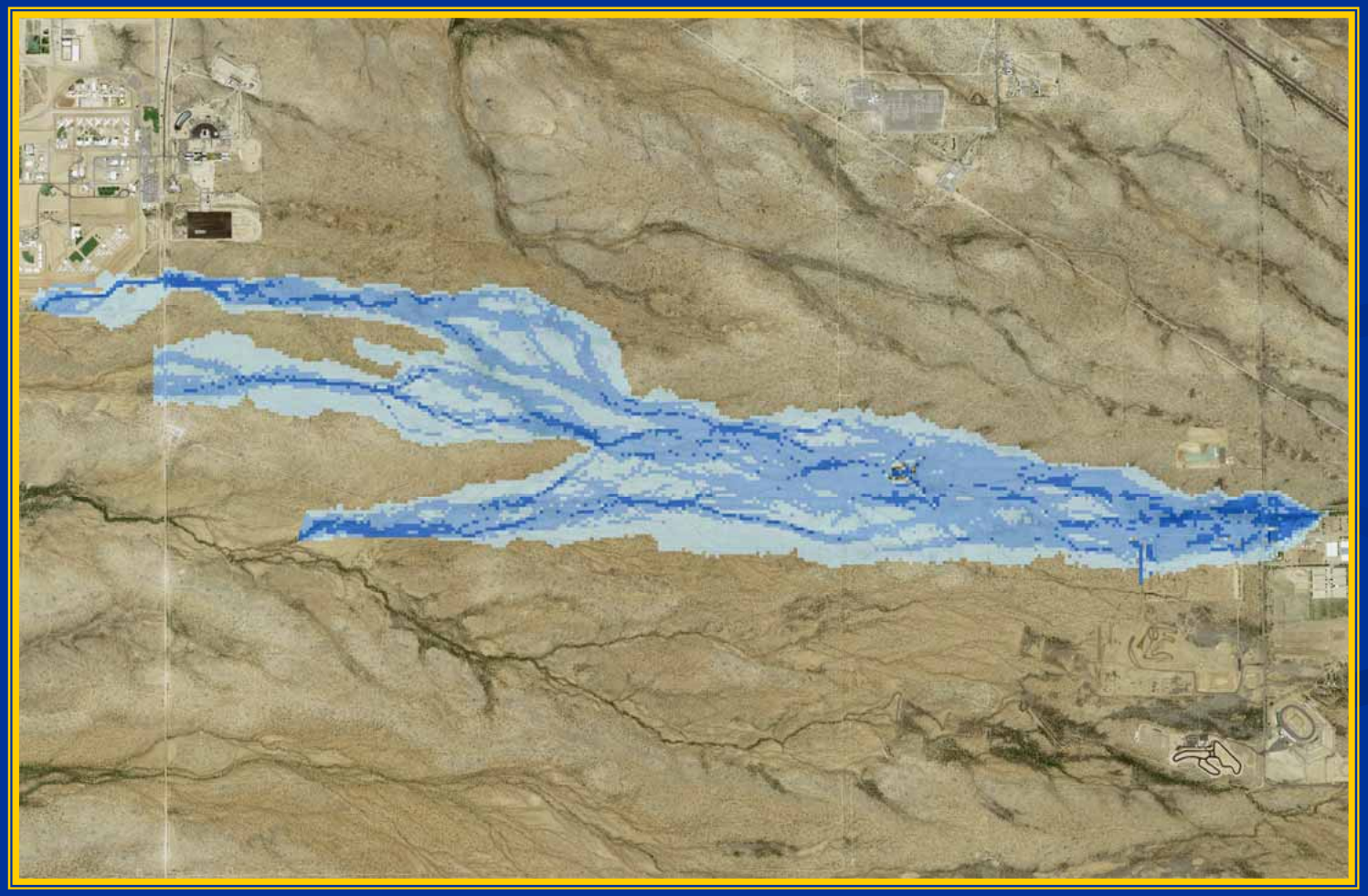
PRELIMINARY ALTERNATIVES

DRAFT FLOODPLAINS

- FLO-2D (Two Dimensional)



LEE MOORE WASH BASIN MANAGEMENT STUDY

FUTURE TASK: ALTERNATIVES ANALYSIS

TASKS

- Existing Constraints Map
- Alternatives Concept Design
- Feasibility Analyses
- Cost Analyses
- Public/ Stakeholder Involvement

OUTCOME

- Evaluation Criteria
- Recommended Alternatives (Feasibility Level)
- Rules of Development

TIMELINE

- Spring 2008 - December 2008

LEE MOORE WASH BASIN MANAGEMENT STUDY

FUTURE TASK: IMPLEMENTATIONS

TASKS
- Recommended Alternatives

CONCEPT DESIGN
- Rules of Development
- Public/ Stakeholder Involvement

OUTCOMES
- Benefits Identification
- Recommended Alternatives

TIMELINE
- June 2008 - December 2008

LEE MOORE WASH BASIN MANAGEMENT STUDY

SCHEDULE

• Data Collection/Existing Conditions	June – April 2007
• Hydrologic Analysis	September 2006 – November 2007
• Hydraulic Analysis	September 2006 – February 2008
• Geomorphic Analysis	September 2006 – February 2008
• Alternative Identification	November 2007 – June 2008
• Rules of Development	November 2007 – August 2008
• Final Deliverables	November 2008

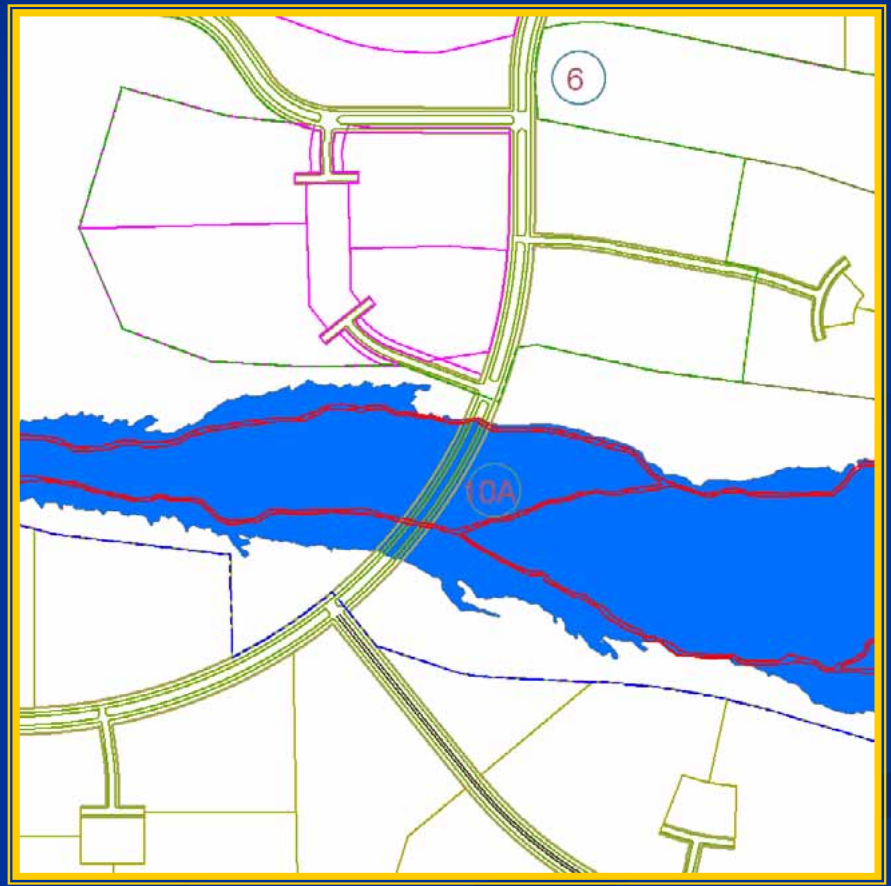
LEE MOORE WASH BASIN MANAGEMENT STUDY

RULES OF DEVELOPMENT

Technical and Regulatory Guidelines Specific to the Watershed will be Developed.

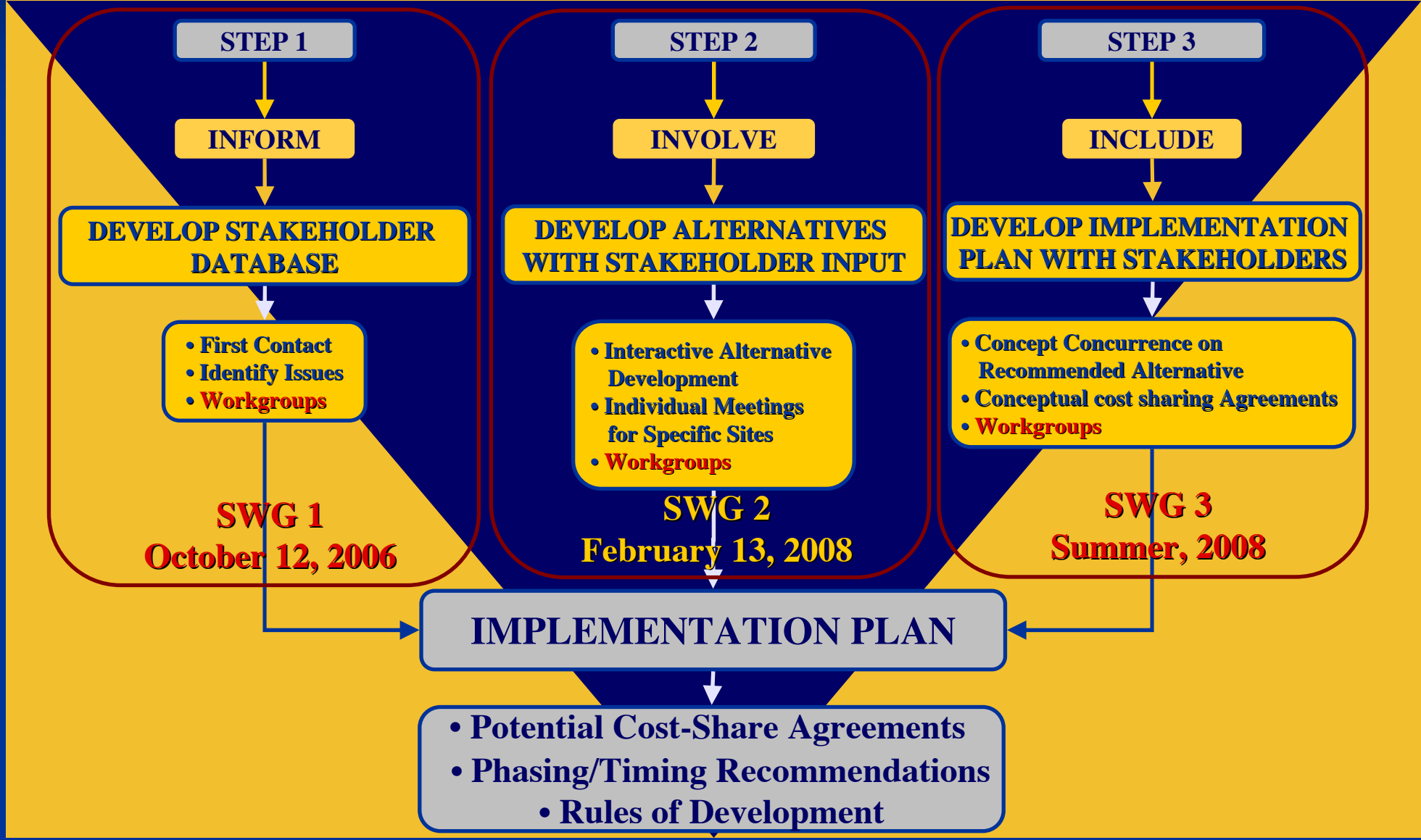
Examples Could Include:

- **Erosion Hazard Setbacks**
- **Disturbance Envelope**
- **Wall & Fences**
- **Inspection and Maintenance of Impoundment Facilities**
- **Culvert and Energy Dissipation**



LEE MOORE WASH BASIN MANAGEMENT STUDY

STAKEHOLDER WORKGROUP SCHEDULE



COMMENTS
&
QUESTIONS ?

Pima County Regional
FLOOD CONTROL
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