SCAMA / NOGALES WATER STORAGE STUDY APPRAISAL STUDY

USIBWC Meeting

January 12, 2012

Photo by John Hoffman.
The Santa Cruz River between Nogales and Tumacácori

Securing Arizona's Water Future

Arizona Department of Water Resources

RECLAMATION

SCAMA / NOGALES WATER STORAGE STUDY

Presentation Topics

1. IGA, Partners, and Cost Share
2. Appraisal Study Process
3. Problem Statement
4. Long List of Alternatives
5. Criteria Assessment
6. Reuse and Tributary Recharge Alternatives
7. Project Status
   - Funding
   - Accomplishments

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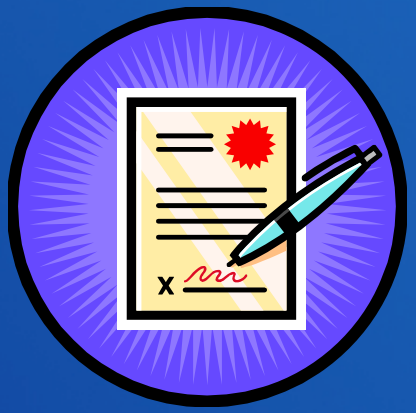
- In 2006 Intergovernmental Agreement (IGA) CONTRACT NO. 2006-2638IGA was finalized with Partners:
  - Reclamation
  - City of Nogales
  - ADWR
  - Santa Cruz County “Sponsor”



- Plan of Study (POS)

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- Total Estimated Study Cost - $1 million
- 50% match-of-study costs
  - ADWR direct funding or in kind
  - Nogales direct funding or in kind
- Cost share accounting and reporting required

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Appraisal Level Study

- Compile existing data and information
- Identify
  - problem statement
  - at least one potential solution
  - potential future Federal involvement
- Typical duration of Appraisal Study – about 2 years when Reclamation funded at about $200K/year
- Used to determine whether feasibility study is necessary

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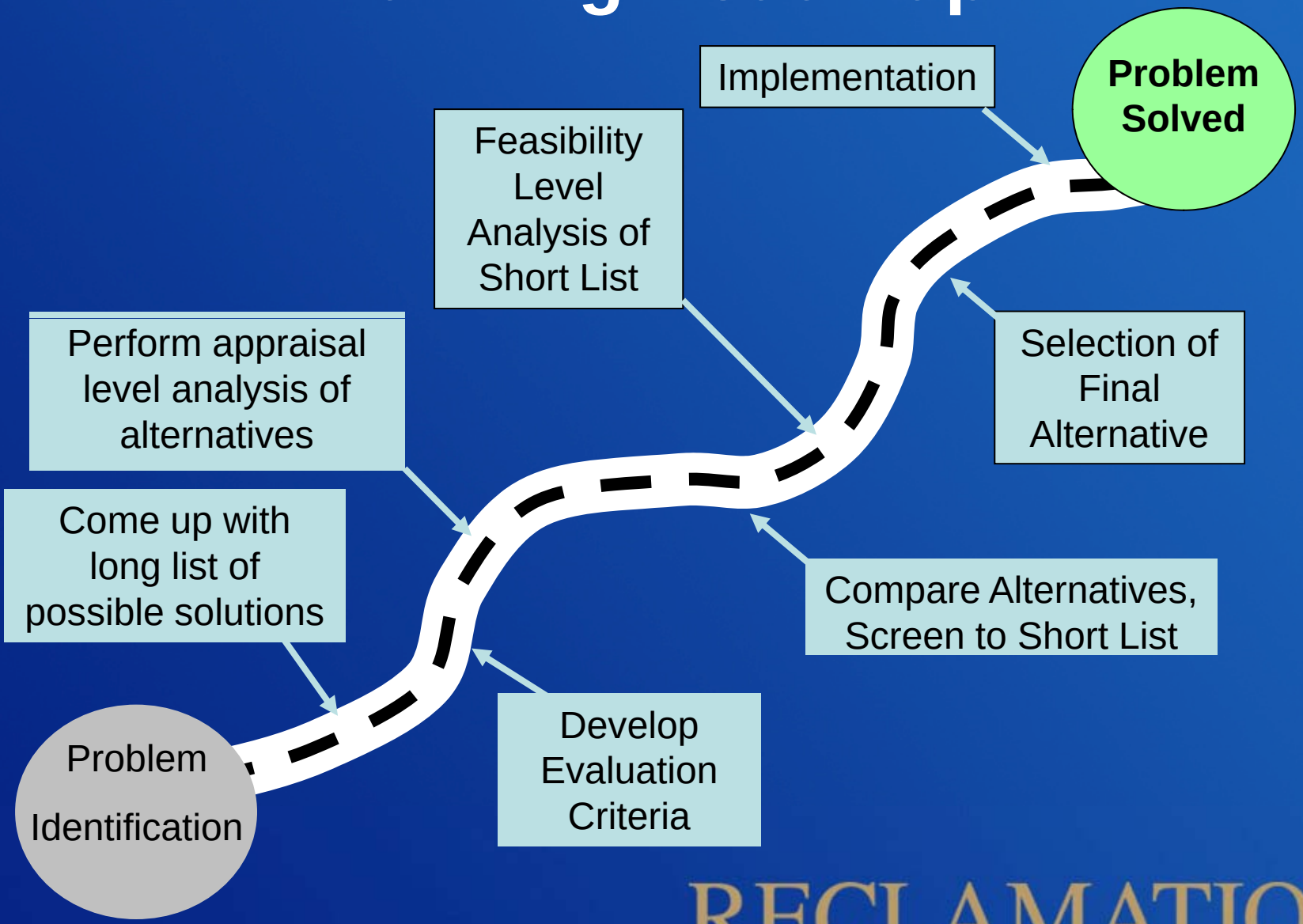
SCAMA / NOGALES WSS Planning Roadmap



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Problem Statement 1/20/09

The Santa Cruz Active Management Area has limited storage in local aquifers used for water supplies. Long-term storage and water augmentation alternatives are required to meet varied water demands in different locations of the SCAMA during times of drought. SCAMA total water demand can be up to approximately 40,000 acre-feet per year[1]. Sufficient supply to meet these demands needs to be maintained to avoid future shortages. A set of water augmentation solutions is needed that would add approximately 40,000 acre-feet of storage by 2018 to augment a portion of the total supply during seasonal localized pumping and during shortages resulting from a 10-year drought.

[1] Source: ADWR January 2009 SCAMA Assessment, calculated average demand from 1985 to 2006.

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Identify Long List of Alternatives

Alternatives include:

- Conservation
- Reuse
- Rainwater Harvesting
- Stormwater Harvesting
- Recharge
- Dams
- No Action

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SCAMA / NOGALES WSS Alternatives

Alternative Name	Alternative Short Description
City of Nogales/Santa Cruz County Rainwater/storm water harvesting commercial and industrial	**Retrofit existing structures for roof-top capture of rainwater and conveyance to storage tank, subsurface detention, or recharge facility. **Construct system for roof-top capture of rainwater and conveyance to storage tank, subsurface detention, or recharge facility. **Retrofit existing structures for subsurface detention to reduce stormwater flows and recharge groundwater. **Construct system for subsurface detention that would reduce stormwater flows and recharge groundwater.
Stormwater Harvest/Recharge in Cumero Canyon	Develop detention and recharge facilities in Cumero Canyon in the watershed for the Highway 82 Microbasin wellfields. Subsurface Dam/Sand-Storage Dam/Gabions.
Stormwater Harvest/Recharge and recharge Lake Patagonia water in Guevavi and Burro Canyons	Develop detention and recharge facilities in Guevavi and Burro Canyons in the watershed for the Guevavi Microbasin wellfield. Subsurface Dam/Sand-Storage Dam/Gabions. Halpenny proposal, Nogales build pipeline to convey 4,000 AFY (Nogales has Permit to appropriate 4,200 AFY) from Patagonia Lake to Guevavi Wash to be used to recharge the Guevavi well field. Money from sale of 4,000 AFY of CAP were to be used to retire the purchase bonds of the 1,000 AFY Guevavi water rights. Halpenny reports this as a 5,000 AFY project.
Stormwater Harvest/Recharge in Cañada de la Palomina/Wildhog Canyon	Develop detention and recharge facilities in Palomina and Wildhog in the watershed for the Kino Springs Microbasin wellfield. Subsurface Dam/Sand-Storage Dam/Gabions.
Stormwater Harvest/Recharge in SCR adjacent to the Border	Nogales owns land at the border. Recharge facilities could be developed to recharge SCR and future postdevelopment stormflow. In channel Gabions/grade control structures, off-channel basins.

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SCAMA / NOGALES WSS Alternatives

Alternative Name	Alternative Short Description
Stormwater Harvest/Recharge in Sopori Wash	Develop detention and recharge faciilties in Sopori to mitigate cone of depression on northern end of SCAMA
Reuse treated effluent from NIWTP in Nogales, Arizona and Nogales, Sonora.	City of Nogales has right to 4,000 AFY of treated effluent. Nogales, Sonora has right to (9.9 mgd treated) treated effluent. Main from NIWTP to Nogales along SCR, IOI ROW, or I-19 frontage.
Reuse treated effluent from NIWTP at Rio Rico Golf Course	Rio Rico golf course uses groundwater on turf. Main from NIWTP outfall to Rio Rico or use SCR as conveyance and construct collection and conveyance to Rio Rico golf course.
Reuse treated effluent from Kino WWTP at Golf Course	Kino WWTP treats about 15,000 GPD to A+ with capacity of 50,000 GPD. Build pipeline to reuse on Golf Course.
Stormwater Harvest/Recharge and recharge treated effluent at Mariposa Gravel Pit	Former gravel pit that could be used as a recharge basin for excess treated effluent or captured postdevelopment stormflows.
Stormwater harvest/recharge and recharge treated effluent at Pesqueira Canyon Gravel Pit	The gravel pit will no longer be active in 2 to 3 years and will be reclaimed. It could be reclaimed as a recharge basin for excess treated effluent or captured storm flows with recreation surrounding it. Note: owner reported 4/2010 gravel pit filled with water from shallow groundwater.
Stormwater Harvest/Recharge and recharge treated effluent at Potrero Canyon Forest Service Land	Develop recharge capacity on Forest Service land upstream from the Palo/Duro/Meadow Hills golf course to recharge excess treated effluent or captured postdevelopment storm flows.

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SCAMA / NOGALES WSS Alternatives

Alternative Name	Alternative Short Description
Recharge dewatered basement water.	There are two locations where water is being pumped from basements. At least one location is using a 2-inch pipe that discharged 24/7 to Nogales Wash during 2009 which amounts to about 0.67 AFY for a Sch40 2" pipe (0.174 gpm)
Wildhog Canyon Reservoir	The topography may be suitable for a dam and reservoir similar to Patagonia Lake. Paul Hathaway owns water rights here.
Nogales Dam and Reservoir	Late 1960's, Reclamation conducted a study – Inflow Design Flood Study Nogales Dam and Reservoir. The dam would be located on the Santa Cruz River about 6 miles east of the cities of Nogales, Arizona and Nogales, Sonora. “The dam would be an earthfill structure with a 40-foot wide crest 1,350 feet in length. The dam would rise 95 feet above the riverbed to elevation 3,778. Protective works would include a 152,000 cfs free-flow spillway operating on a 20-foot surcharge. A 20 cfs conservation outlet works is considered for municipal diversions. To provide the necessary functions the reservoir would require a total capacity of 50,000 acre-feet….” Under this option, it was proposed to abandon the M&I wellfield as its would no longer be necessary.
Subsurface Dam Portrero Canyon	Install subsurface dam to increase groundwater storage.
Subsurface Dam Microbasins	Install subsurface dam to increase subsurface storage.

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SCAMA / NOGALES WSS Evaluation Process

Evaluate long list of alternatives based on:

- **Implementability**
- **Effectiveness**
- **Cost**

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SCAMA / NOGALES WSS Implementability Criteria

- Technical and Administrative feasibility
  - Identify constraints which could preclude or impede implementation
- Site specific considerations
  - Land use, hydrology, geology, and regulatory and permitting requirements
- Political Constraints
  - Social equity of benefits and impacts
- Public Acceptance Constraints

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SCAMA / NOGALES WSS Effectiveness Criteria

- Measure how well each alternative meets the objectives.

- Factors considered in the evaluation include:
  - Technical effectiveness
  - Geographic distribution of benefits and impacts
  - Impact to human health and the environment
  - Reliability

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Cost Criteria

- Alternatives are compared based on relative capital and operation and maintenance (O&M) costs, not detailed estimates, expressed in $/acre-foot or $/1000 gal for comparison of alternatives

- Comparable alternatives that are significantly more expensive will probably be eliminated from further consideration

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Criteria Assessment of Alternatives

- Develop assessment criteria specific for the region.

- Work with Partners and Stakeholders to develop criteria.

- Develop alternatives based on assessment criteria.

- Assess and rank each alternative.

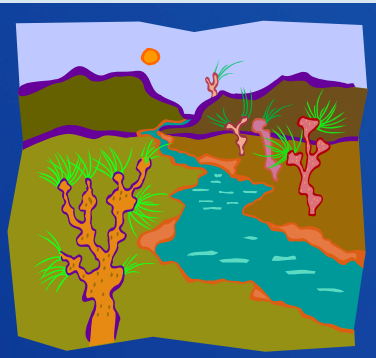
- Compare alternatives based on ranking.

SCAMA / NOGALES WSS
Develop Alternatives

Reclamation Interdisciplinary Team began Development of Two Alternatives:

1. Reuse Pipeline

2. Tributary Recharge



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Reuse Pipeline Alternative

Nogales International Wastewater Treatment Plant Outfall

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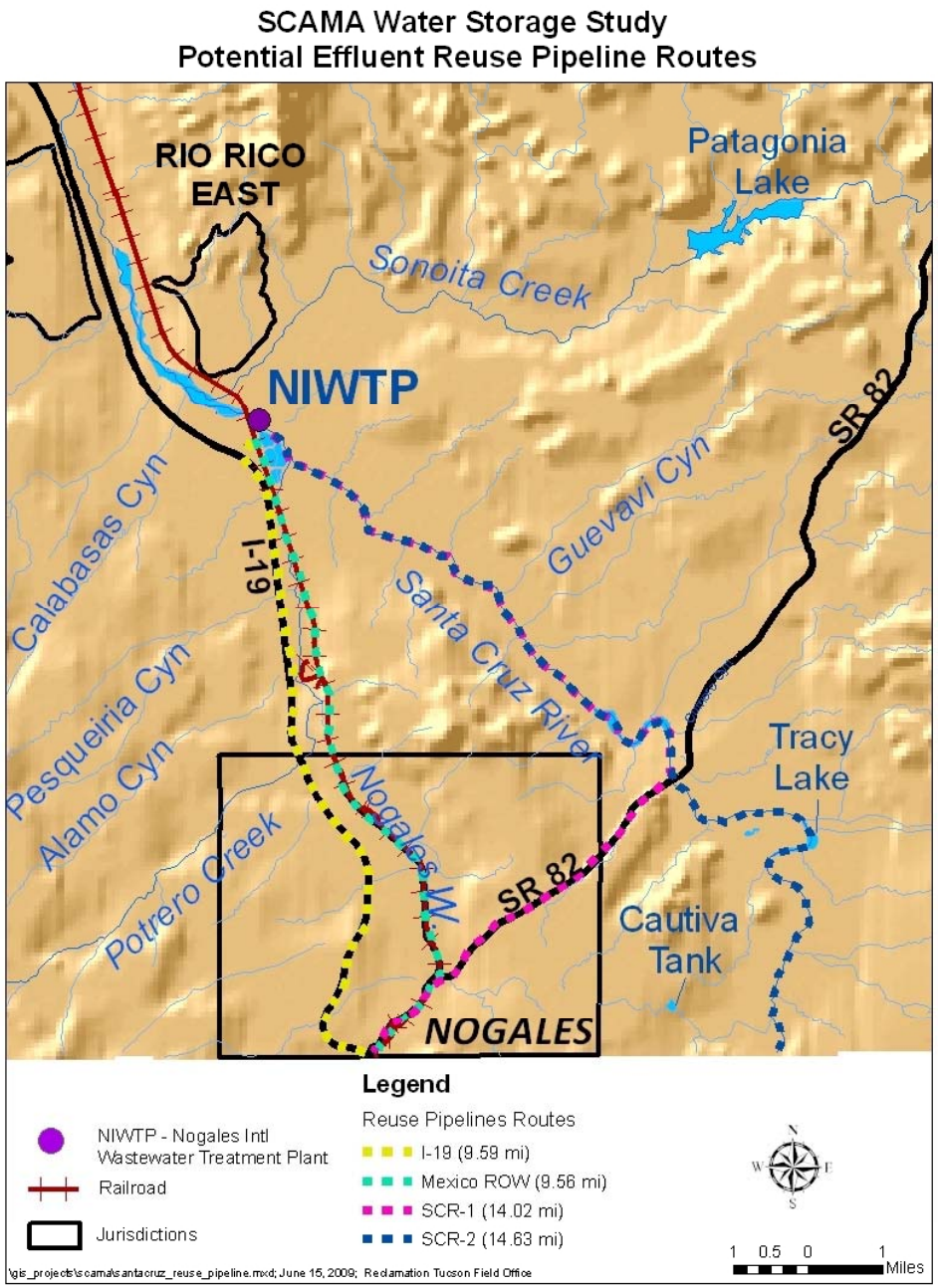

SCAMA / NOGALES WSS Reuse Pipeline Alternative Potential Routes

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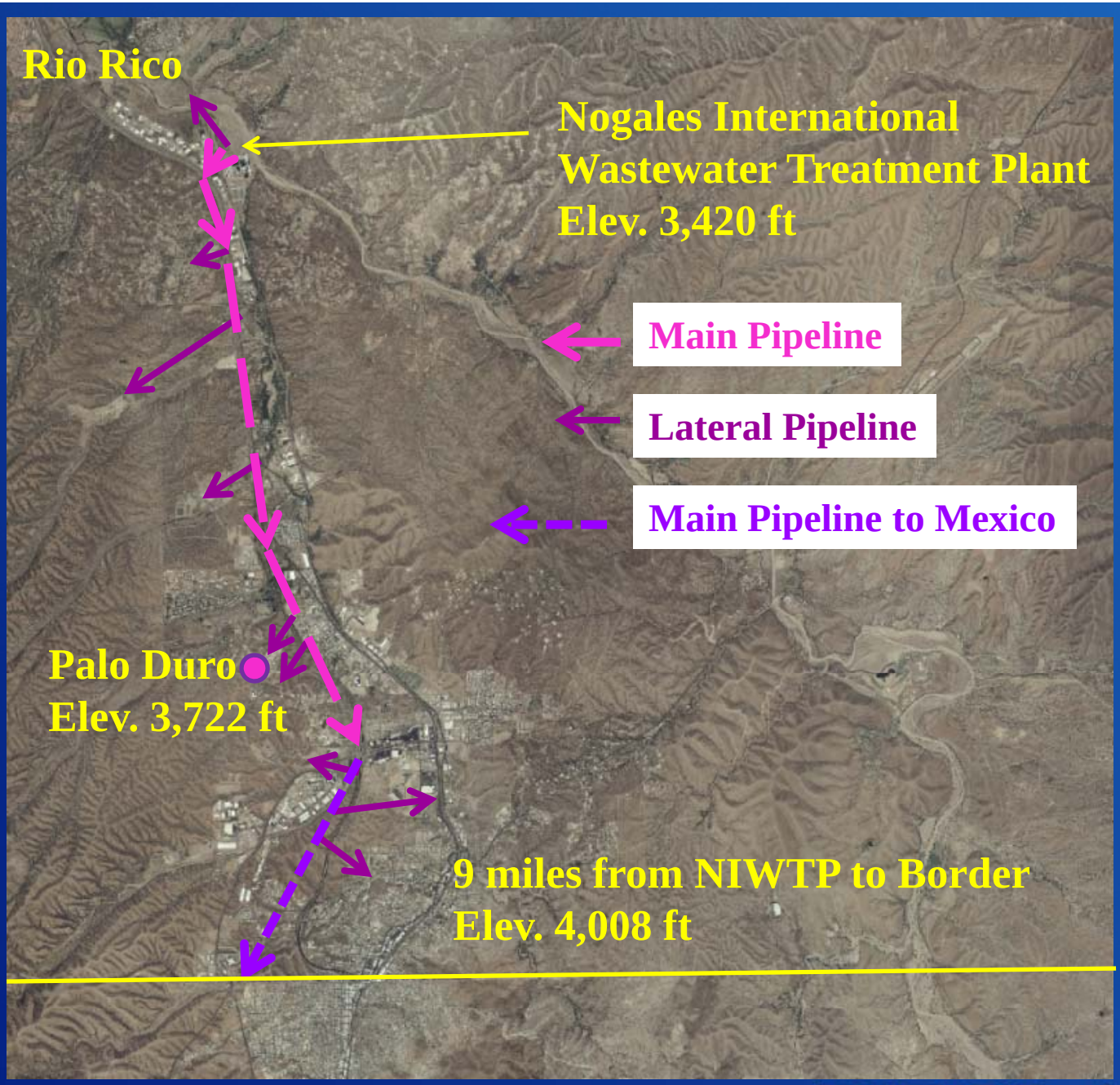

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Reuse Pipeline Proposed Main and Laterals

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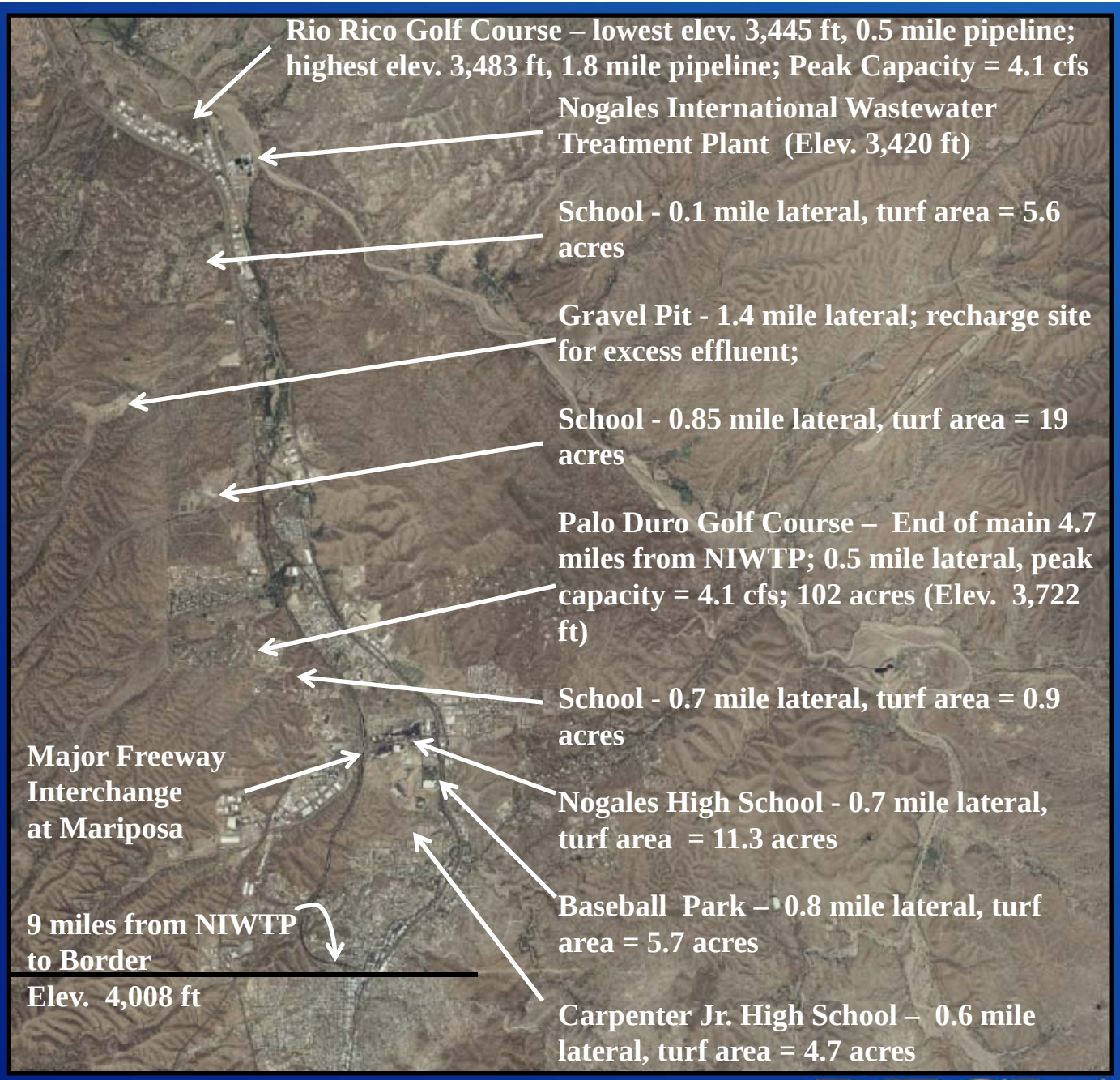

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Reuse Pipeline Alternative Reuse Options

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Replace Groundwater Use with Treated Effluent on Existing Turf

City of Nogales Turf-Related water use 866.4 AFY (SCAMA TMP)

- **Palo Duro Golf Course 647 AFY (Westland)**
- **Kino Springs GC 488.6 AFY (SCAMA TMP)**

Rio Rico and Tubac Golf Courses 1,063 AFY (SCAMA TMP)

Reduce groundwater pumping: 2,199 AF
Incidental recharge (using 5%): 110 AF
Potential increased storage: 2,309 AFY

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Funding Opportunity for Reuse Pipeline

Funding Opportunity Announcement No. R12SF80082 (www.grants.gov)

WaterSMART :

Development of Feasibility Studies under the Title XVI Water Reclamation and Reuse Program

Eligible Applicants: State regional, local authorities; Indian tribes or tribal organizations; or a water district, wastewater district, or rural water district.

50% cost share, up to $150,000 per applicant, applications due February 13, 2012

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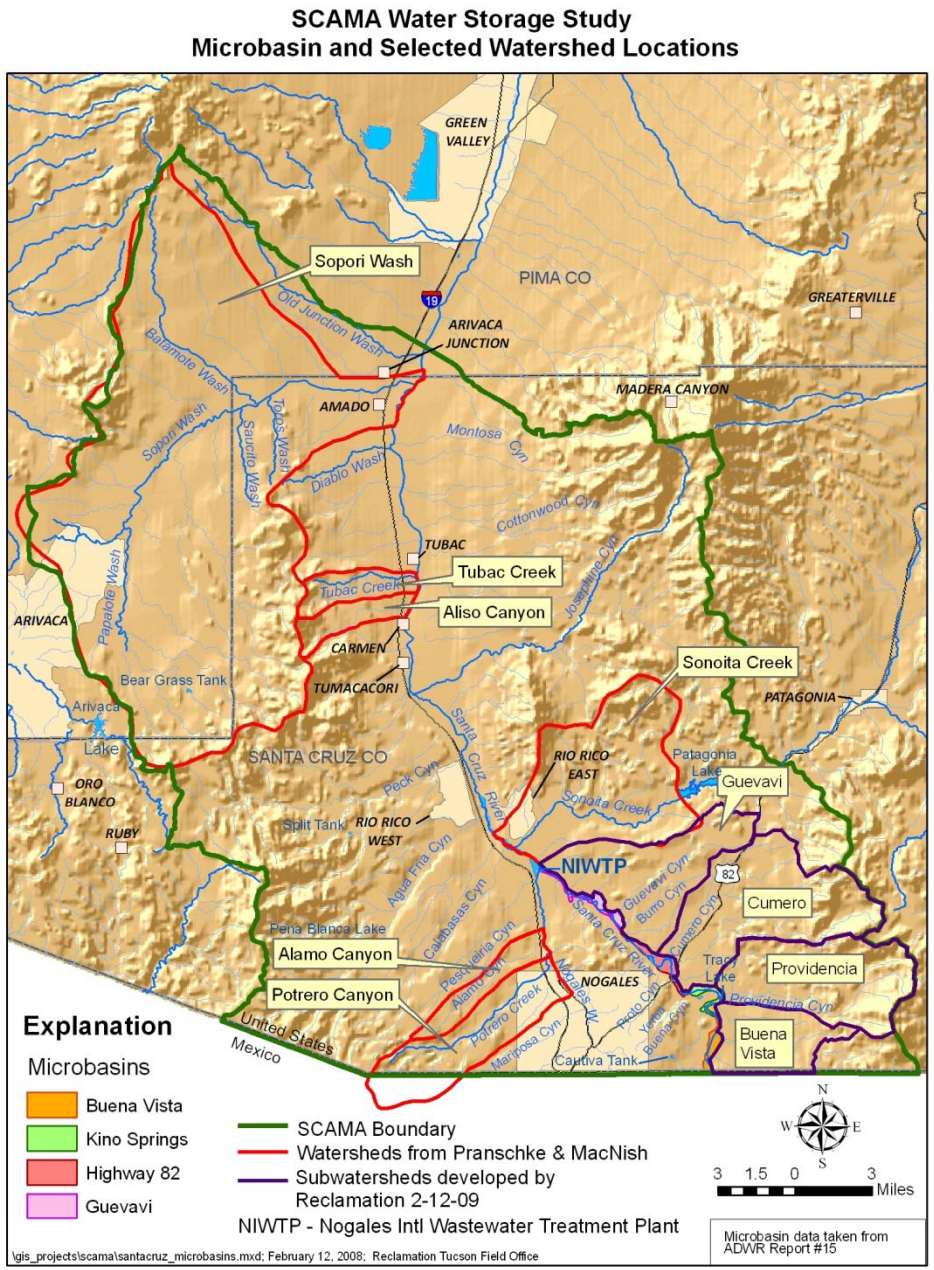

SCAMA / NOGALES WSS Tributary Recharge Alternative

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Tributary Recharge Alternative Example

Aerial view of plugs in the San Bernardino Valley

Source: http://www.elcoronadoranch.net/, accessed 09/15/10

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SCAMA / NOGALES WSS
Tributary Recharge Example

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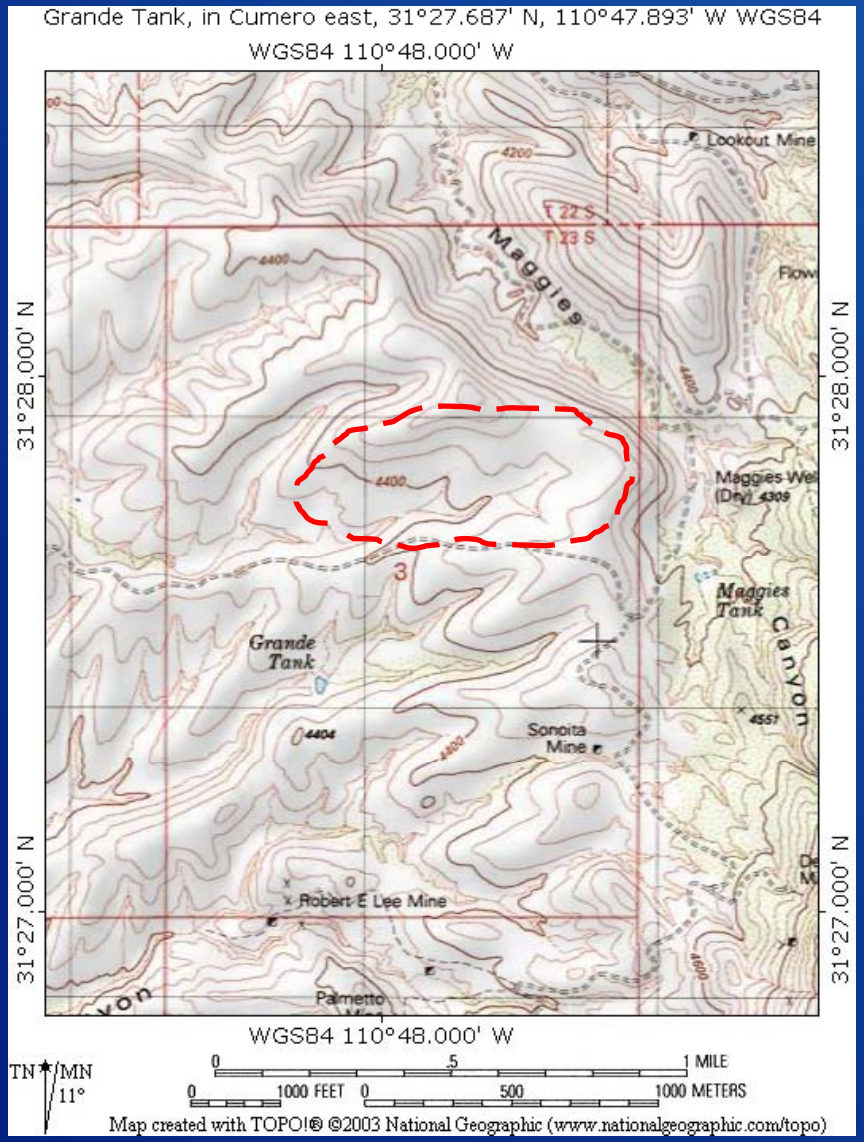
Tributary Recharge Alternative Example



Watering Tanks / Cattle Ponds

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Tributary Recharge Alternative Example

Gravel Pit - basin excavations for detention ponds

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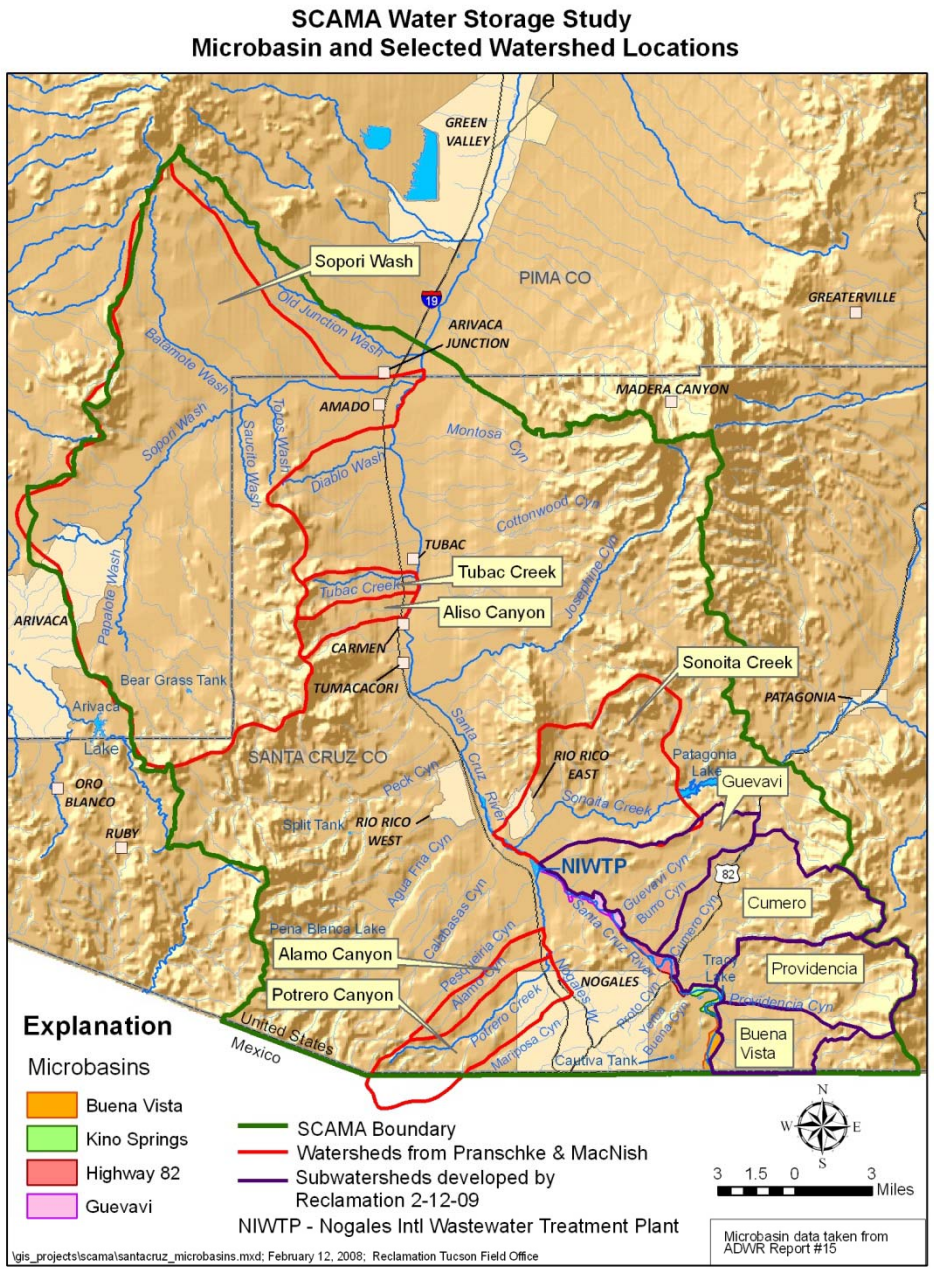

SCAMA / NOGALES WSS Recharge Tributary Alternative Wildhog Canyon

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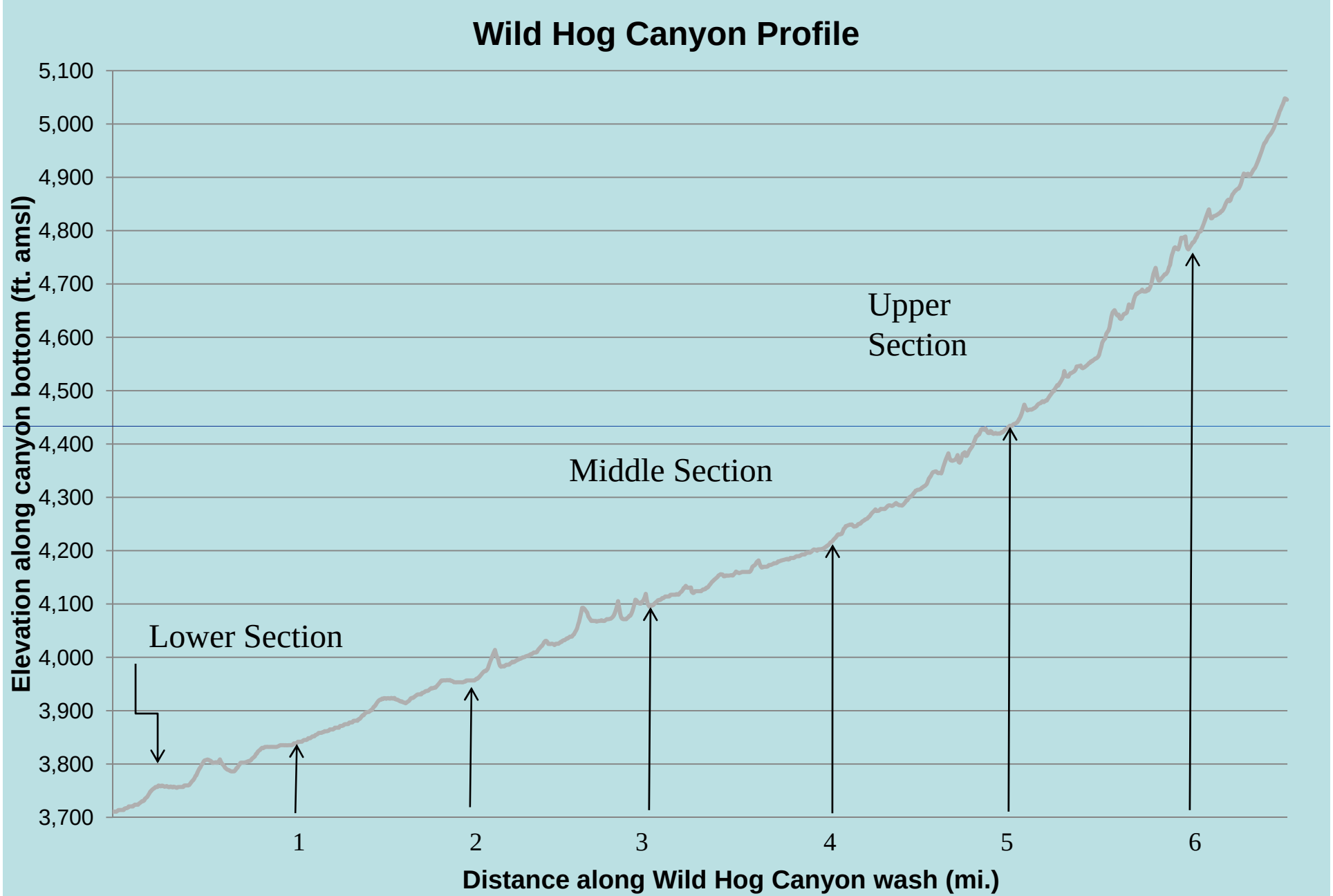
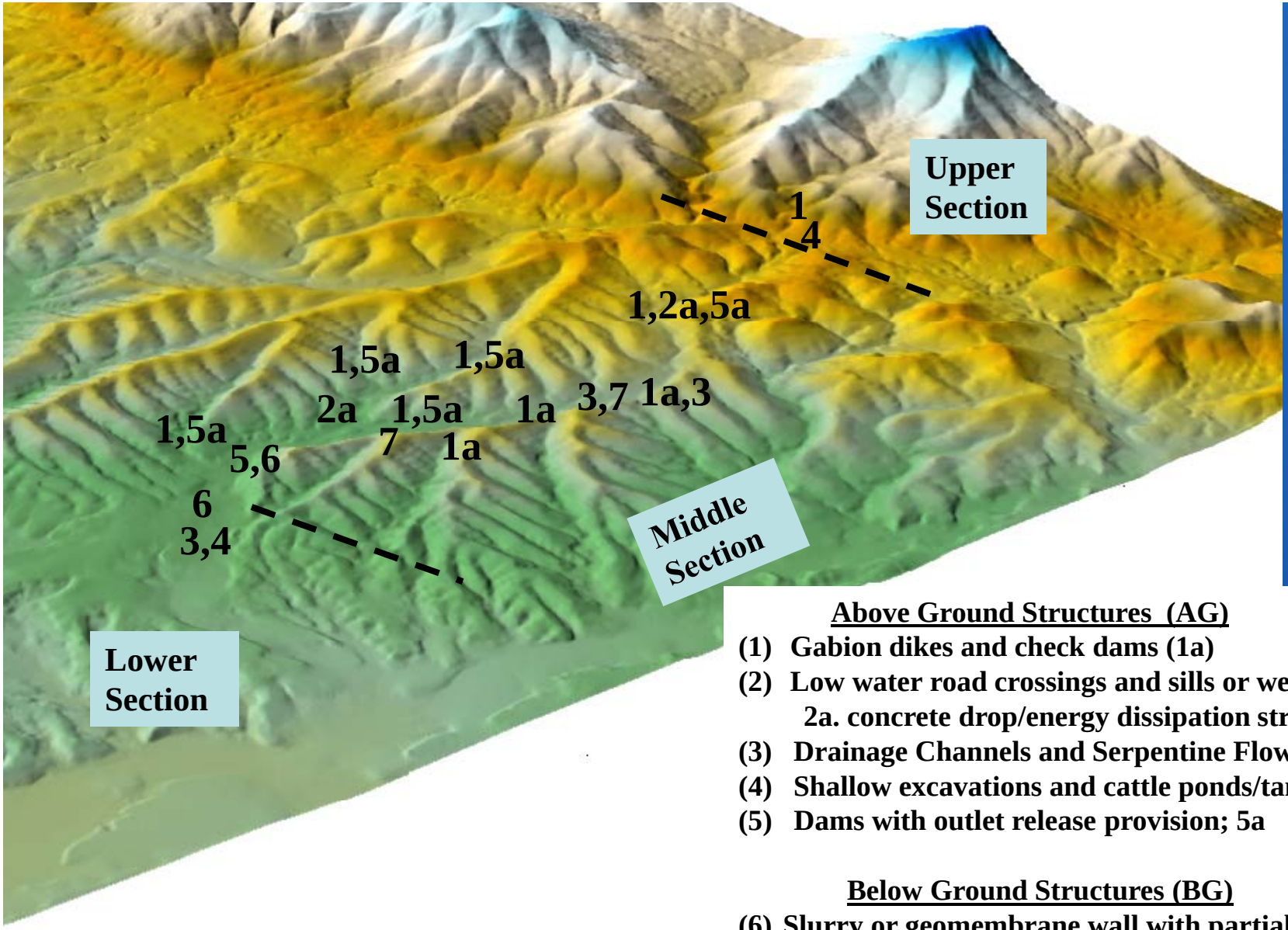


Profile begins at confluence with Providencia Canyon just above Kino Springs Micro-basin
Profile generated from 10m DEM in ArcGIS



Above Ground Structures (AG)

(1) Gabion dikes and check dams (1a)
(2) Low water road crossings and sills or weirs and 2a. concrete drop/energy dissipation structures
(3) Drainage Channels and Serpentine Flow Paths
(4) Shallow excavations and cattle ponds/tanks
(5) Dams with outlet release provision; 5a

Below Ground Structures (BG)

(6) Slurry or geomembrane wall with partial cut-off
(7) Infiltration galleries or trenches
(8) Combinations

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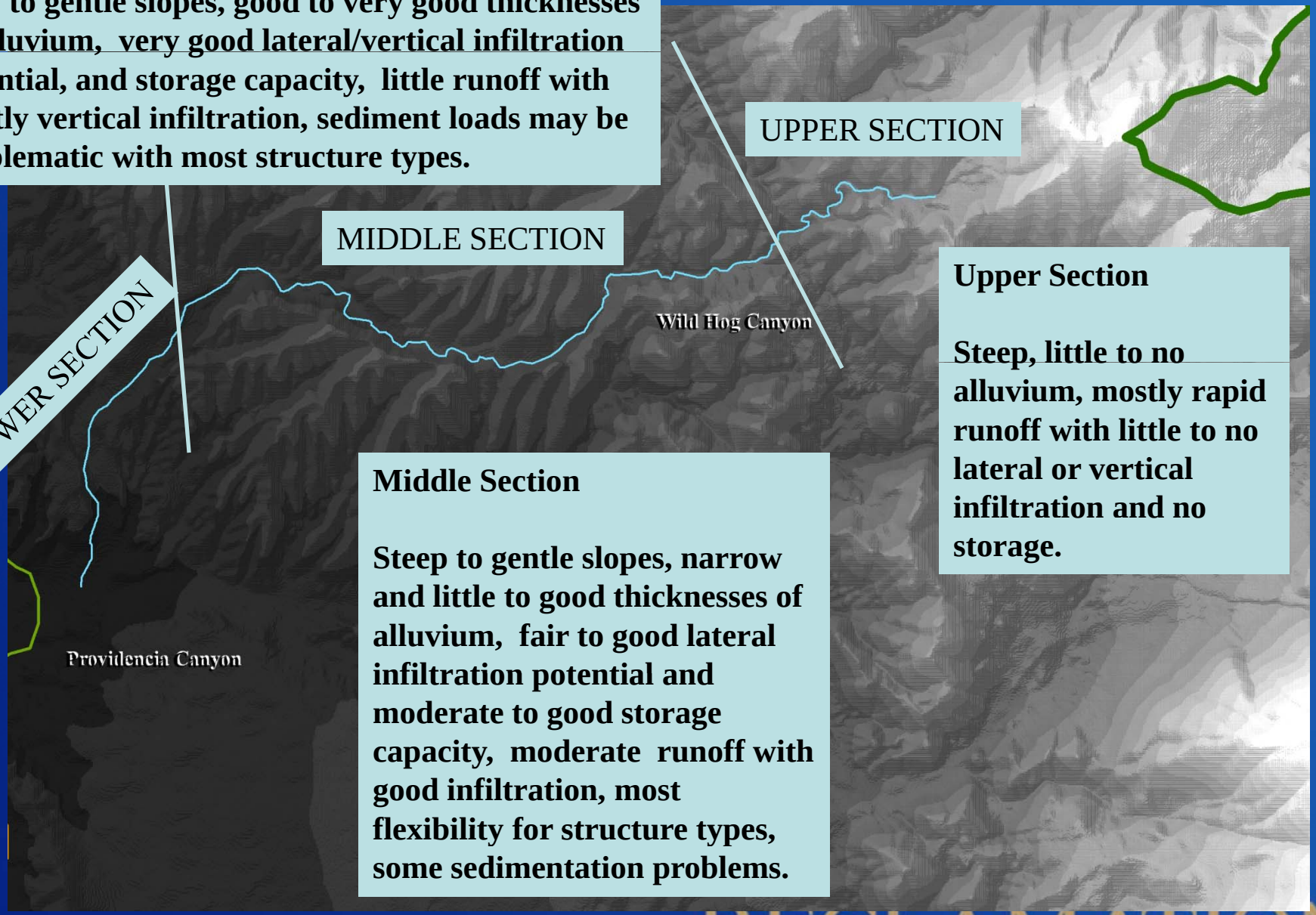
Lower Section

Flat to gentle slopes, good to very good thicknesses of alluvium, very good lateral/vertical infiltration potential, and storage capacity, little runoff with mostly vertical infiltration, sediment loads may be problematic with most structure types.



Upper Section

Steep, little to no alluvium, mostly rapid runoff with little to no lateral or vertical infiltration and no storage.

Middle Section

Steep to gentle slopes, narrow and little to good thicknesses of alluvium, fair to good lateral infiltration potential and moderate to good storage capacity, moderate runoff with good infiltration, most flexibility for structure types, some sedimentation problems.

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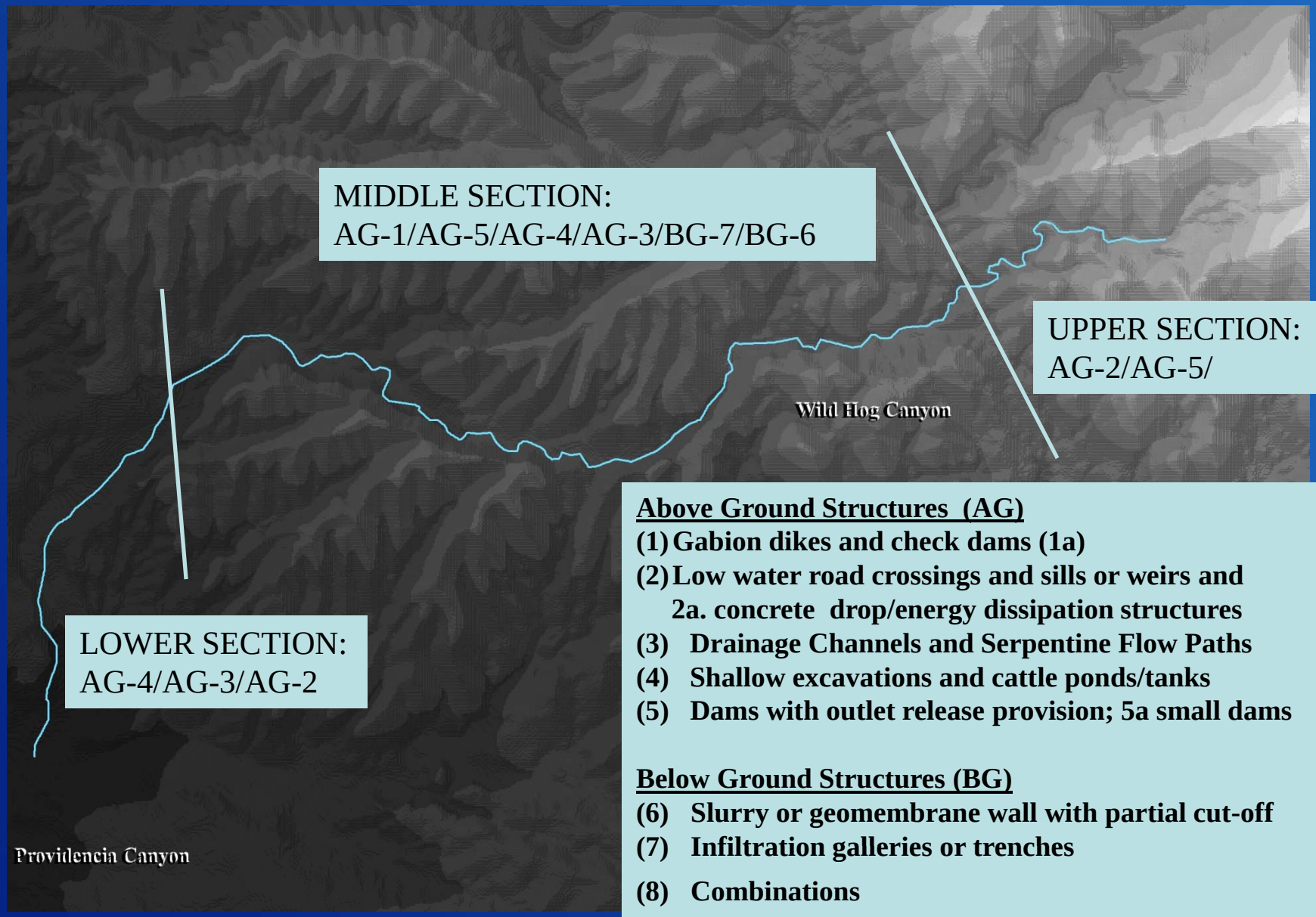

<u>Above Ground Structures (AG)</u>

(1) Gabion dikes and check dams (1a)
(2) Low water road crossings and sills or weirs and
2a. concrete drop/energy dissipation structures
(3) Drainage Channels and Serpentine Flow Paths
(4) Shallow excavations and cattle ponds/tanks
(5) Dams with outlet release provision; 5a small dams

<u>Below Ground Structures (BG)</u>

(6) Slurry or geomembrane wall with partial cut-off
(7) Infiltration galleries or trenches
(8) Combinations

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Project Funding

Fiscal Year	Budget	Average Labor Hours at 105 / hr	Annual Labor Days	Annual Labor in Days per Month	Annual Labor in Full Time Weeks	Annual Labor in Full Time Months
2003 to 2007	$138,579	1319.8	164.9/yr	---	---	---
2008	$ 80,000	761.9	95.2	7.9	19.0	4.8
2009	$ 55,000	523.8	65.5	5.5	13.1	3.3
2010	$ 90,000	857.1	107.1	8.9	21.4	5.4
2011	$ 43,000	409.5	51.2	4.3	10.2	2.6
2012	$ 76,000	723.8	90.5	7.5	18.1	4.5

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SCAMA / NOGALES WSS
Project Funding

Example of Reclamation Interdisciplinary Team Labor Costs during Alternative Development

Labor Type	201018 Labor Cost	201019 Labor Cost	201020 Labor Cost	201021 Labor Cost
Geologist	$ 1,881	$ 2,102	$ 2,434	$ 2,344
GIS	$ 904	$ 2,309	$ 7,172	$ 3,269
Engineer	$ 3,819	$ 3,438	$ 4,641	$ 6,941
PM	$ 1,597	$ 5,749	$ 4,870	$ 1,120
Bi-weekly Labor Cost	$ 8,201	$13,598	$19,117	$ 13,674

Two Months Labor Cost $ 54,590

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SCAMA / NOGALES WSS Congressional Representatives

Senator Jon Kyl
730 Hart Senate Office Building
Washington DC 20510

Senator John McCain
241 Russell Senate Office Building
Washington DC 20510-0303

Representative Raul M. Grijalva
U.S. House of Representatives
1511 Longworth HOB
Washington, DC 20515-0307

Representative Gabrielle Giffords
U.S. House of Representatives
1030 Longworth HOB
Washington, DC 20515

Randy Chandler, Area Manager
Phoenix Area Office
6150 West Thunderbird Rd.
Glendale AZ 85306-400 I

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SCAMA / NOGALES WSS Requesting Project Support from Congressional Representatives

CITY OF NOGALES

HONORABLE OCTAVIO GARCIA-VON BORSTEL

OFFICE OF THE MAYOR

11/14/08

UNITED STATES HOUSE OF REPRESENTATIVES
502 Cannon House Office Building
Washington, D.C. 20515-0308

Dear Honorable Gabrielle Giffords:

Please accept this letter as a request by the City of Nogales for your support of additional funding to the Bureau of Reclamation to continue the Nogales Area Water Storage Study. Reclamation funding to date has been pursuant to Public Law 102-575 which authorizes expenditures for general investigations.

The total cost for the multi-year study is estimated to be $1,000,000. Of that, the City of Nogales and the Arizona Department of Water Resources, as cooperating partners, have committed $250,000 each in payments and in-kind services to advance the study.

The Administration's budget requests only $55,000 for Reclamation in FY-09 for this study. Based on experience, this type of appraisal-level study generally requires approximately $200,000 per year in Reclamation funding over a period of two years. The Administration's proposed budget falls far short of what is necessary to complete this study in a timely and effective manner.

The study is of particular importance to the City of Nogales. The City is located in the Santa Cruz Active Management Area (AMA) created pursuant to the Arizona Groundwater Code. In the Santa Cruz AMA, unlike other AMAs in central and southern Arizona, water uses may not generally exceed the amount of water that is naturally replenished in the AMA by stream flow and groundwater recharge. Moreover, unlike the other AMAs in central and southern Arizona, the Santa Cruz AMA, due to geography and elevation, has no access to Central Arizona Project water. As a result, the City and other users in the Santa Cruz AMA are totally reliant on local water supplies. Accordingly, it is extremely important to investigate and develop means whereby local water supplies are augmented through the capture and storage, both above and below ground, of water that would otherwise move north and out of the Santa Cruz AMA.

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SCAMA / NOGALES WSS Status

1. Compiled references and collaborated with Transboundary Aquifer Assessment Program (TAAP) in development of reference database
2. Prepared outline of legal issues
3. Developed Problem Statement
4. Compiled available hydrogeologic data into tables.
5. Prepared preliminary maps.
6. Begin to develop alternatives.
   - Reuse
   - Stormwater recharge in tributaries to SCR
7. Begin to develop assessment criteria
8. Lack of funding/congressional support, beginning Fall 2010 minimal funds for Reclamation to work on project. Funding sufficient to attend minimal meetings, some report preparation, insufficient to develop alternatives.

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SCAMA / NOGALES WSS
Reclamation Contact

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