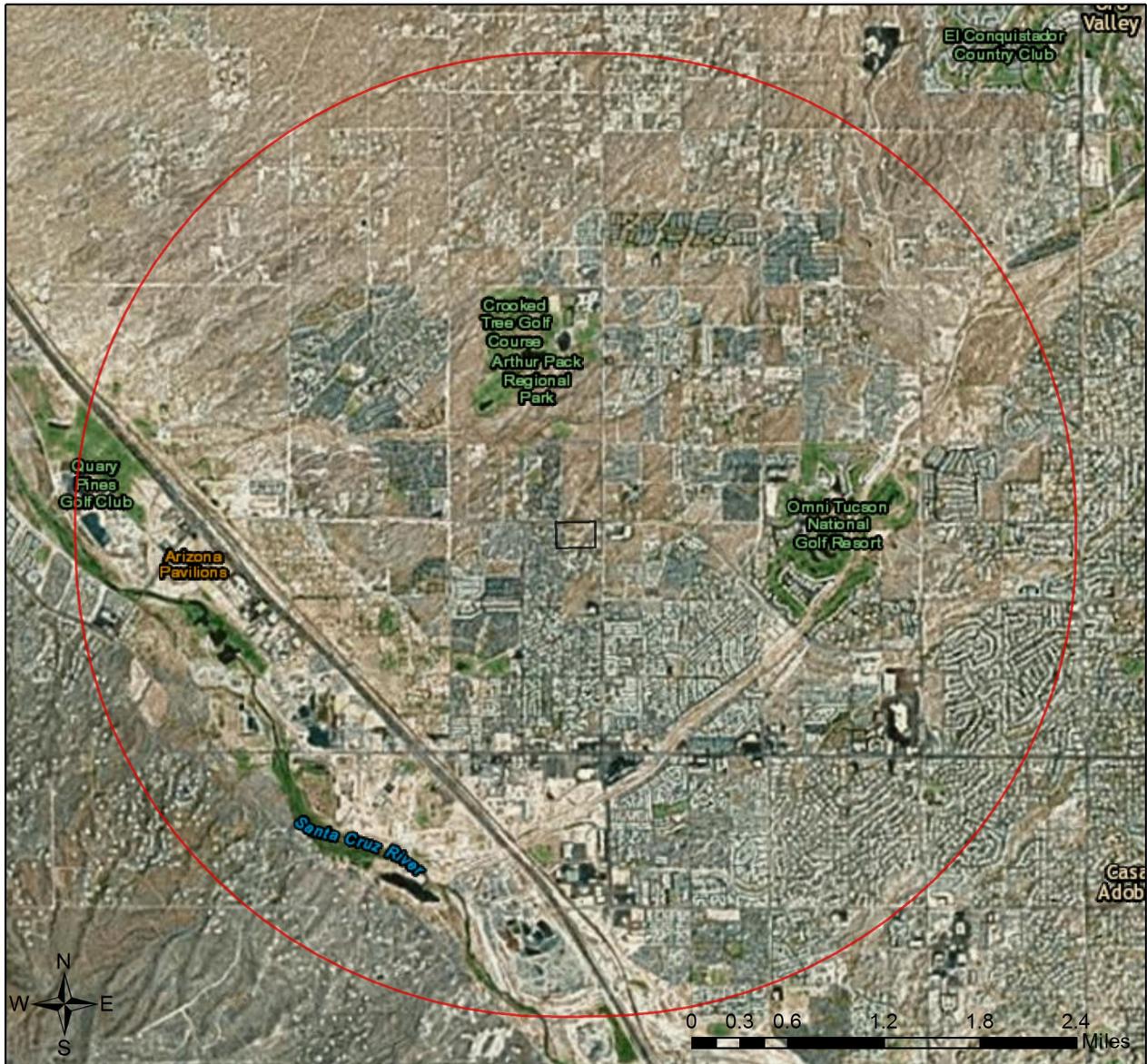


**Recommendations Disclaimer:**

1. The Department is interested in the conservation of all fish and wildlife resources, including those species listed in this report and those that may have not been documented within the project vicinity as well as other game and nongame wildlife.
2. Recommendations have been made by the Department, under authority of Arizona Revised Statutes Title 5 (Amusements and Sports), 17 (Game and Fish), and 28 (Transportation).
3. Potential impacts to fish and wildlife resources may be minimized or avoided by the recommendations generated from information submitted for your proposed project. These recommendations are preliminary in scope, designed to provide early considerations on all species of wildlife.
4. Making this information directly available does not substitute for the Department's review of project proposals, and should not decrease our opportunity to review and evaluate additional project information and/or new project proposals.
5. Further coordination with the Department requires the submittal of this Environmental Review Report with a cover letter and project plans or documentation that includes project narrative, acreage to be impacted, how construction or project activity(s) are to be accomplished, and project locality information (including site map). Once AGFD had received the information, please allow 30 days for completion of project reviews. Send requests to:  
**Project Evaluation Program, Habitat Branch**  
**Arizona Game and Fish Department**  
**5000 West Carefree Highway**  
**Phoenix, Arizona 85086-5000**  
**Phone Number: (623) 236-7600**  
**Fax Number: (623) 236-7366**  
**Or**  
[PEP@azgfd.gov](mailto:PEP@azgfd.gov)
6. Coordination may also be necessary under the National Environmental Policy Act (NEPA) and/or Endangered Species Act (ESA). Site specific recommendations may be proposed during further NEPA/ESA analysis or through coordination with affected agencies

# Red Point Magee

## Aerial Image Basemap With Locator Map



-  Project Boundary
-  Buffered Project Boundary

Project Size (acres): 25.67

Lat/Long (DD): 32.3575 / -111.0493

County(s): Pima

AGFD Region(s): Tucson

Township/Range(s): T12S, R13E

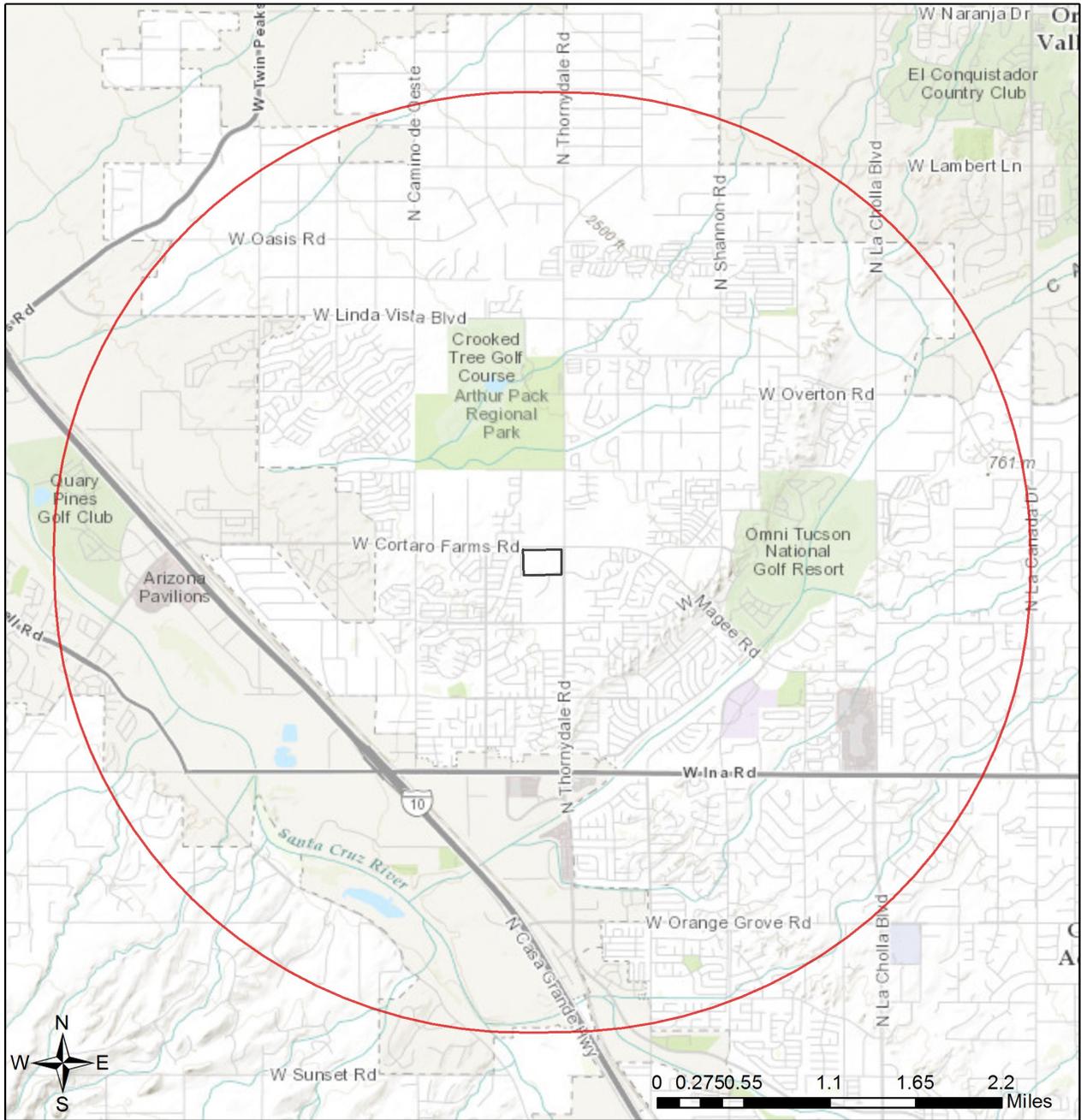
USGS Quad(s): JAYNES

Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong),



# Red Point Magee

## Web Map As Submitted By User



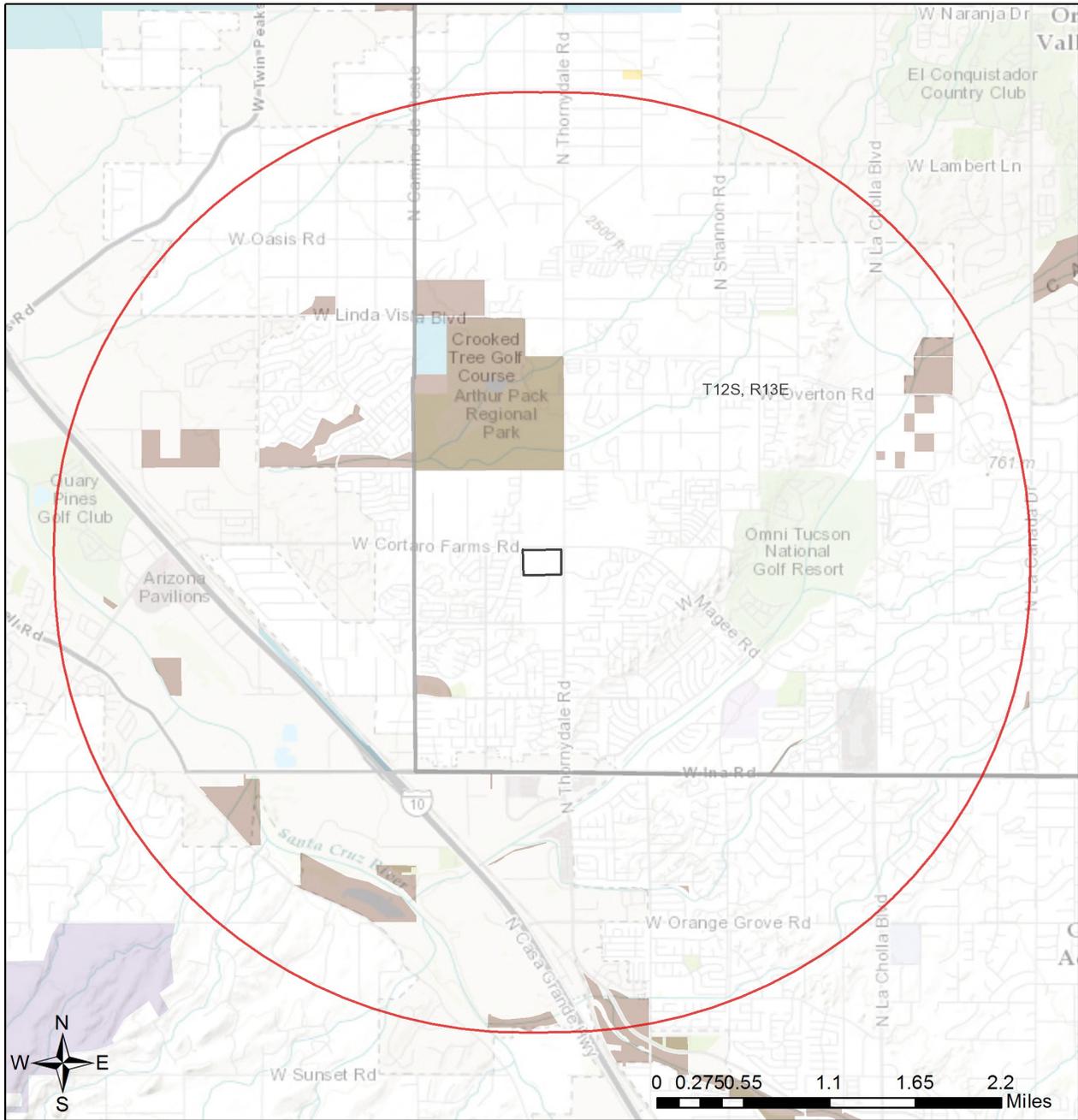
-  Project Boundary
-  Buffered Project Boundary

Project Size (acres): 25.67  
Lat/Long (DD): 32.3575 / -111.0493  
County(s): Pima  
AGFD Region(s): Tucson  
Township/Range(s): T12S, R13E  
USGS Quad(s): JAYNES

Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

# Red Point Magee

## Topo Basemap With Township/Ranges and Land Ownership



- |  |                           |  |                          |
|--|---------------------------|--|--------------------------|
|  | Project Boundary          |  | Mixed/Other              |
|  | Buffered Project Boundary |  | National Park/Mon.       |
|  | Township/Ranges           |  | Private                  |
|  | AZ Game and Fish Dept.    |  | State and Regional Parks |
|  | BLM                       |  | State Trust              |
|  | BOR                       |  | US Forest Service        |
|  | Indian Res.               |  | Wildlife Area/Refuge     |
|  | Military                  |  |                          |

Project Size (acres): 25.67  
 Lat/Long (DD): 32.3575 / -111.0493  
 County(s): Pima  
 AGFD Region(s): Tucson  
 Township/Range(s): T12S, R13E  
 USGS Quad(s): JAYNES

Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

**Special Status Species and Special Areas Documented within 3 Miles of Project Vicinity**

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Antilocapra americana sonoriensis	10J area for Sonoran Pronghorn	LE,XN				
Bat Colony						
Canis lupus baileyi	10J area Zone 2 for Mexican gray wolf	LE,XN				
Dendrocygna bicolor	Fulvous Whistling-Duck	SC				
Glaucidium brasilianum cactorum	Cactus Ferruginous Pygmy-owl	SC	S	S		1B
Leptonycteris curasoae yerbabuenae	Lesser Long-nosed Bat	LE				1A
Myotis velifer	Cave Myotis	SC		S		1B
Opuntia versicolor	Stag-horn Cholla					SR
Tumamoca macdougalii	Tumamoc Globeberry		S	S	SR	

Note: Status code definitions can be found at [http://www.azgfd.gov/w\\_c/edits/hdms\\_status\\_definitions.shtml](http://www.azgfd.gov/w_c/edits/hdms_status_definitions.shtml).

**Species of Greatest Conservation Need  
 Predicted within Project Vicinity based on Predicted Range Models**

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Aix sponsa	Wood Duck					1B
Amazilia violiceps	Violet-crowned Hummingbird		S			1B
Ammospermophilus harrisi	Harris' Antelope Squirrel					1B
Anaxyrus retiformis	Sonoran Green Toad			S		1B
Anthus spragueii	Sprague's Pipit	C*				1A
Antrostomus ridgwayi	Buff-collared Nightjar		S			1B
Aquila chrysaetos	Golden Eagle	BGA		S		1B
Aspidoscelis stictogramma	Giant Spotted Whiptail	SC	S			1B
Athene cunicularia hypugaea	Western Burrowing Owl	SC	S	S		1B
Botaurus lentiginosus	American Bittern					1B
Buteo regalis	Ferruginous Hawk	SC		S		1B
Chilomeniscus stramineus	Variable Sandsnake					1B
Chionactis occipitalis klauberi	Tucson Shovel-nosed Snake	SC				1A
Coccyzus americanus	Yellow-billed Cuckoo (Western DPS)	LT	S			1A
Colaptes chrysoides	Gilded Flicker			S		1B
Coluber bilineatus	Sonoran Whipsnake					1B
Corynorhinus townsendii pallescens	Pale Townsend's Big-eared Bat	SC	S	S		1B
Crotalus tigris	Tiger Rattlesnake					1B
Cyananthus latirostris	Broad-billed Hummingbird		S			1B
Cyprinodon macularius	Desert Pupfish	LE				1A
Dipodomys spectabilis	Banner-tailed Kangaroo Rat			S		1B
Euderma maculatum	Spotted Bat	SC	S	S		1B
Eumops perotis californicus	Greater Western Bonneted Bat	SC		S		1B

**Species of Greatest Conservation Need  
 Predicted within Project Vicinity based on Predicted Range Models**

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
<i>Falco peregrinus anatum</i>	American Peregrine Falcon	SC	S	S		1A
<i>Glaucidium brasilianum cactorum</i>	Cactus Ferruginous Pygmy-owl	SC	S	S		1B
<i>Gopherus morafkai</i>	Sonoran Desert Tortoise	C*	S			1A
<i>Haliaeetus leucocephalus</i>	Bald Eagle	SC, BGA	S	S		1A
<i>Heloderma suspectum</i>	Gila Monster					1A
<i>Incilius alvarius</i>	Sonoran Desert Toad					1B
<i>Kinosternon sonoriense sonoriense</i>	Desert Mud Turtle			S		1B
<i>Lasiurus blossevillii</i>	Western Red Bat		S			1B
<i>Lasiurus xanthinus</i>	Western Yellow Bat		S			1B
<i>Leopardus pardalis</i>	Ocelot	LE				1A
<i>Leptonycteris curasoae yerbabuenae</i>	Lesser Long-nosed Bat	LE				1A
<i>Lepus alleni</i>	Antelope Jackrabbit					1B
<i>Lithobates yavapaiensis</i>	Lowland Leopard Frog	SC	S	S		1A
<i>Macrotus californicus</i>	California Leaf-nosed Bat	SC		S		1B
<i>Melanerpes uropygialis</i>	Gila Woodpecker					1B
<i>Meleagris gallopavo mexicana</i>	Gould's Turkey		S			1B
<i>Melospiza lincolni</i>	Lincoln's Sparrow					1B
<i>Melospiza aberti</i>	Abert's Towhee		S			1B
<i>Micruroides euryxanthus</i>	Sonoran Coralsnake					1B
<i>Myotis occultus</i>	Arizona Myotis	SC		S		1B
<i>Myotis velifer</i>	Cave Myotis	SC		S		1B
<i>Myotis yumanensis</i>	Yuma Myotis	SC				1B
<i>Nyctinomops femorosaccus</i>	Pocketed Free-tailed Bat					1B
<i>Panthera onca</i>	Jaguar	LE				1A
<i>Passerculus sandwichensis</i>	Savannah Sparrow					1B
<i>Perognathus amplus</i>	Arizona Pocket Mouse					1B
<i>Perognathus longimembris</i>	Little Pocket Mouse					1B
<i>Peucaea botterii arizonae</i>	Arizona Botteri's Sparrow			S		1B
<i>Peucaea carpalis</i>	Rufous-winged Sparrow					1B
<i>Phrynosoma solare</i>	Regal Horned Lizard					1B
<i>Phyllorhynchus browni</i>	Saddled Leaf-nosed Snake					1B
<i>Poeciliopsis occidentalis occidentalis</i>	Gila Topminnow	LE				1A
<i>Progne subis hesperia</i>	Desert Purple Martin			S		1B
<i>Setophaga petechia</i>	Yellow Warbler					1B
<i>Sonorella papagorum</i>	Black Mountain Talussnail					1B
<i>Tadarida brasiliensis</i>	Brazilian Free-tailed Bat					1B

**Species of Greatest Conservation Need  
 Predicted within Project Vicinity based on Predicted Range Models**

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Terrapene ornata	Ornate Box Turtle					1A
Troglodytes pacificus	Pacific Wren					1B
Vireo bellii arizonae	Arizona Bell's Vireo					1B
Vulpes macrotis	Kit Fox					1B

**Species of Economic and Recreation Importance Predicted within Project Vicinity**

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Callipepla gambelii	Gambel's Quail					
Odocoileus hemionus	Mule Deer					
Pecari tajacu	Javelina					
Puma concolor	Mountain Lion					
Zenaida asiatica	White-winged Dove					

**Project Type: Development Outside Municipalities (Rural Development), Residential subdivision and associated infrastructure, New construction**

**Project Type Recommendations:**

Fence recommendations will be dependant upon the goals of the fence project and the wildlife species expected to be impacted by the project. General guidelines for ensuring wildlife-friendly fences include: barbless wire on the top and bottom with the maximum fence height 42", minimum height for bottom 16". Modifications to this design may be considered for fencing anticipated to be routinely encountered by elk, bighorn sheep or pronghorn (e.g., Pronghorn fencing would require 18" minimum height on the bottom). Please refer to the Department's Fencing Guidelines located on the home page of this application at <http://www.azgfd.gov/hgis/guidelines.aspx>.

During the planning stages of your project, please consider the local or regional needs of wildlife in regards to movement, connectivity, and access to habitat needs. Loss of this permeability prevents wildlife from accessing resources, finding mates, reduces gene flow, prevents wildlife from re-colonizing areas where local extirpations may have occurred, and ultimately prevents wildlife from contributing to ecosystem functions, such as pollination, seed dispersal, control of prey numbers, and resistance to invasive species. In many cases, streams and washes provide natural movement corridors for wildlife and should be maintained in their natural state. Uplands also support a large diversity of species, and should be contained within important wildlife movement corridors. In addition, maintaining biodiversity and ecosystem functions can be facilitated through improving designs of structures, fences, roadways, and culverts to promote passage for a variety of wildlife.

Consider impacts of outdoor lighting on wildlife and develop measures or alternatives that can be taken to increase human safety while minimizing potential impacts to wildlife. Conduct wildlife surveys to determine species within project area, and evaluate proposed activities based on species biology and natural history to determine if artificial lighting may disrupt behavior patterns or habitat use. Use only the minimum amount of light needed for safety. Narrow spectrum bulbs should be used as often as possible to lower the range of species affected by lighting. All lighting should be shielded, cantered, or cut to ensure that light reaches only areas needing illumination.

Minimize potential introduction or spread of exotic invasive species. Invasive species can be plants, animals (exotic snails), and other organisms (e.g., microbes), which may cause alteration to ecological functions or compete with or prey upon native species and can cause social impacts (e.g., livestock forage reduction, increase wildfire risk). The terms noxious weed or invasive plants are often used interchangeably. Precautions should be taken to wash all equipment utilized in the project activities before leaving the site. Arizona has noxious weed regulations (Arizona Revised Statutes, Rules R3-4-244 and R3-4-245). See Arizona Department of Agriculture website for restricted plants, <https://agriculture.az.gov/>. Additionally, the U.S. Department of Agriculture has information regarding pest and invasive plant control methods including: pesticide, herbicide, biological control agents, and mechanical control, <http://www.usda.gov/wps/portal/usdahome>. The Department regulates the importation, purchasing, and transportation of wildlife and fish (Restricted Live Wildlife), please refer to the hunting regulations for further information [http://www.azgfd.gov/h\\_f/hunting\\_rules.shtml](http://www.azgfd.gov/h_f/hunting_rules.shtml)

The construction or maintenance of water developments should include: incorporation of aspects of the natural environment and the visual resources, maintaining the water for a variety of species, water surface area (e.g., bats require a greater area due to in-flight drinking), accessibility, year-round availability, minimizing potential for water quality problems, frequency of flushing, shading of natural features, regular clean-up of debris, escape ramps, minimizing obstacles, and minimizing accumulation of silt and mud.

Minimization and mitigation of impacts to wildlife and fish species due to changes in water quality, quantity, chemistry, temperature, and alteration to flow regimes (timing, magnitude, duration, and frequency of floods) should be evaluated. Minimize impacts to springs, in-stream flow, and consider irrigation improvements to decrease water use. If dredging is a project component, consider timing of the project in order to minimize impacts to spawning fish and other aquatic species (include spawning seasons), and to reduce spread of exotic invasive species. We recommend early direct coordination with Project Evaluation Program for projects that could impact water resources, wetlands, streams, springs, and/or riparian habitats.

The Department recommends that wildlife surveys are conducted to determine if noise-sensitive species occur within the project area. Avoidance or minimization measures could include conducting project activities outside of breeding seasons.

Based on the project type entered, coordination with State Historic Preservation Office may be required (<http://azstateparks.com/SHPO/index.html>).

Trenches should be covered or back-filled as soon as possible. Incorporate escape ramps in ditches or fencing along the perimeter to deter small mammals and herptefauna (snakes, lizards, tortoise) from entering ditches.

Communities can actively support the sustainability and mobility of wildlife by incorporating wildlife planning into their regional/comprehensive plans, their regional transportation plans, and their open space/conservation land system programs. An effective approach to wildlife planning begins with the identification of the wildlife resources in need of protection, an assessment of important habitat blocks and connective corridors, and the incorporation of these critical wildlife components into the community plans and programs. Community planners should identify open spaces and habitat blocks that can be maintained in their area, and the necessary connections between those blocks to be preserved or protected. Community planners should also work with State and local transportation planning entities, and planners from other communities, to foster coordination and cooperation in developing compatible development plans to ensure wildlife habitat connectivity. The Department's guidelines for incorporating wildlife considerations into community planning and developments can be found on the home page of this application at <http://www.azgfd.gov/hgis/guidelines.aspx>.

Design culverts to minimize impacts to channel geometry, or design channel geometry (low flow, overbank, floodplains) and substrates to carry expected discharge using local drainages of appropriate size as templates. Reduce/minimize barriers to allow movement of amphibians or fish (e.g., eliminate falls). Also for terrestrial wildlife, washes and stream corridors often provide important corridors for movement. Overall culvert width, height, and length should be optimized for movement of the greatest number and diversity of species expected to utilize the passage. Culvert designs should consider moisture, light, and noise, while providing clear views at both ends to maximize utilization. For many species, fencing is an important design feature that can be utilized with culverts to funnel wildlife into these areas and minimize the potential for roadway collisions. Guidelines for culvert designs to facilitate wildlife passage can be found on the home page of this application at <http://www.azgfd.gov/hgis/guidelines.aspx>.

Based on the project type entered, coordination with Arizona Department of Environmental Quality may be required (<http://www.azdeq.gov/>).

Based on the project type entered, coordination with Arizona Department of Water Resources may be required (<http://www.azwater.gov/azdwr/default.aspx>).

Based on the project type entered, coordination with U.S. Army Corps of Engineers may be required (<http://www.usace.army.mil/>)

Based on the project type entered, coordination with County Flood Control district(s) may be required.

Development plans should provide for open natural space for wildlife movement, while also minimizing the potential for wildlife-human interactions through design features. Please contact Project Evaluation Program for more information on living with urban wildlife.

Vegetation restoration projects (including treatments of invasive or exotic species) should have a completed site-evaluation plan (identifying environmental conditions necessary to re-establish native vegetation), a revegetation plan (species, density, method of establishment), a short and long-term monitoring plan, including adaptive management guidelines to address needs for replacement vegetation.

***The Department requests further coordination to provide project/species specific recommendations, please contact Project Evaluation Program directly. [PEP@azgfd.gov](mailto:PEP@azgfd.gov)***

#### **Project Location and/or Species Recommendations:**

HDMS records indicate that one or more native plants listed on the Arizona Native Plant Law and Antiquities Act have been documented within the vicinity of your project area. Please contact:

Arizona Department of Agriculture

1688 W Adams St.

Phoenix, AZ 85007

Phone: 602.542.4373

<https://agriculture.az.gov/environmental-services/np1>

HDMS records indicate that one or more listed, proposed, or candidate species or Critical Habitat (Designated or Proposed) have been documented in the vicinity of your project. The Endangered Species Act (ESA) gives the US Fish and Wildlife Service (USFWS) regulatory authority over all federally listed species. Please contact USFWS Ecological Services Offices at <http://www.fws.gov/southwest/es/arizona/> or:

**Phoenix Main Office**

2321 W. Royal Palm Rd, Suite 103  
Phoenix, AZ 85021  
Phone: 602-242-0210  
Fax: 602-242-2513

**Tucson Sub-Office**

201 N. Bonita Suite 141  
Tucson, AZ 85745  
Phone: 520-670-6144  
Fax: 520-670-6155

**Flagstaff Sub-Office**

SW Forest Science Complex  
2500 S. Pine Knoll Dr.  
Flagstaff, AZ 86001  
Phone: 928-556-2157  
Fax: 928-556-2121



## **Appendix B:**

### **Project Demand Calculator Arizona Department of Water Resources (ADWR)**

### **Table B – Water Conservation Measures (Pima County Form)**

### **Annual Water Level Monitoring Report Metropolitan Domestic Water Improvement District**

October 4, 2015

**PROJECT DEMAND CALCULATOR**

Name of Proposed Project:

**Magee Road Rezoning**

**INSTRUCTIONS:** This spreadsheet is designed to help you calculate the water demand for your proposed development for purposes of applying for a Certificate of Assured Water Supply, Water Adequacy Report or Analysis of Assured (or Adequate) Water Supply. Please enter information into the blue boxes as applicable. If you need help with this form, please contact the Office of Assured and Adequate Water Supply at (602) 771-8599.

**NOTE:** This sheet, when completed, does not constitute approval of the demand estimate for your proposed development. It is intended for general estimation purposes only. The final, official demand estimates will be determined by the Department upon review of your complete application.

Enter the AMA the subdivision is located in\*: **TUC** \* Enter PHX for Phoenix, TUC for Tucson, PIN for Pinal, PRE for Prescott or SCR for Santa Cruz.  
 If you are not sure if you are located inside or outside of an AMA, contact the Office of Assured and Adequate Water Supply at (602) 771-8599.

Enter the COUNTY the subdivision is located in: **PIMA** \* Enter either APACHE, COCHISE, COCONINO, GILA, GRAHAM, GREENLEE, LA PAZ, MARICOPA, MOHAVE, NAVAJO, PIMA, PINAL, SANTA CRUZ, YAVAPAI, or YUMA.

**Residential Usage\***

Category	PPHU	GPCD or per house/day	Demand/HU/YR (af/yr)	No. HU (Lots)	Residential Demand/Yr (af/yr)
Single Family (int)	3.60	57.00	0.23	28.00	6.44
Multi-Family (int)	3.20	57.00	0.20	36.00	7.36
Single Family Landscape (ext)	1.00	118.00	0.13	28.00	3.70
Multi-Family Landscape (ext)	3.20	21.00	0.08	36.00	2.71
Single family Demand/HU/YR			0.36		
Multifamily Demand/HU/YR			0.28		

	Square Feet	Acres	Demand Factor (af/yr)	No. HU (Lots)	Large Lot Adjustment Demand/Yr (af/yr)
Average Lot Size (sq. ft)**	6300.00	0.14			
TMP Model Lot Size (sq. ft)	7,500 - 10,000	0.17 - 0.23			
Large Lot Adjustment	0.00	0.00			
1/2 low water use	0.00	0.00	1.50	0.00	0.00
1/2 turf	0.00	0.00	4.60	0.00	0.00

\*\*NOTE: If the subdivision contains several groupings of lot sizes, the large lot adjustment needs to be calculated for each grouping of large lot sizes.  
 If CC&Rs with landscaping restrictions for the residential lots will be adopted, a modified large lot adjustment can be calculated based on the specific landscaping restrictions.  
 Contact the Office of Assured and Adequate Water Supply for assistance in calculating the large lot adjustment for subdivisions with several groupings of large lot sizes or if CC&Rs limiting landscaping within the residential lots will be adopted.

**Total Residential Demand** **20.20**

**Non-Residential Usage\*\*\***

For each category please enter either square feet or acres of land for that type of non-residential use within your subdivision.

Category	Square Feet	Acres	Demand Factor (af/ac)	Non-Residential Demand (af/yr)
Common Area1		4.25	1.50 low water use	6.38
Common Area2		0.00	4.60 turf	0.00
Right of Way		0.00	1.50 low water use	0.00
Golf Course		0.00	AMA Turf Program - contact AMA	0.00
Commercial use		0.00	2.25 all acres	0.00
Public Pool (length x width = square feet)		0.00	Based on closest AMA pool	0.00
Parks1		0.00	1.50 low water use	0.00
Parks2		0.00	4.60 turf	0.00
Retention/Detention Basins		3.20	1.50 low water use	4.80
Retention/Detention Basins		0.00	4.60 turf	0.00
School Landscape1		0.00	1.50 low water use	0.00
School Landscape2		0.00	4.60 turf	0.00
Elementary school interior use	Number of students		25 GPCD interior demand	0.00
Middle/High School interior use			43 GPCD interior demand	0.00

\*\*\*NOTE: If your application is for a change of ownership from a previously issued Certificate of Assured Water Supply, and is for only a portion of the original Certificate, contact the Office of Assured and Adequate Water Supply to pro-rate non-residential area acreage.

**Total Non-Residential Demand** **11.18**

**Distribution Losses**

	Residential	Non-Residential	Total	Loss Factor %	Distribution Losses (af/yr)
Demand af/yr	20.20	11.18	31.38	10.00	3.14

**Construction**

	No. of Lots	Demand (gals/lot)	100 yr demand (af)	Construction Demand (af/yr)
	64.00	10000.00	2.96	0.03

**Total Demand Per Year**

Residential Usage af/yr	Non-Residential Usage	Lost & Unaccounted for	Construction	Total Non-Res	Total Demand Per Year (af/yr)
20.20	11.18	3.14	0.03	14.34	34.54

Residential Usage GPCD	Total Demand GPCD
83	143

**Annual Build Out Demand**

34.54
-------

## Table B - Water Conservation Measures

### Indoor and Outdoor Options

(15-point Minimum; Must include at least one Outdoor Conservation Measure)

Indoor Options	Possible Points	Points Achieved
• I-1 Install grey water plumbing lines, labeled and stubbed out to exterior of residence	1	1
I-2 Install a "central-core" plumbing system with all water-using fixture fittings ≤5 ft. from HW heater	1	
I-3 Install a manifold "home run" structured plumbing system; with fixtures ≤ 1/2" in diameter	2	2
• I-4 Install a manual or motion activated on-demand hot water circulation pumping system	2	
I-5 Install a point-of-use tankless hot water heater that uses only cold water supply or solar-assisted preheating for any fixture > 20 pipe run feet from water heater	3	
• I-6 Install lavatory faucets that meet the proposed EPA's WaterSense™ criteria or have a maximum flow rate of 1.5 gpm @ 80 psi of pressure	3	3
• I-7 Install showerheads that meet the proposed EPA's WaterSense™ criteria or have a maximum flow rate of 1.5 gpm @ 80 psi of pressure	3	3
I-8 Install toilets that meet the EPA's WaterSense™ rating (1.28 gpf) OR	3	3
• I-9 Install dual flush toilets with 1.6 gpf/1.8 gpf or less water use	3	
I-10 Install a washing machine with a water factor of 6.0 or less	2	
I-11 Install composting toilet(s), 2 pts/fixture; no maximum	2	
I-12 Install a refrigerator with an in-door filtered water system	0.5	
I-13 Install excess flow check valves or excess water shutoff connectors at fixtures	3	
I-14 No garbage disposal	1	
<b>Outdoor Options</b>		
O-1 Install a rainwater harvesting system capable of retaining and storing 50% or more of the average annual available rainfall on the catchment surface. (min. Catchment Area = 500 ft.)	6	
O-2 Install a rainwater harvesting system capable of retaining and storing 25% or more of the average annual available rainfall on the catchment surface. (min. Catchment Area = 500 ft.)	4	
O-3 Install a rainwater harvesting system capable of retaining and storing 10% or more of the average annual available rainfall on the catchment surface. (min. Catchment Area = 500 ft.)	2	
O-4 Install a gutter and downspout system or canals that tie to storm water infiltration trenches, bioswales, or rain gardens	2	
O-5 Install grey water plumbing lines, labeled and stubbed out to exterior of residence, but with connection to an onsite landscaping drip irrigation system	2	
O-6 No swimming pool	2	
• O-7 No decorative water features or mister systems that use potable water.	1	1
O-8 Impervious driveway & walkway surfaces shall be <5% of total site area (≤ 5 acres); OR 1% of the site area (over 5 acres)	2	
O-9 Construct no impervious surfaces outside the building footprint	2	
O-10 Install a vegetative roof system (min 50% of roof area) to reduce impervious surfaces	3	
O-11 Install drought-tolerant, non-irrigated landscaping design by a licensed landscape professional	3	
O-12 Install drought-tolerant, non-irrigated landscaping design by a licensed landscape professional. Plant species limited to native plants only.	4	
• O-13 Irrigation system designed and installed by an EPA WaterSense™ certified professional	1	1
O-14 Provide recharge/retention plan for rainwater	1	
• O-15 Install a high efficiency irrigation system that uses:	0.5	
a. "Smart Controllers" (w/ moisture sensor and rain delay controllers) & high efficiency nozzles;	0.5	
b. Check valves in heads and heads matched to the beds distinct watering needs;	0.5	
c. Separate sprinkler zones for beds, with plants grouped based on watering needs (hydrozoning);	0.5	
• d. A timer/controller that irrigates during the hours of 1- pm-8am to minimize evaporation;	0.5	.5
• e. Drip irrigation for all planting beds;	0.5	.5

**TOTAL POINTS: 15.0**

**Metropolitan Domestic Water Improvement District  
Board of Directors Meeting**

**March 9, 2015**

**Annual Water Level Monitoring Report**

**Synopsis**

The Board of Directors is requested to review with staff the water level information obtained from the recently completed annual water level monitoring effort. This report gives an important review of the aquifers and wells that provide water to District customers.

**Background**

The District began the annual groundwater level monitoring program in 1993. The initial purpose was to track the annual declines in the Metro Main service area at its 36 wells to help with the design of pump replacements. The monitoring program now includes 57 wells, both active and inactive, within five of the District's service areas to meet operational and regulatory requirements.

After Metro Main received its 100-Year Designation of Assured Water Supply (DAWS) from the Arizona Department of Water Resources (ADWR) in 1996, ADWR required Metro to measure and report annual groundwater levels from within the service area. Metro also uses the water level change information to determine if its CAP recovery wells in Metro Main are in compliance with ADWR's decline limit of 4 feet per year averaged over a five year period for each of our four wellfield areas. Annual water level measurements at Metro Hub wells were added to the monitoring program in 1999 when Metro Hub was purchased. Metro West was added in 2006 when it received its DAWS. Water levels for Metro Southwest Diablo Village were added in 2011, and Metro Southwest E&T were added in 2012. Water levels for Metro Southwest-Lazy B are not taken due to the small size of the well that does not allow access for water measurements.

Water Sustainability staff manually measures each of the 57 wells that are part of the annual monitoring program. To improve efficiencies and gather additional data throughout the year, water level monitoring systems (water level transducer and continuous data logger) have been installed at eight locations in Metro Main and one in Metro Hub. Figure 1 depicts the locations of the eight automated monitoring locations in Metro Main, and Figure 2 shows the same for Metro Hub.

## **Groundwater Levels**

### *Metro Main*

Depth to water in the south half of Metro Main in the Western CDO Wash and Rillito Creek Wellfields ranged from 163 feet to 332 feet below land surface (Table 1). Groundwater level changes varied at the wells from a 9 foot rise to a decline of 6.6 feet since last year. The variation in water level change is a function of the amount of pumpage at Metro Main wells and the amount of recharge over the past year. The average well field change was a 1.0 foot decline. The water level hydrographs for the La Colina and Las Palmas East Wells show water levels continue to decline (Figure 3).

Depth to water in the north half of the service area in the Catalina Foothills and Eastern CDO Wash Wellfields varied from 274 feet to 448 feet (Table 1). The northern portion also experienced a wide range of water level changes from a rise of 2.4 feet to a decline of 10.5 feet. The average change was a decrease of 2.8 feet. Water levels at Tucson National North Well have remained fairly stable, but show the influence of nearby Metro wells when they are operating (Figure 4). However, water levels to the north at Stiller Well continue to have a steady decline as shown in Figure 5.

The 5-year change table shows that Metro's four wellfield areas met ADWR's less than 4 foot decline criteria for recovery well use (Table 2).

For the entire service area, groundwater levels over the last ten years have declined on the average 2.0 feet per year (Table 3). Well productivity has continued to decline as the water table drops. This information highlights the importance of the District pursuing its CAP Water Recharge, Recovery & Delivery System by utilizing a renewable supply and reducing groundwater pumping and the associated costs with a depleting groundwater supply.

### *Metro Hub*

Depth to water at the five active and three inactive Hub wells ranged from 49 feet to 94 feet below land surface (Table 4). The average groundwater level change at the six Hub wells was an increase of 0.7 feet within the service area since last year. Groundwater level changes ranged from a decline of 4.9 feet to a rise of 8.3 feet.

Table 5 shows that Metro Hub had an average rise of 0.9 foot per year over five years. For the entire service area, groundwater levels over the last ten years have risen on the average 0.4 feet per year (Table 6). The aquifer appears sensitive to natural recharge and pumpage as demonstrated by annual rises and declines.

### *Metro West*

Depth to water at the two Metro West wells varied from 208 feet to 214 feet below land surface. The groundwater level changes at the two wells varied from an increase of 0.6 feet to an increase

of 1.3 feet since last year. The average was a one foot rise. Metro West had an average decline of 0.2 foot per year over five years. A ten year change calculation is not possible for comparison because annual measurements only began in 2006. Water Sustainability staff schedules the annual measurement at these two wells with the required monthly water level monitoring at the Avra Valley Recharge Project, since the two facilities are in proximity.

#### *Metro Southwest*

Depth to water at the two Diablo wells varied from 463 feet to 504 feet below land surface. The average water level change from the last year was a rise of 6.3 feet. These increases are assumed to reflect the rising water levels from the nearby City of Tucson's Southern Avra Valley Recharge and Recovery Project. A transducer and an automated recorder are waiting to be installed in this service area because of its remoteness.

Depth to groundwater beneath the E&T service area is comparable to that in the Hub service area. Water levels varied from 68 to 75 feet below land surface. The average water level change from the last year was a rise of 1.8 feet.

#### *Avra Valley Recharge Project*

Depth to water is measured monthly at the Avra Valley Recharge Project monitor well (AVMW-01) (Figure 6). The winter measurement was 190 feet below land surface. The change from last year was an increase of 0.8 feet. Water levels at this site constantly fluctuate and are influenced by monthly recharge volumes at the site, the adjacent Lower Santa Cruz Recharge Project owned by the Central Arizona Water Conservation District, and nearby irrigation well pumpage. Since the operation of the Avra Valley Recharge Project began in 1997, groundwater levels have increased 5 feet per year.

#### **Future Monitoring Efforts**

Since groundwater is currently the only source of drinking water that the District serves its customers, it is imperative that we continue to monitor the state of the aquifer. Staff will continue to manually measure groundwater levels annually at each well. Additional measurements are collected via transducers that log continual water-level measurements at select wells throughout the year, which provides further information about the aquifer. Transducers measure pressure of water within a well and the data loggers convert pressure to groundwater levels in feet below land surface. The data loggers continually record the water level measurements so that Water Sustainability staff only needs to visit those well sites three times a year to download the data and monitor the charge of the data logger battery rather than doing monthly manual measurements.

The Water Sustainability staff would like to expand the use of transducers. A transducer is awaiting installation at Metro Southwest Diablo Village. Likewise, in the Hub service area, the transducer from the HEX-2 test well will be redeployed to inactive Hub Well No. 1 this fiscal year now that Hub Well No. 1A is active. Staff is proposing a transducer installation in Metro

E&T for next fiscal year. To save money, several existing transducers are being repurposed. The new active wells of Old Magee Trail, Riverside Crossing, and Hub No. 1A have been outfitted with pressure transducers to display continuously both static and pumping water levels.

The inactive Rasmussen well is situated in Metro Main's Western CDO Wash Wellfield. The Rasmussen well is in a strategic location to monitor groundwater levels in this very productive wellfield. Unfortunately, a stuck and collapsed section of column pipe within the well prevents water level measurements. Water Sustainability staff will propose for the next fiscal year to have a driller open the blockage in the Rasmussen well to resume water level measurements and install a pressure transducer and data logger. In a subsequent fiscal year, the self-powered transducer that was in the once-inactive Riverside Crossing Well will be redeployed at the inactive Estes Well to monitor the Rillito Creek Wellfield.

### **Summary**

The Board of Directors is requested to discuss with staff this water level monitoring update. Long-term water level trends continue to show the importance of the District working with the other Northwest Water Providers and Tucson Water to treat and directly deliver its CAP allocation. No motion is required for this agenda item.

Respectfully submitted,

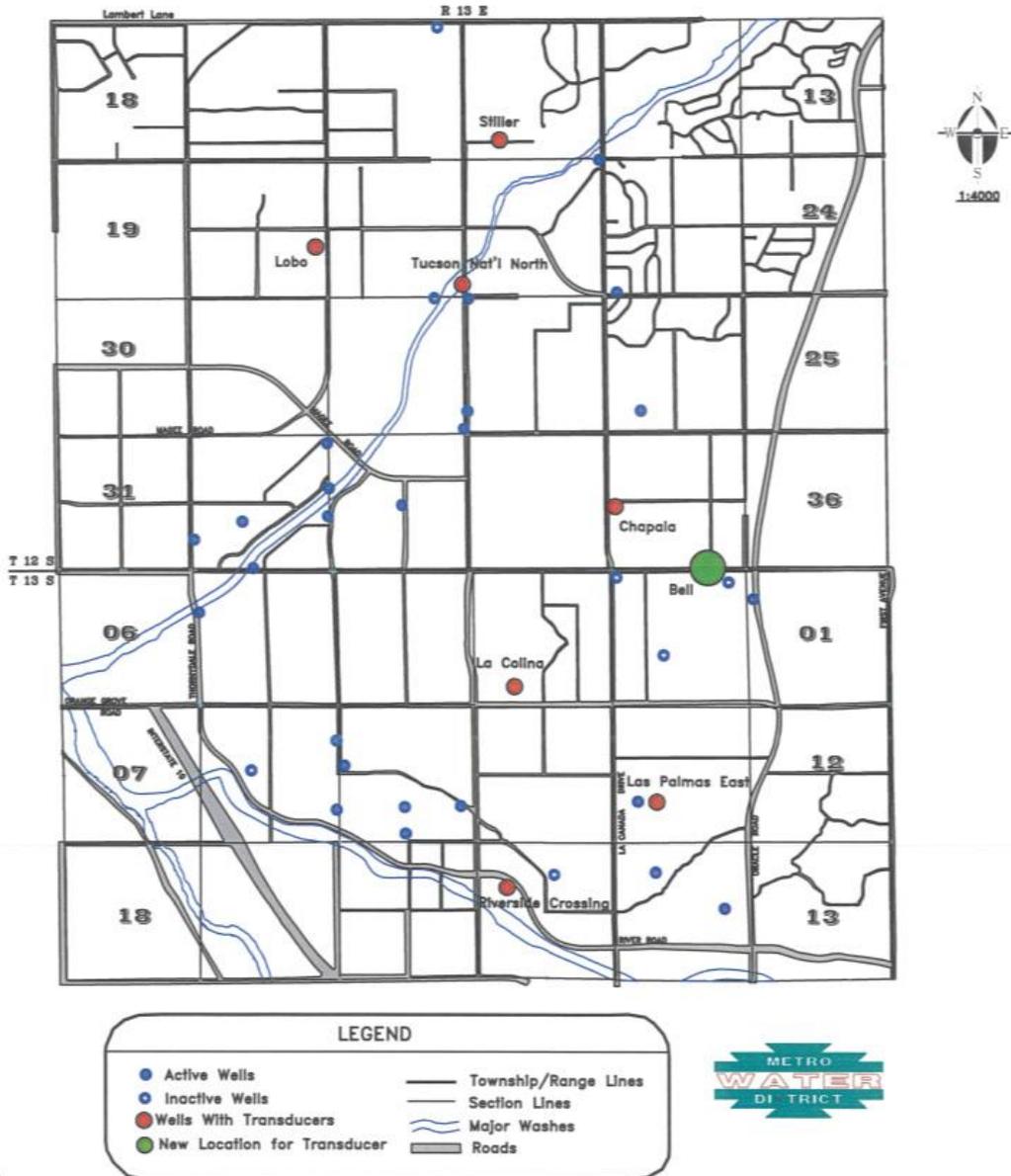
Warren Tenney  
Assistant General Manager

I concur with staff's recommendation.

Respectfully submitted,

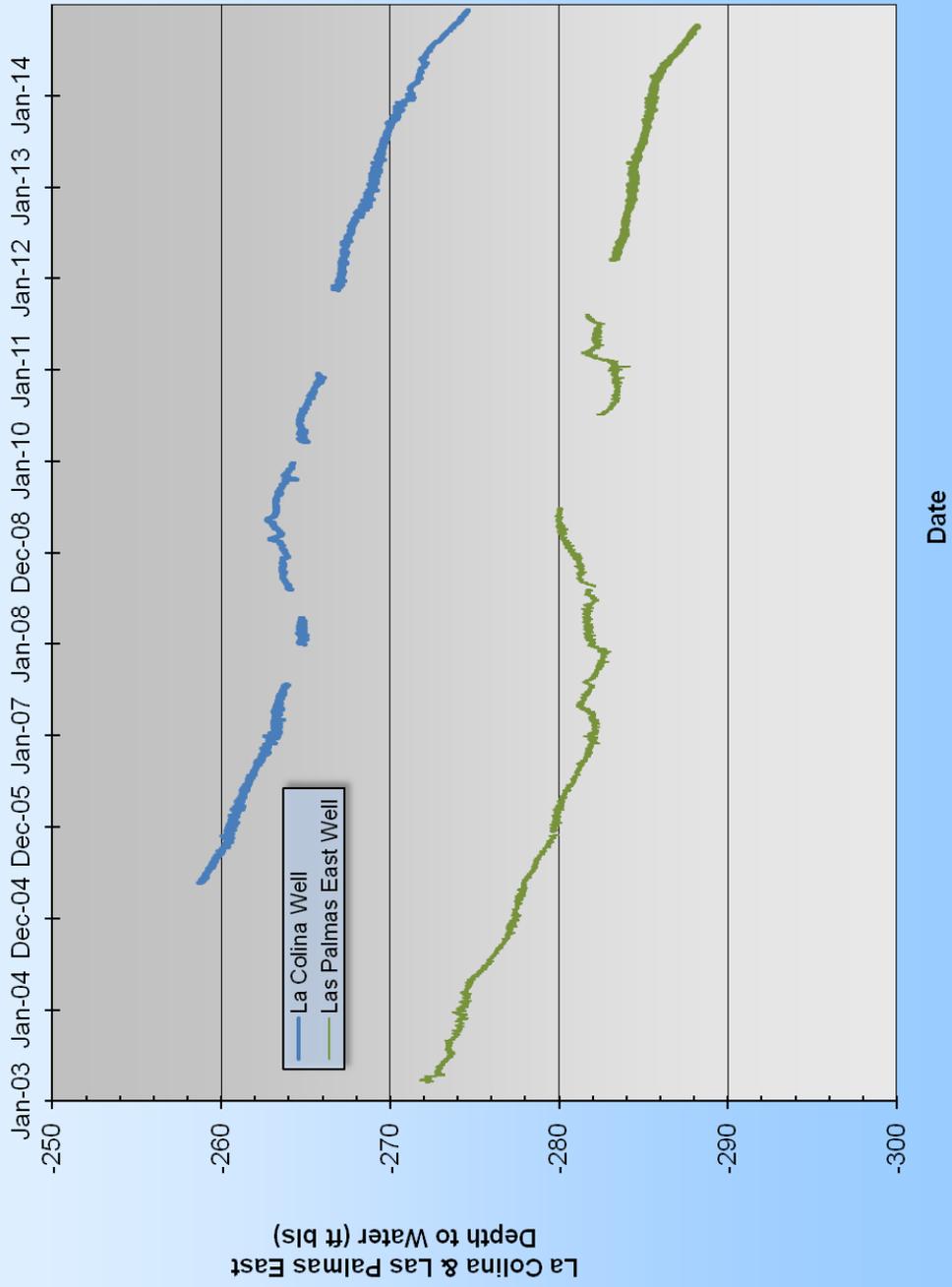
Joseph Olsen, P.E.  
General Manager

Figure 1  
Continuous Groundwater  
Monitoring Stations  
Metro Main

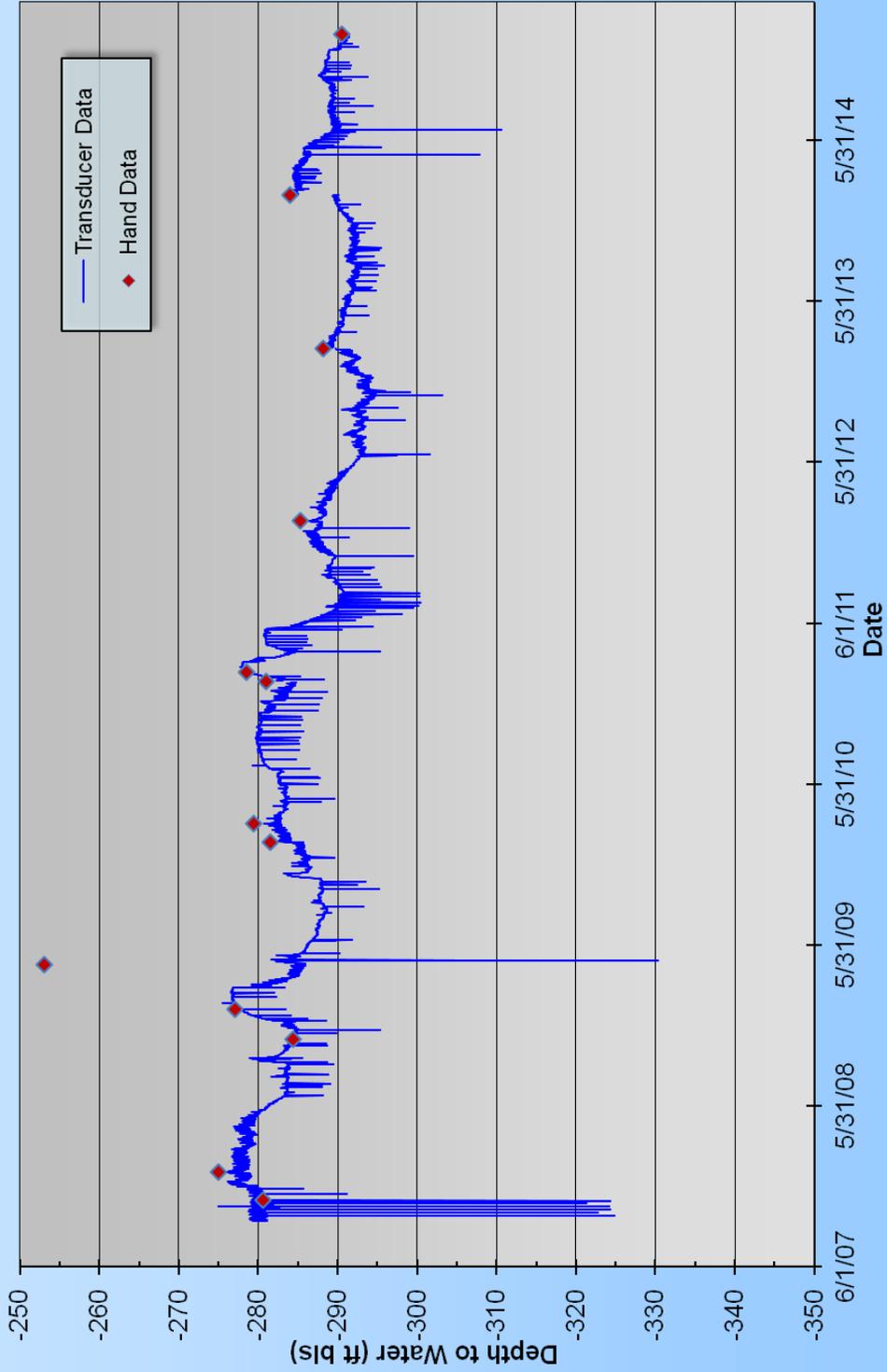




**Figure 3: Average Water Level Hydrographs  
Metro-Main Service Area**



**Figure 4:**  
**Tucson National North Average Water Level Hydrograph**  
**12-13-21 DDD**



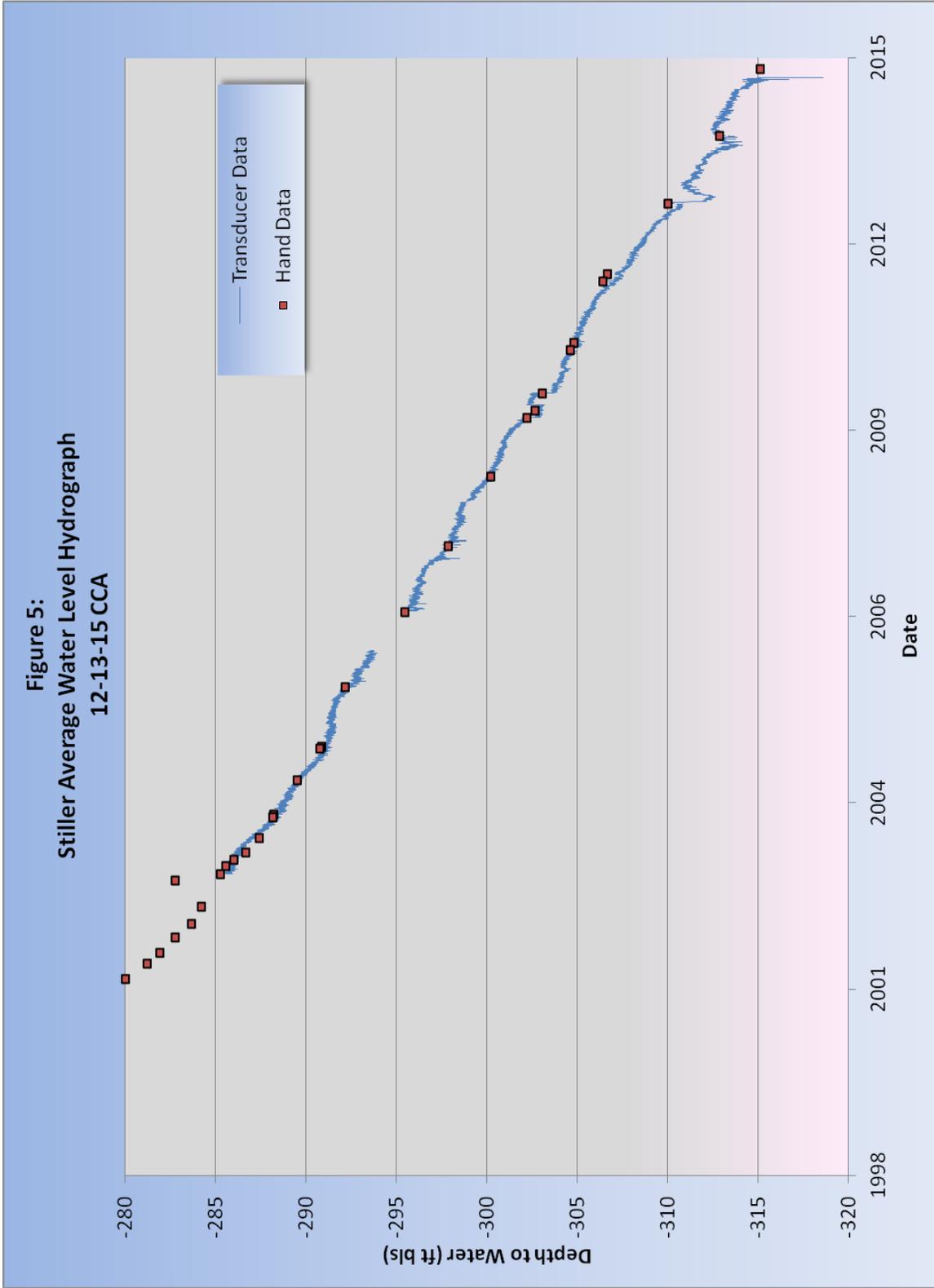


Figure 6: Avra Valley Recharge Project  
Depth to Water at AVMW-1

