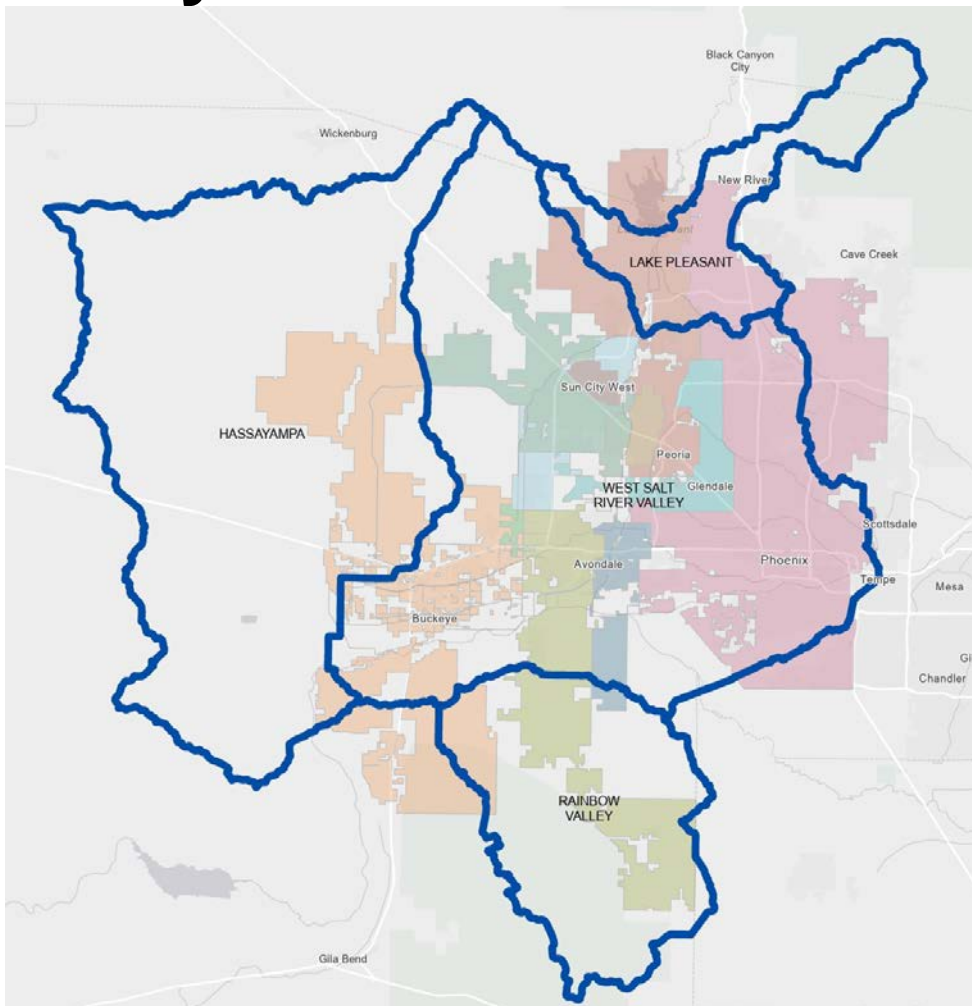


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Managing Water in the West

West Valley Water Association Groundwater Recharge Suitability Analysis



U.S. Department of the Interior
Bureau of Reclamation
Lower Colorado Region
Phoenix Area Office

September 2019

Mission Statements

The mission of the Department of the Interior is to protect and manage the Nation's natural resources and cultural heritage; provide scientific and other information about those resources; and honor its trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

West Valley Water Association Groundwater Recharge Suitability Analysis

prepared by

Geographic Information Systems Branch
Jay Corum, GIS Specialist (Data Management)



**U.S. Department of the Interior
Bureau of Reclamation
Lower Colorado Region
Phoenix Area Office**

September 2019

Contents

	Page
WVWA Groundwater Recharge GIS Suitability Analysis (GIS Weighted Analysis).....	1
Overview	1
Area of Interest	1
GIS Suitability Analysis Model	2
Land use	2
Hydrology	2
Horizontal Conductivity.....	2
Geology/Soils.....	3
Criteria Not Considered	4
Results of GIS Weighted Analysis	Error! Bookmark not defined.

Acknowledgments

Several individuals were instrumental in developing the data and analysis needed for this study. Suggestions and guidance by West Valley Water Association Planning Committee throughout this study are greatly acknowledged

WVWA Groundwater Recharge GIS Suitability Analysis (GIS Weighted Analysis)

Overview

West Valley Water Association Groundwater Recharge GIS Suitability Analysis, using weighted analysis technique.

Area of Interest

The area of interest for this Site Suitability Analysis includes the area within the Lower Hassayampa, Lake Pleasant, West Salt River Valley, and Rainbow Valley Basins. (ADWR).

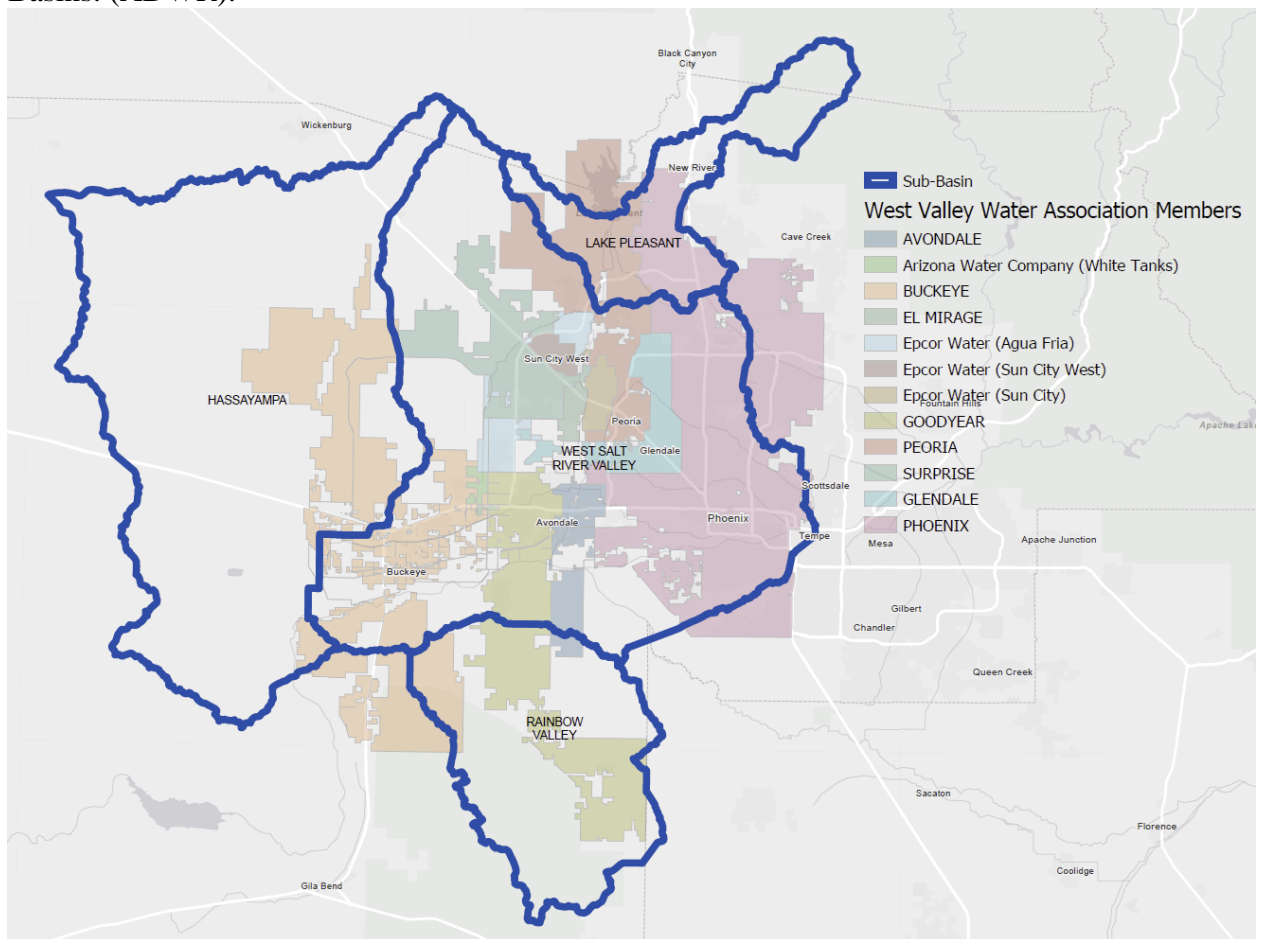


Figure 1

GIS Suitability Analysis Model

1. Goal: Identify optimal locations for Groundwater Recharge in the WVWA area of interest.
2. Suitability model evaluation: Are viable recharge locations available within the WVWA area of interest

Land use

2016 Existing Land Use (EXLU) for the Maricopa Association of Governments Region consisting of Maricopa County and parts of Pinal County, compiled by MAG.

Credits: Maricopa Association of Governments (MAG) and the MAG member agencies.

Suitability	Classification	Value
Exclude	Developed	0
High Suitability	Active Open Space, Golf Course, Passive/Restricted Open Space, Public Land, Agriculture, Vacant, Vacant State Trust	5

Table 1

Hydrology

Depth to Water - Raster layer developed from Kriging analysis of 2017 GWSI layer based on Depth to Water attribute. Depths Re-Classified.

Suitability	Classification	Value
Exclude	1	<100 ft
Least Suitable	2	100-200 ft
Low Suitability	3	200-300 ft
Medium Suitability	4	300-400 ft
High Suitability	5	>400 ft

Table 2

Horizontal Conductivity

This layer is derived from the 2017 version of the [gSSURGO](#) 30m (contiguous 48 States and Washington D.C.) and 10m rasters (all other regions) produced by the [Natural Resources Conservation Service](#) (NRCS). The value for drainage class is derived from the gSSURGO map unit aggregated attribute table field Drainage Class - Dominant Condition (drclassdcd).

The layer has an attribute field for Drainage Class and a description field for use in pop-ups.

The values of drainage class in the West Valley Water Association Area of Interest are defined by the [NRCS Soil Survey Manual](#) as:

Excessively drained: Water is removed very rapidly. The occurrence of internal free water commonly is very rare or very deep. The soils are commonly coarse-textured and have very high hydraulic conductivity or are very shallow.

Somewhat excessively drained: Water is removed from the soil rapidly. Internal free water occurrence commonly is very rare or very deep. The soils are commonly coarse-textured and have high saturated hydraulic conductivity or are very shallow.

Well drained: Water is removed from the soil readily but not rapidly. Internal free water occurrence commonly is deep or very deep; annual duration is not specified. Water is available to plants throughout most of the growing season in humid regions. Wetness does not inhibit growth of roots for significant periods during most growing seasons. The soils are mainly free of the deep to redoximorphic features that are related to wetness.

Moderately well drained: Water is removed from the soil somewhat slowly during some periods of the year. Internal free water occurrence commonly is moderately deep and transitory through permanent. The soils are wet for only a short time within the rooting depth during the growing season, but long enough that most mesophytic crops are affected. They commonly have a moderately low or lower saturated hydraulic conductivity in a layer within the upper 1 m, periodically receive high rainfall, or both.

Geology/Soils

Hard Rock

Hard rock areas are excluded from suitable site. The layer used to determine Hard rock areas is from the Arizona Geological Survey representing Hard rock areas that are generally mountainous or rock outcrops.

Arizona Geology-Soils Index

Soils information ranked based on screening criteria.

Source; Arizona Geological Survey

Suitability	Classification	Value
Exclude	1	Bedrock Units
Least Suitable	2	Px, Qy, Tb, TKg, Tsm, Tsy, Tv, Xg, Xm, Xms, Xmv, Yg, Ys, Yxg

Low Suitability	3	Qm, Qy
Medium Suitability	4	QM, Qo, Q
High Suitability	5	Qr

Table 3

Criteria Not Considered

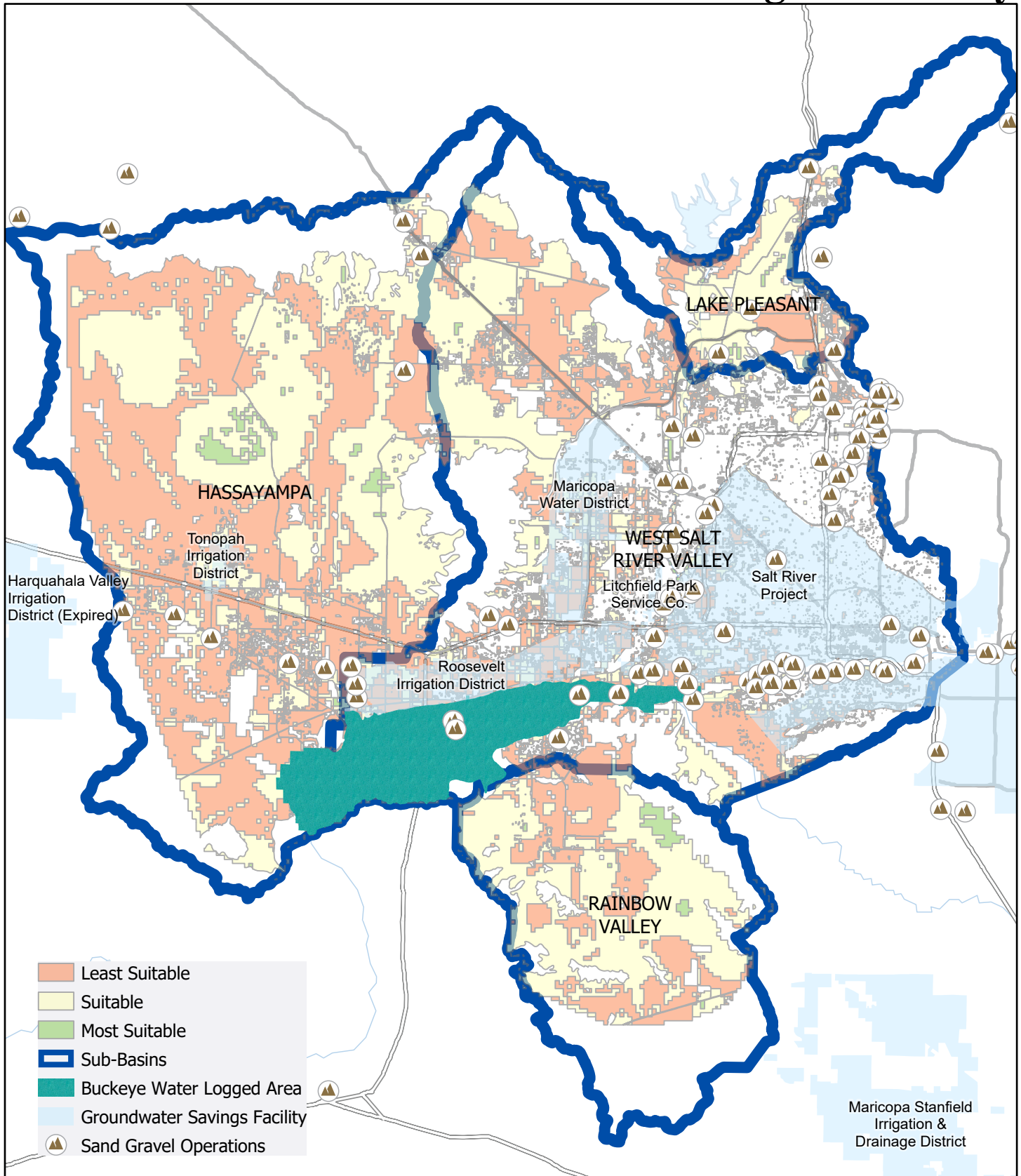
Seven geographical features were previously Identified to be factors in Suitable Groundwater Recharge Sites. It was determined that using these features would be too restrictive for the analysis, and were not considered for this version of the groundwater suitability analysis and will be evaluated on a site-specific basis when suitable sites are located using the baseline criteria. Those features are listed below

1. Active Land Subsidence
2. Mining/Sand & Gravel
3. Luke Salt Dome
4. Terrain (Slope)
5. Buckeye Waterlogged Area
6. Power/ Infrastructure
7. Water Quality Impacts

Groundwater Recharge Suitability Results

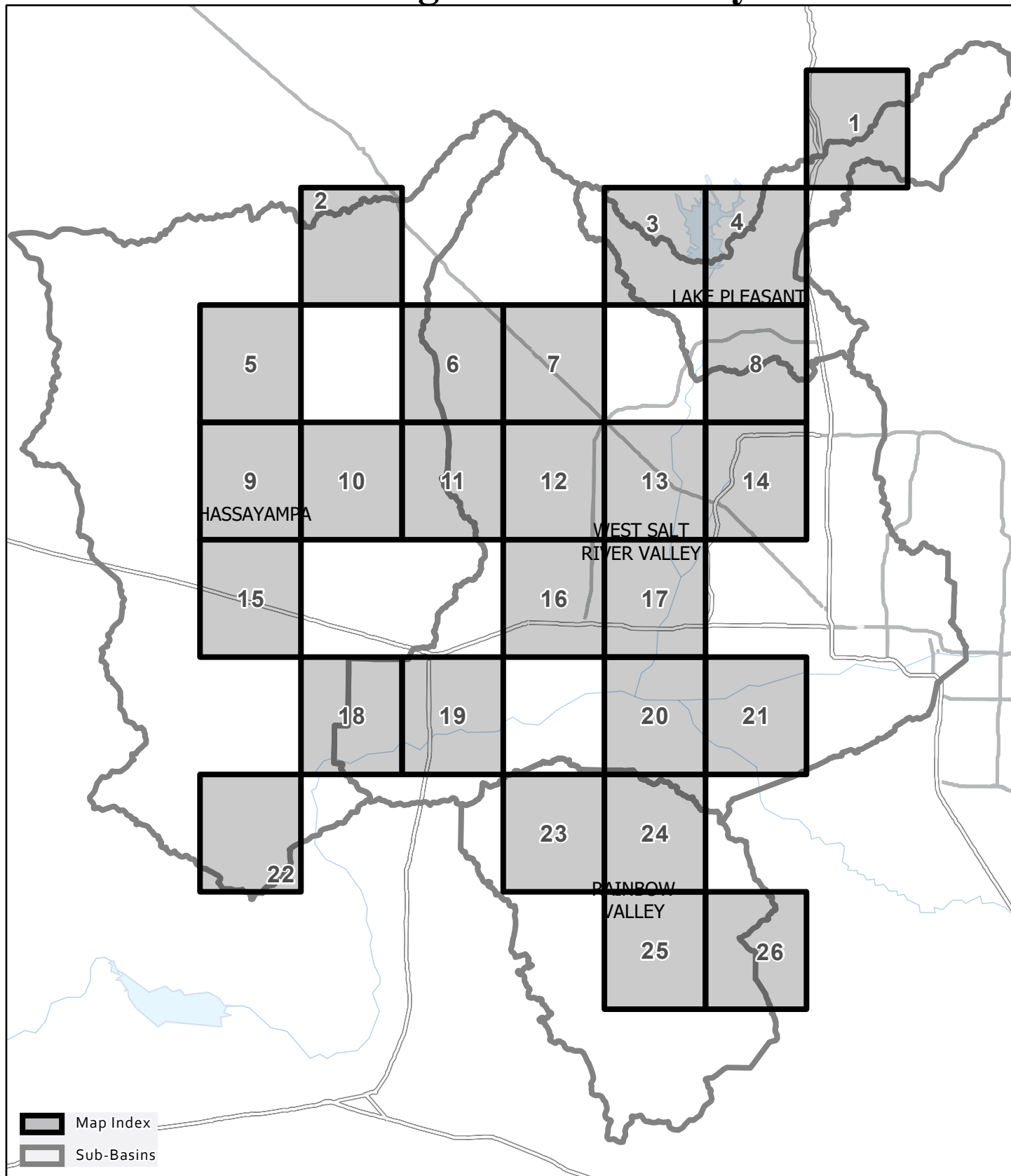
The results of the Groundwater Recharge Suitability Analysis based on the criteria defined by the West Valley Water Association Planning committee are depicted on the following maps. The suitable locations are generally undeveloped areas according to the 2016 Existing Land Use (EXLU) provided by the Maricopa Association of Governments. However, land ownership was not a consideration for this analysis.

Groundwater Recharge Suitability



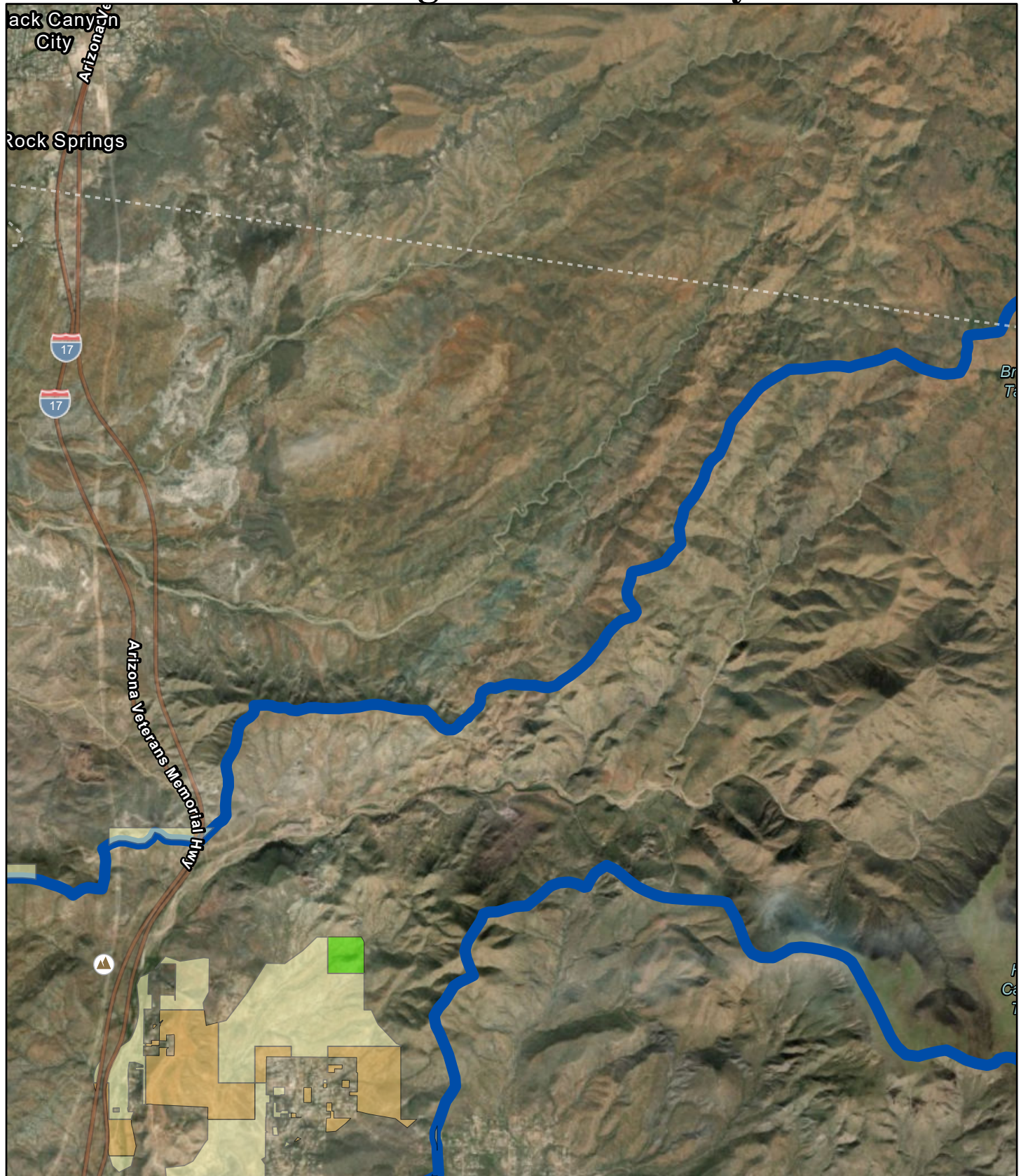
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Groundwater Recharge Site Suitability



Groundwater Recharge Site Suitability

Map Number: 1



- Sand Gravel Operations
- Sub-Basin
- Groundwater Savings Facility
- Buckeye Water Logged Area

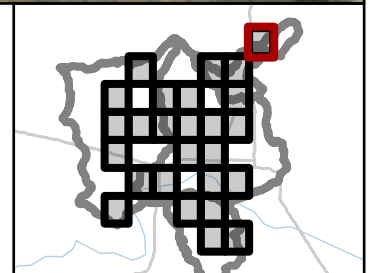
0 1 2 3 Miles

Groundwater Recharge Suitability

- Least Suitable
- Suitable
- Most Suitable

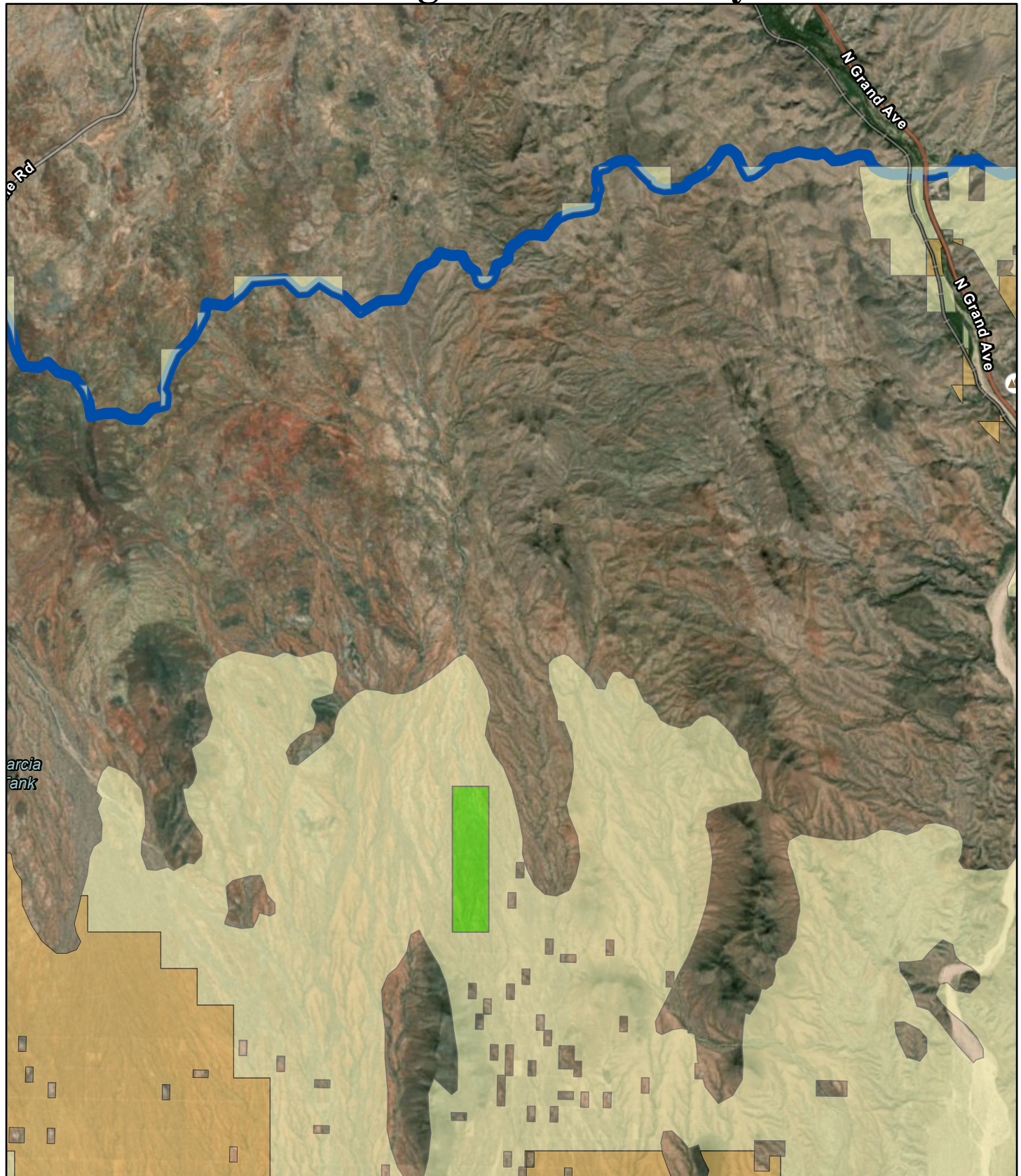
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Groundwater Recharge Site Suitability

Map Number: 2



- Sand Gravel Operations
- Sub-Basin
- Groundwater Savings Facility
- Buckeye Water Logged Area

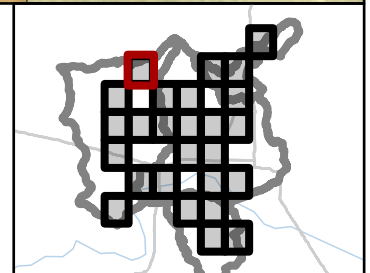
Groundwater Recharge Suitability

- Least Suitable
- Suitable
- Most Suitable

0 1 2 3 Miles

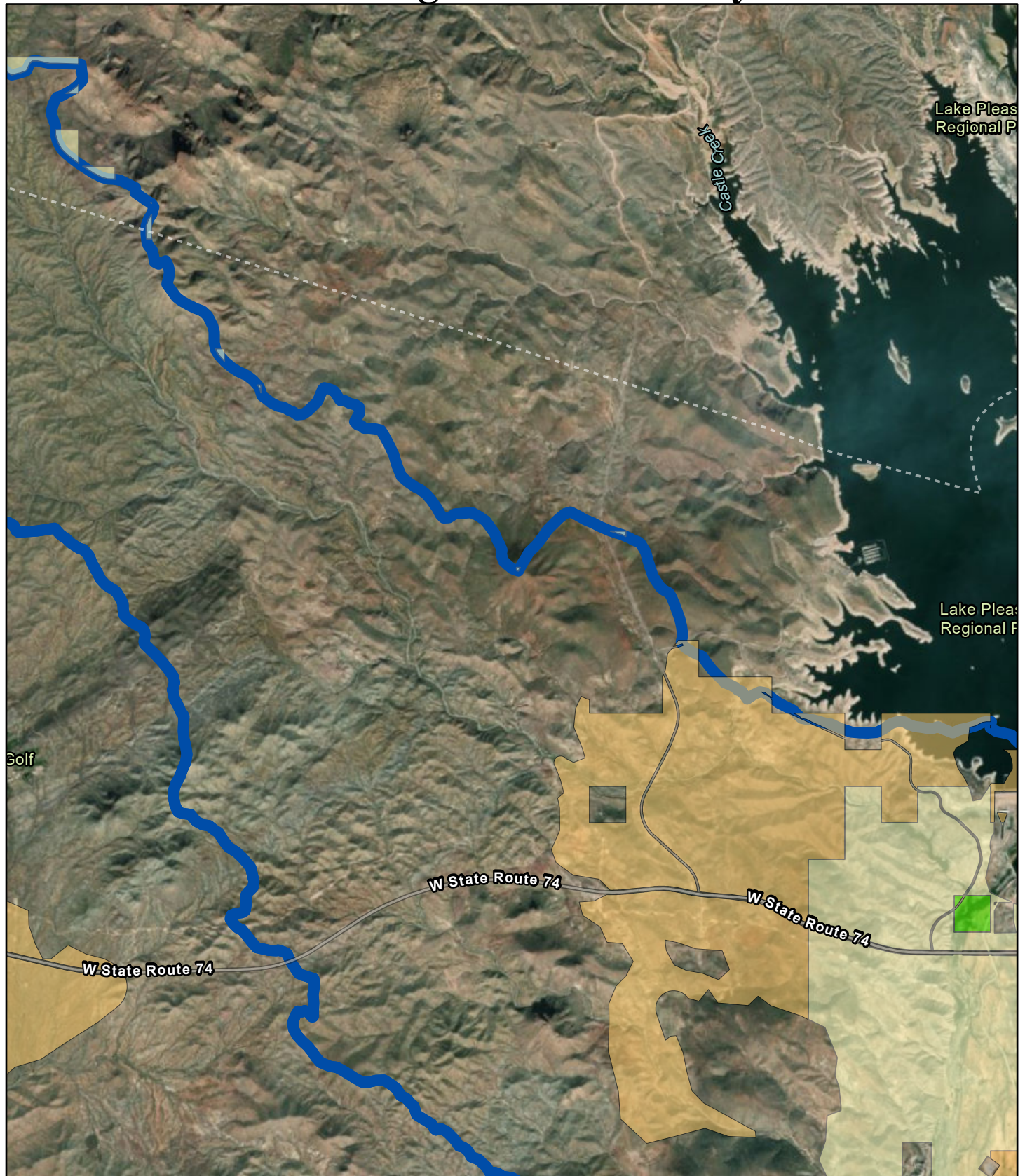
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Groundwater Recharge Site Suitability

Map Number: 3



- Sand Gravel Operations
- Sub-Basin
- Groundwater Savings Facility
- Buckeye Water Logged Area

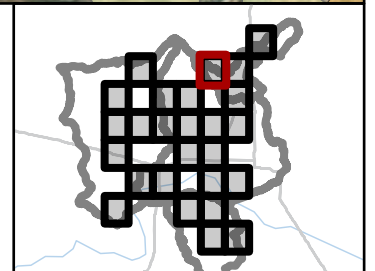
Groundwater Recharge Suitability

- Least Suitable
- Suitable
- Most Suitable

0 1 2 3 Miles

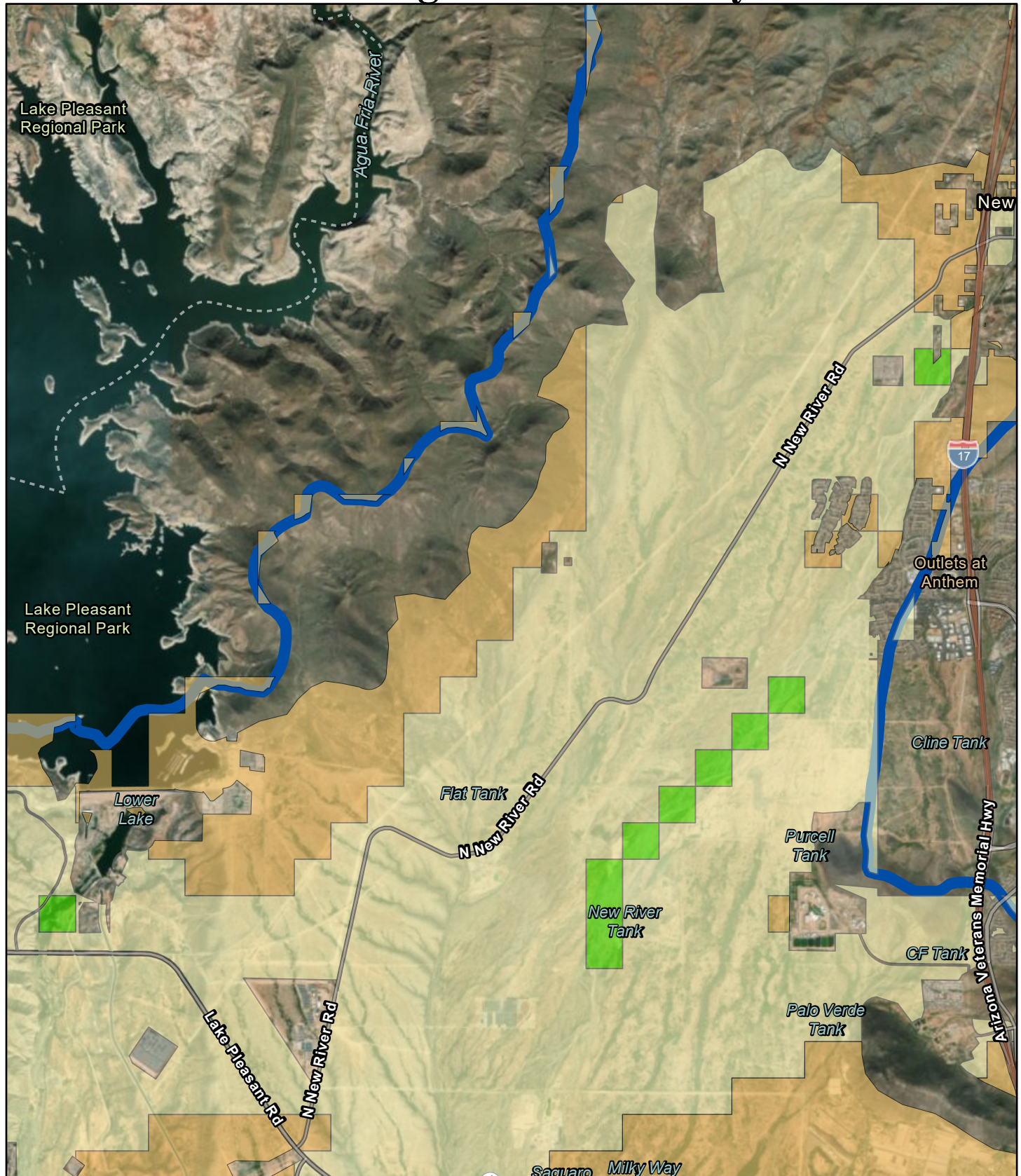
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Groundwater Recharge Site Suitability

Map Number: 4



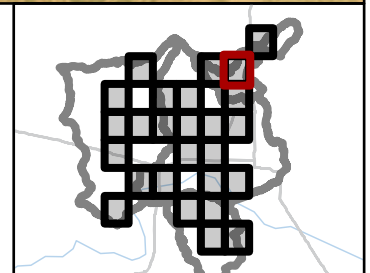
- Sand Gravel Operations
- Sub-Basin
- Groundwater Savings Facility
- Buckeye Water Logged Area

Groundwater Recharge Suitability

- Least Suitable
- Suitable
- Most Suitable

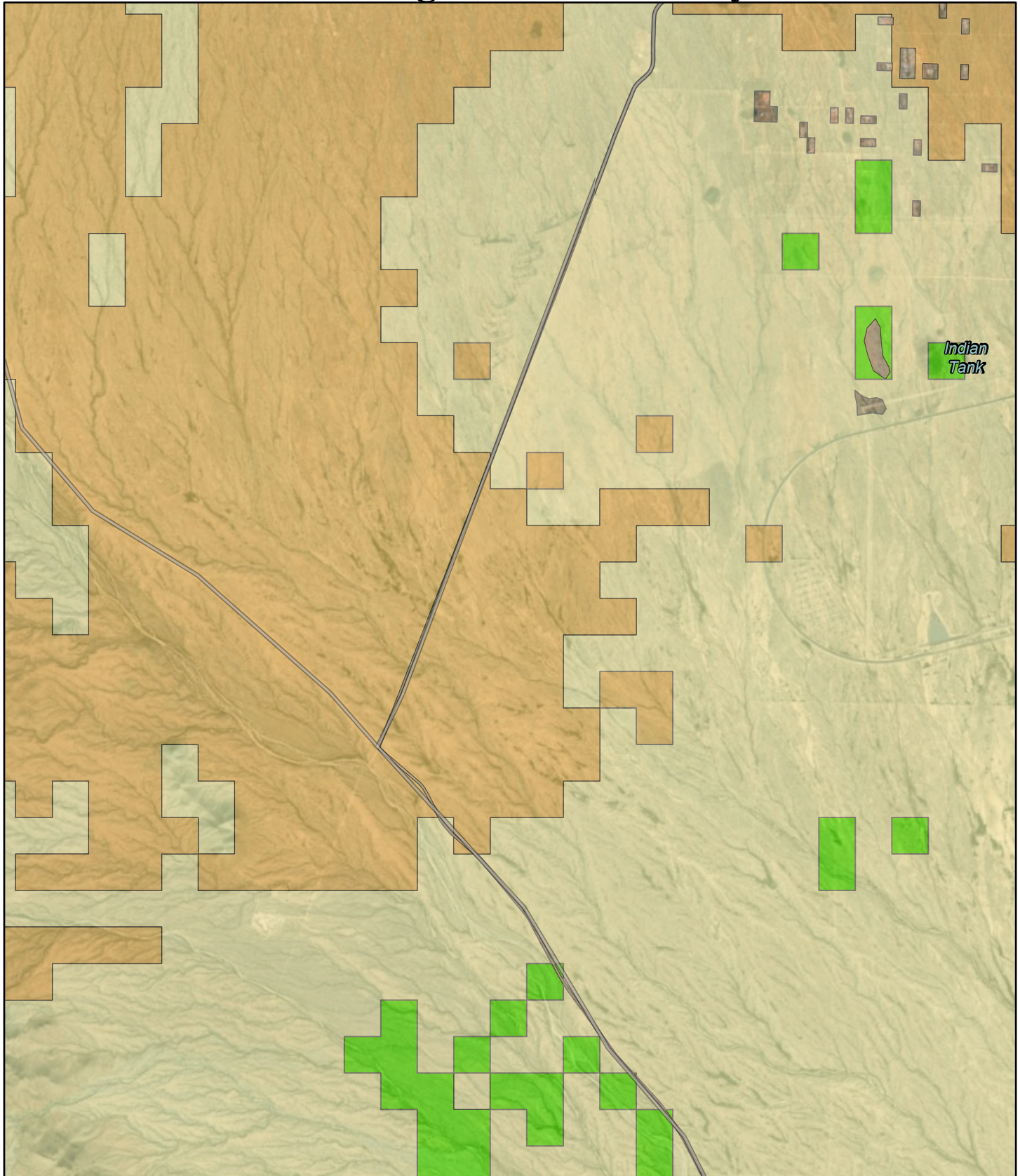
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Groundwater Recharge Site Suitability

Map Number: 5



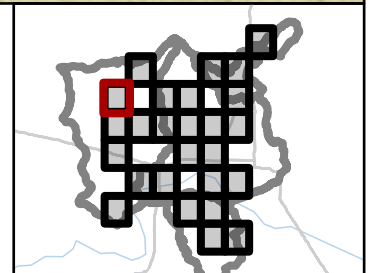
- Sand Gravel Operations
- Sub-Basin
- Groundwater Savings Facility
- Buckeye Water Logged Area

Groundwater Recharge Suitability

- Least Suitable
- Suitable
- Most Suitable

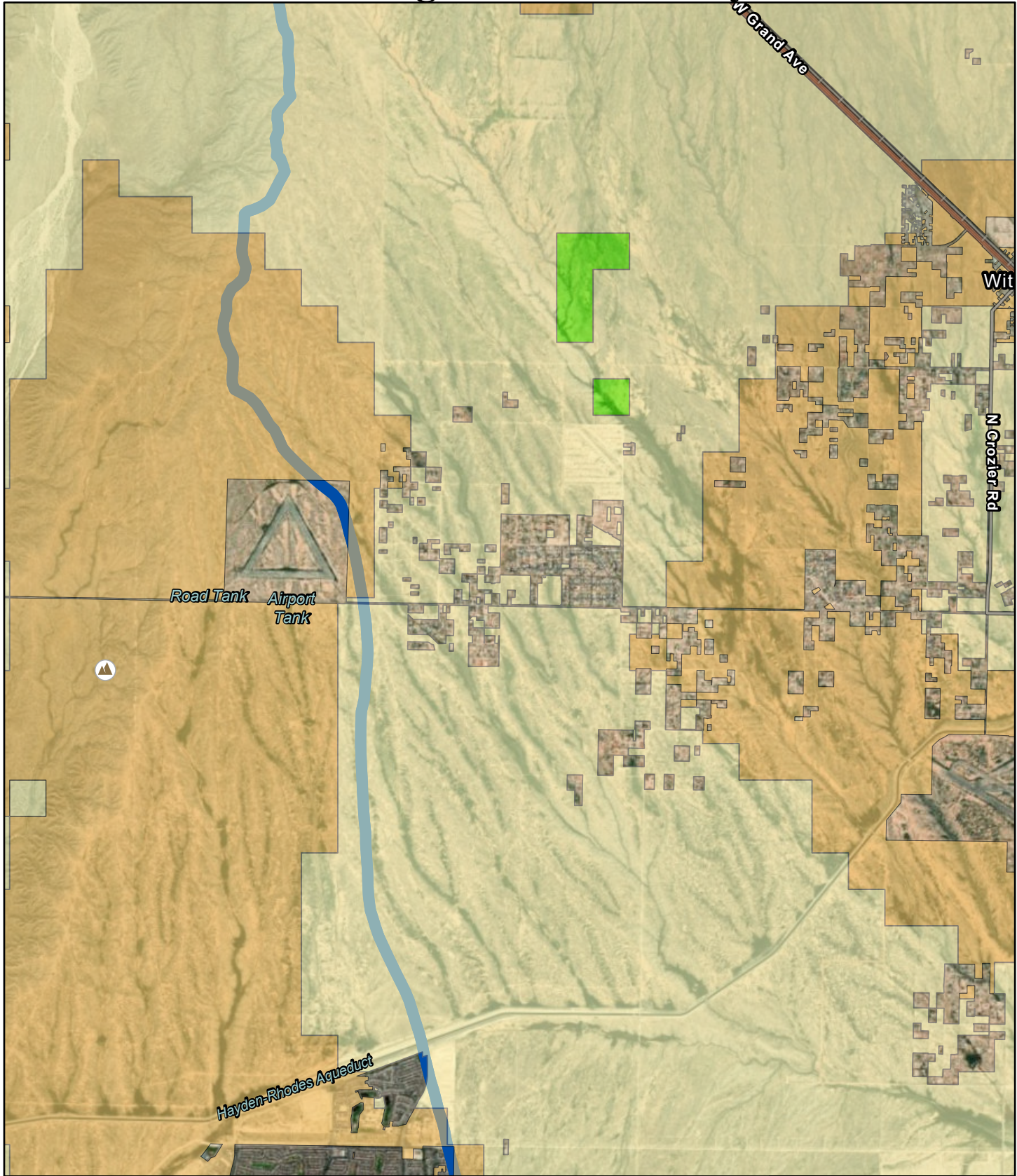
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Groundwater Recharge Site Suitability

Map Number: 6



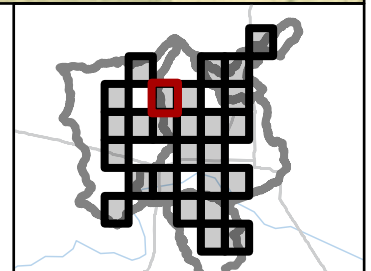
-  Sand Gravel Operations
-  Sub-Basin
-  Groundwater Savings Facility
-  Buckeye Water Logged Area

Groundwater Recharge Suitability

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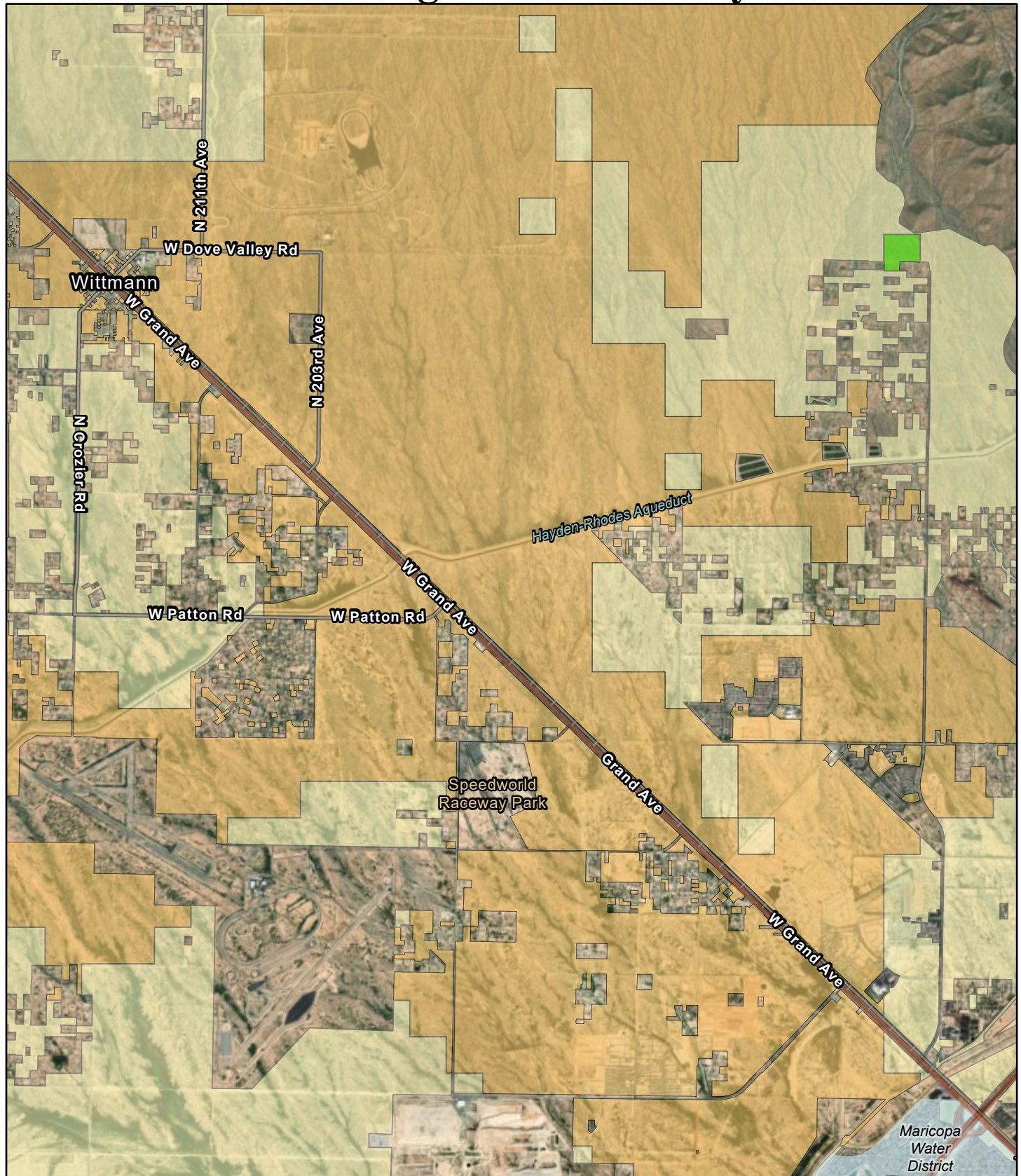
- Least Suitable
 - Suitable
 - Most Suitable

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Groundwater Recharge Site Suitability

Map Number: 7



- Sand Gravel Operations
- Sub-Basin
- Groundwater Savings Facility
- Buckeye Water Logged Area

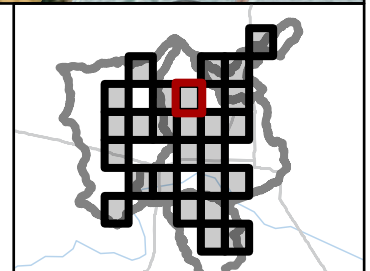
0 1 2 3 Miles

Groundwater Recharge Suitability

- Least Suitable
- Suitable
- Most Suitable

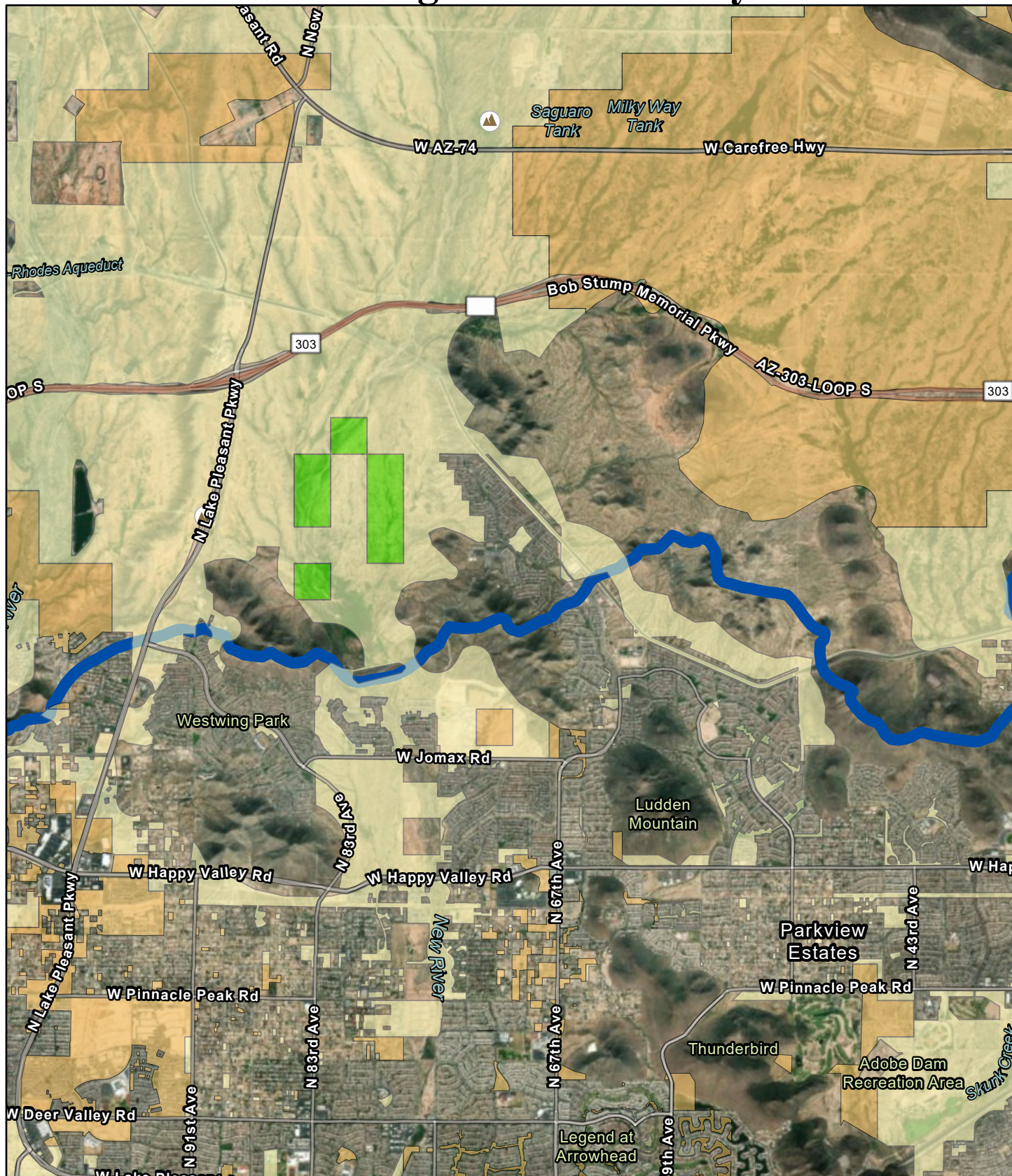
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Groundwater Recharge Site Suitability

Map Number: 8



- Sand Gravel Operations
- Sub-Basin
- Groundwater Savings Facility
- Buckeye Water Logged Area

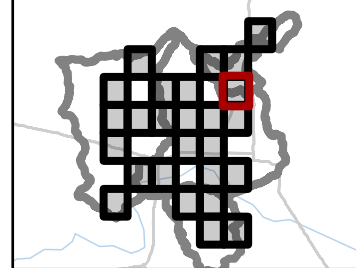
0 1 2 3 Miles

Groundwater Recharge Suitability

- Least Suitable
- Suitable
- Most Suitable

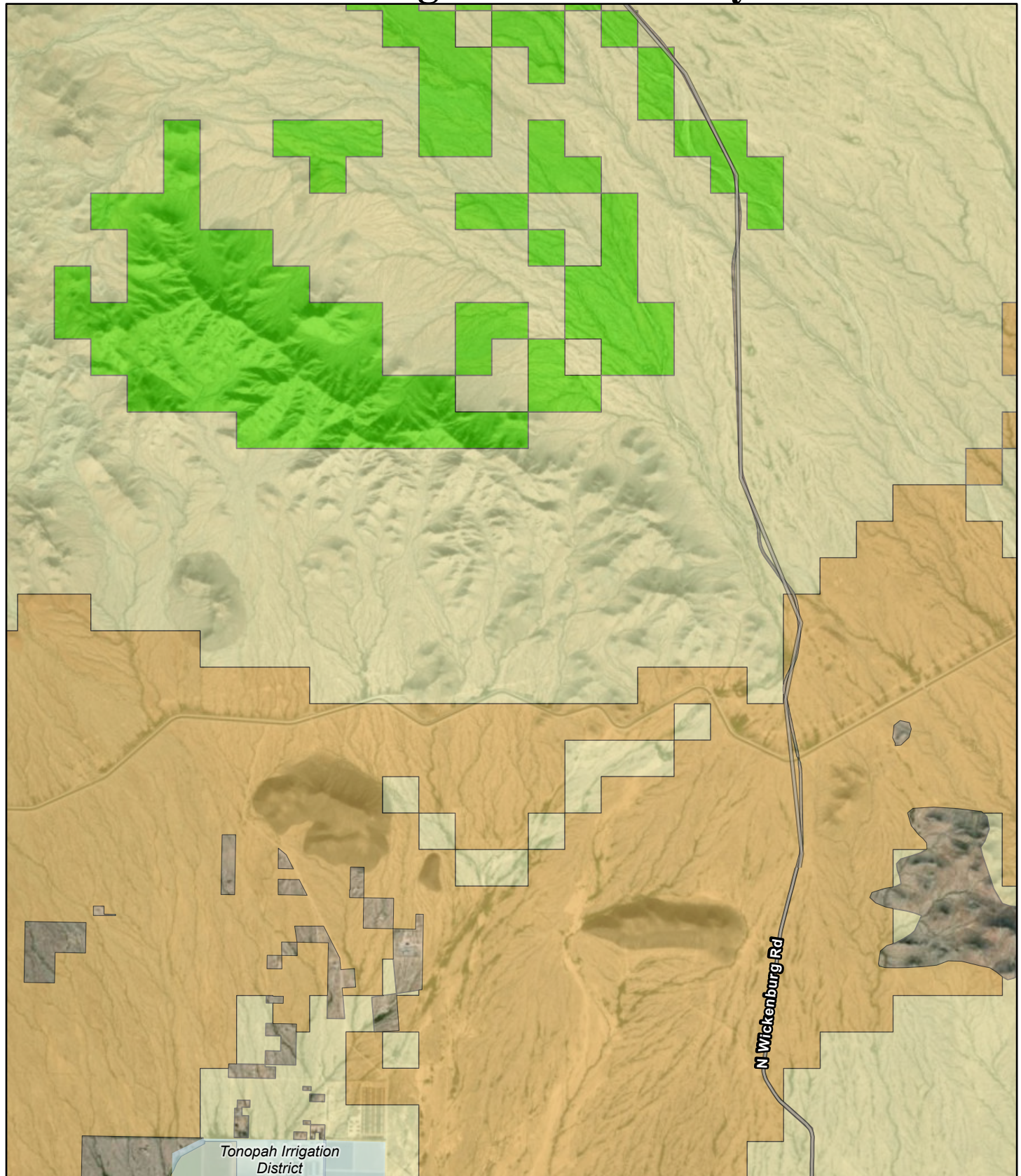
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Groundwater Recharge Site Suitability

Map Number: 9



- Sand Gravel Operations
- Sub-Basin
- Groundwater Savings Facility
- Buckeye Water Logged Area

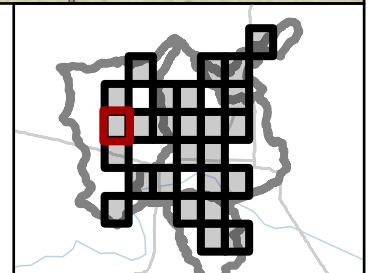
0 1 2 3 Miles

Groundwater Recharge Suitability

- Least Suitable
- Suitable
- Most Suitable

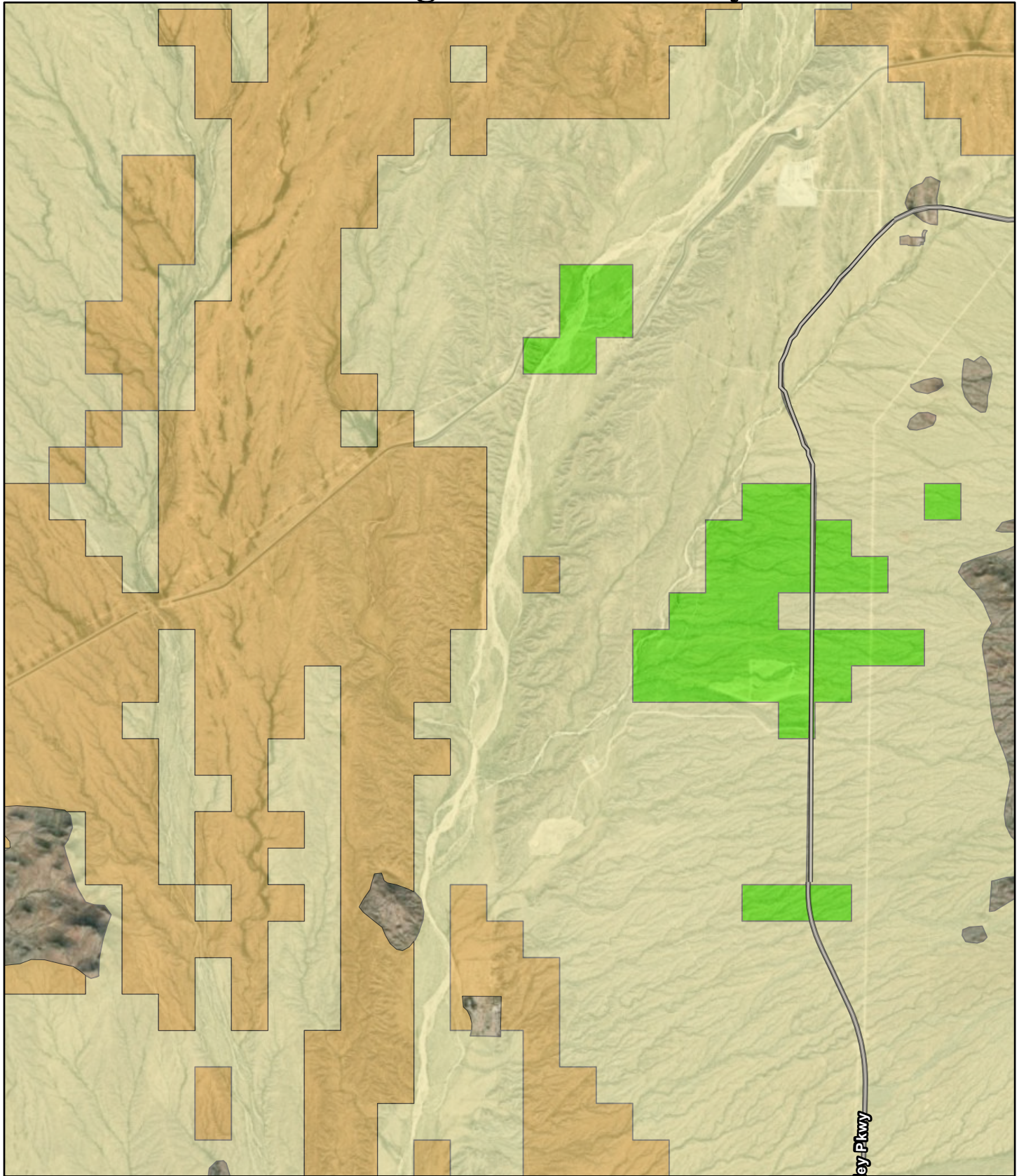
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Groundwater Recharge Site Suitability

Map Number: 10



- Sand Gravel Operations
- Sub-Basin
- Groundwater Savings Facility
- Buckeye Water Logged Area

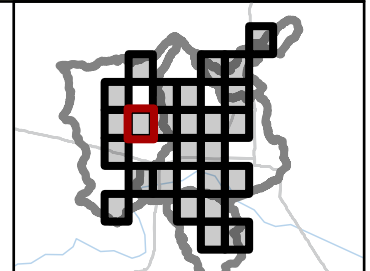
0 1 2 3 Miles

Groundwater Recharge Suitability

- Least Suitable
- Suitable
- Most Suitable

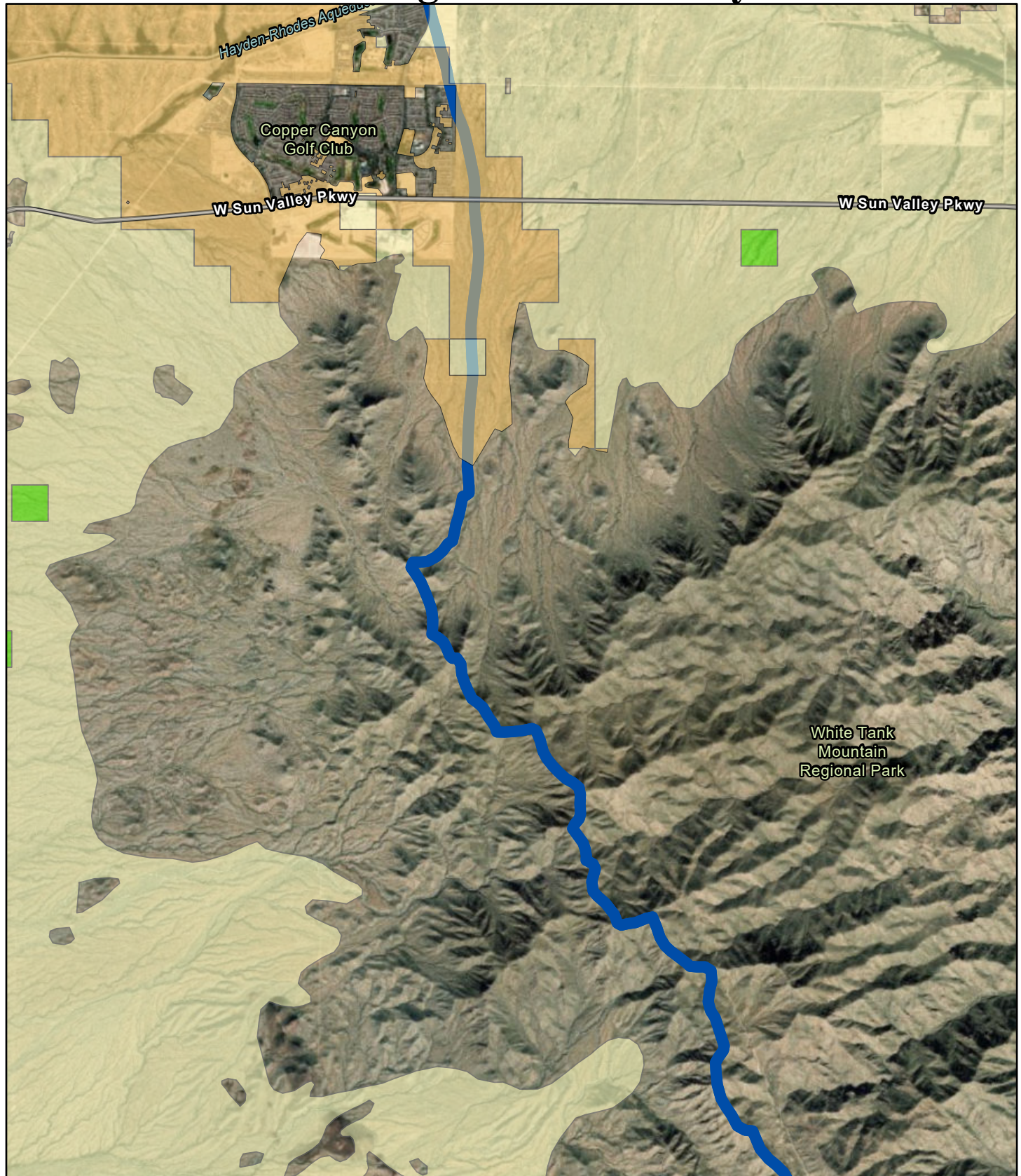
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Groundwater Recharge Site Suitability

Map Number: 11



- Sand Gravel Operations
- Sub-Basin
- Groundwater Savings Facility
- Buckeye Water Logged Area

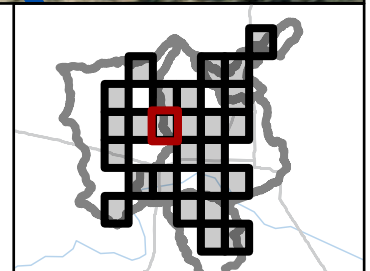
Groundwater Recharge Suitability

- Least Suitable
- Suitable
- Most Suitable

0 1 2 3 Miles

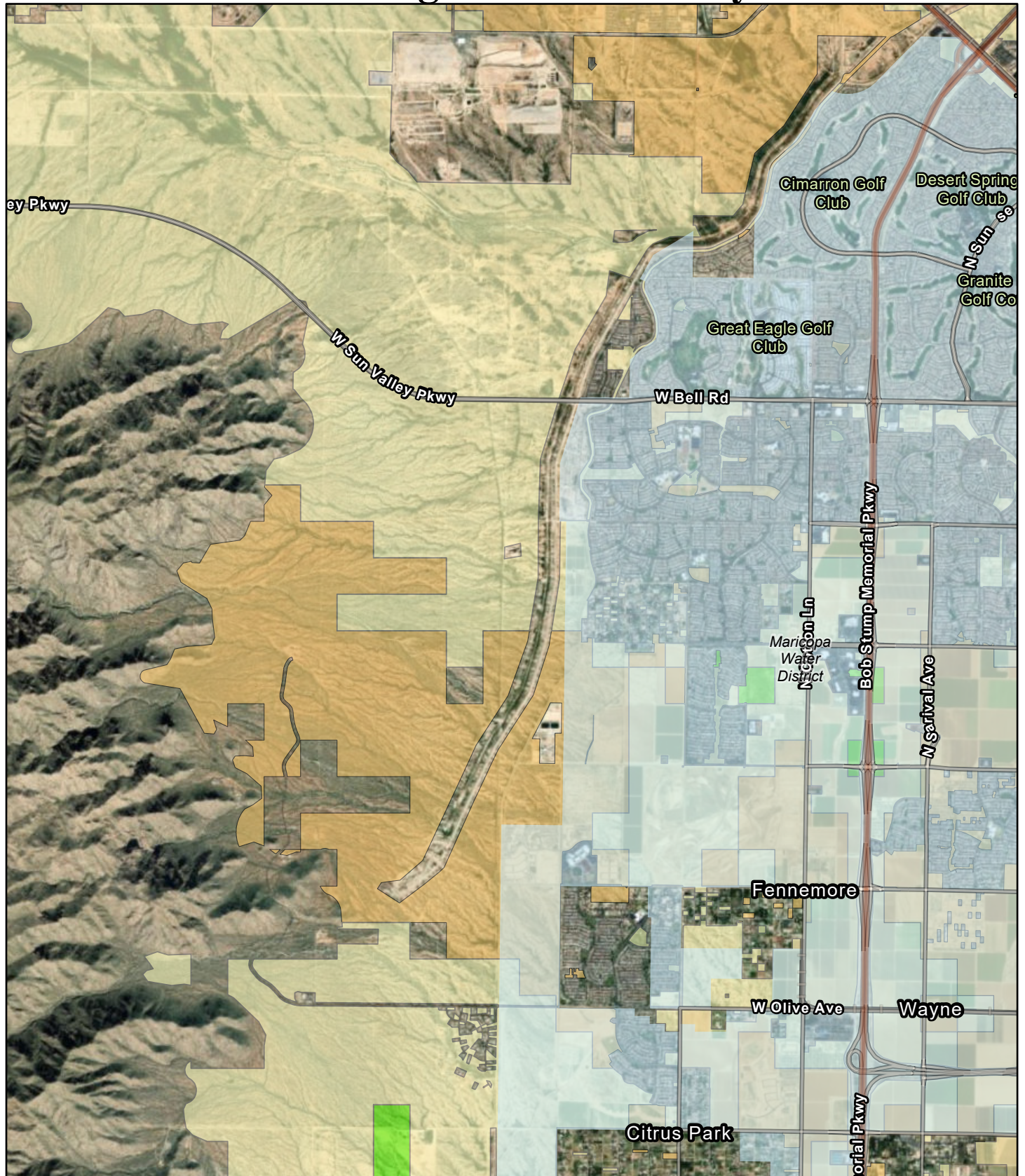
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

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

Groundwater Recharge Site Suitability

Map Number: 12



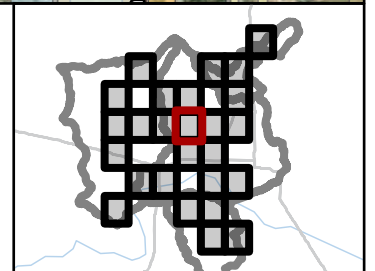
-  Sand Gravel Operations
-  Sub-Basin
-  Groundwater Savings Facility
-  Buckeye Water Logged Area

Groundwater Recharge Suitability

-  Least Suitable
-  Suitable
-  Most Suitable

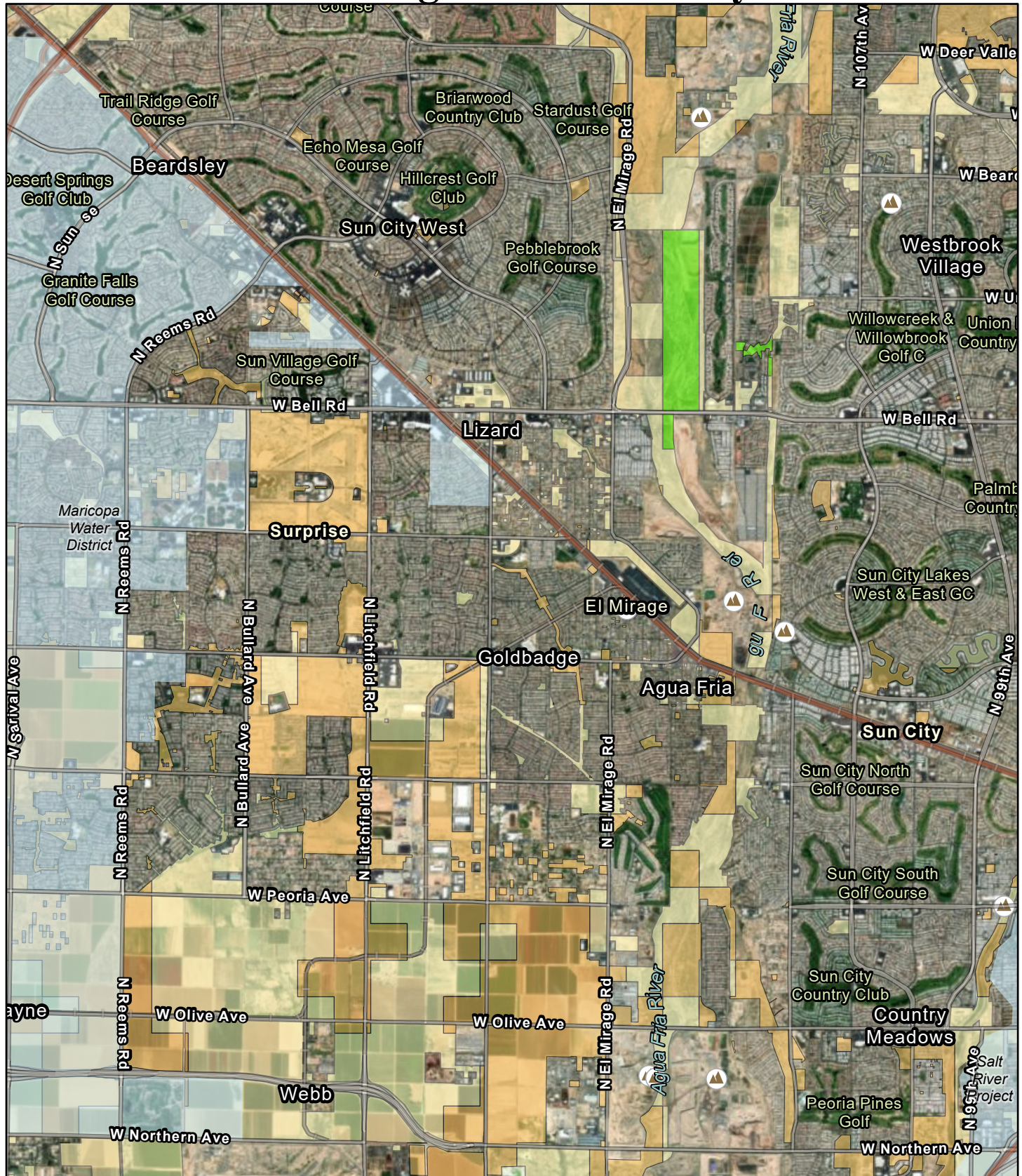
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Groundwater Recharge Site Suitability

Map Number: 13



- Sand Gravel Operations
- Sub-Basin
- Groundwater Savings Facility
- Buckeye Water Logged Area

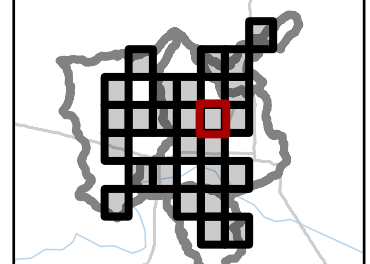
0 1 2 3 Miles

Groundwater Recharge Suitability

- Least Suitable
- Suitable
- Most Suitable

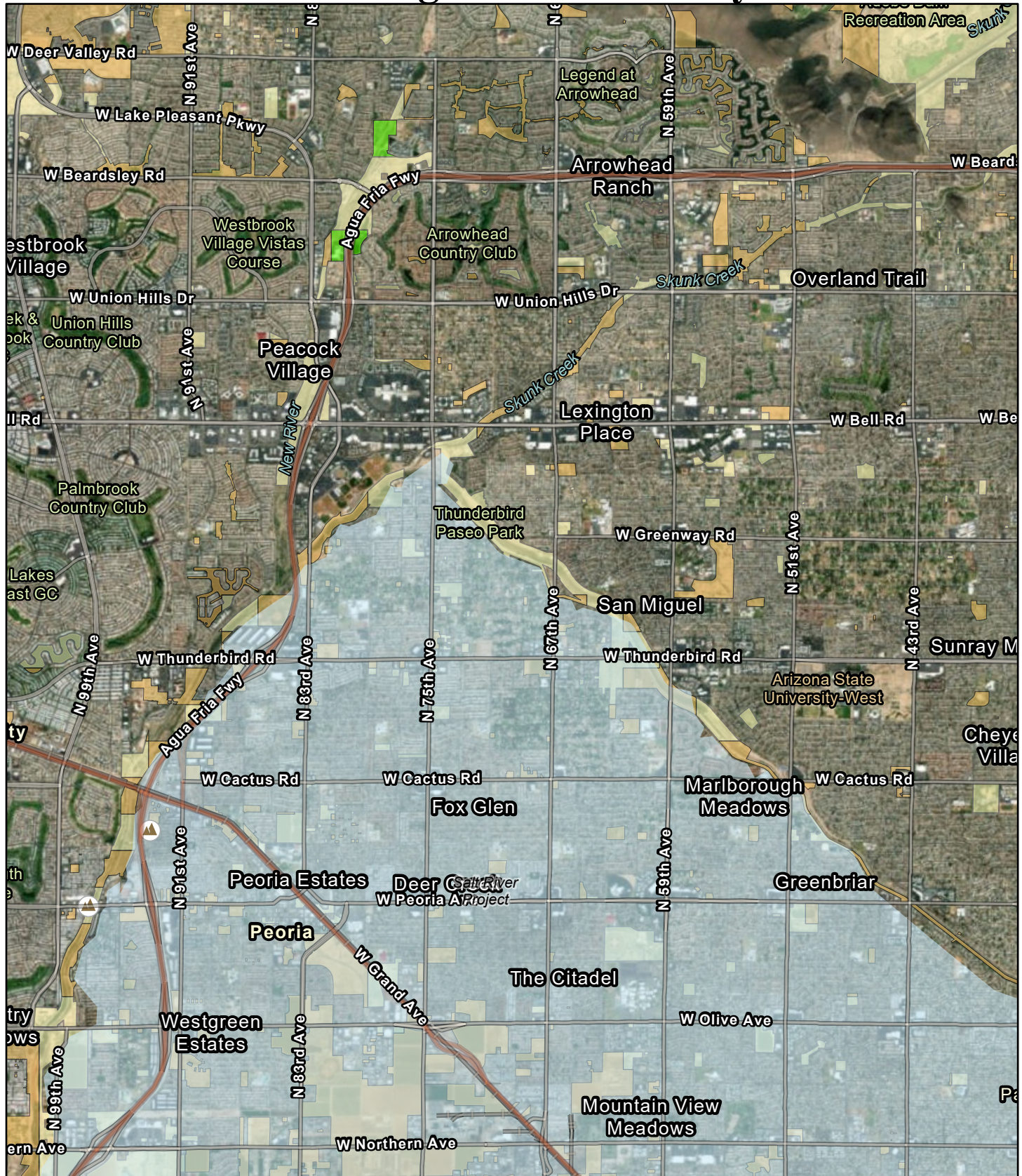
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Groundwater Recharge Site Suitability

Map Number: 14



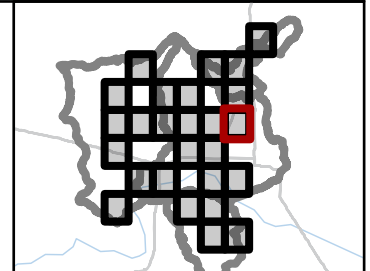
- Sand Gravel Operations
- Sub-Basin
- Groundwater Savings Facility
- Buckeye Water Logged Area

Groundwater Recharge Suitability

- Least Suitable
- Suitable
- Most Suitable

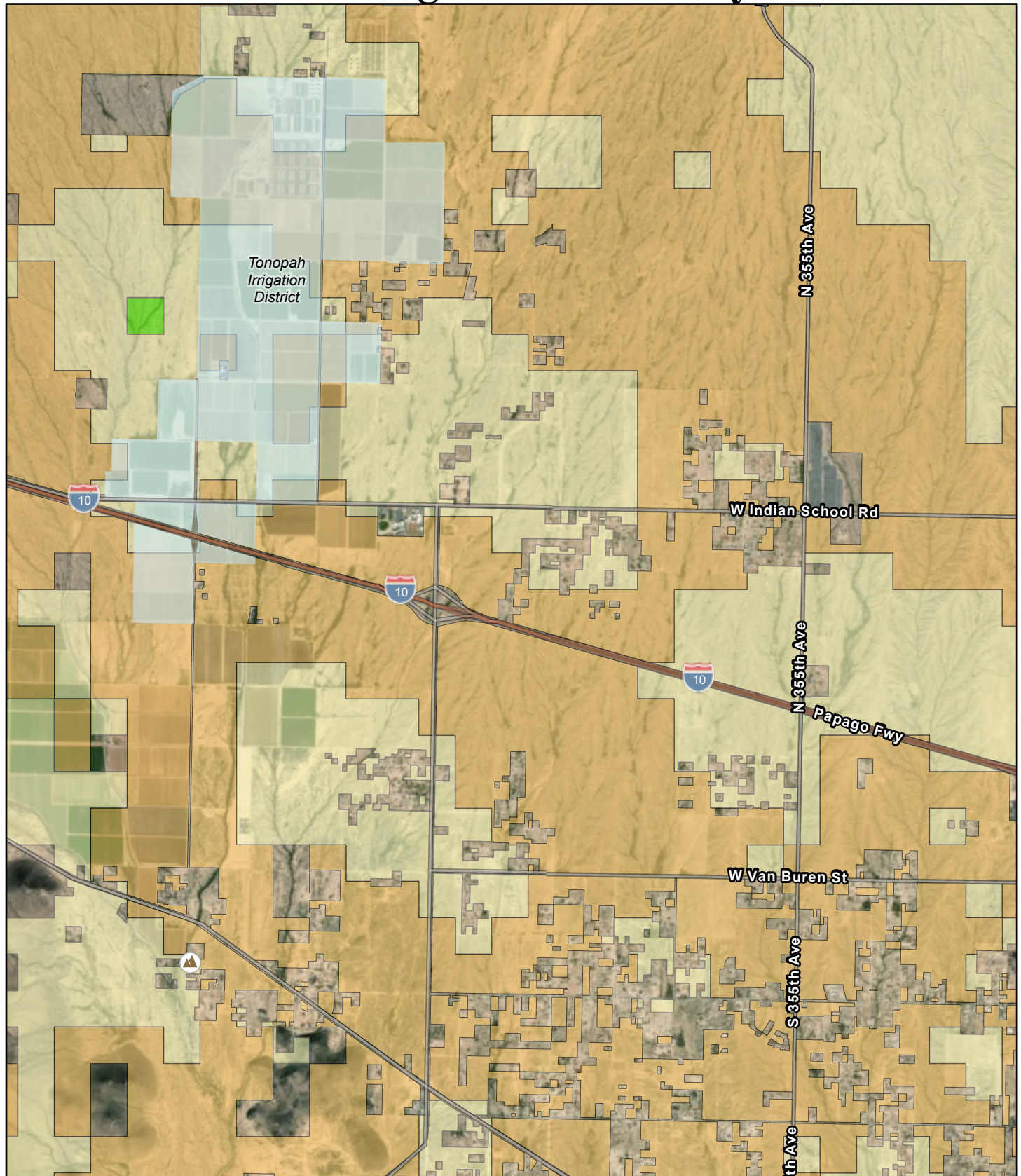
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Groundwater Recharge Site Suitability

Map Number: 15



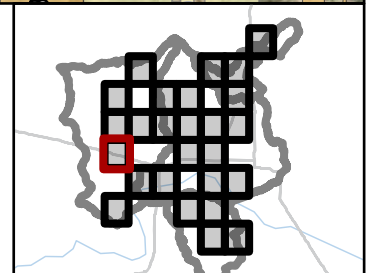
- Sand Gravel Operations
- Sub-Basin
- Groundwater Savings Facility
- Buckeye Water Logged Area

Groundwater Recharge Suitability

- Least Suitable
- Suitable
- Most Suitable

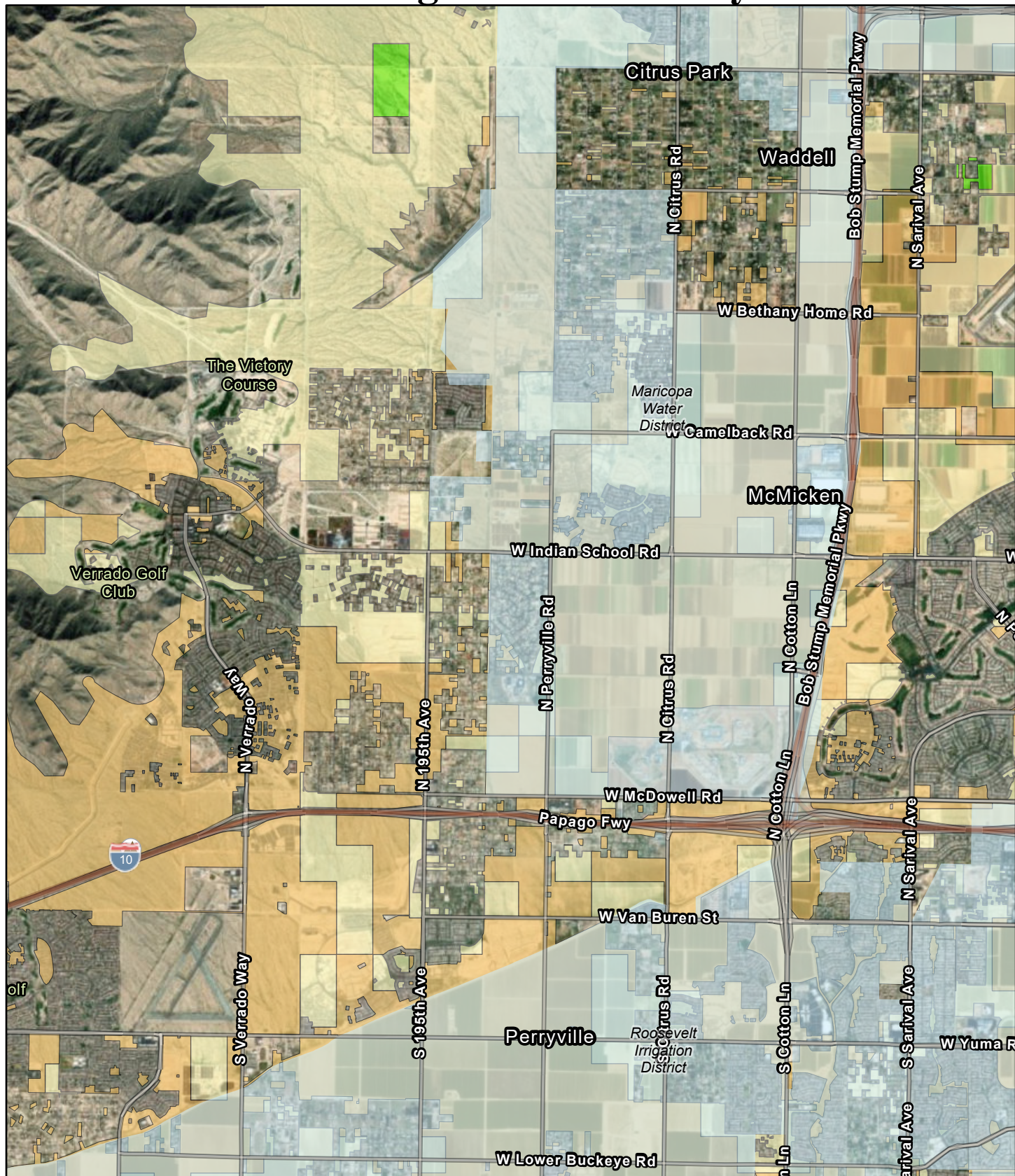
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Groundwater Recharge Site Suitability

Map Number: 16



- Sand Gravel Operations
- Sub-Basin
- Groundwater Savings Facility
- Buckeye Water Logged Area

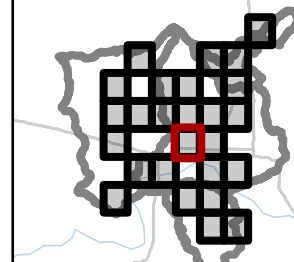
Groundwater Recharge Suitability

- Least Suitable
- Suitable
- Most Suitable

0 1 2 3 Miles

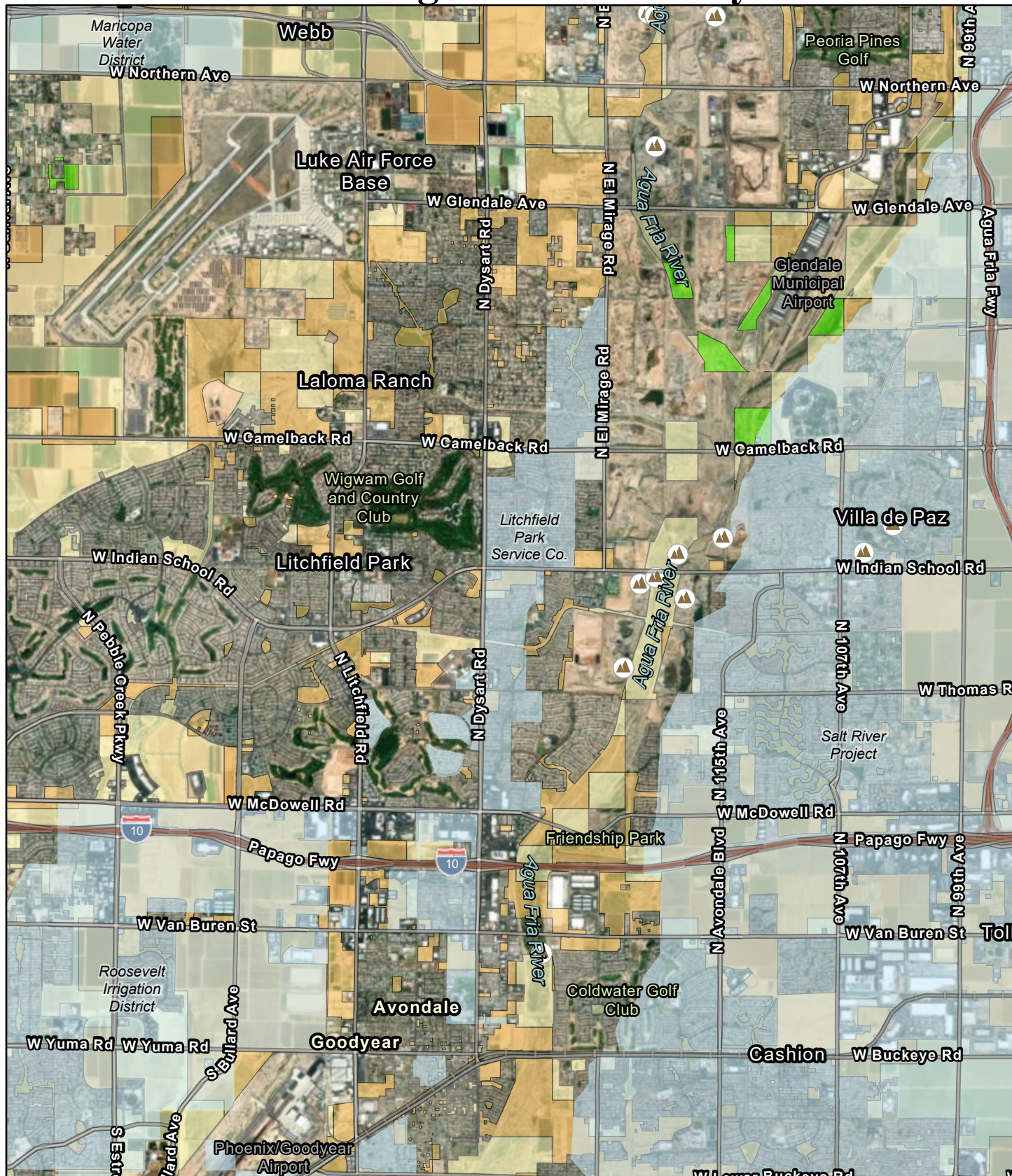
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Groundwater Recharge Site Suitability

Map Number: 17



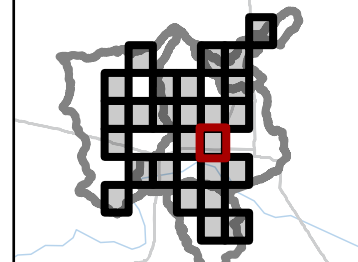
- Sand Gravel Operations
- Sub-Basin
- Groundwater Savings Facility
- Buckeye Water Logged Area

Groundwater Recharge Suitability

- Least Suitable
- Suitable
- Most Suitable

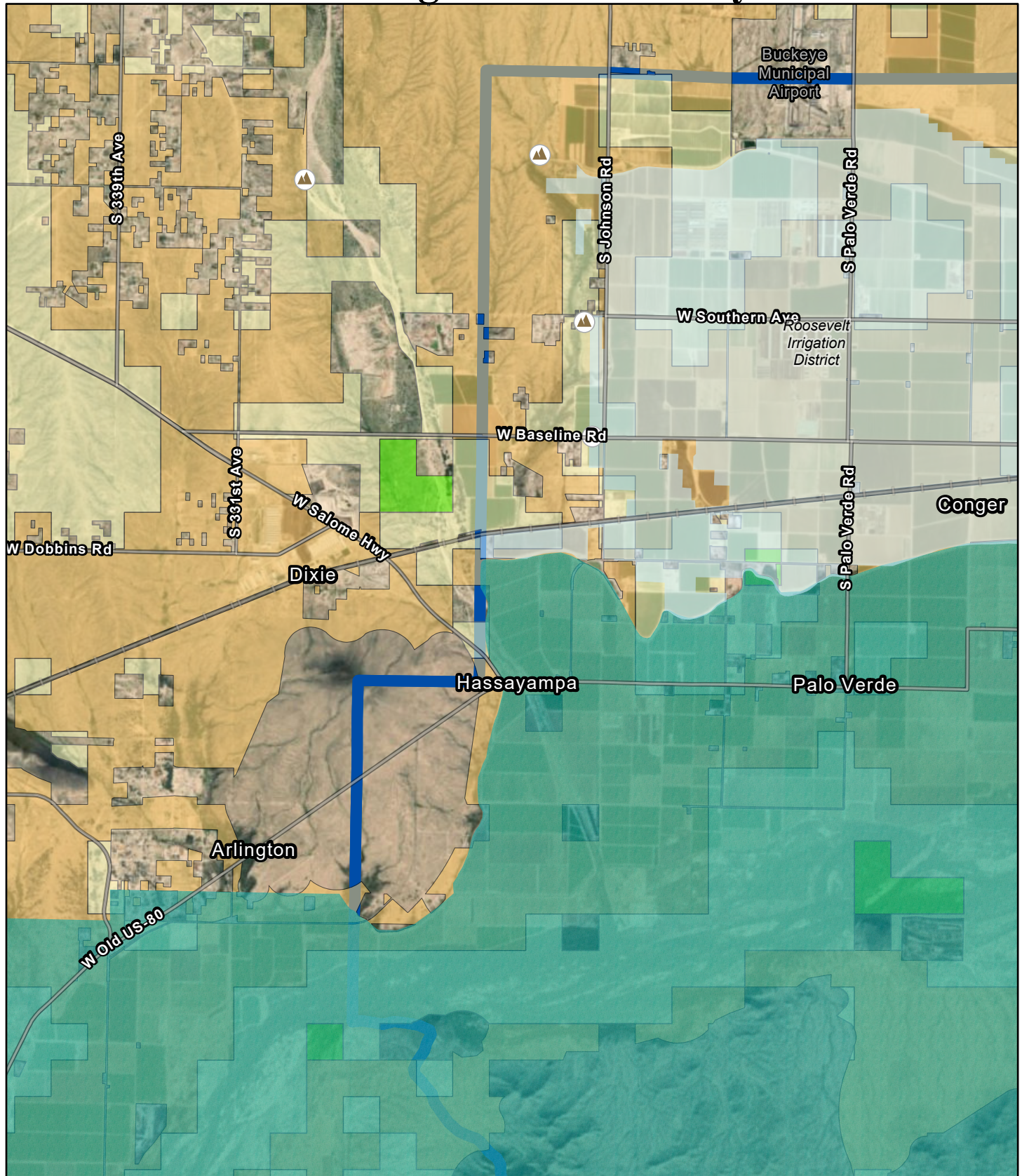
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Groundwater Recharge Site Suitability

Map Number: 18



- Sand Gravel Operations
- Sub-Basin
- Groundwater Savings Facility
- Buckeye Water Logged Area

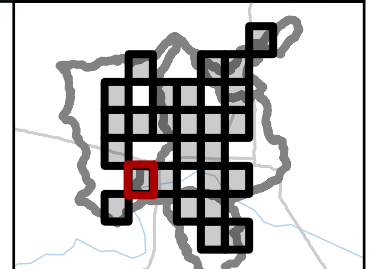
Groundwater Recharge Suitability

- Least Suitable
- Suitable
- Most Suitable



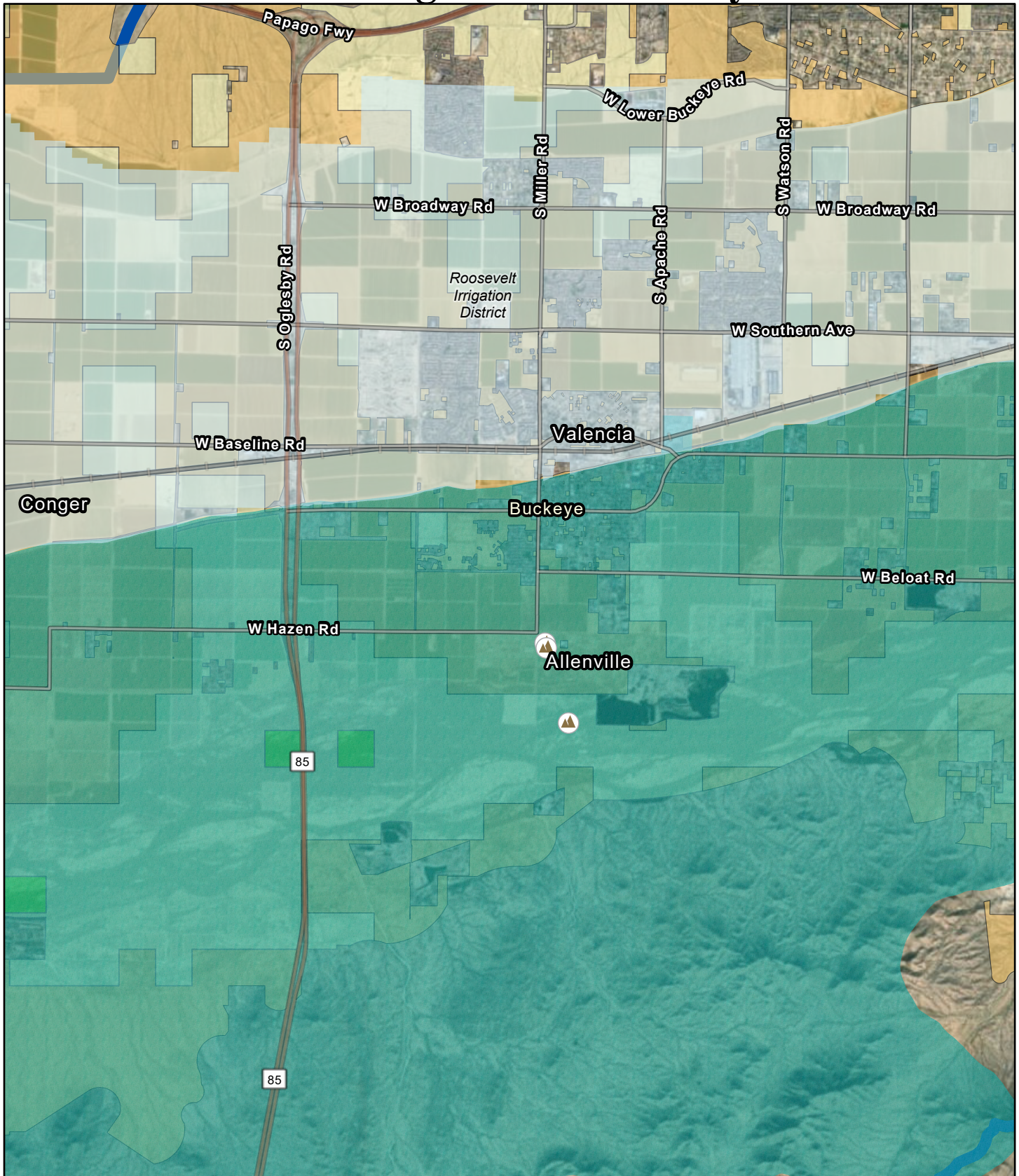
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Groundwater Recharge Site Suitability

Map Number: 19



- Sand Gravel Operations
- Sub-Basin
- Groundwater Savings Facility
- Buckeye Water Logged Area

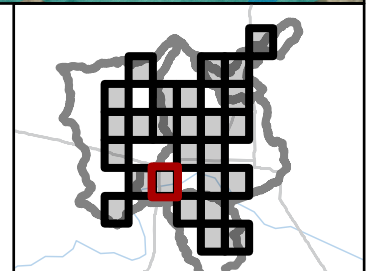
0 1 2 3 Miles

Groundwater Recharge Suitability

- Least Suitable
- Suitable
- Most Suitable

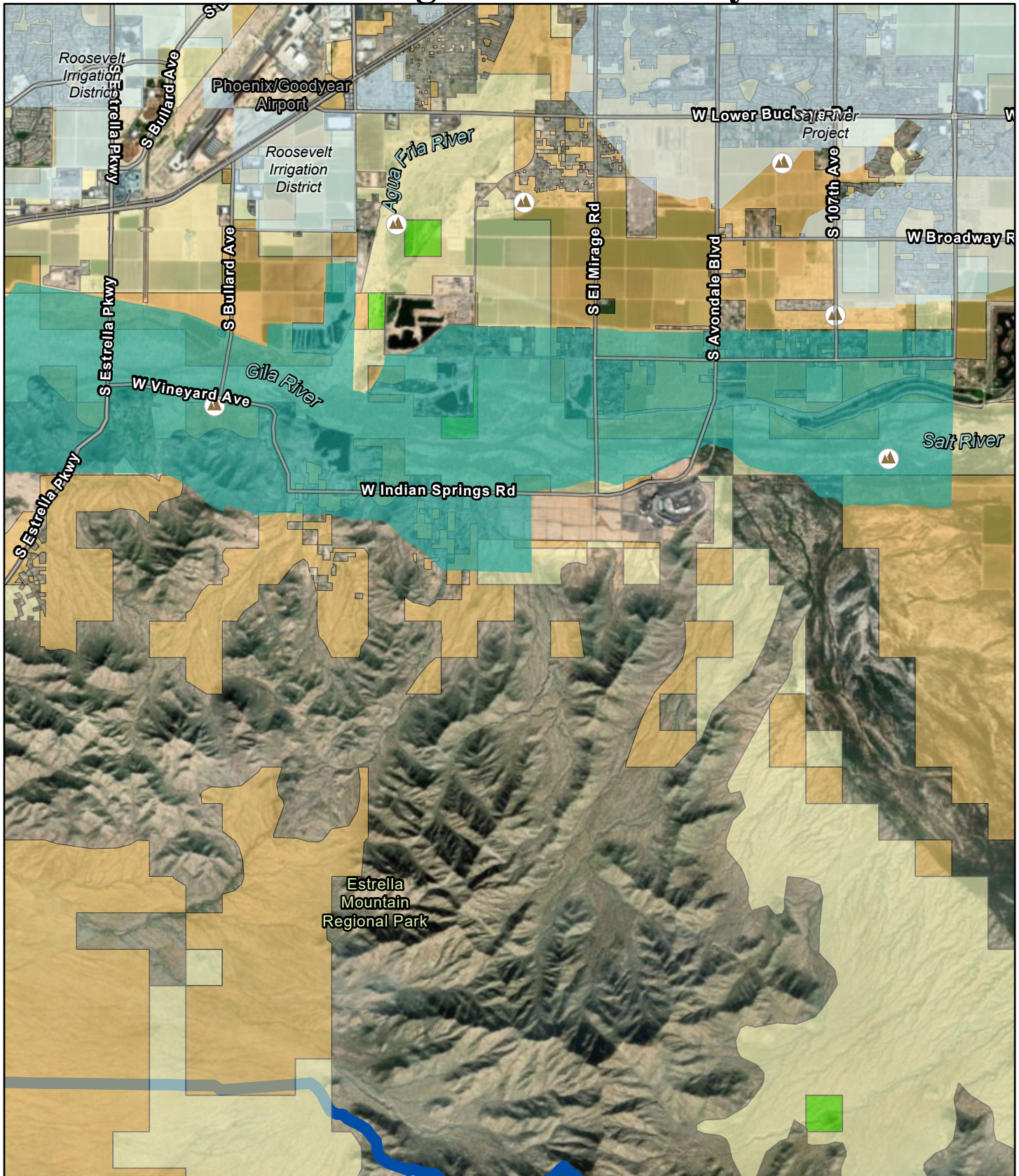
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Groundwater Recharge Site Suitability

Map Number: 20



- Sand Gravel Operations
- Sub-Basin
- Groundwater Savings Facility
- Buckeye Water Logged Area

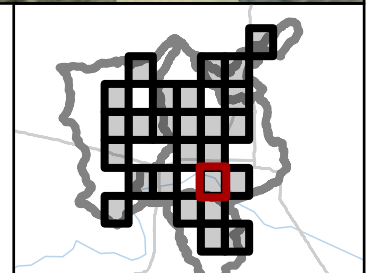
0 1 2 3 Miles

Groundwater Recharge Suitability

- Least Suitable
- Suitable
- Most Suitable

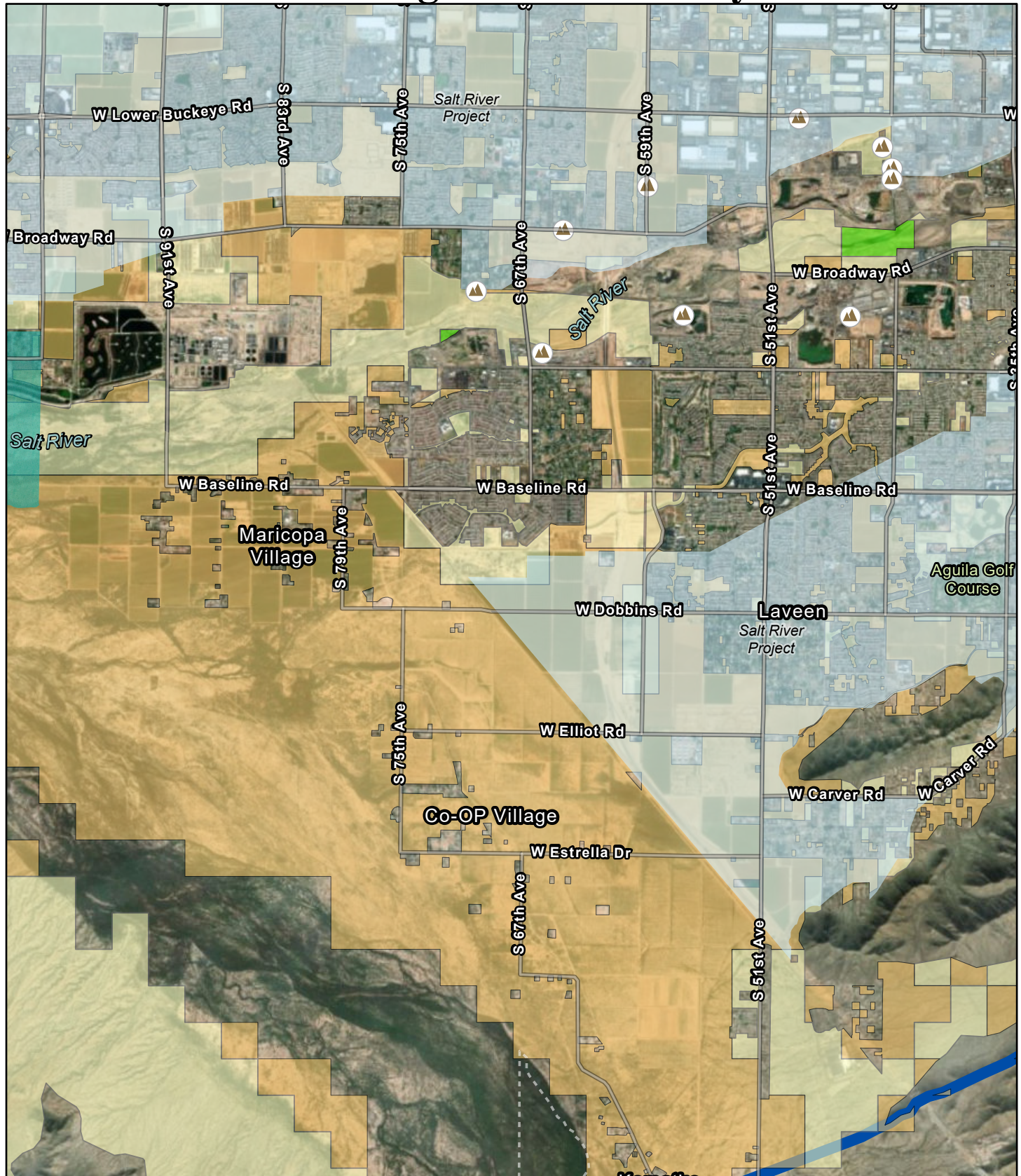
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Groundwater Recharge Site Suitability

Map Number: 21



- Sand Gravel Operations
- Sub-Basin
- Groundwater Savings Facility
- Buckeye Water Logged Area

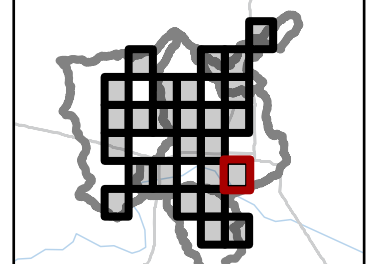
Groundwater Recharge Suitability

- Least Suitable
- Suitable
- Most Suitable

0 1 2 3 Miles

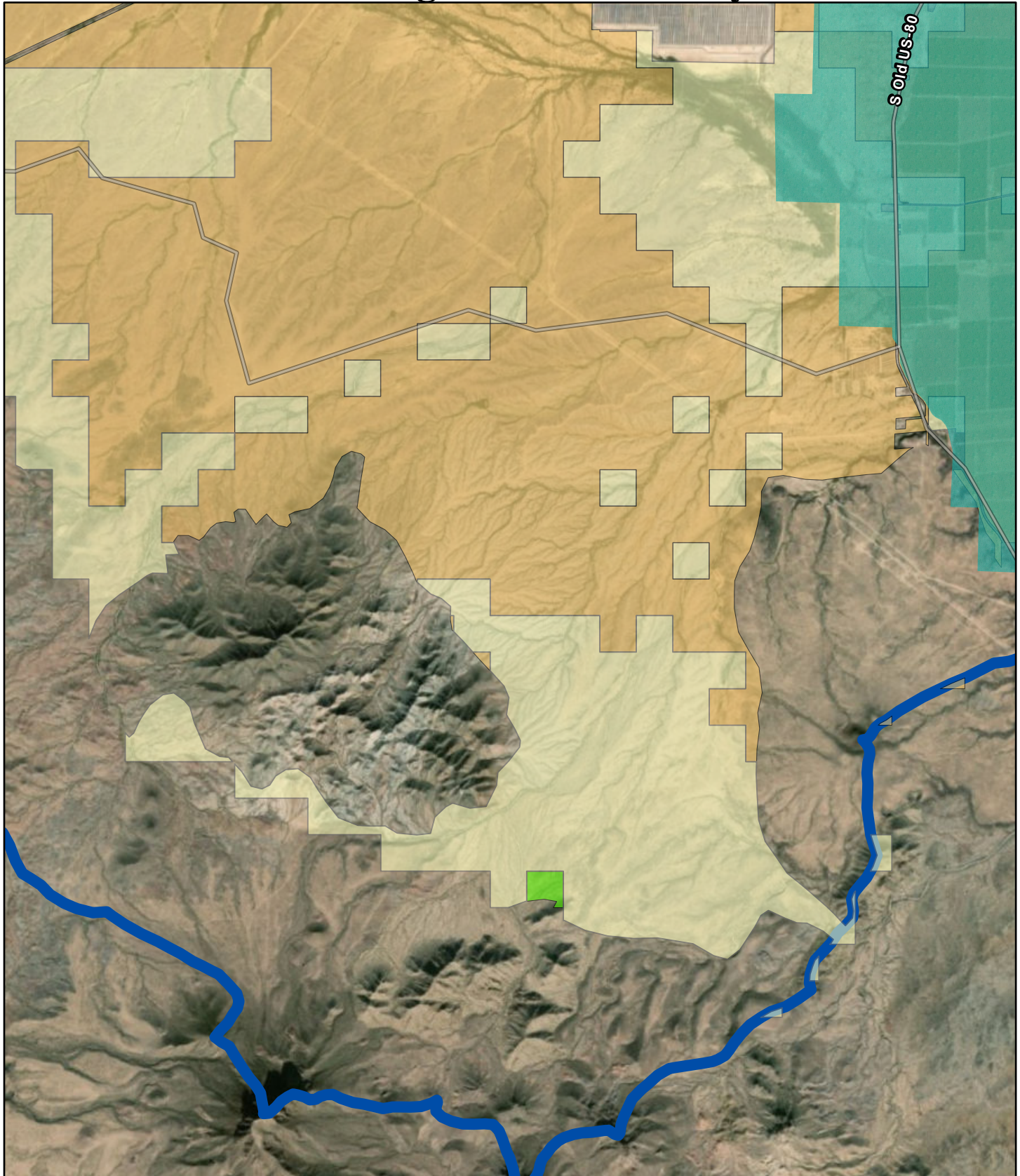
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Groundwater Recharge Site Suitability

Map Number: 22



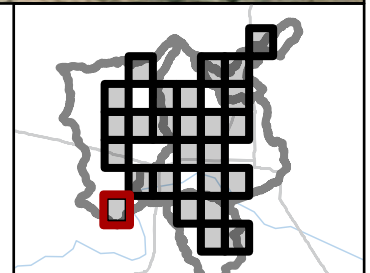
- Sand Gravel Operations
- Sub-Basin
- Groundwater Savings Facility
- Buckeye Water Logged Area

Groundwater Recharge Suitability

- Least Suitable
- Suitable
- Most Suitable

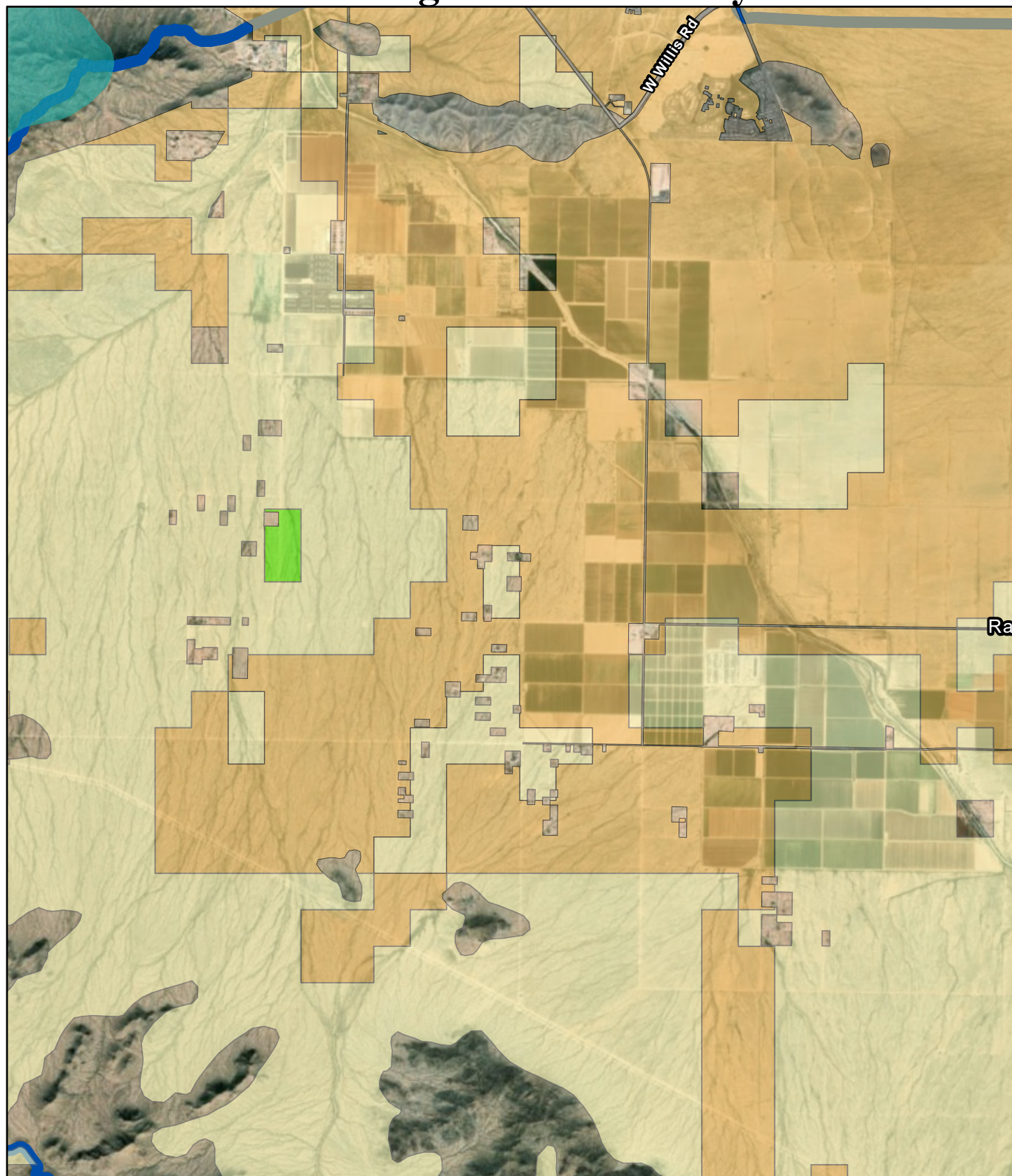
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Groundwater Recharge Site Suitability

Map Number: 23



- Sand Gravel Operations
- Sub-Basin
- Groundwater Savings Facility
- Buckeye Water Logged Area

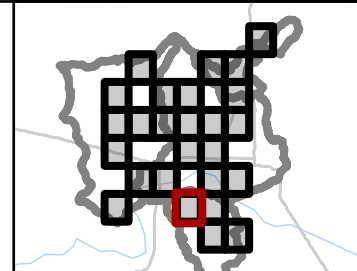
Groundwater Recharge Suitability

- Least Suitable
- Suitable
- Most Suitable

0 1 2 3 Miles

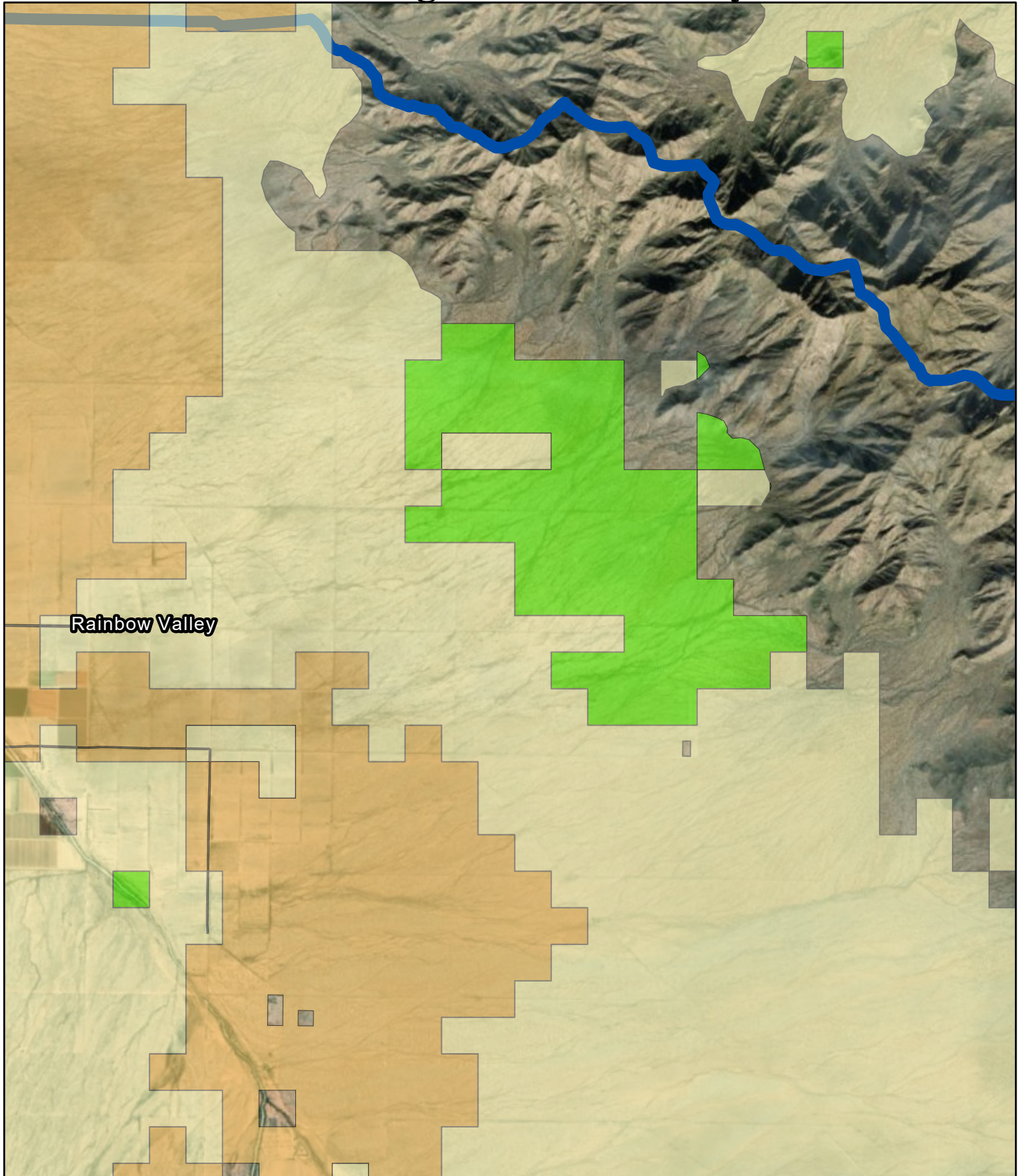
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Groundwater Recharge Site Suitability

Map Number: 24



- Sand Gravel Operations
- Sub-Basin
- Groundwater Savings Facility
- Buckeye Water Logged Area

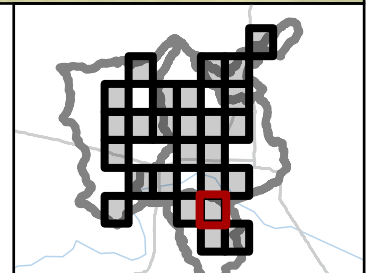
0 1 2 3 Miles

Groundwater Recharge Suitability

- Least Suitable
- Suitable
- Most Suitable

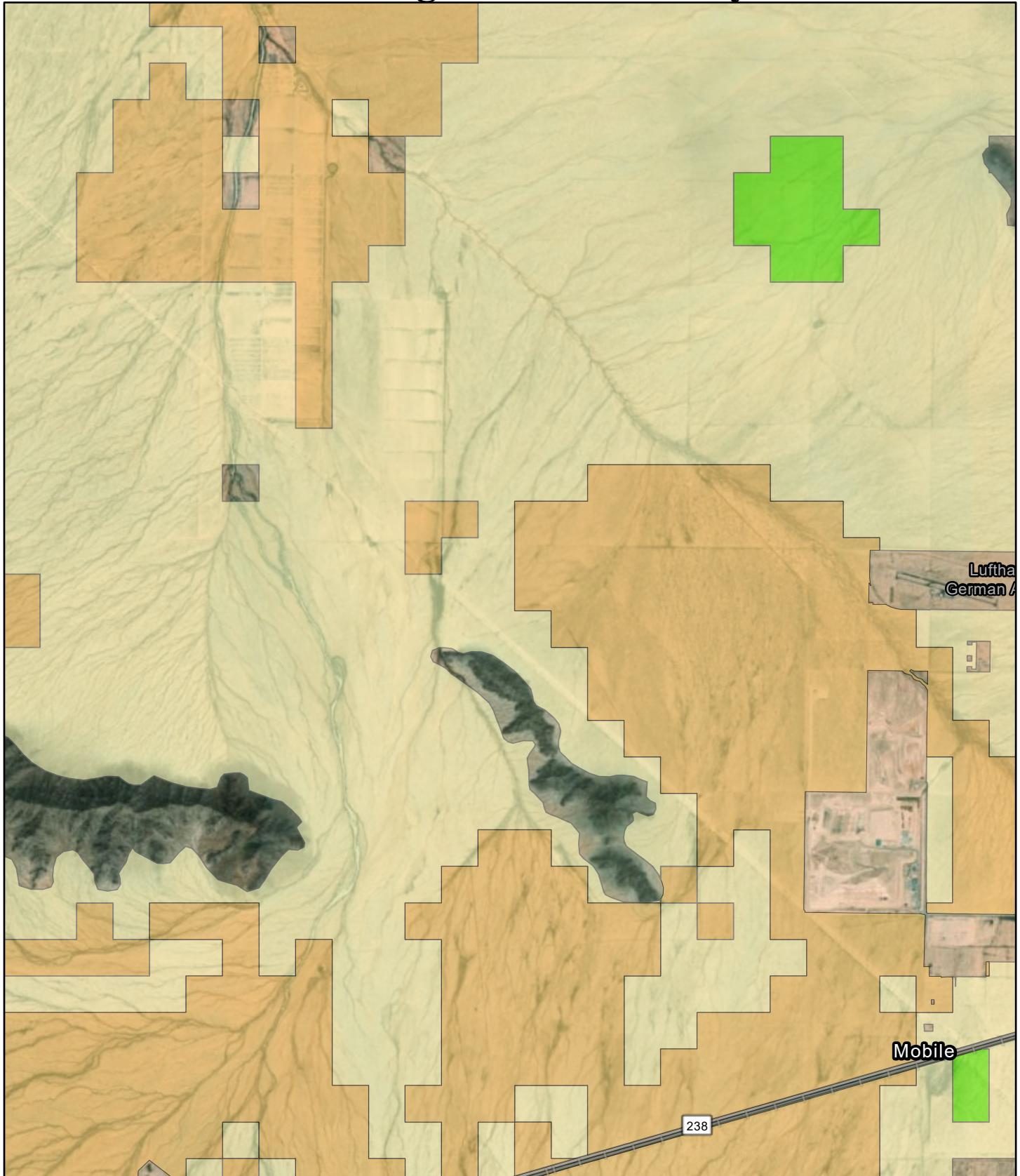
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Groundwater Recharge Site Suitability

Map Number: 25



- Sand Gravel Operations
- Sub-Basin
- Groundwater Savings Facility
- Buckeye Water Logged Area

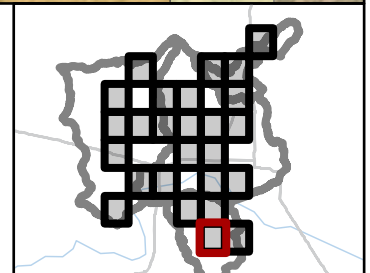
Groundwater Recharge Suitability

- Least Suitable
- Suitable
- Most Suitable

0 1 2 3 Miles

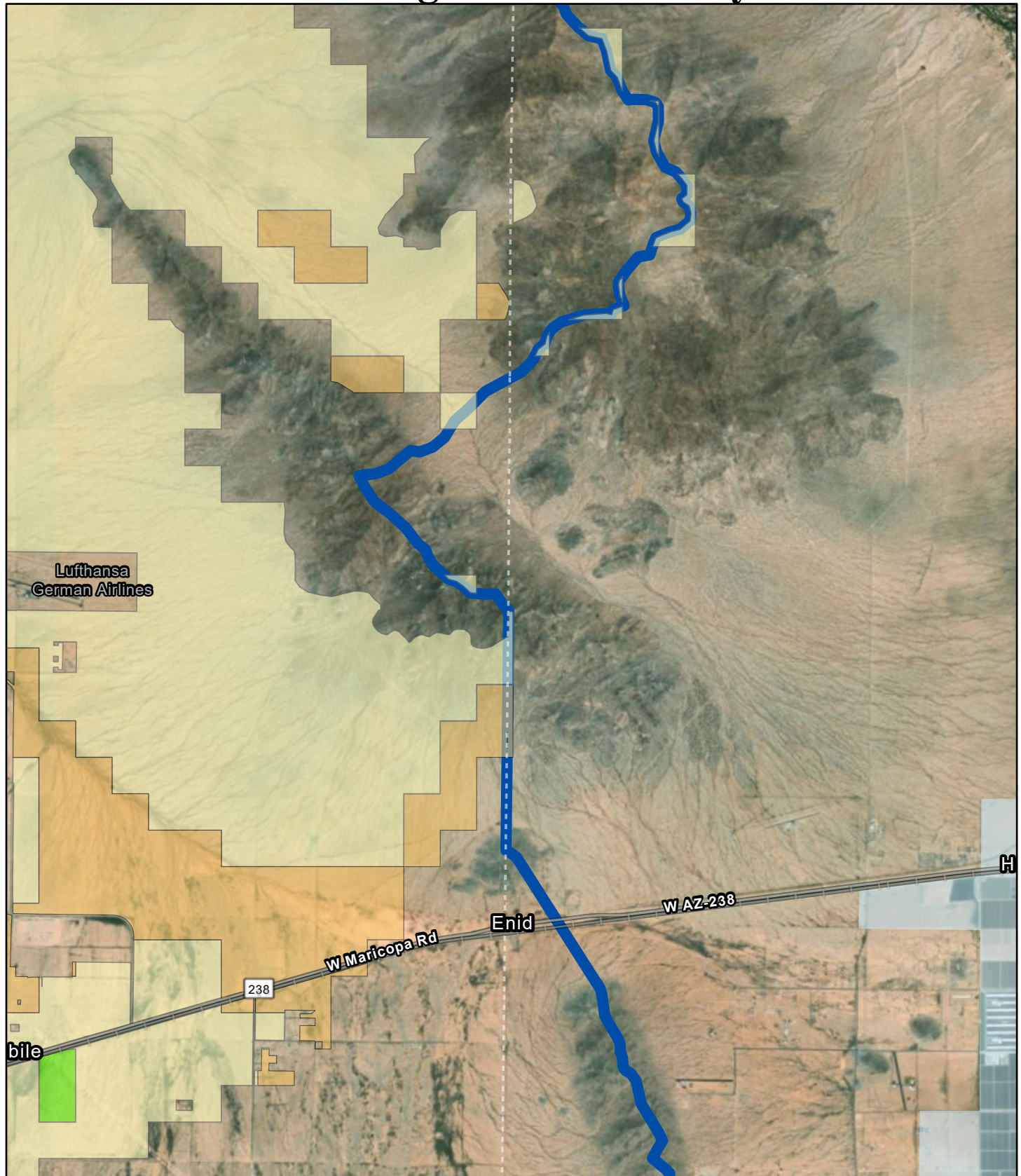
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Groundwater Recharge Site Suitability

Map Number: 26



- Sand Gravel Operations
- Sub-Basin
- Groundwater Savings Facility
- Buckeye Water Logged Area

Groundwater Recharge Suitability

- Least Suitable
- Suitable
- Most Suitable

0 1 2 3 Miles

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