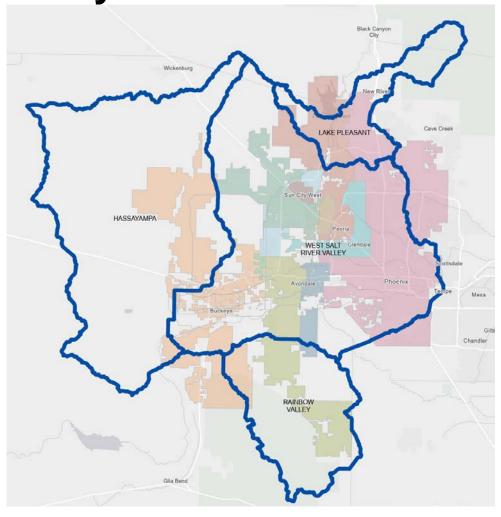
RECLAMATION Managing Water in the West

West Valley Water Association Groundwater Recharge Suitability Analysis





Mission Statements

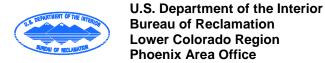
The mission of the Department of the Interior is to protect and manage the Nation's natural resources and cultural heritage; provide scientific and other information about those resources; and honor its trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated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



Contents

	Page
WVWA Groundwater Recharge GIS Suitability Ana	alysis (GIS Weighted
Analysis)	
Overview	
Area of Interest	
GIS Suitability Analysis Model	2
Land use	
Hydrology	2
Horizontal Conductivity	2
Geology/Soils	3
Criteria Not Considered	4
Results of GIS Weighted AnalysisError	r! 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).

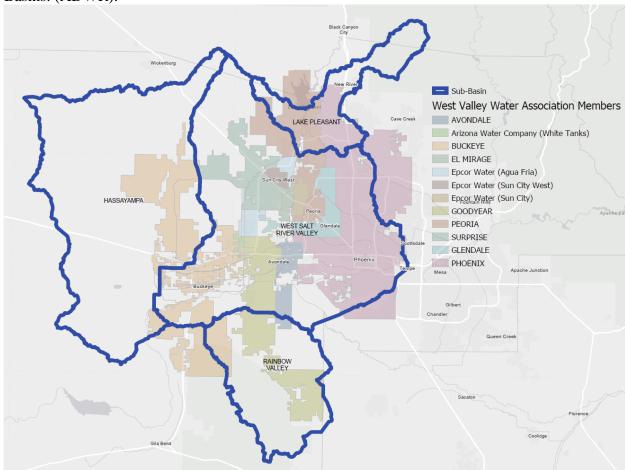


Figure 1

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	5
	Course, Passive/Restricted	
	Open Space, Public Land,	
	Agriculture, Vacant,	
	Vacant State Trust	

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

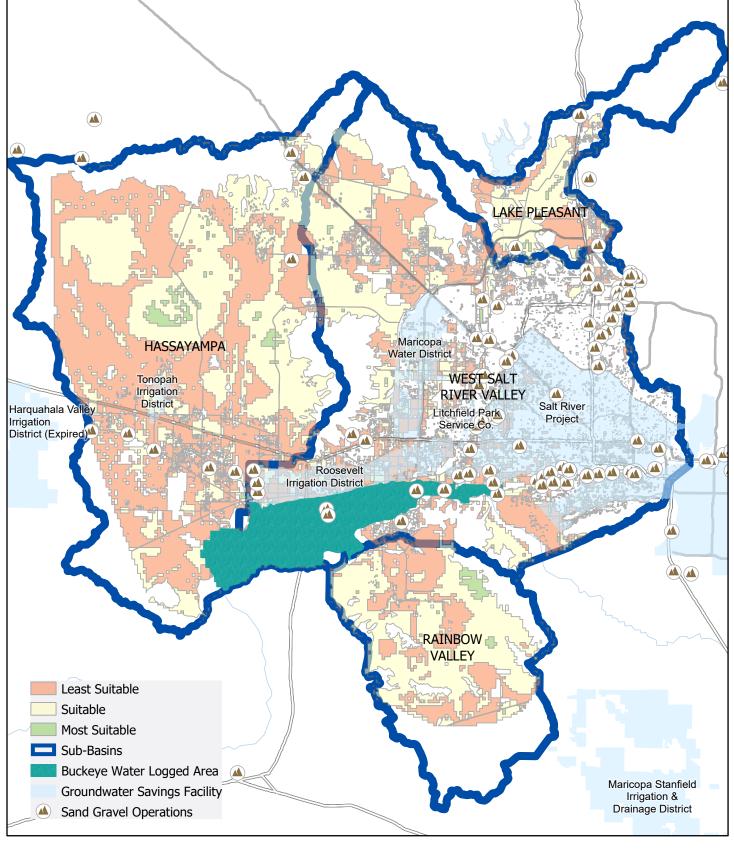
Seven geographical features were previously Identified to be factors in Suitable Groundwater Recharge Sites. It was determined that using these features would be too restrictive for the analysis, and were not considered for this version of the groundwater suitability analysis and will be evaluated on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

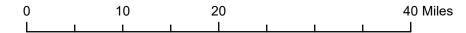
- 1. Active Land Subsidence
- 2. Mining/Sand & Gravel
- 3. Luke Salt Dome
- 4. Terrain (Slope)
- 5. Buckeye Waterlogged Area
- 6. Power/ Infrastructure
- 7. Water Quality Impacts

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 LAKE PLEASAN







Groundwater Recharge Site Suitability PLEASANT HASSAYAMP EST SALT RIVER VALLEY /ALLEY Map Index = Sub-Basins 40 Miles

Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, @ OpenStreetMap contributors, and the GIS User Community, USDA FSA, GeoEye, Earthstar Geographics

Suitable

Most Suitable

Groundwater Recharge Site Suitability Map Number: 2 arcia Tank Sand Gravel Operations 0 3 Miles Sub-Basin Groundwater Savings Facility Buckeye Water Logged Area RECLAMATION
Managing Water in the West Groundwater Recharge Suitability Suitable Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, USDA FSA, GeoEye, Earthstar Geographics Most Suitable

Groundwater Recharge Site Suitability Map Number: 3 Lake Pleas Regional P Lake Pleas Regional F Golf W State Route 74 W State Route 74 W State Route 74 Sand Gravel Operations 3 Miles Sub-Basin Groundwater Savings Facility Buckeye Water Logged Area RECLAMATION
Managing Water in the West Groundwater Recharge Suitability Suitable Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, USDA FSA, GeoEye, Earthstar Geographics Most Suitable

Groundwater Recharge Site Suitability Map Number: 4 Lake Pleasant Regional Park Outlets at Anthem Lake Pleasant Regional Park Cline Tank Purcell New River CF Tank to Tank Palo Verde Tank Milky Way Sand Gravel Operations 2 3 Miles 0 Sub-Basin Groundwater Savings Facility Buckeye Water Logged Area RECLAMATION
Managing Water in the West **Groundwater Recharge Suitability** Suitable Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, USDA FSA, GeoEye, Earthstar Geographics Most Suitable

Groundwater Recharge Site Suitability Map Number: 5 Tank Sand Gravel Operations 0 2 3 Miles Sub-Basin Groundwater Savings Facility Buckeye Water Logged Area RECLAMATION
Managing Water in the West Groundwater Recharge Suitability Least Suitable Suitable Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Most Suitable Community, USDA FSA, DigitalGlobe, GeoEye, Earthstar Geographics

Groundwater Recharge Site Suitability Map Number: 6 Road Tank Airport Tank Heyden-Rhodes Aqueduct Sand Gravel Operations 0 2 3 Miles Sub-Basin Groundwater Savings Facility Buckeye Water Logged Area RECLAMATION
Managing Water in the West **Groundwater Recharge Suitability** Least Suitable Suitable Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Most Suitable Community, USDA FSA, DigitalGlobe, GeoEye, Earthstar Geographics

Groundwater Recharge Site Suitability Map Number: 7 W Dove Valley Rd Wittmann Hayden-Rhodes Aqueduc W Patton Rd W Patton Rd Speedworld Maricopa Water Sand Gravel Operations 2 3 Miles 0 Sub-Basin Groundwater Savings Facility Buckeye Water Logged Area RECLAMATION
Managing Water in the West **Groundwater Recharge Suitability** Suitable Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, USDA FSA, DigitalGlobe, GeoEye, Earthstar Geographics Most Suitable

Groundwater Recharge Site Suitability Map Number: 8 Milky Way Saguaro Tank Tank WAZ-74 **W** Carefree Hwy Bob Stump Memorial Phys AZ-303-Loop S Rhodes Aqueduct 303 op S 303 **Westwing Park** W Jomax Rd Ludden Mountain W Hap W Happy Valley Rd (1) Happy Valley Rd **Parkview Estates** W Pinnacle Peak Rd W Pinnacle Peak Rd Thunderbird Adobe Dam Recreation Area Milita W Deer Valley Rd Legend at Arrowhead Sand Gravel Operations 2 3 Miles Sub-Basin Groundwater Savings Facility Buckeye Water Logged Area RECLAMATION
Managing Water in the West Groundwater Recharge Suitability Suitable Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, USDA FSA, DigitalGlobe, GeoEye, Earthstar Geographics Most Suitable

Groundwater Recharge Site Suitability Map Number: 9 Tonopah Irrigation District Sand Gravel Operations 3 Miles Sub-Basin Groundwater Savings Facility Buckeye Water Logged Area RECLAMATION
Managing Water in the West Groundwater Recharge Suitability Suitable Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, USDA FSA, DigitalGlobe, GeoEye, Earthstar Geographics Most Suitable

Groundwater Recharge Site Suitability Map Number: 10 Sand Gravel Operations 0 3 Miles Sub-Basin Groundwater Savings Facility Buckeye Water Logged Area RECLAMATION
Managing Water in the West **Groundwater Recharge Suitability** Suitable Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Most Suitable Community, USDA FSA, DigitalGlobe, GeoEye, Earthstar Geographics

Groundwater Recharge Site Suitability Map Number: 11 Copper Canyon Golf Club W Sun Valley Pkwy W Sun Valley Pkwy White Tank Mountain Sand Gravel Operations 3 Miles Sub-Basin Groundwater Savings Facility Buckeye Water Logged Area RECLAMATION
Managing Water in the West Groundwater Recharge Suitability Suitable Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, USDA FSA, DigitalGlobe, GeoEye, Earthstar Geographics Most Suitable

Groundwater Recharge Site Suitability Map Number: 12 Desert Spring Colf Club Cimarron Colf Club ey Pkwy Club Club Walla Vallay Plans Fennemore W Olive Ave **Wayne Citrus Park** Sand Gravel Operations 0 2 3 Miles Sub-Basin Groundwater Savings Facility Buckeye Water Logged Area RECLAMATION
Managing Water in the West **Groundwater Recharge Suitability** Suitable Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, USDA FSA, DigitalGlobe, GeoEye, Earthstar Geographics Most Suitable

Groundwater Recharge Site Suitability Map Number: 13 W Deer Valle Briarwood Traff Ridge Golf Briarwood
Country Club
Stardust Coff
Course Course
Crest Golf
Club
West Echo Mesa Golf Beardsley W Bear Desert Springs Colf Club Hillcrest Golf Sun City West Westbrook Pebblebrook Village **Golf Course Granite Falls Colf** Course Aleems Rd Willowcreek & Union Willowbrook Country Golf C Sun Village Golf Course W Bell Rd W Bell Rd Lizard Countr Maricopa Water 2 Surprise District Sun City Lakes West & East GC El Mirage Goldbadge Agua Fria Sun City Sun City North Golf Course Sun City South Golf Course W Peoria Ave Sun City Country Club ayne W Olive Ave Country W Olive Ave Meadows River Webb **B**roject **Peoria Pines** Golf W Northern Ave W Northern Ave Sand Gravel Operations 2 3 Miles 0 Sub-Basin Groundwater Savings Facility Buckeye Water Logged Area RECLAMATION
Managing Water in the West Groundwater Recharge Suitability Suitable Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, USDA FSA, DigitalGlobe, GeoEye, Earthstar Geographics Most Suitable

Groundwater Recharge Site Suitability Map Number: 14 Recreation Area Mail W Deer Valley Rd Legend at Arrowhead Z W Lake Pleasant Pkwy **W** Beard Arrowhead W Beardsley Rd Ranch Westbrook Village Vistas Arrowhead stbrook Country Club Course /illage W Union Hill's Dr W Union Hills Dr Union Hills Country Club Peacock Village Lexington Place Palmbrook **Country Club** Thunderbird Paseo Park W Greenway Rd Lakes ast GC San Miguel Sunray M W Thunderbird Rd W Thunderbird Rd Arizona State **University-West** Chey VIIIa W Cactus Rd W Cactus Rd W Cactus Rd Marlborough Fox Clen Meadows Peorla Estates Deer Calteriver W Peoria Arroject **Greenbriar Peorla** The Offadel W Offve Ave Westgreen **Estates** P **Mountain View** Meadows W Northern Ave Sand Gravel Operations 2 3 Miles Sub-Basin Groundwater Savings Facility Buckeye Water Logged Area CLAMATION Managing Water in the West Groundwater Recharge Suitability Suitable Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User

Community, USDA FSA, DigitalGlobe, GeoEye, Earthstar Geographics

Most Suitable

Groundwater Recharge Site Suitability Map Number: 15 Tonopah Irrigation District W Indian School Rd N 355th Ave W Van Buren St Sand Gravel Operations 0 2 3 Miles Sub-Basin Groundwater Savings Facility Buckeye Water Logged Area RECLAMATION
Managing Water in the West **Groundwater Recharge Suitability** Least Suitable Suitable Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, USDA FSA, DigitalGlobe, GeoEye, Earthstar Geographics Most Suitable

Groundwater Recharge Site Suitability Map Number: 16 **Citrus Park** Waddell W Bethany Home Rd The Victory Maricopa Water District Camelback Rd McMicken Windlan School Rd Verrado Golf N offices Rd W McDowell Rd M Cot Papago Fwy W Van Buren St Roosevelt Irrigation District **Perryville** W Yuma R W Lower Buckeye Rd Sand Gravel Operations 0 2 3 Miles Sub-Basin Groundwater Savings Facility Buckeye Water Logged Area **Groundwater Recharge Suitability**

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RECLAMATION

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Suitable

Most Suitable

Groundwater Recharge Site Suitability Map Number: 17 Maricopa Water Webb **Peoria Pines** District W Northern Ave Golf W Northern Ave Luke Air Force Base W Glendale Ave W Glendale Ave Agua Filia Fwy Glendale Municipal Aliporth Laloma Ranch W Camelback Rd W Camelback Rd W Camelback Rd Wigwam Golf and Country Villa de Paz Club Litchfield W Indian School Roy Park Service Co. Litchfield Park Windlan School Rd W Thomas R Salt River Project W McDowell Rd W McDowell Rd Friendship Park **2** Papago Fwy Papago Fwy W Van Buren St W Van Buren St Toll Roosevelt Irrigation Coldwater Colf Avondale District Club W Yuma Rd W Yuma Rd Goodyear **Cashion** W Buckeye Rd Phoenix/Goodyea Aliport Sand Gravel Operations 2 3 Miles Sub-Basin Groundwater Savings Facility Buckeye Water Logged Area RECLAMATION
Managing Water in the West Groundwater Recharge Suitability Suitable Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User

Community, USDA FSA, DigitalGlobe, GeoEye, Earthstar Geographics

Most Suitable

Groundwater Recharge Site Suitability Map Number: 18 m_ **Buckeye Municipal** Alipoit W Southern Ave Irrigation District Conger **W** Dobbins Rd Dixie Hassayampa Palo Verde Arlington Sand Gravel Operations 0 2 3 Miles Sub-Basin Groundwater Savings Facility Buckeye Water Logged Area RECLAMATION
Managing Water in the West **Groundwater Recharge Suitability** Suitable Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, USDA FSA, DigitalGlobe, GeoEye, Earthstar Geographics Most Suitable

Groundwater Recharge Site Suitability Map Number: 19 Papago Fwy Mower Business Rd W Broadway Rd W Broadway Rd S Oglesby Rd Roosevelt Irrigation District W Southern Ave **Valencia** W Baseline Rd Conger **Buckeye** W Beloat Rd W Hazen Rd Allenville 85 Sand Gravel Operations 2 0 3 Miles Sub-Basin Groundwater Savings Facility Buckeye Water Logged Area RECLAMATION
Managing Water in the West Groundwater Recharge Suitability Least Suitable Suitable Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, USDA FSA, DigitalGlobe, GeoEye, Earthstar Geographics Most Suitable

Groundwater Recharge Site Suitability Map Number: 20 Roosevelt Irrigation District Phoenix/Goodyear Aliport W Lower Bucksperive (interpretation Roosevelt Irrigation District S Bullard Ave W Broadway R W Vineyard Ave Salt River W Indian Springs Rd Estrella Mountain Regional Park Sand Gravel Operations 0 2 3 Miles Sub-Basin Groundwater Savings Facility Buckeye Water Logged Area RECLAMATION
Managing Water in the West **Groundwater Recharge Suitability** Suitable Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, USDA FSA, DigitalGlobe, GeoEye, Earthstar Geographics Most Suitable

Groundwater Recharge Site Suitability Map Number: 21 Salt River W Lower Buckeye Rd Project **Broadway Rd** W Broadway Rd Salt River W Baseline Rd W Baseline Rd W Baseline Rd Maricopa Village Aguilla Colf Course W Dobbins Rd Laveen Salt River Project WEIIlot Rd W Carver Rd Co-OP Village W Estrella Dr Sand Gravel Operations 0 2 3 Miles Sub-Basin Groundwater Savings Facility Buckeye Water Logged Area RECLAMATION
Managing Water in the West **Groundwater Recharge Suitability** Suitable Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, USDA FSA, DigitalGlobe, GeoEye, Earthstar Geographics Most Suitable

Groundwater Recharge Site Suitability Map Number: 22 Sand Gravel Operations 3 Miles Sub-Basin Groundwater Savings Facility Buckeye Water Logged Area RECLAMATION
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Groundwater Recharge Site Suitability Map Number: 23 Sand Gravel Operations 0 2 3 Miles Sub-Basin Groundwater Savings Facility Buckeye Water Logged Area RECLAMATION
Managing Water in the West Groundwater Recharge Suitability Suitable Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Most Suitable Community, USDA FSA, DigitalGlobe, GeoEye, Earthstar Geographics

Groundwater Recharge Site Suitability Map Number: 24 Rainbow Valley Sand Gravel Operations 0 3 Miles Sub-Basin Groundwater Savings Facility Buckeye Water Logged Area RECLAMATION
Managing Water in the West **Groundwater Recharge Suitability** Least Suitable Suitable Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, USDA FSA, DigitalGlobe, GeoEye, Earthstar Geographics Most Suitable

Groundwater Recharge Site Suitability Map Number: 25 Luitha German A Mobile Sand Gravel Operations 0 2 3 Miles Sub-Basin Groundwater Savings Facility Buckeye Water Logged Area RECLAMATION
Managing Water in the West **Groundwater Recharge Suitability** Least Suitable Suitable

Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User

Community, USDA FSA, DigitalGlobe, GeoEye, Earthstar Geographics

Most Suitable

Groundwater Recharge Site Suitability Map Number: 26 Lufthansa **German Airlines** Sand Gravel Operations 2 3 Miles Sub-Basin Groundwater Savings Facility Buckeye Water Logged Area RECLAMATION
Managing Water in the West **Groundwater Recharge Suitability** Suitable Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, USDA FSA, DigitalGlobe, GeoEye, Earthstar Geographics Most Suitable