Northridge Estates
Rezoning Site Analysis

(Oro Valley #2302611)

Prepared For:

INSIGHT HOMES

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Prepared By:

PARADIGM LAND DESIGN

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In Collaboration With:

M Esparza Engineering, LLC

WILDER Landscape Architects

eec / CEC
Part of Civil & Environmental Consultants, Inc. (CEC)

May 2024

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I. INTRODUCTION

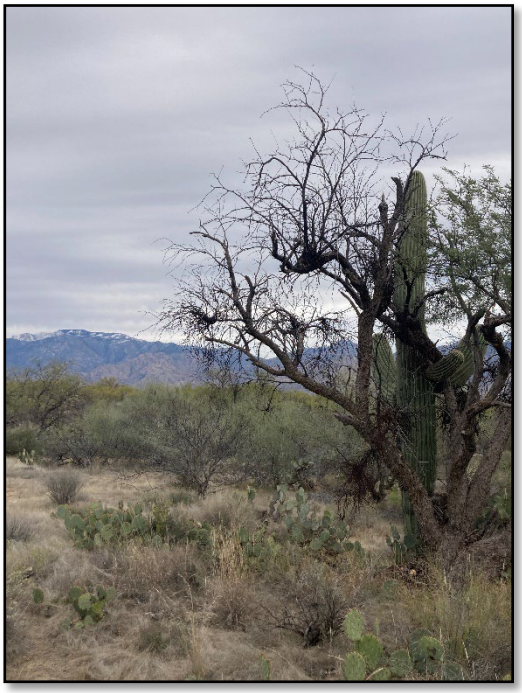
A. PROJECT OVERVIEW

Insight Homes proposes the construction of a neighborhood of custom homes at the southwest corner of La Canada Drive and Moore Road in Oro Valley, Arizona. The subject property (the "Property") consists of 35.4± acres and is currently undeveloped. The voter-approved Your Voice Our Future General Plan designates the western side of the Property as LDR-1 (Low Density Residential 1: 0.4-1.2 homes per acre) and the eastern side of the Property as LDR-2 (Low Density Residential 2: 1.3-2.0 homes per acre), indicating that construction of up to 59 homes would be appropriate for this Property. However, Insight's proposed neighborhood will be less than one home per acre. The Property is surrounded by single-family residential to the south and west, La Canada Drive and single-family residential to the east, and Moore Road and single-family residential to the north. Insight Homes also developed the La Canada Ridge subdivision to the south.

This document has been prepared in support of a request to rezone the Property from R1-144 (Single-Family Residential: 3.3 acres per home) to R1-36 (Single-Family Residential: 0.8 acres per home) on the west side of the onsite wash and R1-20 (Single-Family Residential: 0.45 acres per home) on the east side of the wash. This will allow for the construction of 31 custom homes with an average lot size of nearly an acre and a gross density of 0.9 homes per acre, which is well below the densities suggested by the existing General Plan. Even so, a minor General Plan Amendment is proposed for the eastern portion of the Property to bring the Environmentally Sensitive Land Ordinance's open space requirements in line with this large-lot, custom home development format.

B. PRIMARY OBJECTIVES

- Provide much needed high-quality, single-family detached homes for new residents wishing to live in the Town of Oro Valley. Very strong demand for new housing options continues to exist in this northern part of the greater Tucson metropolitan area.
- Construct a residential community that is compatible with existing surrounding land uses.
- Provide additional customers for local businesses, which also bolsters Oro Valley's tax base.



II. INVENTORY & ANALYSIS

The purpose of the Inventory & Analysis section of this document is to catalog the various developmental opportunities and constraints impacting the property in order to provide a meaningful and relevant context for the development proposal detailed in Section III of this document. Through careful consideration of these existing conditions a design can be deemed compatible with its surroundings and appropriate for the area.

A. EXISTING LAND USES

1. Regional Context

   The Property subject to this rezoning request consists of 35.4± acres located in Section 35, Township 11 south, Range 13 east, Pima County, Arizona. The site is located at the southwest corner of the intersection of La Canada Drive and Moore Road. The Pima County Tax Assessor designates the subject property as parcel number 219-49-003A. See Exhibit II-A-1: Site Location Map.

   The Project's administrative address has yet to be determined.

2. Existing Onsite Land Uses, Zoning & General Plan

   The Property is currently undeveloped and vacant. See Exhibit II-A-2: Existing Land Uses.

   The Property is currently zoned R1-144 (Single-Family Residential District) within the Town of Oro Valley.

   The Your Voice Our Future General Plan designates the western side of the Property as LDR (Low Density Residential (0.1-1.2 RAC) and the eastern side of the Property as LDR (Low Density Residential 1.3-2.0 RAC). These land use designations are appropriate for the project's low density but need to be adjusted to cause a concomitant adjustment to the Environmentally Sensitive Lands Ordinance's open space requirements, which are not compatible with large-lot, custom home development.

3. Existing Adjacent Zoning and Land Uses

i. Surrounding Zoning & Land Uses

The Property is surrounded by properties featuring the following zoning designations and land uses.

N: Existing zoning: Rancho Vistoso PAD MDR (Medium Density Residential 6 RAC) & Open Space
Existing land use: Moore Road, Torreno Subdivision, Undeveloped Land

NE: Existing zoning: Rancho Vistoso PAD MDR (Medium Density Residential 6 RAC)
Existing land use: La Canada Dr. / Moore Rd. Intersection, Vistoso Crossing Subdivision

E: Existing zoning: R1-20 (Single-Family Residential 2 RAC)
Existing land use: La Canada Drive, Vistoso Highlands Subdivision

SE: Existing zoning: R1-20 (Single-Family Residential 2 RAC)
Existing land use: La Canada Drive, Vistoso Highlands Subdivision

S: Existing zoning: R1-36 (Single-Family Residential 1.2 RAC), R1-20 (Single-Family Res. 2 RAC)
Existing land use: La Canada Ridge Subdivision

SW: Existing zoning: SR (Suburban Ranch – Pima County 0.3 RAC)
Existing land use: Unplanned Single-Family Residential Development

W: Existing zoning: SR (Suburban Ranch – Pima County 0.3 RAC)
Existing land use: Unplanned Single-Family Residential Development

NW: Existing zoning: R1-300 (Single-Family Residential 0.15 RAC)
Existing land use: La Cholla Airpark

ii. Surrounding Building Heights

Surrounding building heights vary between one and two story.

iii. Nearby Pending Rezonings

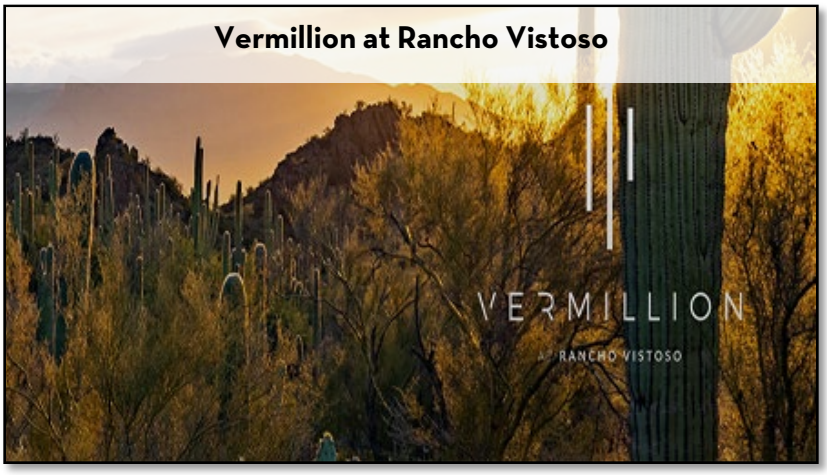
There are no pending rezonings within one-quarter mile of the Property.

iv. Nearby Conditionally Approved Rezonings

There are no conditionally approved rezonings within one-quarter mile of the Property.

v. Nearby Approved Subdivisions & Development Plans

Vermillion is the most recently approved nearby subdivision and is nearing completion of construction. It is just over 1/4 -mile north of the subject property.



vi. Architectural Styles used in Adjacent Properties

The architectural styles used in adjacent residential projects are mainly wood frame or block construction that utilize a stucco and/or stone veneer and have either a flat or tiled roof. The Leman Academy of Excellence to the south also utilizes stucco with brick veneer and flat roofs and metal overhangs.

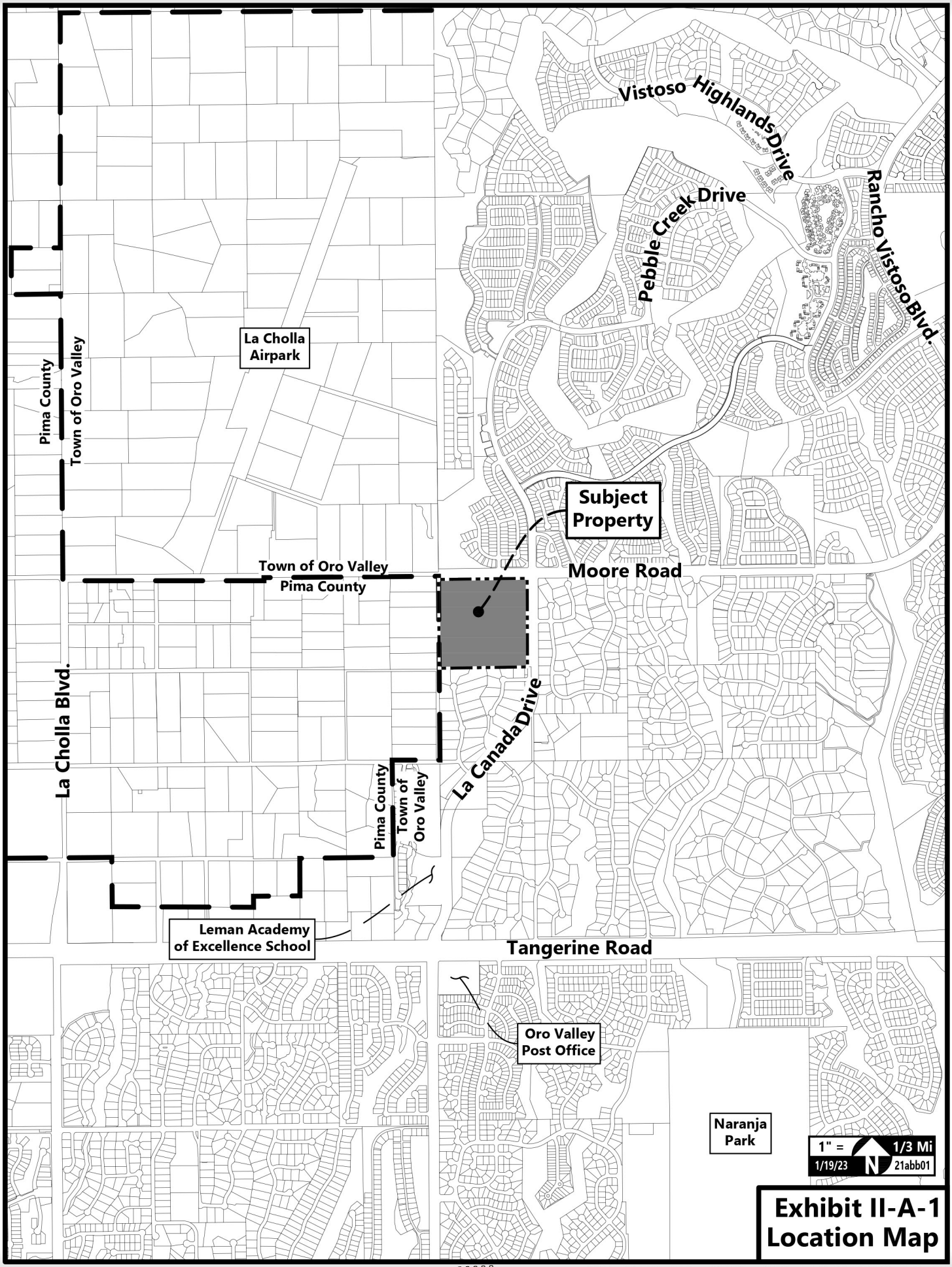


Exhibit II-A-1
Location Map

"G:\Projects\21ab La Canada & Moore SWC\b01 Rezone\0230\Site Analysis\Exhibits\Exh 2-A-1 Location Map.dwg"

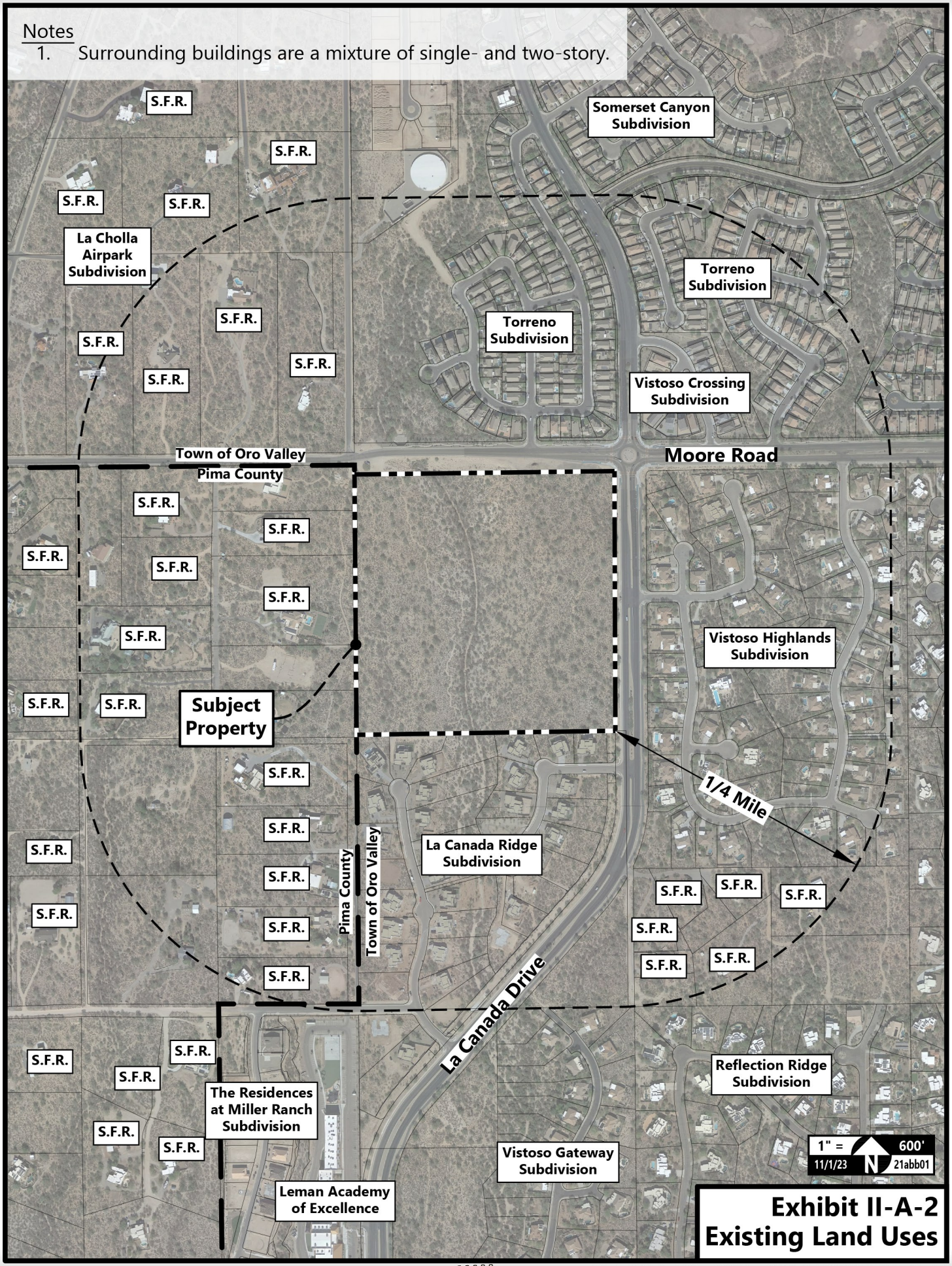


Exhibit II-A-2
Existing Land Uses

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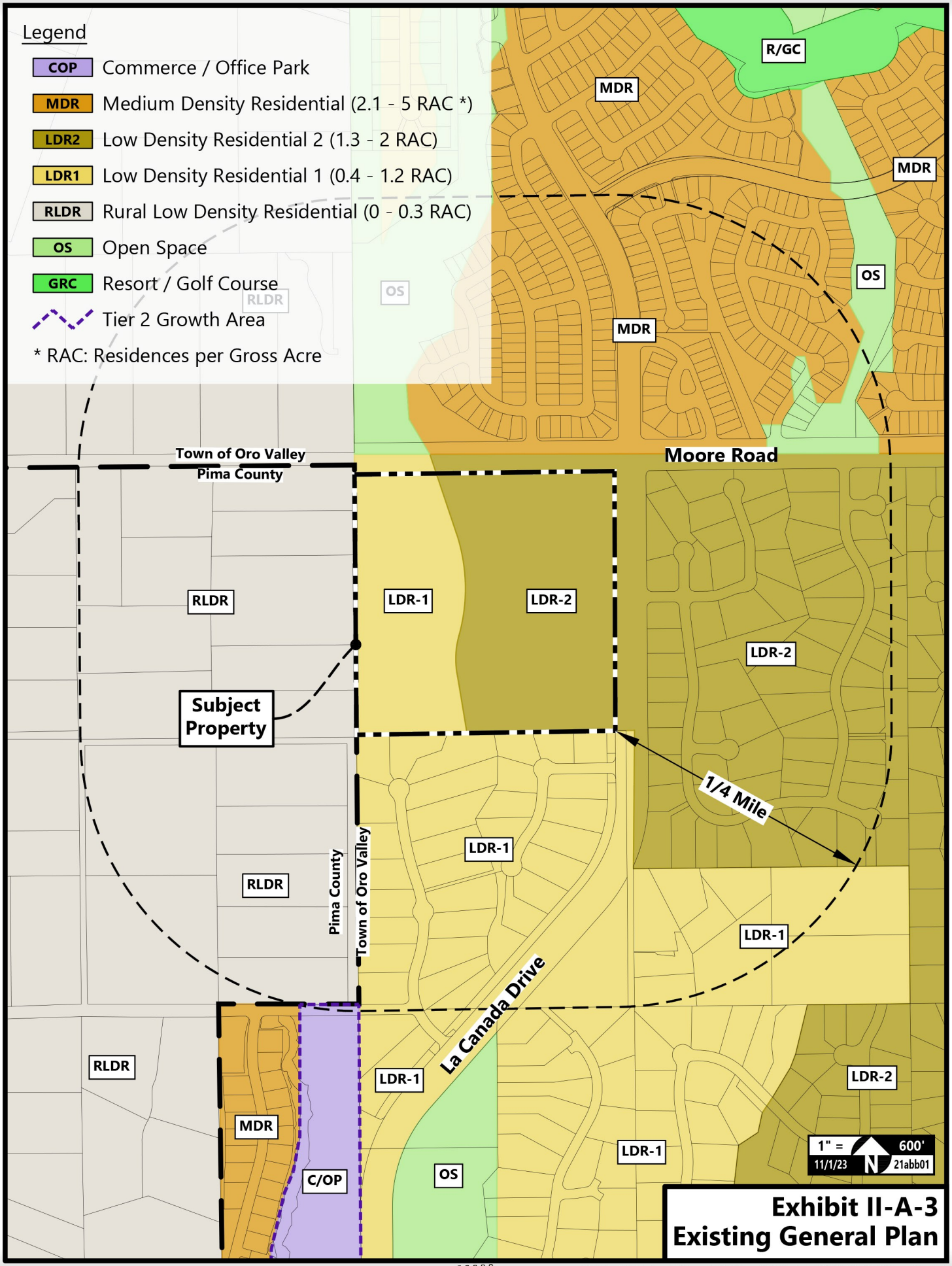

Exhibit II-A-3
Existing General Plan

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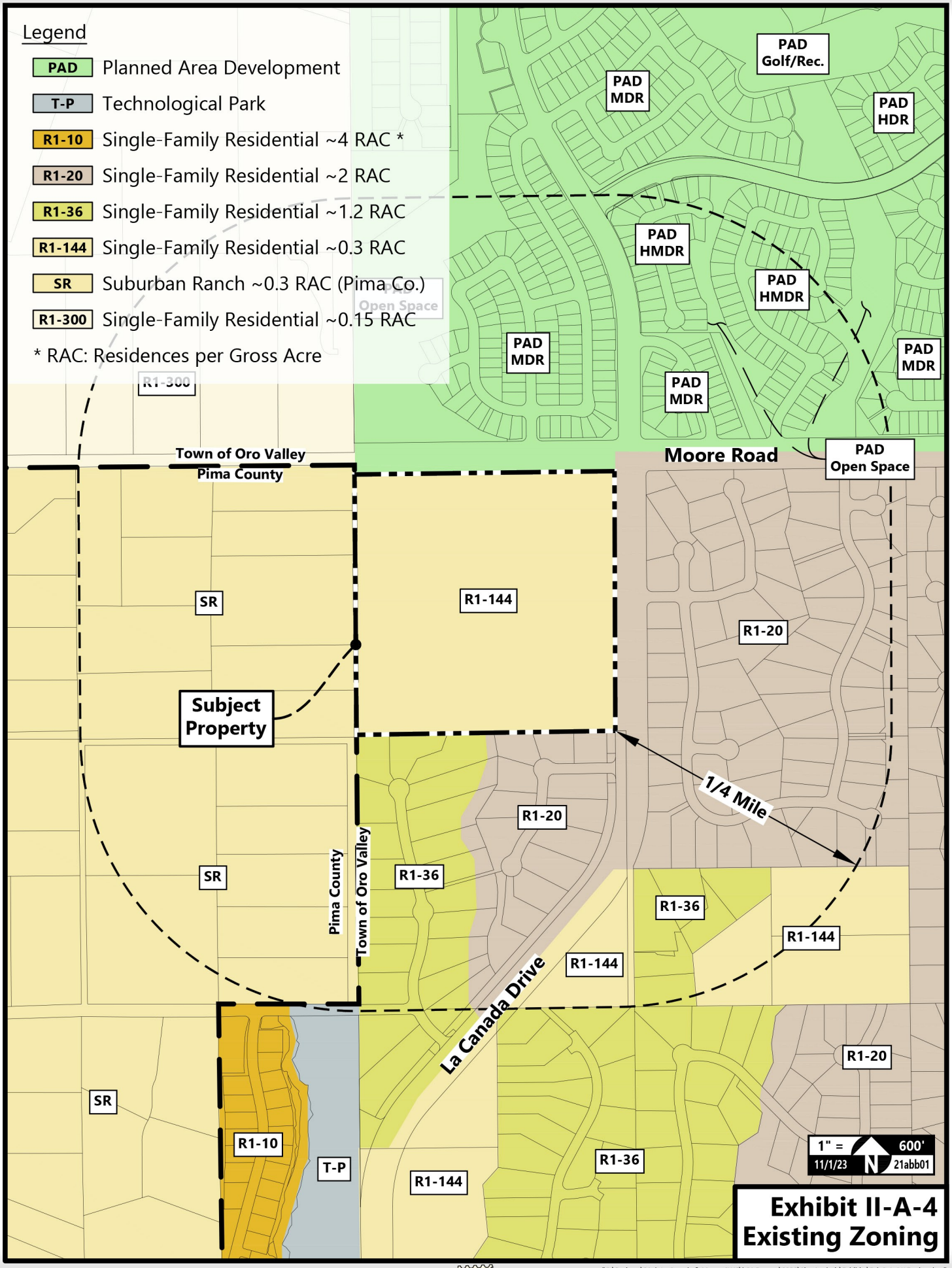

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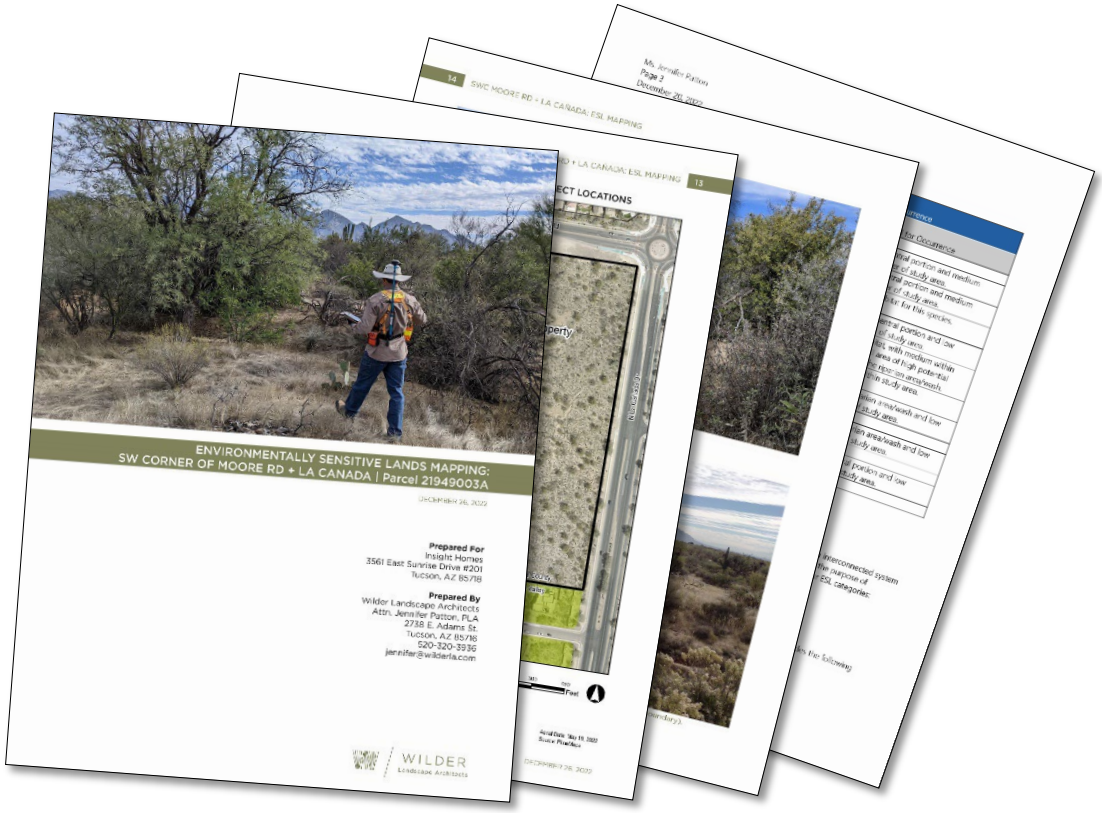
B. ENVIRONMENTALLY SENSITIVE LANDS (ESL)

1. ESL Categories Onsite

With the Property originally being in Pima County, it was not included in the Town of Oro Valley's ESL mapping. ESL mapping on the Property was recently completed by Wilder Landscape Architects in December of 2022. See Appendix 'A': Environmentally Sensitive Lands Mapping. This mapping identified one band of Critical Resource Area that cuts through the central portion of the Property from the north to the south. Critical Resource Areas require a minimum of 95% open space. The remainder of the property is composed of Resource Management Area Tier 1, which requires a minimum of 66% open space. Upon approval of the minor General Plan Amendment associated with this rezoning 18.53 acres east of the onsite wash will be redesignated as Resource Management Area Tier 2, which requires a minimum of 25% open space. See Exhibit II-B-1: Environmentally Sensitive Lands.



2. Additional ESL Characteristics

There are no regulated rock outcrops, distinctive native plant stands, or distinctive individual native plants on the subject property.

3. Total Acreage Present Onsite for each Conservation Category

Conservation Category	Acreage	Acreage After GPA
Major Wildlife Linkage	0	
Critical Resource Area	3.84±	3.84±
Core Resource Area	0	
Resource Management Area Tier 1	31.53±	13.00±
Resource Management Area Tier 2	0	18.53±
Resource Management Area Tier 3	0	

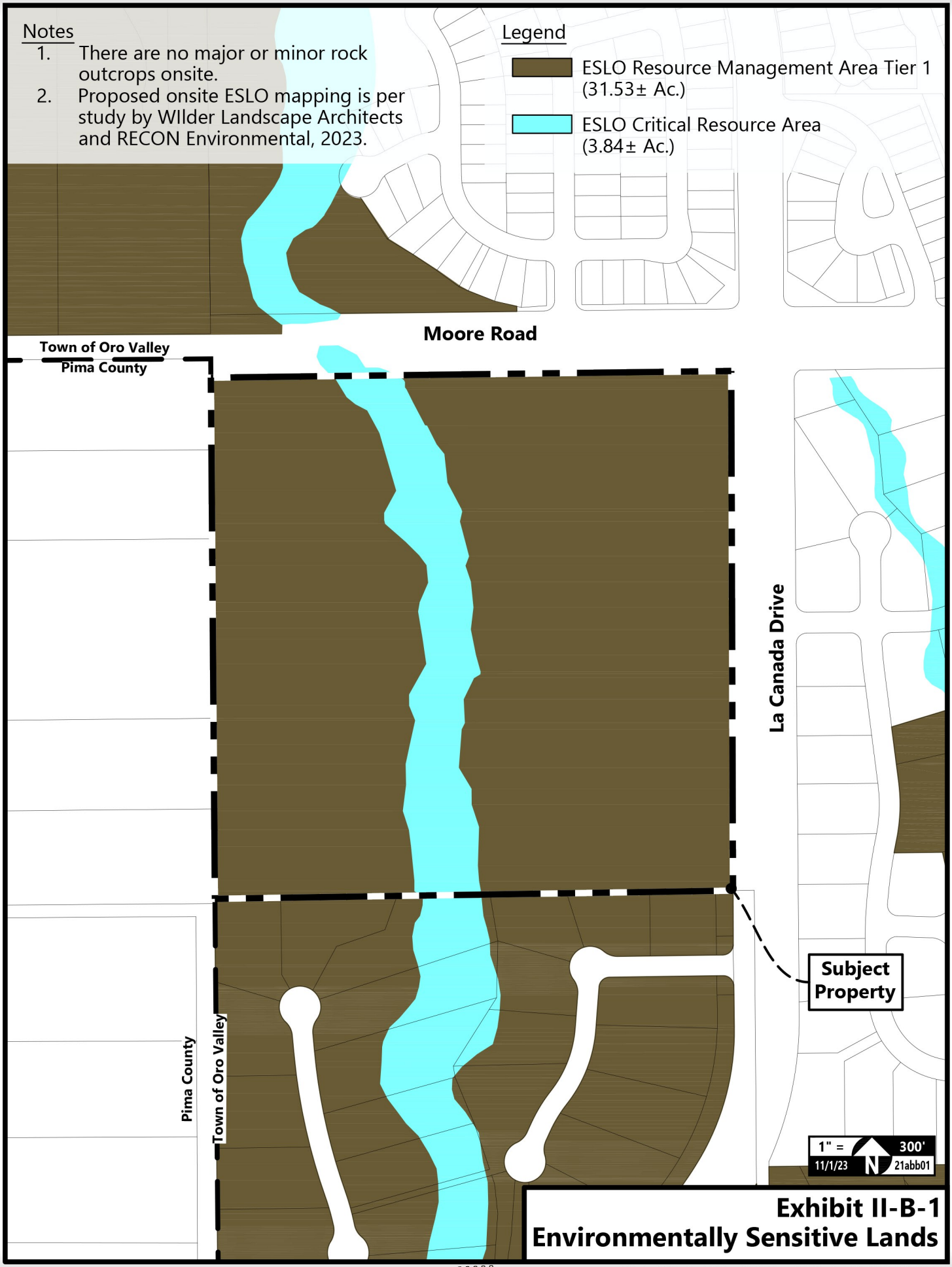


Exhibit II-B-1
Environmentally Sensitive Lands

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C. TOPOGRAPHY

The topography of the Property is generally characterized by relatively flat terrain within some undulating areas near the Critical Resource Area cutting across the Property. The Property generally slopes gently downward from the north to the south. Elevations range from approximately 2,880 feet above sea level along the northern boundary of the Property to approximately 2,852 feet above sea level along the southern boundary. The Property does not contain any slopes of 25% or greater, hillside conservation areas, rock outcrops, or other significant topographic features. See Exhibit II-C-1: Topography.

Topographic Feature Category	Acreage
15% to less than 18%	0
18% to less than 20%	0
20% to less than 25%	0
25% to less than 33%	0
33% or greater	0
Ridgelines	0
Rock Outcrops & Boulders	0

Notes
1. There are no major or minor rock outcrops onsite.
2. There are no regulated slopes of 15% or greater onsite.

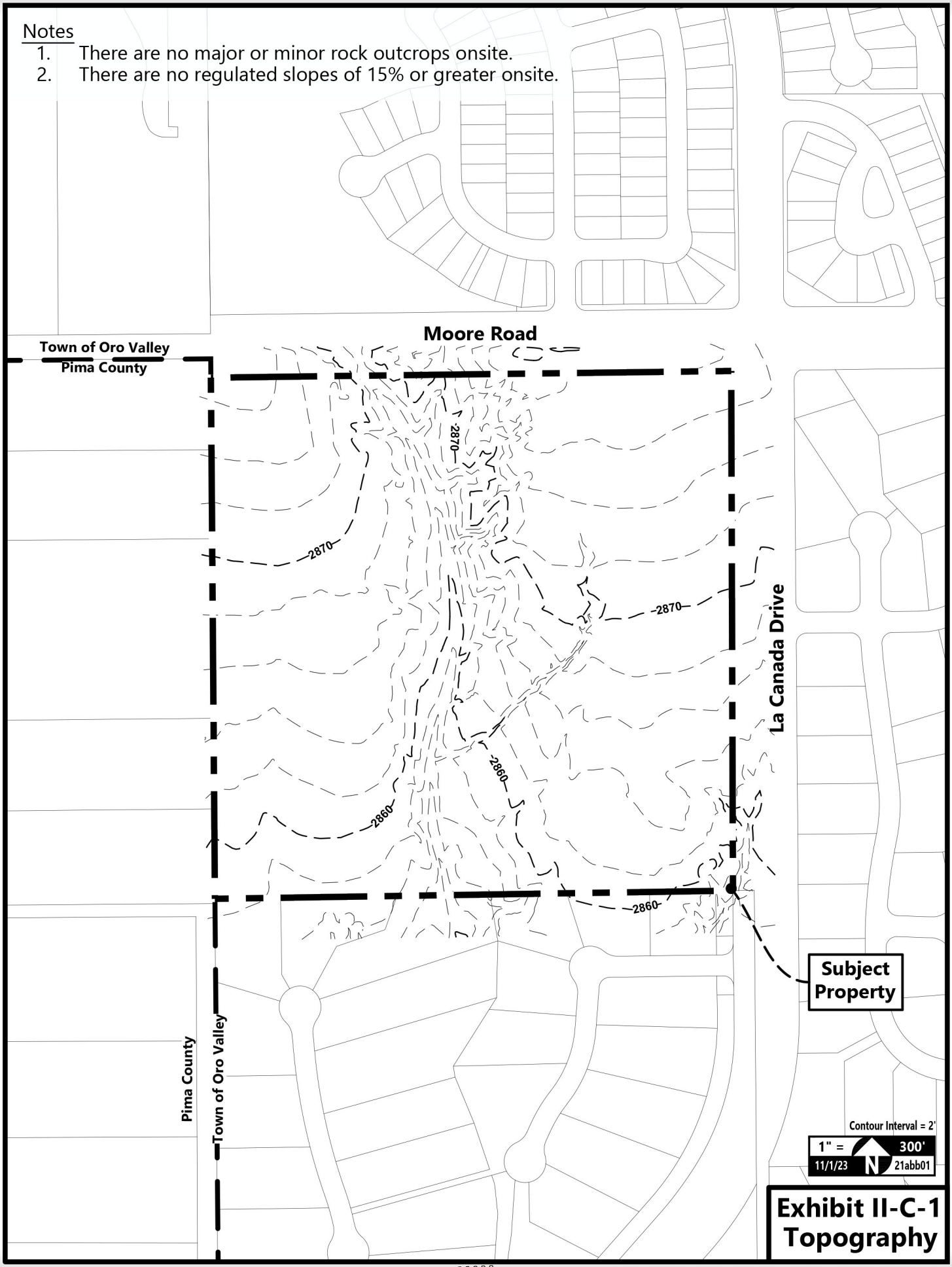

Exhibit II-C-1
Topography

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D. CULTURAL / ARCHAEOLOGICAL / HISTORIC RESOURCES

The subject Property had not been previously surveyed, but a recent survey was conducted on the Property by Bowers Environmental in January of 2022. No archaeological sites were recorded within the subject property, only a handful of isolated occurrences, which do not require any additional research.

No further archaeological study of the project area is recommended. In the unlikely event that buried archaeological features or human remains are unearthed during construction, all work should stop in the immediate vicinity of the discovery and an archaeologist should be contacted to verify the discovery and assess its significance.

STATE HISTORIC PRESERVATION OFFICE
SURVEY REPORT SUMMARY FORM 1

A CLASS III CULTURAL RESOURCES SURVEY ACROSS 36.4 ACRES OF PRIVATE LAND, PARCEL 219-49-003A, PIMA COUNTY, ARIZONA

Prepared for:
Bowers Environmental

Prepared and submitted by:
MCA Consulting
Joseph Howell and Michael Cook
12190 North Tall Grass Drive
Oro Valley, Arizona 85755

January 3, 2022
MCA Cultural Resources Report No. 2021.058

MCA

MCA 2021.058

E. HYDROLOGY

1. Offsite Watersheds Affecting, or Affected by, the Site

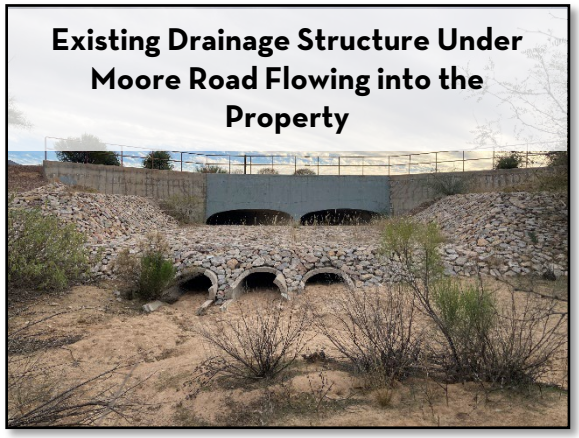
   There is one off-site watershed impacting the Property. It originates several miles to the north in the Tortolita Mountains. As is typical within the Tortolita fan, it is a long, narrow watershed containing a mix of developed and undeveloped land. The natural terrain consists of native desert vegetation. Surface runoff associated with the watershed flows south and ultimately discharges into the Canada del Oro Wash approximately 3.5 miles downstream of the Property.

2. Balanced & Critical Basins

   Per the Town of Oro Valley Drainage Criteria Manual, all watersheds are classified as balanced basins unless otherwise designated. Stormwater retention is allowed up to 4 inches in depth with a 12-hour drain time. Pima County indicates that this Property is within a critical basin. Stormwater retention and detention will therefore be provided within the project so that post-development flows exiting the site are reduced by 10% from pre-development flows.

3. Significant Offsite Features Affecting or Affected by the Property

   Upstream flows of the onsite wash are generally natural with the exception of two roadway crossings: Moore Road adjacent to the Property and Vistoso Sky Drive within the Vermillion subdivision approximately one-third of a mile north of the Property.



Existing Drainage Structure Under Moore Road Flowing into the Property

4. Area of Upstream Watersheds Greater than 100 Cubic Feet per Second (CFS)

   The upstream watershed impacting the Property has an area of approximately 997 acres with an approximate flow of 3,506 CFS entering the Property.

5. Location / Ownership of Well Sites within 100' of the Site

   According to the Arizona Department of Water Resources, there are two wells located within adjacent properties, both to the west of the Property. As ADWR's mapped well locations are centered on 10-acre cadastral squares, it is not clear if either of the wells is within 100' of the Property. However, in the most recent aerial photo available from Pima County no such wells are visible within 100' feet of the Property.

6. Onsite Hydrology Characteristics

Four existing onsite sub-watersheds have been delineated on the Property, all generally flowing from north to south. The two central sub-watersheds flow into the onsite wash. The eastern watershed flows to the southeast corner of the Property where it joins flows from La Canada Drive before flowing southwest through the La Canada Ridge subdivision. The western watershed sheet flows south-southwest.

Approximately 1.5 acres in the south-central portion of the Property is mapped by the National resource Conservation Service as Soil Group 'D'. The remainder of the Property is mapped as Mixed Soil Groups.

i. 100-year Floodplains with Peak Discharges exceeding 100 CFS

The project site contains one watershed which generates a 100-year peak discharge greater than 100 CFS. The associated floodplain was determined by EEC. See Exhibit II-E-1: Onsite Pre-Development Hydrology.

ii. Areas of Sheet Flooding and Average Depths

The project site is not subject to sheet flooding.

iii. Federally mapped floodways and floodplains

Per the current FEMA Flood Insurance Rate Maps (FIRM) Panel 04019C1090L and Panel 04019C1080L, dated June 16, 2011, the project site and all surrounding areas are located in a Zone X (areas determined to be outside the 0.2% annual chance floodplain).

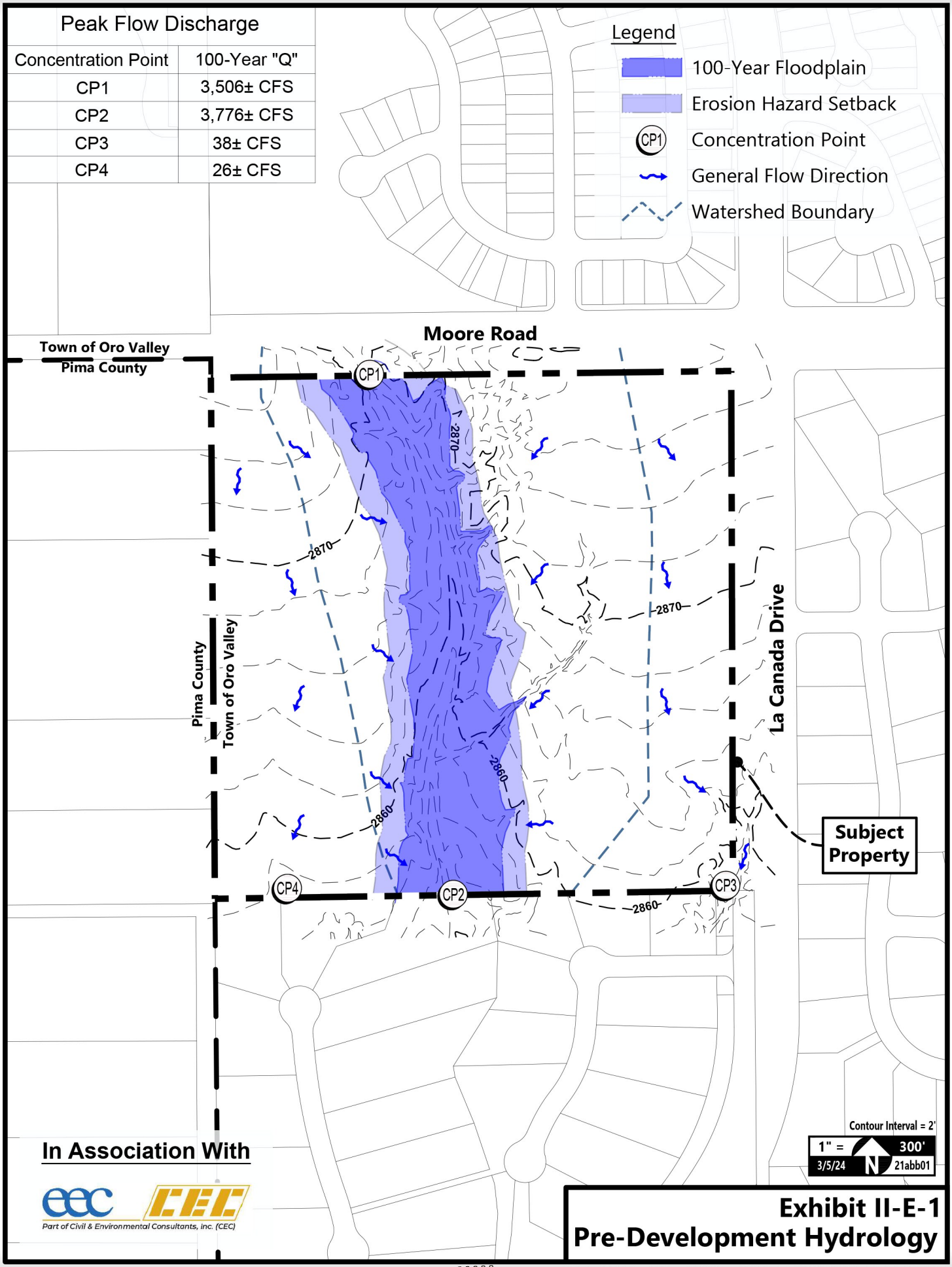
iv. Calculation of all 100-year peak discharges exceeding 100 CFS

The onsite watershed generating a 100-year peak flow exceeding 100 CFS contributes approximately 3,776 CFS at the downstream concentration points along the Property's southern boundary.

7. Existing Drainage Conditions along the Downstream Property Boundary

The existing downstream outflows discharging to the La Canada Ridge subdivision have been accommodated by that subdivision's engineering design. The wash generally remains in its natural condition as it flows further south away from the Property through La Canada Ridge.

Peak Flow Discharge	
Concentration Point	100-Year "Q"
CP1	3,506± CFS
CP2	3,776± CFS
CP3	38± CFS
CP4	26± CFS



In Association With

eec CEC
Part of Civil & Environmental Consultants, Inc. (CEC)

Exhibit II-E-1
Pre-Development Hydrology

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F. VEGETATION

1. Onsite Vegetative Communities

   The vegetation community on the property is typical of the Sonoran Desertscrub Paloverde-Mixed Cacti, which includes Palo Verde, Mesquite, Acacia, Saguaro, Cholla, Prickly Pear, and Barrel Cactus.

2. Significant, Threatened, or Endangered Flora

   No threatened or endangered flora are known to exist onsite. Individual plants meeting Oro Valley's definition of "significant" are shown on the site resource inventory. See Appendix 'B': Site Resource Inventory.

3. Vegetative Densities

   Vegetative density of the Property is approximately 50% plant cover. See Exhibit II-F-1: Vegetation.

Typical Vegetation Onsite

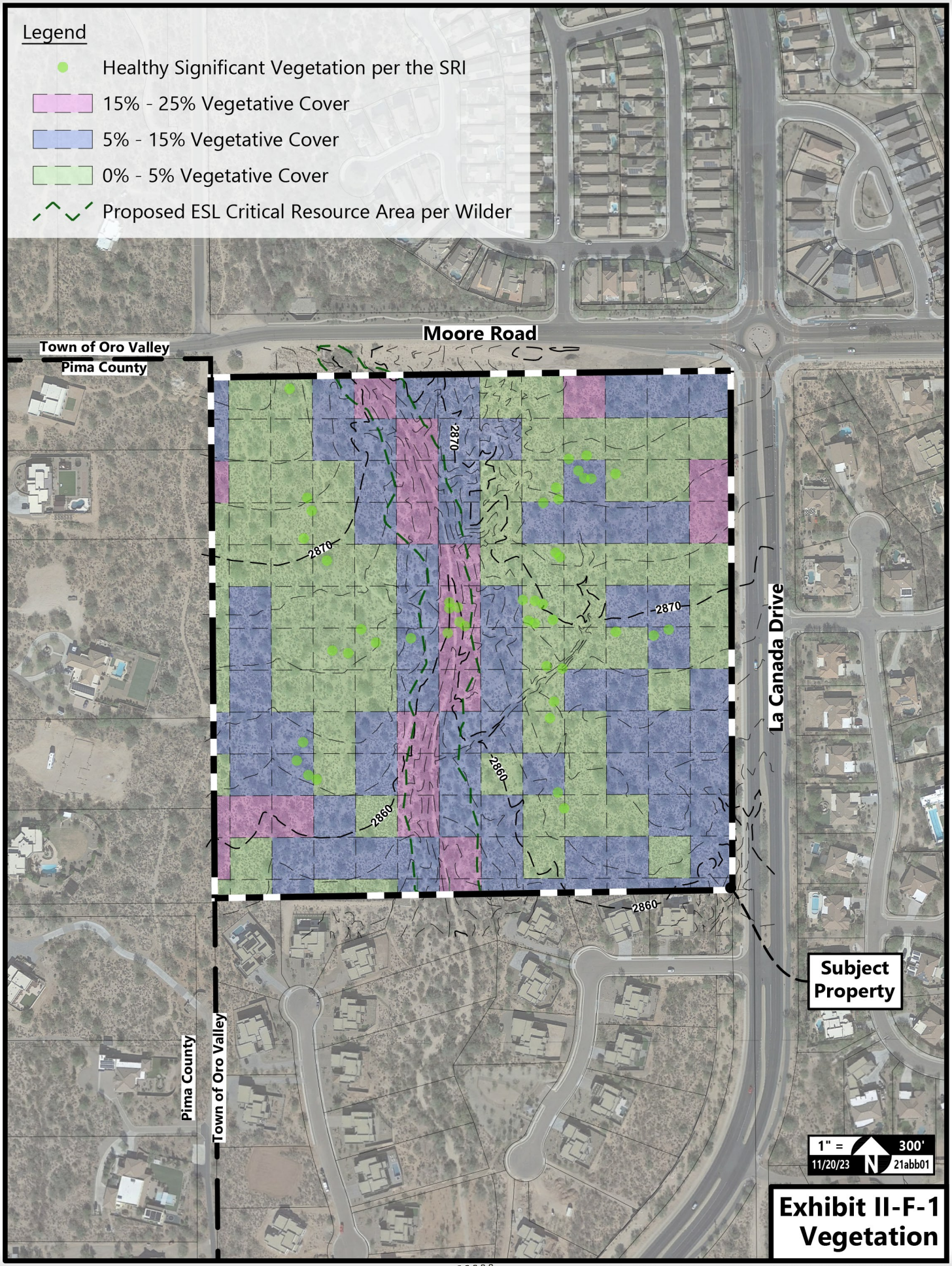

Exhibit II-F-1
Vegetation

"G:\Projects\21ab La Canada & Moore SWC\b01 Rezone\0230\Site Analysis\Exhibits\Exh 2-F-1 Vegetation.dwg"

G. WILDLIFE

The Arizona Game and Fish Department's (AZGFD) online review tool has been consulted, and the Environmental Review report, dated November 30, 2022, indicates that several federally listed species have been known to exist in the vicinity of this development. Additional input was sought from the AZGFD, and their updated letter dated April 4, 2024 (including the original 2022 report) is shown in Exhibit II-G-1: AZGFD Report. Any protected species encountered onsite will be handled according to applicable regulatory criteria.

April 8, 2024

Mr. Paul Oland
Paradigm Land Design, LLC

Electronically submitted to gpo@paradigmland.us

Re: Review of the SWC La Canada & Moore 36 Residential Rezoning project

Dear Mr. Oland:

The Arizona Game and Fish Department (Department) reviewed your Project Evaluation Request dated February 8, 2024, regarding the rezoning to allow a low-density residential subdivision of 38 lots and associated infrastructure to be developed at the southwest corner of La Canada Drive and Moore Road in Oro Valley, Pima County, Arizona. The 35-acre parcel is currently undeveloped Sonoran desert scrub vegetation, surrounded by low density residential development to the west and south, with higher-density residential development to the north and east.

Based on the information provided, the Department offers the following general recommendations:

- The Department's Online Environmental Review Tool report (HGIS-17886) updated on April 4, 2024 (attached), indicates cactus ferruginous pygmy-owl, Sonoran desert tortoise, Gila monster, and lowland leopard frogs have been reported within a three mile radius of your proposed project.
    - The cactus ferruginous pygmy-owl, which is federally proposed as Threatened under the Endangered Species Act (ESA), has been recorded within a three mile radius of your proposed project. The Department recommends that you and/or the project proponent contact the U.S. Fish and Wildlife Service[1] (USFWS) for their Technical Assistance. The USFWS will provide options to comply with the ESA, such as conservation measures to avoid or minimize adverse effects to listed species.
    - The Sonoran desert tortoise (*Gopherus morafkai*) is a federal and state species of special concern. The Department recommends conducting a survey for Sonoran desert tortoise within suitable habitat, in accordance with the *Desert Tortoise Survey Guidelines for Environmental Consultants*[2], to determine the presence of this species. If tortoises are identified during the survey, please refer and adhere to the *Recommended Standard Mitigation Measures for Projects in Sonoran Desert*

[1] https://www.fws.gov/office/arizona-ecological-services/contact-us
[2] https://s3.amazonaws.com/azgfd-portal-wordpress/PortalImages/files/wildlife/2010SurveyguidelinesForConsultants.pdf

Tortoise Habitat[3] and *Guidelines for Handling Sonoran Desert Tortoises Encountered on Development Projects*[4].

- Arizona Species of Greatest Conservation Need have the potential to occur within the project area. If wildlife are encountered while working in the project area, the Department recommends moving them out of harm's way, no more than 0.25 mile outside the project area into similar habitat.

- The Department recommends that a qualified biologist conduct a survey for nesting birds within the project area prior to removal or trimming of trees/vegetation, if the removal or trimming occurs during the breeding season. The trees and/or vegetation within the project area may provide nesting opportunities for avian species that are regulated under the Migratory Bird Treaty Act (MBTA) and protected under state law. Breeding season for birds in the project vicinity is generally mid-January to late June, depending on the species and habitat, and for raptors it is generally January through late June. If it is anticipated the project will not be in compliance with MBTA, the Department recommends contacting the USFWS for technical assistance. The USFWS will provide options to comply with the MBTA.
- The Department has noted the drainage that runs north-south through the project area, and recognizes washes and any associated riparian habitat as areas of environmental importance to wildlife, and actively encourages management practices that will result in the conservation and protection of the washes. Alterations of the floodplain should be minimized to the extent possible to preserve the historic hydrologic regime and the wildlife the area supports. The Department recommends the following best management practices:
  - Washes and riparian corridors can be important movement corridors for wildlife. See the Department's guidelines on how to plan for wildlife and preserve wildlife corridors at https://www.azgfd.com/wildlife/planning/wildlifeguidelines/.
  - To the extent possible a buffer of 100 feet should be maintained around the wash corridor. Riparian habitat along the wash can buffer against excessive runoff from upland activities, whether natural or human induced, which can degrade water quality. Alterations of the waterway should be minimized and controls to minimize stormwater runoff should be employed to preserve water quality.
- Please ensure the project complies with Arizona Native Plant Law regulations[5]. A Native Plant Inventory may need to be conducted to identify, record, and coordinate plant salvage efforts for species that are Protected under the Arizona Native Plant Law. In addition, the applicable land management agencies should be consulted regarding guidelines for revegetation efforts.
- Implement erosion and drainage control measures during the project to prevent the introduction of sediment-laden runoff into adjacent washes or surface waters and to prevent impacts to surface water quality. Stabilize exposed soils, particularly on slopes, with native vegetation as soon as possible to prevent excess erosion.
- If trenching will occur, trenching and backfilling crews should be close together to minimize the amount of open trenches at any given time. Avoid leaving trenches open

[3] https://s3.amazonaws.com/azgfd-portal-wordpress/PortalImages/files/wildlife/MitigationMeasures.pdf
[4] https://s3.amazonaws.com/azgfd-portal-wordpress/PortalImages/files/wildlife/2014%20Tortoise%20handling%20guidelines.pdf
[5] https://agriculture.az.gov/plantsproduce/native-plants

overnight. Where trenches cannot be back-filled immediately, escape ramps should be constructed at least every 90 meters. Escape ramps can be short lateral trenches or wooden planks sloping to the surface. The slope should be less than 45 degrees (1:1). Trenches that have been left open overnight should be inspected and animals removed prior to backfilling.

- Minimize the potential introduction or spread of exotic invasive species, including aquatic and terrestrial plants, animals, insects and pathogens. Precautions should be taken to wash and/or decontaminate all equipment utilized in the project activities before entering and leaving the site. Please review the Arizona Department of Agriculture's website for a list of prohibited and restricted noxious weeds[6] and the Arizona Native Plant Society[7] for recommendations on control methods. To view a list of documented invasive species or to report invasive species in or near your project area visit iMapInvasives[8] - a national cloud-based application for tracking and managing invasive species.
- Landscape with drought-tolerant species that are native to the area. Landscaping with native plants can help support wildlife and pollinator species that inhabit rural and urbanized areas. Visit the Arizona Native Plant Society's website[9] for information on preferred native plants to utilize in landscaping.
- Artificial lighting impairs the ability of nocturnal animals to navigate (e.g., owls, migratory birds, bats, and other nocturnal mammals) and may negatively affect wildlife behavior and populations. The Department recommends using only the minimum amount of light needed for safety. Motion sensing lighting and narrow spectrum lighting (i.e., close to the red bandwidth) should be used as often as possible to lower the range of species affected by lighting. All lighting should be shielded and focused to ensure that light reaches only areas needing illumination to minimize impacts to nocturnal wildlife.

The Department appreciates the opportunity to provide an evaluation of impacts to wildlife or wildlife habitats associated with the SWC La Canada & Moore 36 Residential Rezoning project. If you have any questions regarding this letter, please contact me at (623) 236-7615 and visit our website[10] for additional guidelines.

Sincerely,

Cheri Bouchér

Cheri Bouchér
Project Evaluation Program Specialist, Habitat Branch

AZGFD #M24-02082902

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[6] https://agriculture.az.gov/pestspest-control/agriculture-pests/noxious-weeds
[7] https://aznps.com/invas
[8] https://imap.natureserve.org/imap/services/page/map.html
[9] https://aznps.com/grow-native/
[10] https://live-azgfd-main.pantheonsite.io/wildlife-conservation/planning-for-wildlife/planning-for-wildlife-wildlife-friendly-guidelines/

Arizona Environmental Online Review Tool Report

Arizona Game and Fish Department Mission
To conserve Arizona's diverse wildlife resources and manage for safe, compatible outdoor recreation opportunities for current and future generations.

Project Name:
SWC La Canada & Moore 36

User Project Number:
21abb01

Project Description:
Single-Family residential development consisting of ~38 lots and associated infrastructure.

Project Type:
Development Within Municipalities (Urban Growth), Residential subdivision and associated infrastructure, New construction

Contact Person:
Clay Goodwin

Organization:
Paradigm Land Design LLC

On Behalf Of:
CONSULTING

Project ID:
HGIS-17866

Please review the entire report for project type and/or species recommendations for the location information entered. Please retain a copy for future reference.

Page 1 of 13

Disclaimer:

1. This Environmental Review is based on the project study area that was entered. The report must be updated if the project study area, location, or the type of project changes.
2. This is a preliminary environmental screening tool. It is not a substitute for the potential knowledge gained by having a biologist conduct a field survey of the project area. This review is also not intended to replace environmental consultation (including federal consultation under the Endangered Species Act), land use permitting, or the Departments review of site-specific projects.
3. The Departments Heritage Data Management System (HDMS) data is not intended to include potential distribution of special status species. Arizona is large and diverse with plants, animals, and environmental conditions that are ever changing. Consequently, many areas may contain species that biologists do not know about or species previously noted in a particular area may no longer occur there. HDMS data contains information about species occurrences that have actually been reported to the Department. Not all of Arizona has been surveyed for special status species, and surveys that have been conducted have varied greatly in scope and intensity. Such surveys may reveal previously undocumented population of species of special concern.
4. HabiMap Arizona data, specifically Species of Greatest Conservation Need (SGCN) under our State Wildlife Action Plan (SWAP) and Species of Economic and Recreational Importance (SERI), represent potential species distribution models for the State of Arizona which are subject to ongoing change, modification and refinement. The status of a wildlife resource can change quickly, and the availability of new data will necessitate a refined assessment.

Locations Accuracy Disclaimer:
Project locations are assumed to be both precise and accurate for the purposes of environmental review. The creator/owner of the Project Review Report is solely responsible for the project location and thus the correctness of the Project Review Report content.

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
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

Arizona Game and Fish Department
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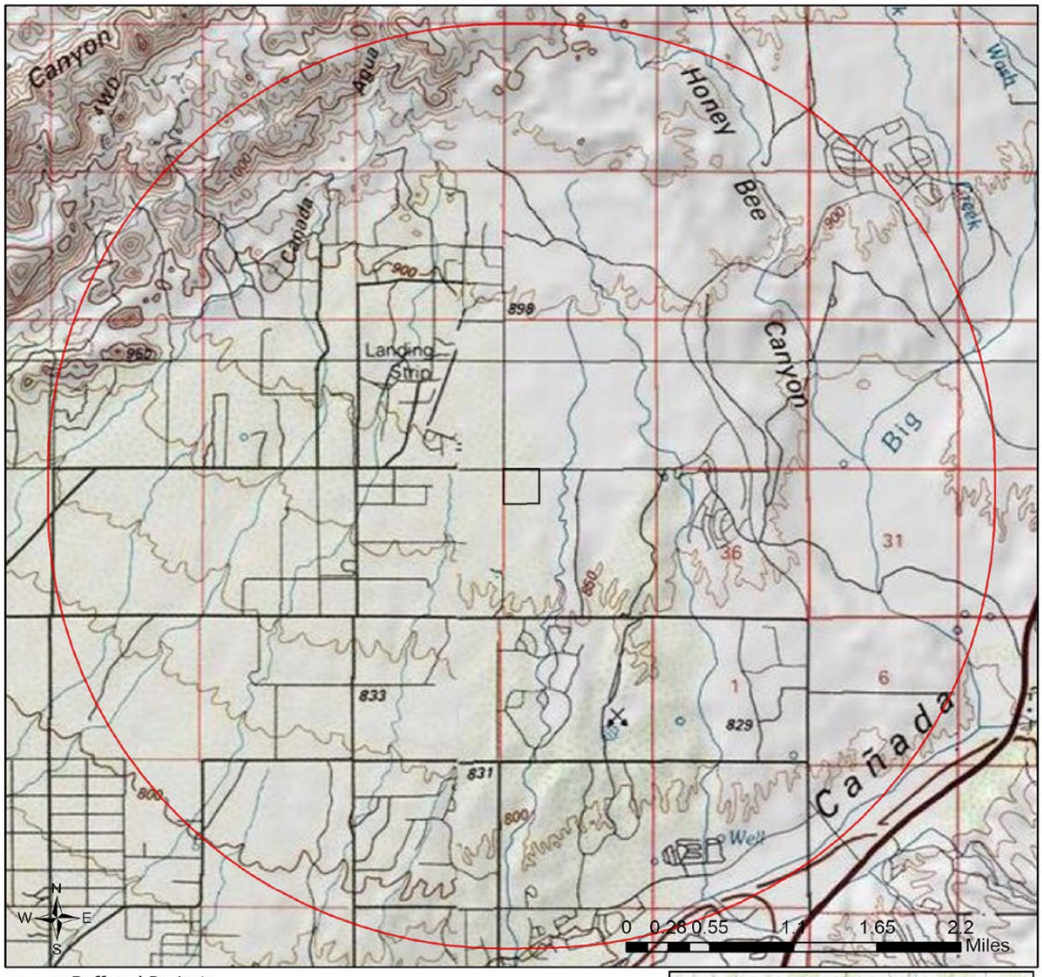
SWC La Canada & Moore 36

USA Topo Basemap With Locator Map



Buffered Project Boundary

Project Boundary

Project Size (acres): 35.36

Lat/Long (DD): 32.4364 / -110.9933

County(s): Pima

AGFD Region(s): Tucson

Township/Range(s): T11S, R13E

USGS Quad(s): ORO VALLEY

Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community

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Exhibit II-G-1: AZGFD Report (cont'd)

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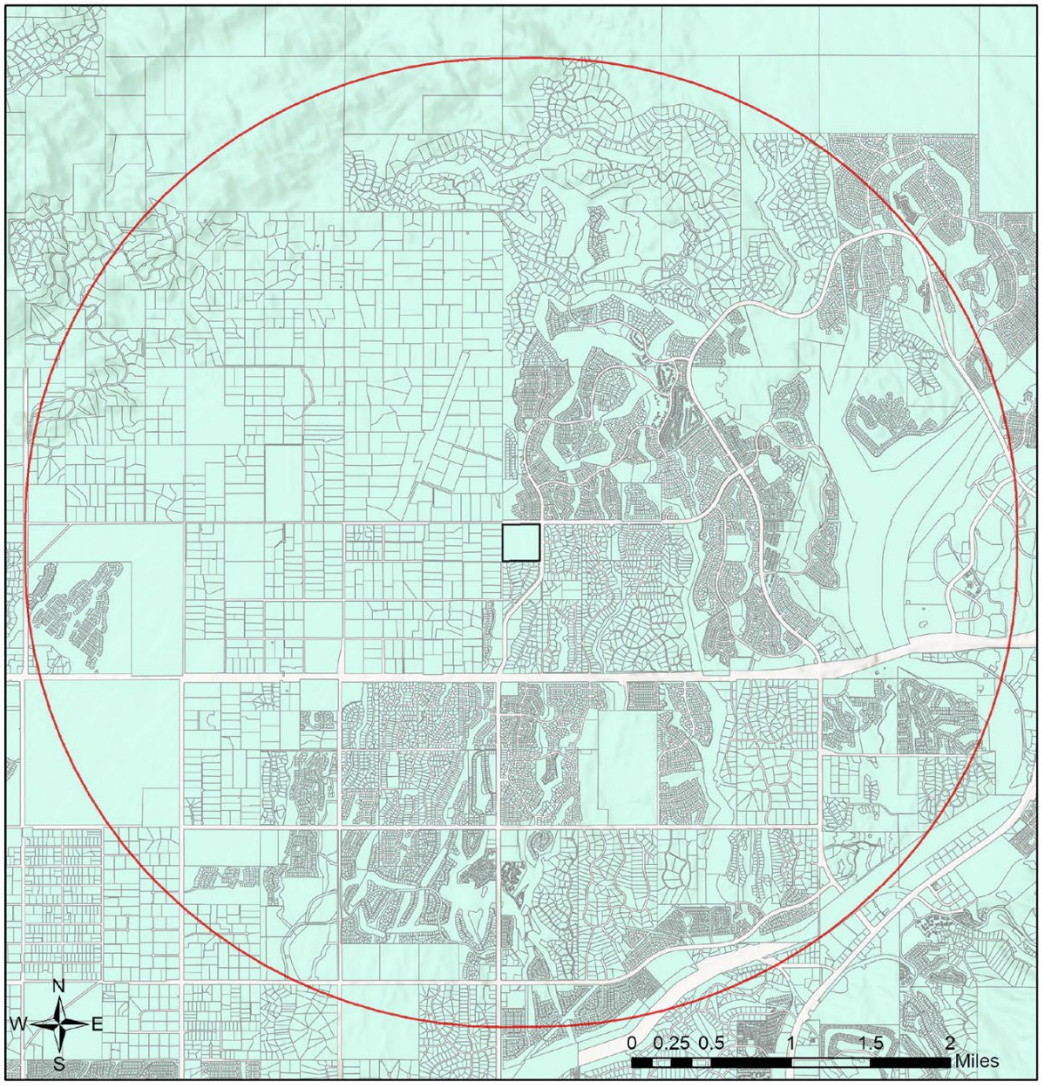
SWC La Canada & Moore 36

Web Map As Submitted By User



id_pima
Buffered Project Boundary
Project Boundary

Project Size (acres): 35.36
Lat/Long (DD): 32.4364 / -110.9933
County(s): Pima
AGFD Region(s): Tucson
Township/Range(s): T11S, R13E
USGS Quad(s): ORO VALLEY

Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community

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Exhibit II-G-1: AZGFD Report (cont'd)

Arizona Game and Fish Department
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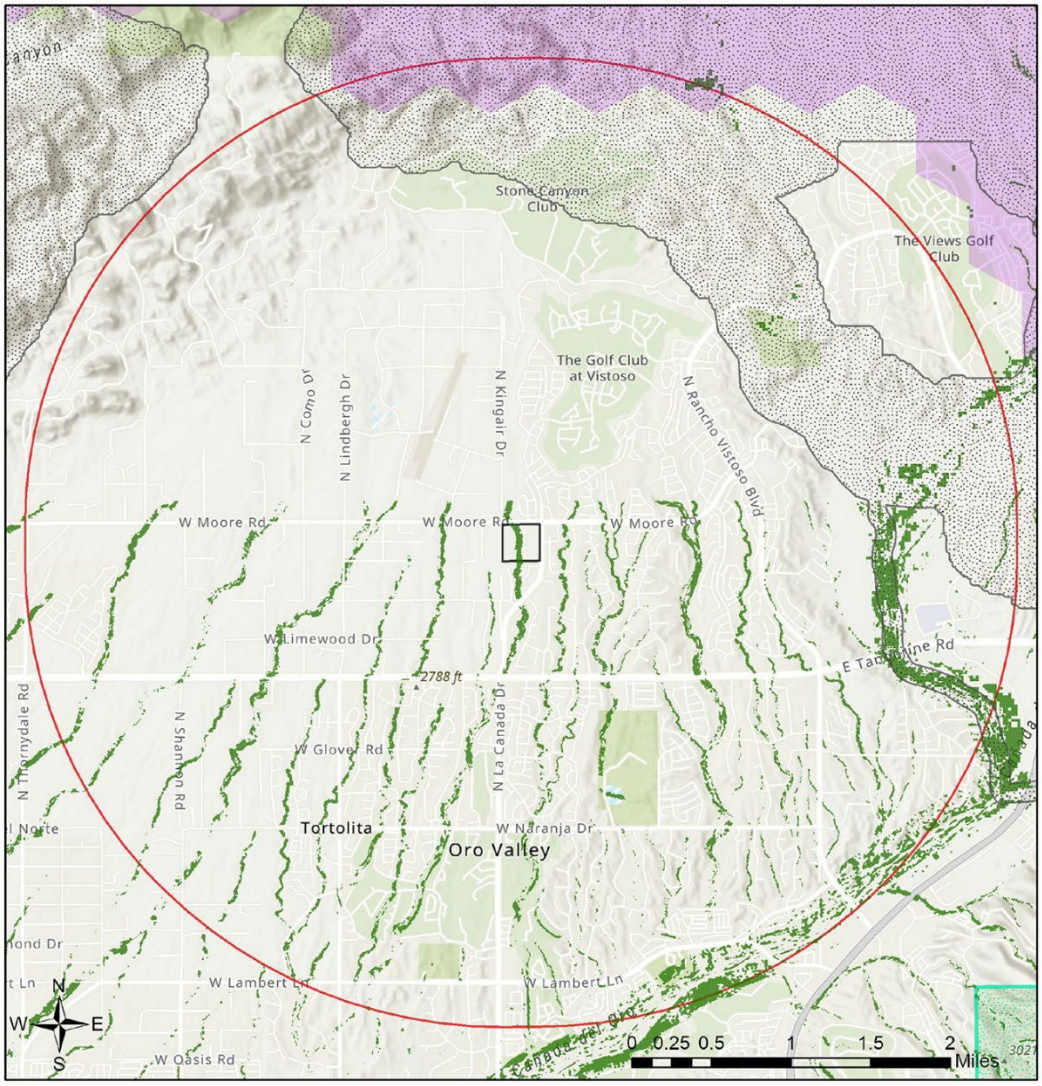
Review Date: 11/30/2022 10:42:41 AM

SWC La Canada & Moore 36

Important Areas



- Buffered Project Boundary
- Project Boundary
- Important Bird Areas
- Critical Habitat
- Pinal County Riparian
- Important Connectivity Zones
- Wildlife Connectivity

Project Size (acres): 35.36
Lat/Long (DD): 32.4364 / -110.9933
County(s): Pima
AGFD Region(s): Tucson
Township/Range(s): T11S, R13E
USGS Quad(s): ORO VALLEY

Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community
Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

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Exhibit II-G-1: AZGFD Report (cont'd)

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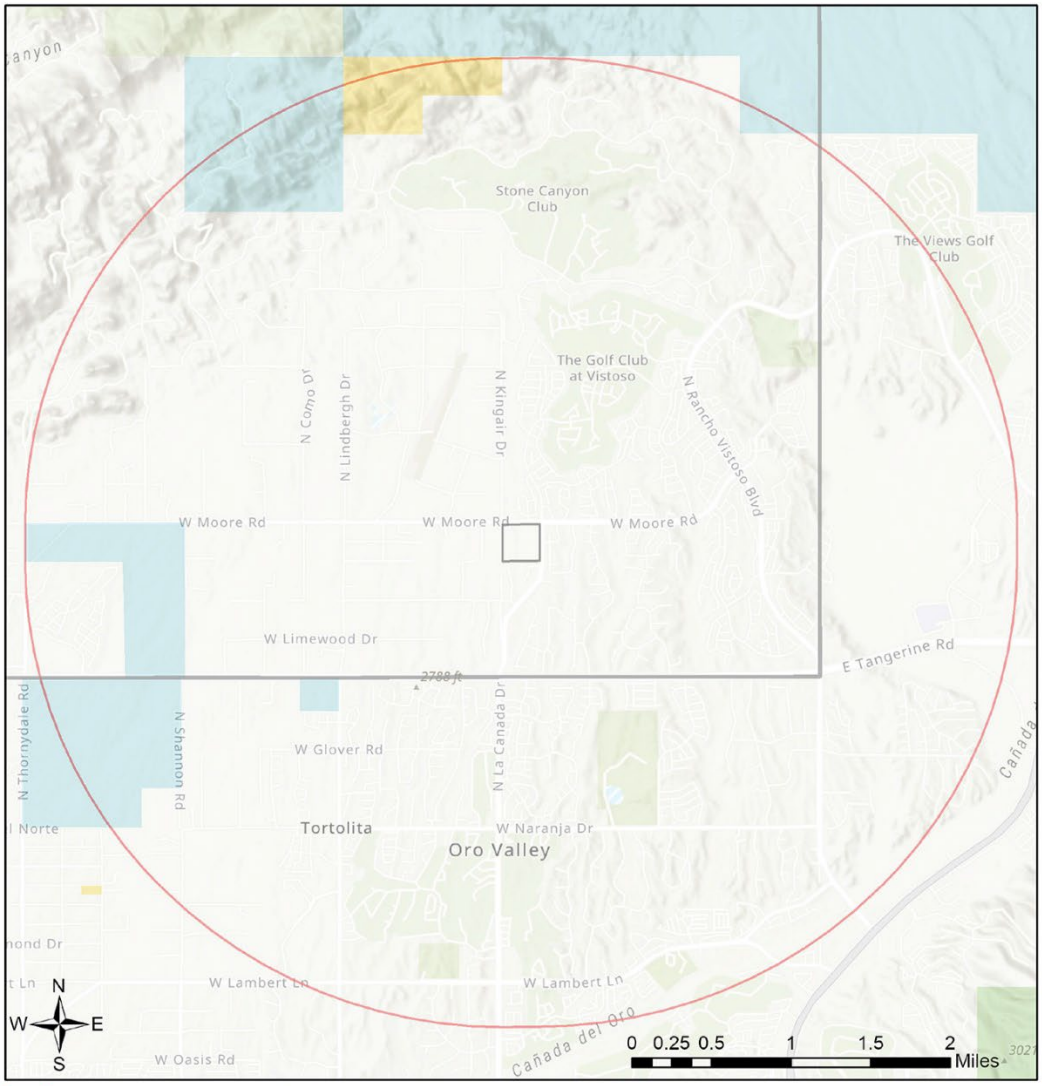
SWC La Canada & Moore 36

Township/Ranges and Land Ownership



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

Project Size (acres): 35.36
Lat/Long (DD): 32.4364 / -110.9933
County(s): Pima
AGFD Region(s): Tucson
Township/Range(s): T11S, R13E
USGS Quad(s): ORO VALLEY

Arizona Game and Fish Department
Project ID: HGIS-17866

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Special Status Species Documented within 3 Miles of Project Vicinity

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Glaucidium brasilianum cactorum	Cactus Ferruginous Pygmy-owl	PT	S	S		1B
Gopherus morafkai	Sonoran Desert Tortoise	CCA	S	S		1A
Heloderma suspectum	Gila Monster					1A
Lithobates yavapaiensis	Lowland Leopard Frog	SC	S	S		1A

Note: Status code definitions can be found at https://www.azgfd.com/wildlife/planning/wildlifeguidelines/statusdefinitions/
.

Special Areas Documented that Intersect with Project Footprint as Drawn

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Riparian Area	Riparian Area					
Tortolita Fan to Canada del Oro	Pima County Wildlife Movement Area - Landscape					

Note: Status code definitions can be found at https://www.azgfd.com/wildlife/planning/wildlifeguidelines/statusdefinitions/
.

Species of Greatest Conservation Need Predicted that Intersect with Project Footprint as Drawn, based on Predicted Range Models

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Aix sponsa	Wood Duck					1B
Ammospermophilus harrisii	Harris' Antelope Squirrel					1B
Anthus spragueii	Sprague's Pipit	SC				1A
Aspidoscelis stictogramma	Giant Spotted Whiptail	SC	S			1B
Aspidoscelis xanthonota	Red-backed Whiptail	SC	S			1B
Athene cunicularia hypugaea	Western Burrowing Owl	SC	S	S		1B
Botaurus lentiginosus	American Bittern					1B
Calypte costae	Costa's Hummingbird					1C
Chilomeniscus stramineus	Variable Sandsnake					1B
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
Cynanthus latirostris	Broad-billed Hummingbird		S			1B
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
Falco peregrinus anatum	American Peregrine Falcon	SC	S	S		1A
Glaucidium brasilianum cactorum	Cactus Ferruginous Pygmy-owl	PT	S	S		1B
Gopherus morafkai	Sonoran Desert Tortoise	CCA	S	S		1A

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Species of Greatest Conservation Need Predicted that Intersect with Project Footprint as Drawn, based on Predicted Range Models

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Haliaeetus leucocephalus	Bald Eagle	SC, BGA	S	S		1A
Heloderma suspectum	Gila Monster					1A
Incilius alvarius	Sonoran Desert Toad					1B
Kinosternon sonoriense sonoriense	Desert Mud Turtle			S		1B
Lasiurus blossevillii	Western Red Bat		S			1B
Lasiurus xanthinus	Western Yellow Bat		S			1B
Leopardus pardalis	Ocelot	LE				1A
Leptonycteris yerbabuenae	Lesser Long-nosed Bat	SC				1A
Lepus alleni	Antelope Jackrabbit					1B
Macrotus californicus	California Leaf-nosed Bat	SC		S		1B
Melanerpes uropygialis	Gila Woodpecker					1B
Meleagris gallopavo mexicana	Gould's Turkey		S			1B
Melospiza lincolnii	Lincoln's Sparrow					1B
Melozone aberti	Abert's Towhee		S			1B
Micrathene whitneyi	Elf Owl					1C
Micruroides euryxanthus	Sonoran Coralsnake					1B
Myiarchus tyrannulus	Brown-crested Flycatcher					1C
Myotis occultus	Arizona Myotis	SC		S		1B
Myotis velifer	Cave Myotis	SC		S		1B
Myotis yumanensis	Yuma Myotis	SC				1B
Nyctinomops femorosaccus	Pocketed Free-tailed Bat					1B
Oreoscoptes montanus	Sage Thrasher					1C
Oreothlypis luciae	Lucy's Warbler					1C
Panthera onca	Jaguar	LE				1A
Peucaea carpalis	Rufous-winged Sparrow					1B
Phrynosoma solare	Regal Horned Lizard					1B
Phyllorhynchus browni	Saddled Leaf-nosed Snake					1B
Progne subis hesperia	Desert Purple Martin			S		1B
Setophaga petechia	Yellow Warbler					1B
Sphyrapicus nuchalis	Red-naped Sapsucker					1C
Spizella breweri	Brewer's Sparrow					1C
Tadarida brasiliensis	Brazilian Free-tailed Bat					1B
Thomomys umbrinus intermedius	Southern Pocket Gopher					1B
Vireo bellii arizonae	Arizona Bell's Vireo					1B
Vulpes macrotis	Kit Fox	No Status				1B

Arizona Game and Fish Department
Project ID: HGIS-17866

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Species of Economic and Recreation Importance Predicted that Intersect with Project Footprint as Drawn

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					
Zenaida macroura	Mourning Dove					

Project Type: Development Within Municipalities (Urban Growth), Residential subdivision and associated infrastructure, New construction

Project Type Recommendations:
Fence recommendations will be dependent 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 Wildlife Friendly Guidelines page, which is part of the Wildlife Planning button at https://www.azgfd.com/wildlife/planning/wildlifeguidelines/.

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. Guidelines for many of these can be found at: https://www.azgfd.com/wildlife/planning/wildlifeguidelines/.

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, canted, or cut to ensure that light reaches only areas needing illumination.

Minimize the potential introduction or spread of exotic invasive species, including aquatic and terrestrial plants, animals, insects and pathogens. Precautions should be taken to wash and/or decontaminate all equipment utilized in the project activities before entering and leaving the site. See the Arizona Department of Agriculture website for a list of prohibited and restricted noxious weeds at https://www.invasivespeciesinfo.gov/unitedstates/az.shtml and the Arizona Native Plant Society https://aznps.com/invas for recommendations on how to control. To view a list of documented invasive species or to report invasive species in or near your project area visit iMapInvasives - a national cloud-based application for tracking and managing invasive species at https://imap.natureserve.org/imap/services/page/map.html.

- To build a list: zoom to your area of interest, use the identify/measure tool to draw a polygon around your area of interest, and select "See What's Here" for a list of reported species. To export the list, you must have an account and be logged in. You can then use the export tool to draw a boundary and export the records in a csv file.

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 (https://azstateparks.com/).

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 herpetofauna (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 Wildlife Friendly Guidelines portion of the Wildlife Planning page at https://www.azgfd.com/wildlife/planning/wildlifeguidelines/.

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 https://www.azgfd.com/wildlife/planning/wildlifeguidelines/.

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 (https://new.azwater.gov/).

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 at PEP@azgfd.gov or at https://www.azgfd.com/wildlife/planning/wildlifeguidelines/ and https://www.azgfd.com/Wildlife/LivingWith.

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 at PEP@azgfd.gov.

Project Location and/or Species Recommendations:
Analysis indicates that your project is located in the vicinity of an identified ***wildlife habitat connectivity feature***. The **County-level Stakeholder Assessments** contain five categories of data (Barrier/Development, Wildlife Crossing Area, Wildlife Movement Area- Diffuse, Wildlife movement Area- Landscape, Wildlife Movement Area- Riparian/Washes) that provide a context of select anthropogenic barriers, and potential connectivity. The reports provide recommendations for opportunities to preserve or enhance permeability. Project planning and implementation efforts should focus on maintaining and improving opportunities for wildlife permeability. For information pertaining to the linkage assessment and wildlife species that may be affected, please refer to: https://www.azgfd.com/wildlife/planning/habitatconnectivity/identifying-corridors/.
Please contact the Project Evaluation Program (pep@azgfd.gov) for specific project recommendations.

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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 https://www.fws.gov/office/arizona-ecological-services or:

Phoenix Main Office
9828 North 31st Avenue #C3
Phoenix, AZ 85051-2517
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

This review has identified **riparian areas** within the vicinity of your project. During the planning stage of your project, avoid, minimize, or mitigate any potential impacts to riparian areas identified in this report. Riparian areas play an important role in maintaining the functional integrity of the landscape, primarily by acting as natural drainages that convey water through an area, thereby reducing flood events. In addition, riparian areas provide important movement corridors and habitat for fish and wildlife. Riparian areas are channels that contain water year-round or at least part of the year. Riparian areas also include those channels which are dry most of the year, but may contain or convey water following rain events. All types of riparian areas offer vital habitats, resources, and movement corridors for wildlife. The Pinal County Comprehensive Plan (i.e. policies *6.1.2.1* and *7.1.2.4*), Open Space and Trails Master Plan, Drainage Ordinance, and Drainage Design Manual all identify riparian area considerations, guidance, and policies. Guidelines to avoid, minimize, or mitigate impacts to riparian habitat can be found at https://www.azgfd.com/wildlife/planning/wildlifeguidelines/. Based on the project type entered, further consultation with the Arizona Game and Fish Department and Pinal County may be warranted.

HDMS records indicate that **Sonoran Desert Tortoise** have been documented within the vicinity of your project area. Please review the Tortoise Handling Guidelines found at: https://www.azgfd.com/wildlife/nongamemanagement/tortoise/

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H. VIEWSHEDS

Because this property is relatively flat and generally at the same elevation as surrounding properties, all site perimeter areas are highly visible from adjacent roadways and properties. Primary views away from the site are mainly of the Catalina Mountains and Pusch Ridge to the east and southeast. The Property also has minor views of the Tortolita Mountains to the north and of the Tucson Mountains to the southwest. See Exhibit II-H-1: Viewsheds and Exhibit II-H-2: Viewshed Photographs.

1. Viewshed Analysis

   The Property is within the outer edge of the Tangerine Road Corridor Overlay District but is not visible from Tangerine Road so a viewshed analysis is not required.

2. View Preservation Plan (VPP)

   Not Applicable.

3. Core Character Vegetation (CCV)

   Not Applicable.

Nearby Public Art

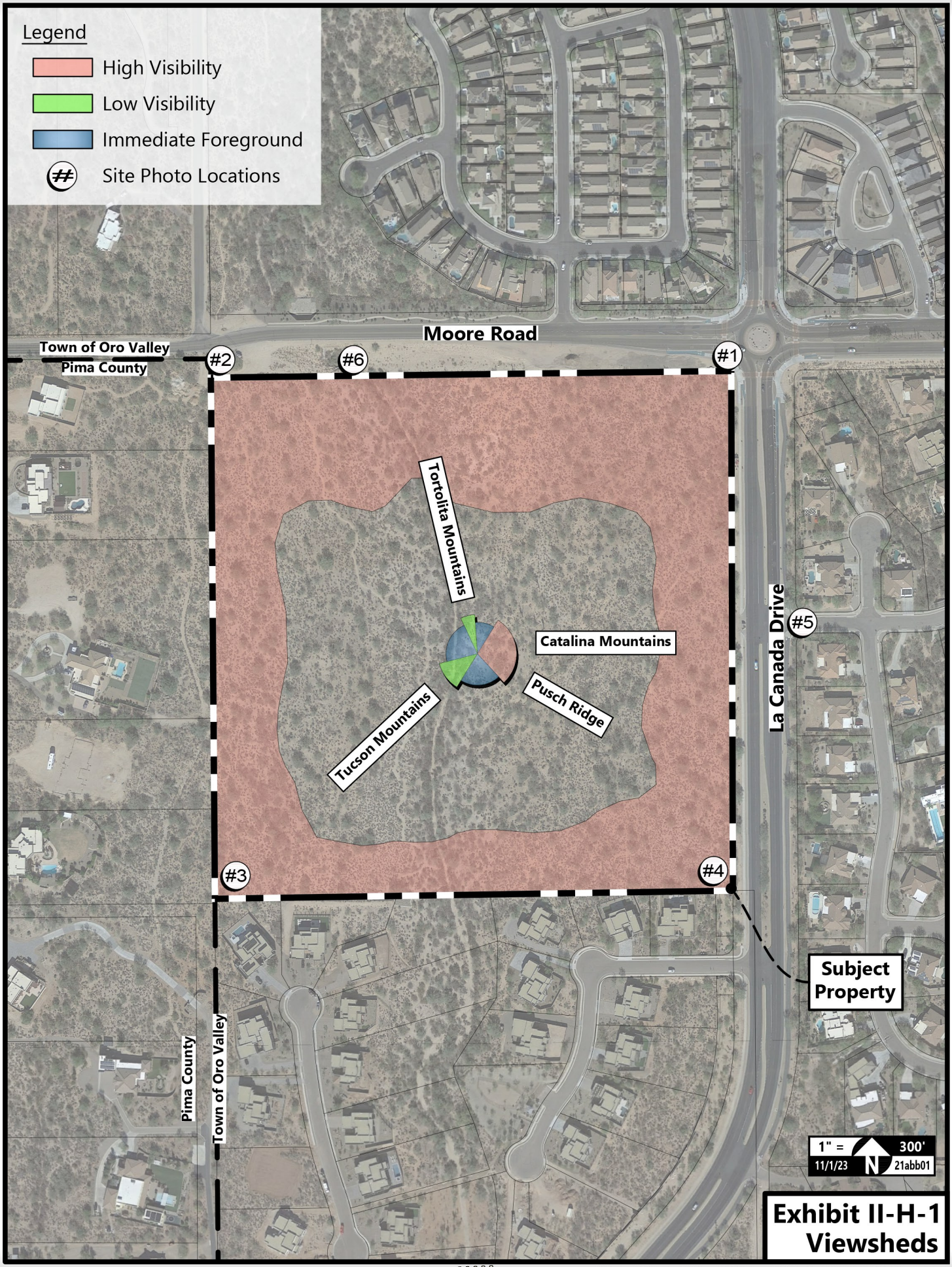

Exhibit II-H-1 Viewsheds

"G:\Projects\21ab La Canada & Moore SWC\b01 Rezone\0230\Site Analysis\Exhibits\Exh 2-H-1 Viewsheds.dwg"

Exhibit II-H-2: Viewshed Photographs

Photo Location #1: Looking North, away from the Property at the Northeast corner of the Property

Photo Location #1: Looking East, away from the Property at the Northeast corner of the Property

Photo Location #1: Looking South, along the Eastern Boundary of the Property along La Canada Drive

Photo Location #1: Looking West, along the Northern Boundary of the Property along Moore Road

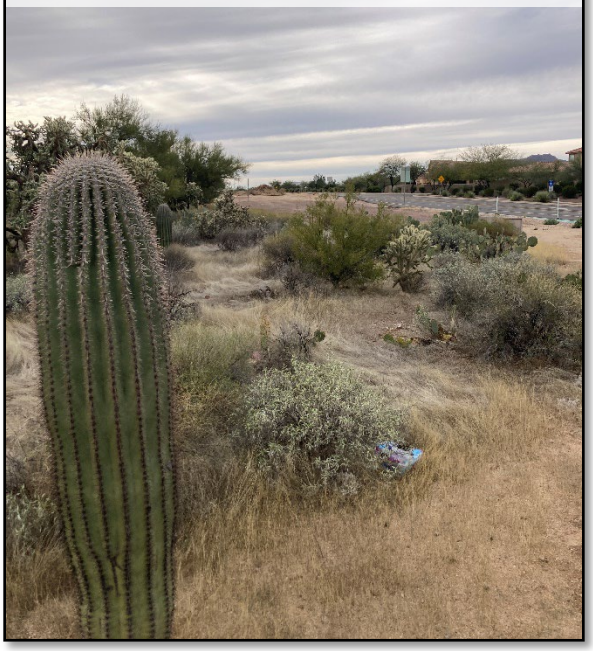

Exhibit II-H-2: Viewshed Photographs (cont'd)

Photo Location #2: Looking North, away from the Property at the Northwest corner of the Property

Photo Location #2: Looking East, along the Northern Boundary of the Property along Moore Road

Photo Location #2: Looking South, along the Western Boundary of the Property at the Northwest corner of

Photo Location #2: Looking West, away from the Property at the Northwest corner of the Property

Exhibit II-H-2: Viewshed Photographs (cont'd)

Photo Location #3: Looking North, along the Western Boundary of the Property from the Southwest corner of the Property

Photo Location #3: Looking East, along the Southern Boundary of the Property from the Southwest corner of the Property

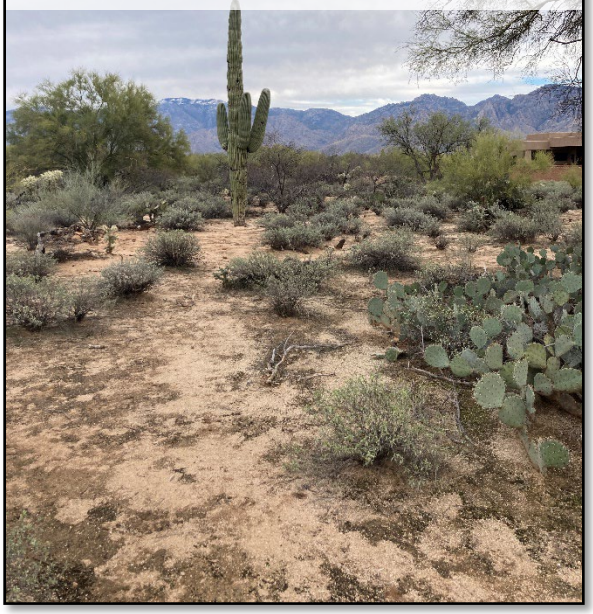

Photo Location #3: Looking South, away from the Property at the Southwest corner of the Property

Photo Location #3: Looking West, away from the Property at the Southwest corner of the Property

Exhibit II-H-2: Viewshed Photographs (cont'd)

Photo Location #4: Looking North, along the Eastern Boundary of the Property along La Canada Drive

Photo Location #4: Looking East, away from the Property at the Southeast corner of the Property

Photo Location #4: Looking South, away from the Property along La Canada Drive

Photo Location #4: Looking West, along the Property's Southern Boundary

Exhibit II-H-2: Viewshed Photographs (cont'd)

Photo Location #5: Looking West, into and across the Property from the intersection of La Canada Drive and White Diamond Place

Photo Location #6: Looking South, across the Property and into the Critical Resource Area

I. TRAFFIC

1. Existing / Proposed Offsite Streets between the Development and Nearest Arterial Streets

This development is located at the southwest corner of the intersection of La Canada Drive and Moore Road. Along the northern edge of the Property, Moore Road is four-lanes immediately west of the roundabout but quickly transitions to two-lanes (one in each direction) heading west. Traveling east and away from the Property, Moore Road is a four-land roadway (two lanes in each direction) with a raised median and a five-foot concrete sidewalk that runs for its entirety. La Canada Drive is a four-lane (two lanes in each direction) with a raised median, five-foot concrete sidewalk, and a ten-foot multi-use path. The entry into the Property will be via La Canada Drive at an existing median break that is aligned with White Diamond Place. No vehicular access is being proposed onto Moore Road.

Intersection of La Canada Drive & Moore Road

2. Arterial Streets within One Mile of the Site

All the traffic generated by this project will be accommodated by La Canada Drive, Moore Road, Tangerine Road, and La Cholla Boulevard. See Exhibit: II-I-1 Major Roads. An analysis of capacity (the "North Ridge Estates Traffic Impact Analysis") by M Esparza Engineering, dated November 17, 2023 has been included as an Appendix to this site analysis.

i. Existing and proposed right-of-way widths. See table below.

ii. Whether or not said widths conform to Oro Valley minimum requirements. See table below.

iii. Ownership (public or private). See table below.

iv. Whether or not rights-of-way jog or are continuous. See table below.

v. Number of travel lanes, theoretical capacity, and design speed for existing streets. See table below.

vi. Present Average Daily Traffic (ADT) for existing streets. See table below.

vii. Describe surface conditions on existing streets providing access to the site. See table below

viii. Program for completion of roadway and intersection improvements. See table below.

Roadway Name	Existing R.O.W.	Ultimate R.O.W.	Travel Lanes	Capacity	Speed Limit	ADT (PAG 2021)	Condition	Scheduled Improvements
La Canada Drive (Public)	150'	150' Continuous	4	40,000	45	10,739	Paved	None Scheduled
Moore Road (Public)	150'	150' Jogged	4	25,000	35	3,646	Paved	None Scheduled
Tangerine Road (Public)	300'	300' Continuous	4	40,000	45	17,702	Paved	None Scheduled
La Cholla Blvd. (Public)	60'	150' Jogged	2	25,000	45	1,162	Paved	Recently Completed

3. Existing and Proposed Arterial Intersections w/in One Mile of the Site

   Several arterial intersections that will carry traffic generated by this development exist within one mile of the Property. These include La Canada Drive & Moore Road, La Canada Drive & Tangerine Road, La Cholla Blvd. & Moore Road, and La Cholla Blvd. & Tangerine Road.

4. Existing Bicycle / Pedestrian Ways Adjacent to the Site and their Connections w/ Arterial Streets, Parks & Schools

   La Canada Drive contains a signed bike route with on-street multi-use line that extends for its entirety. La Canada Drive also includes a five-foot concrete sidewalk and a ten-foot multi-use path. Moore Road contains a signed bike route with an on-street multi-use lane and five-foot concrete sidewalks. Tangerine Road contains a signed bike route with an on-street multi-use lane and a ten-foot multi-use path. These routes provide connectivity to Leman Academy of Excellence, Painted Sky Elementary School, Innovation Academy, Copper Creek Elementary School, Basis North Charter School, Canyon Del Oro High School, Ironwood Ridge High School, Honey Bee Park, the Woodshade Linear Park, Sunset Park, Hohokam Park, the Naraja Townsite Park, and to the greater Oro Valley / Pima County bicycle-pedestrian path system. See Exhibit II-I-2: Bike Routes.

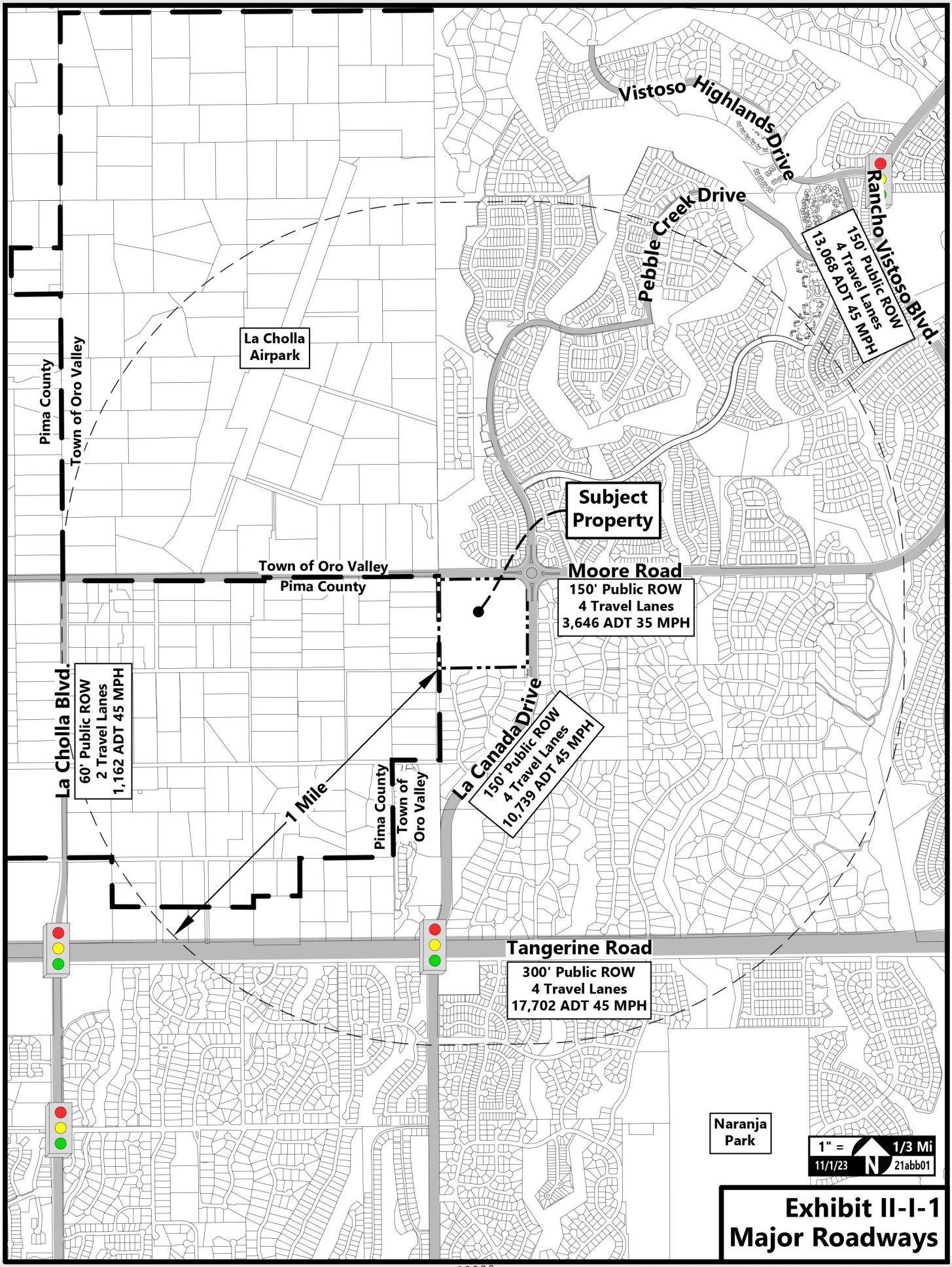

Exhibit II-I-1
Major Roadways

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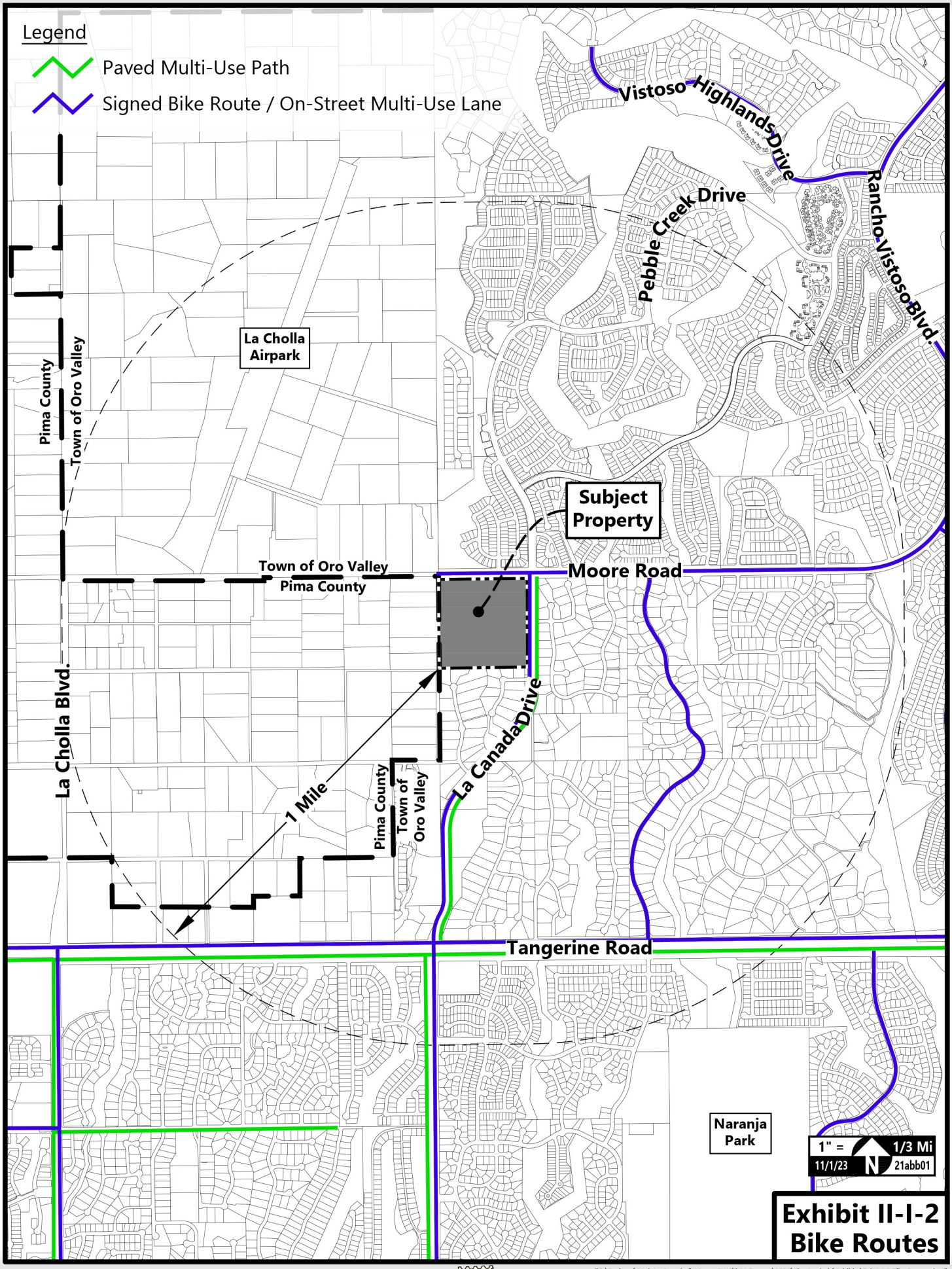

Exhibit II-I-2
Bike Routes

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J. PARKS, RECREATION AREAS, AND TRAILS

There are numerous trails and neighborhood parks located within one mile of the Property. The Vistoso Trails Nature Preserve is approximately one-half mile to the north of the Property. Hohokam Park and Sunset Park are both three-quarters of a mile to the northeast. The Naranja Townsite Park is just over one mile to the southeast and the El Conquistador Country Club is just over one mile to the south of the Property. There are a series of natural trails and multi-use paths that weave their way through and around the surrounding neighborhoods. These trails connect neighborhoods to one another, to the active recreation areas, and to the greater Oro Valley tails system. See Exhibit II-J-1: Schools, Recreation &Trails.

Surrounding Recreation Areas

Park Name	Park Size (Acres)	Park Type (Active or Passive)
Vistoso Trails Nature Preserve	220±	Passive
Naranja Townsite Park	172.6±	Active & Passive
Hohokam Park	8.8±	Active & Passive
Sunset Park / Woodshade Trail	3.1±	Active & Passive
El Conquistador Country Club	250+	Active & Passive

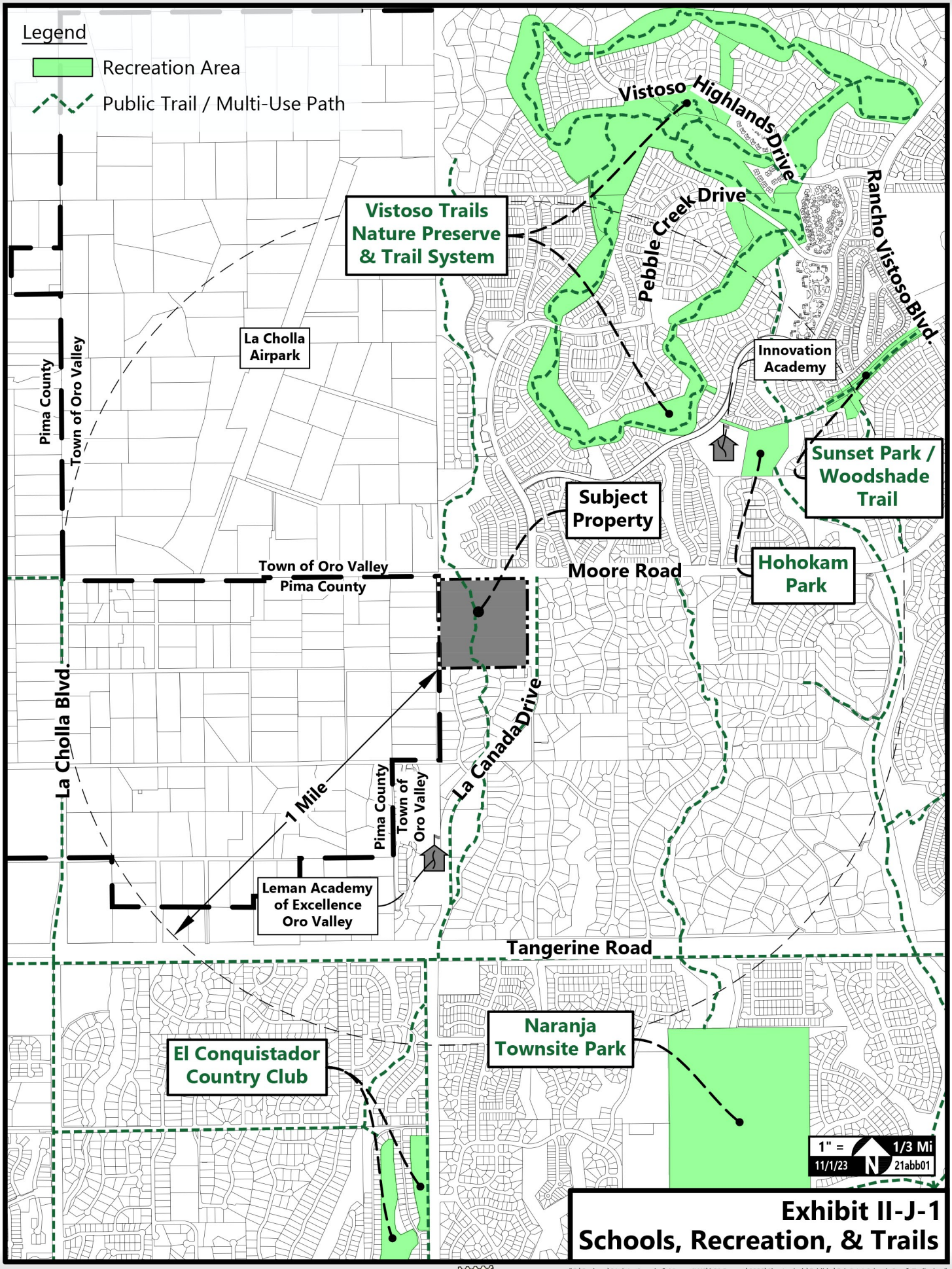

Exhibit II-J-1
Schools, Recreation, & Trails

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K. SCHOOLS

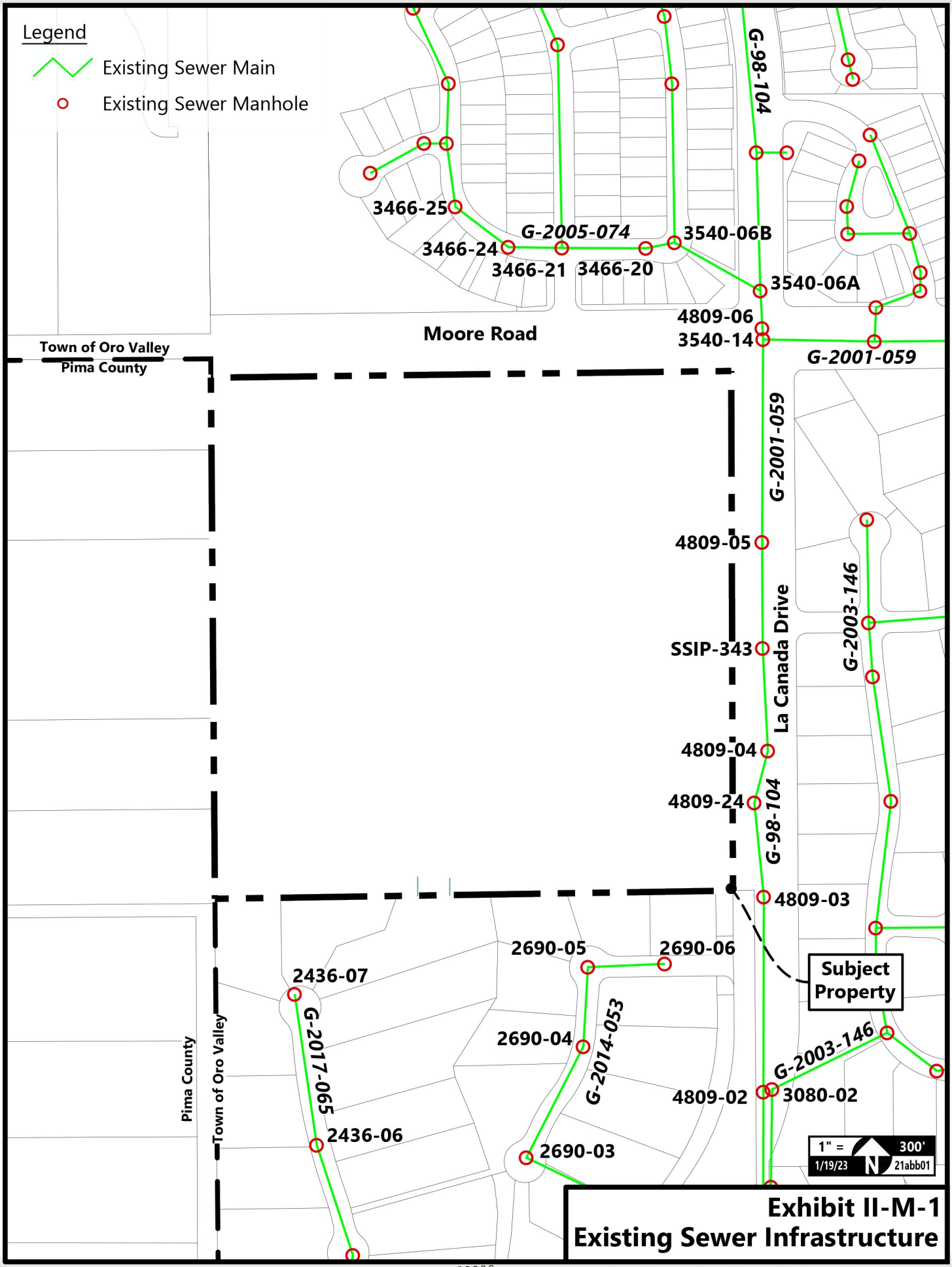
Students within this development may attend private schools, charter schools, or will be homeschooled. Alternatively, some parents may allow their children to attend government schools within the Amphitheater Unified School District. The Leman Academy of Excellence Oro Valley is approximately one-half mile south of the Property. Innovation Academy is approximately one-half mile to the northeast, and the Painted Sky Elementary School is just over one mile to the east. Future students may also attend Coronado K-8, Basis Oro Valley, Ironwood Ridge High School, and Canyon Del Oro High School, which also have capacity for this development. See Exhibit II-J-1: Schools, Recreation &Trails.

L. WATER SERVICE

The Property will be served by the Oro Valley Water Utility: (520) 229-5000. A looped connection will be provided between the existing waterlines within the La Canada Drive and Moore Road rights-of-way. The exact nature of offsite improvements will be determined during the platting process. This looped connection will supply this project with adequate water pressure.

M. SEWER SERVICE

There is an existing 12" sewer line (G-98-104) within the La Canada Drive right-of-way that can serve this project as proposed. The exact nature of offsite improvements will be determined during the platting process. Capacity is currently available for this project in the public sewer G-98-104, downstream from manhole 4809-03. See Exhibit II-M-1: Existing Sewer Infrastructure.



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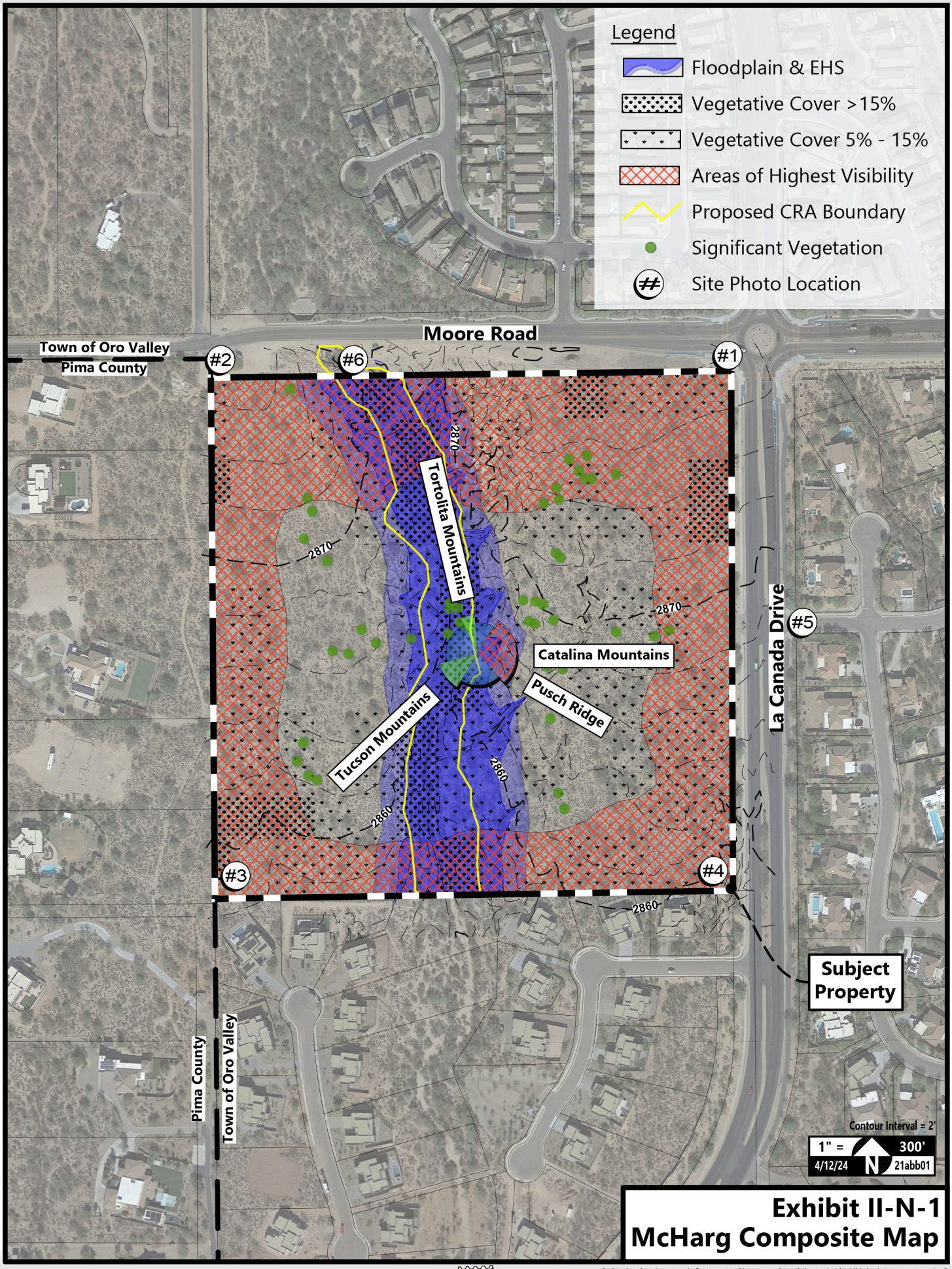

Exhibit II-N-1
McHarg Composite Map

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III. LAND USE PROPOSAL

This section describes how the development responds to the opportunities and constraints described in the Inventory & Analysis section of this document, along with the Town of Oro Valley Development Code. As evidenced by the site plan, this proposed rezoning has been crafted after careful and responsive consideration of the Property's context.

A. PROJECT OVERVIEW

1. Project Description

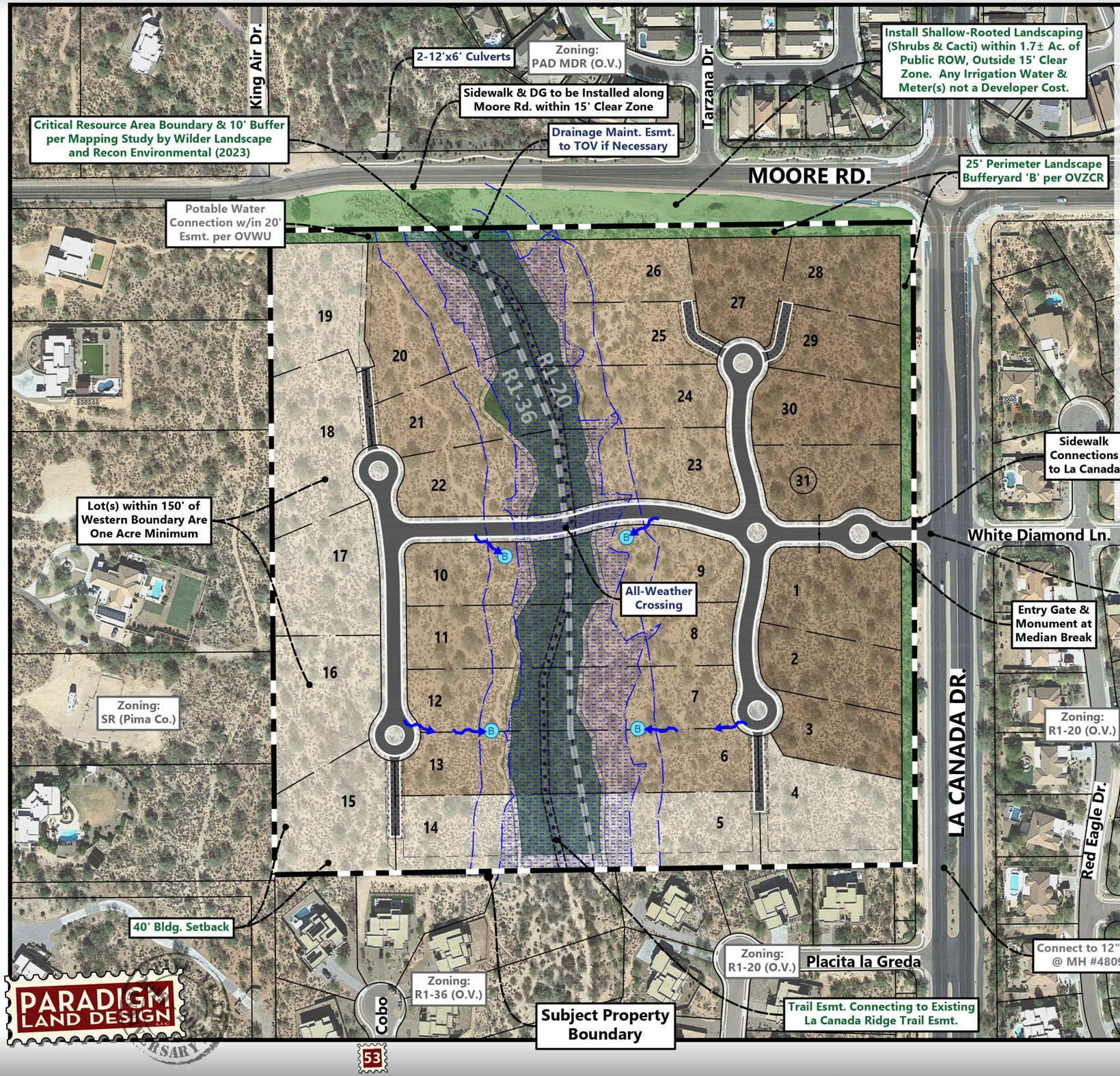
Insight Homes proposes to rezone the subject property from R1-144, Single-Family Residential, to R1-36, Single-Family Residential west of the onsite wash and R1-20, Single-Family Residential to the east of the wash. This will allow for the development of a single-family residential neighborhood consisting of 31 custom homes on lots of at least a half-acre each. This project will be of a similar density to the La Canada Ridge subdivision to the south, and less dense than the existing subdivisions to the east and north. All lots along the Property's western boundary will be at least one-acre each in order to provide an appropriate transition to the more rural and unplanned single-family residential to the west. The critical resource area that cuts through the site will be preserved except for necessary roadway and utility crossings. The proposed residences within the project will be one-story homes with a maximum height of 18' and will include a variety of square footages and floorplans. See Exhibit III-A-1: Tentative Development Plan.

2. General Plan Conformance

The property has current land use designations of LDR-1 and LDR-2 (Low Density Residential), which suggests a denser development would be appropriate. Even so, a minor General Plan Amendment is proposed for the eastern portion of the Property to bring the Environmentally Sensitive Land Ordinance's open space requirements in line with this large-lot, custom home development format.

3. Flexible Design Options / Conservation Subdivision Design

One of the Environmentally Sensitive Lands Ordinance's available Flexible Design Options allows reductions of required ESOS, which would be necessary to allow this large-lot custom home development format. However, in consultation with Town staff we've opted instead to request a minor General Plan Amendment that will have the effect of reducing the required ESOS percentage.



Property Data

1.	Property Area:	35.4± Ac.
2.	Assessor Parcel(s):	219-49-003A
3.	Existing Zoning:	R1-144
4.	Existing O.V. Gen. Plan:	LDR-1.2 W. of Wash / LDR-2.0 E. of Wash
5.	FEMA Floodplain:	Zone 'X' (Minimal Flood Hazard)

Proposal Summary

1.	Gen. Plan:	Revise E. of Wash from LDR-2.0 to MDR
2.	Rezoning:	R1-36 W. of Wash / R1-20 E. of Wash
3.	Homes:	31
4.	Minimum Lot Size:	Half-Acre (See Legend)
5.	Average Lot Size:	0.9 Acre
6.	Gross Density:	0.9 Homes per Acre (1.1 Acres per Home)
7.	Open Space:	47.7% ESOS Required / Provided
8.	Building Height:	18' Single-Story
9.	Trail:	Public Non-Motorized 15' Trail Esmt. to be Granted to TOV. Alignment subject to Field Adjustments.
10.	ESLO Flexible Development Incentive Requests:	
10.a.	Bldg. Setback Reduction:	Not Requested.
10.b.	Landscape Bufferyard Reduction:	Not Requested.
10.c.	Minimum Lot Size Reduction:	Not Requested.
10.d.	Minimum Lot Width Reduction:	Not Requested.
10.e.	Building Height Increase:	Not Requested.
10.f.	Open Space Reduction:	Not Requested.
10.g.	Mixed-Use:	Not Requested.

PARADIGM LAND DESIGN

Exhibit III-A-1
Tentative Development Plan

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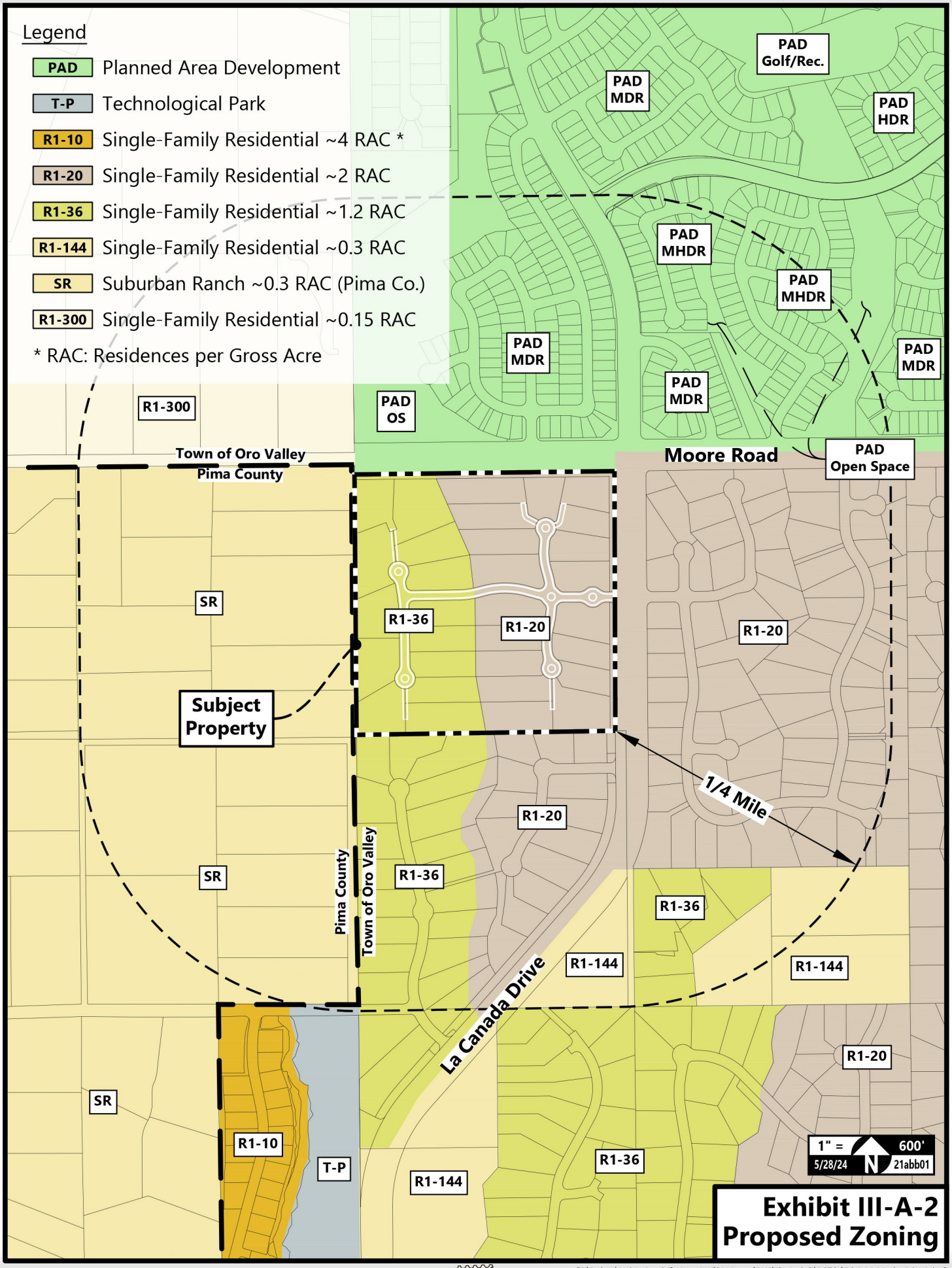

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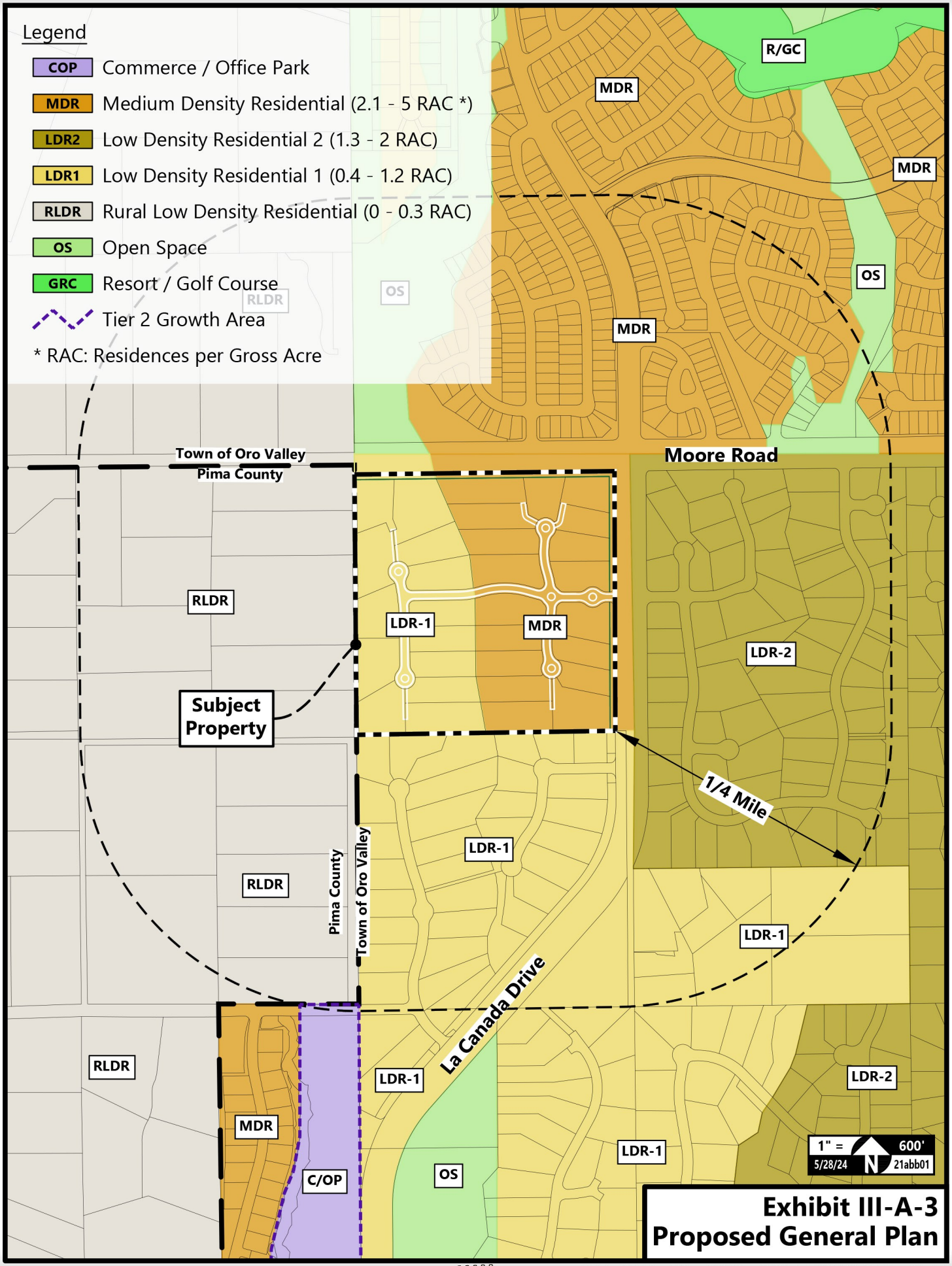

Exhibit III-A-3
Proposed General Plan

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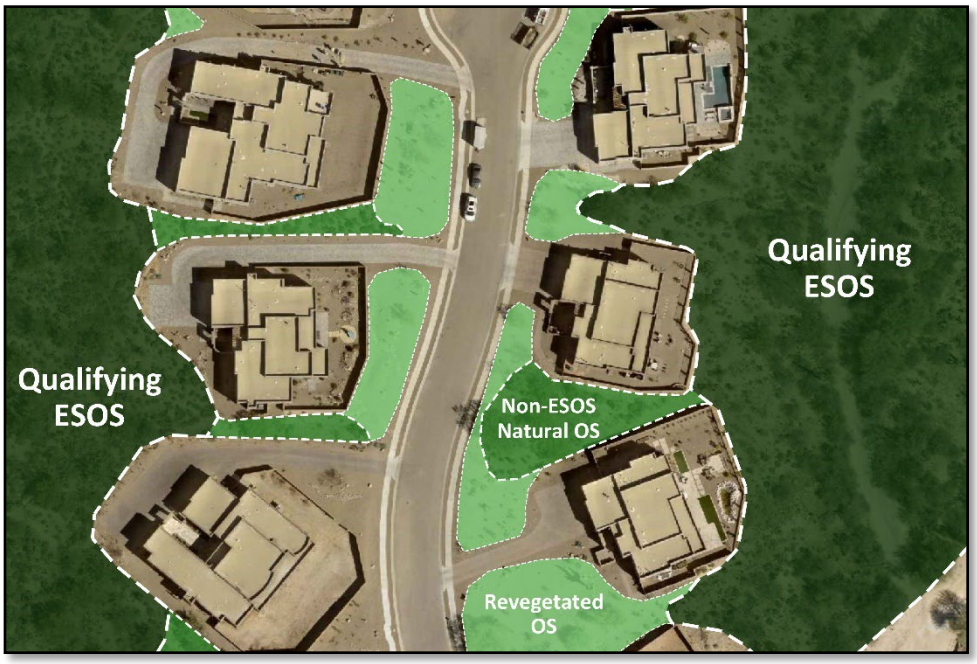
B. EFFECT ON EXISTING LAND USES

Since the subject property is currently vacant, there will be no negative impact on existing land uses. Developing this property as a custom home development will create a neighborhood that is compatible with the existing homes to the north, east, and south. The proposed density of this project will help support the many commercial businesses within the greater Oro Valley area.

C. ENVIRONMENTALLY SENSITIVE LANDS

The onsite wash forms a strand of Critical Resource Area running through the central portion of the Property from the north to the south. A minimum of 93.5% of this Critical Resource Area will be preserved. The remainder of the Property will be composed of Resource Management Area Tiers 1 & 2 upon approval of the minor General Plan Amendment accompanying this rezoning. The overall project will provide 47.7% ESOS. Additional open space will be provided onsite between some of the house pads, although some of those areas will not qualify due to their geometry, even if they're left in their natural, undisturbed state. Additionally, revegetated open space areas, which are visually significant, also don't count as ESOS. Any vegetation that is disturbed will of course meet mitigation requirements as set forth in the Town of Oro Valley Zoning Code. In the example graphic to the right, the darkest green area is the only open space that qualifies as ESOS, whereas the areas colored as two lighter shades of green don't count toward ESOS despite the fact that they're important and functional open space within the development. See Exhibit III-C-1: Proposed ESOS.



Conservation Category	Area	Allowed Disturbance	Additional Requested Disturbance	Total Proposed Disturbance
Major Wildlife Linkage	0	0	0	0
Critical Resource Area	3.84± Ac.	5% (0.192± Ac.)	1.5% (0.058± Ac.)	6.5% (0.250± Ac.)
Core Resource Area	0	0	0	0
Resource Management Area Tier 1	13.00± Ac.	34% (4.420± Ac.)	24.1% (3.139± Ac.)	58.1% (7.559± Ac.)
Resource Management Area Tier 2	18.53± Ac.	75% (13.900± Ac.)	-17.2% (-3.197± Ac.)	57.8% (10.703± Ac.)
Resource Management Area Tier 3	0	0	0	0
Total Site	**35.37± Ac.**	**52.3% (18.512± Ac.)**	**0% (0 Ac.)**	**52.3% (18.512± Ac.)**

The ESLO's ESOS requirements and development incentives encourage reductions in lot size and clustering of homes to preserve wider swaths of open space. While that is generally an appropriate development strategy for properties that are highly impacted by natural and other constraints, less constrained sites such as this Property afford the potential for development of more generously sized lots with larger, higher-end homes (which, in this case, are much more compatible with the surrounding neighborhoods). Insight Homes built the La Canada Ridge neighborhood directly south of this project before ESLO was enacted. La Canada Ridge features luxury custom homes on individual building pads, but nowadays it wouldn't even come close to being permitted under the stricter open space requirements of the ESLO. Exhibit III-C-2: La Canada Ridge ESOS Comparison illustrates this clearly.

Example of likely ESOS (to the right) meeting Non-ESOS (to the left). Both types of open space are functional and important to the natural edge and aesthetics of the neighborhood.

The intent of the ESLO was not to prohibit high-quality and responsible developments like La Canada Ridge, nor should it disallow projects such as is proposed by this rezoning, which provides a higher open space percentage than La Canada Ridge. La Canada Ridge (including the home pictured above) would not be buildable today without a larger ESOS reduction than is requested by this project. One of the Environmentally Sensitive Lands Ordinance's available Flexible Design Options allows reductions of required ESOS, which would be necessary to allow this large-lot custom home development format. However, in consultation with Town staff we've opted instead to request a minor General Plan Amendment that will have the effect of reducing the required ESOS percentage.

Notes

1. Grading limit is schematic and subject to change during the detailed engineering phase.

* Within the areas designated as RMA1 and RMA2 on this map, each lot shall be restricted to a maximum of 19,582 square feet of grading for the custom house pad, individual driveway, and individual utilities. Unused grading area allotment may be transferred to other lots within this development during the individual grading permit stage, as long as the overall percentage of qualifying ESOS is maintained.

Legend

- Resource Mgmt. Area Tier 1 ESOS (5.44± Ac. / 41.9% Provided)
- Resource Mgmt. Area Tier 2 ESOS (7.83± Ac. / 42.2% Provided)
- Critical Resource Area ESOS (3.59± Ac. / 93.5% Provided)
- All ESOS Areas Combined (16.86± Ac. / 47.7% Provided)

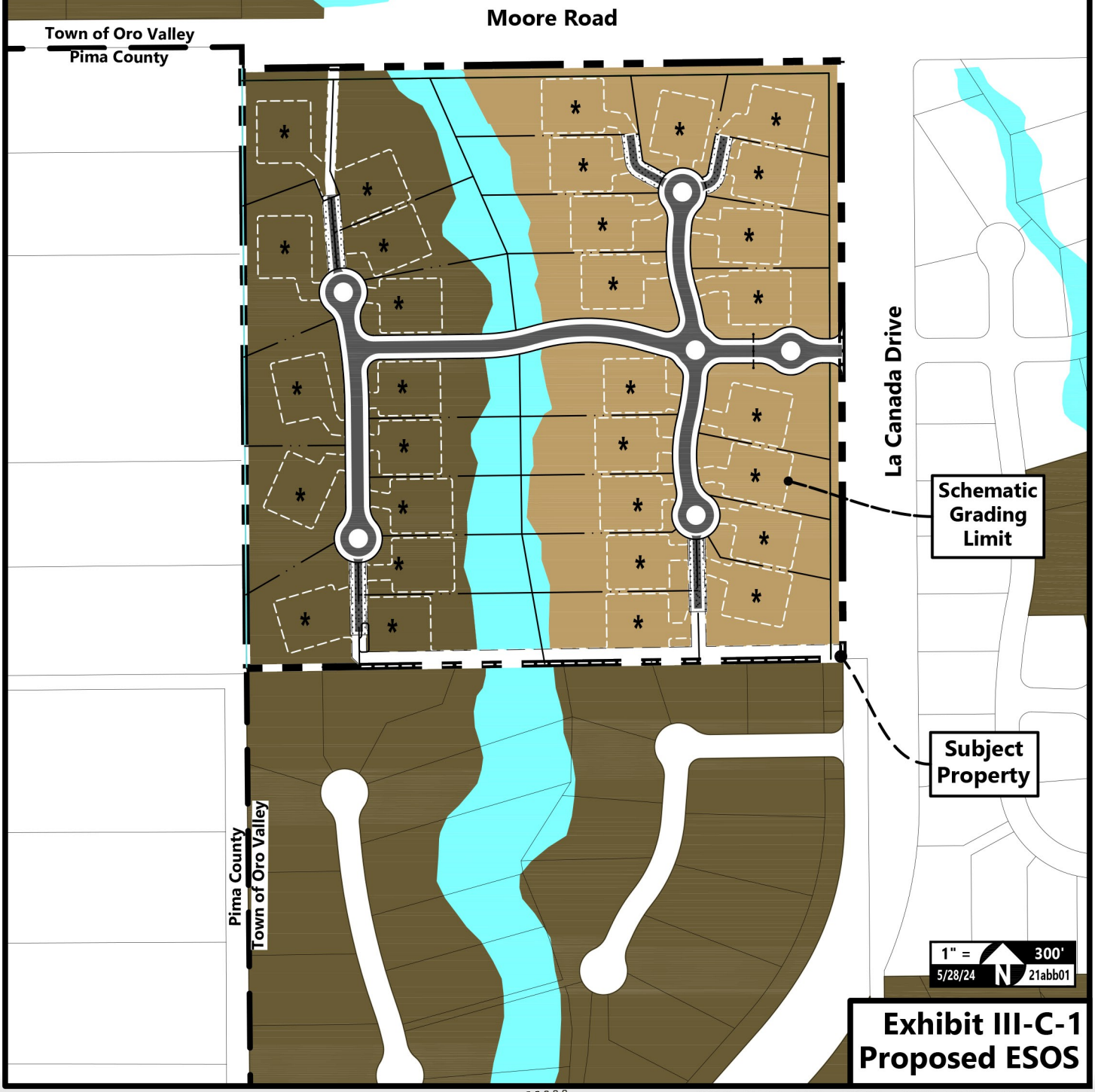


Exhibit III-C-1
Proposed ESOS

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Placita la Greda

Placita el Cobo

LA CANADA DR.

Estimated Grading Limits

LA CANADA RIDGE
Areas that Would Qualify as ESOS:
~40.3% of Overall Site

VS.

SUBJECT PROPERTY
Proposed ESOS:
47.7% of Overall Site

MOORE RD.

LA CANADA DR.

Illustrative Grading Limits

Placita la Greda

Pl. el Cobo

La Canada Ridge

1" = 200'
5/17/24
21abb01

Exhibit III-C-2
La Canada Ridge ESOS Comparison

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D. TOPOGRAPHY

1. Design Responses to Site Topography

   The development of this property will require site specific grading to ensure each lot is located at or near existing grade, while balancing the amount of cut and fill and accommodating any nearby floodplain water surface elevations. Grading will occur within the proposed rights-of-way and utility easements, as well as on individual lots for the construction of house pads, individual driveways, and individual utilities.

2. Slope Encroachment

   Not Applicable.

3. Hillside Conservation Areas

   Not Applicable.

4. Quantified Site Disturbance

   Approximately 5± acres (15% of the Property) will be graded to allow for the construction of common elements such as the private roadway and utility easements. Each lot shall be restricted to a maximum of 19,606 square feet of grading for the custom house pad, individual driveway, and individual utilities. Unused grading area allotment may be transferred to other lots within this development during the individual grading permit stage, as long as the overall ESOS percentage is maintained. Total grading for those common infrastructure elements plus house pads, individual driveways, and individual utilities may account for no more than 18.512± acres (52.3% of the Property), with a portion of that area being re-landscaped with native vegetation.

Notes

1. Grading limit is schematic and subject to change during the detailed engineering phase.

* Within the areas designated as RMA1 and RMA2 on this map, each lot shall be restricted to a maximum of 19,606 square feet of grading for the custom house pad, individual driveway, and individual utilities. Unused grading area allotment may be transferred to other lots within this development during the individual grading permit stage, as long as the overall percentage of qualifying ESOS is maintained.

Legend

Proposed Graded Area for Common Elements: 5± Ac.

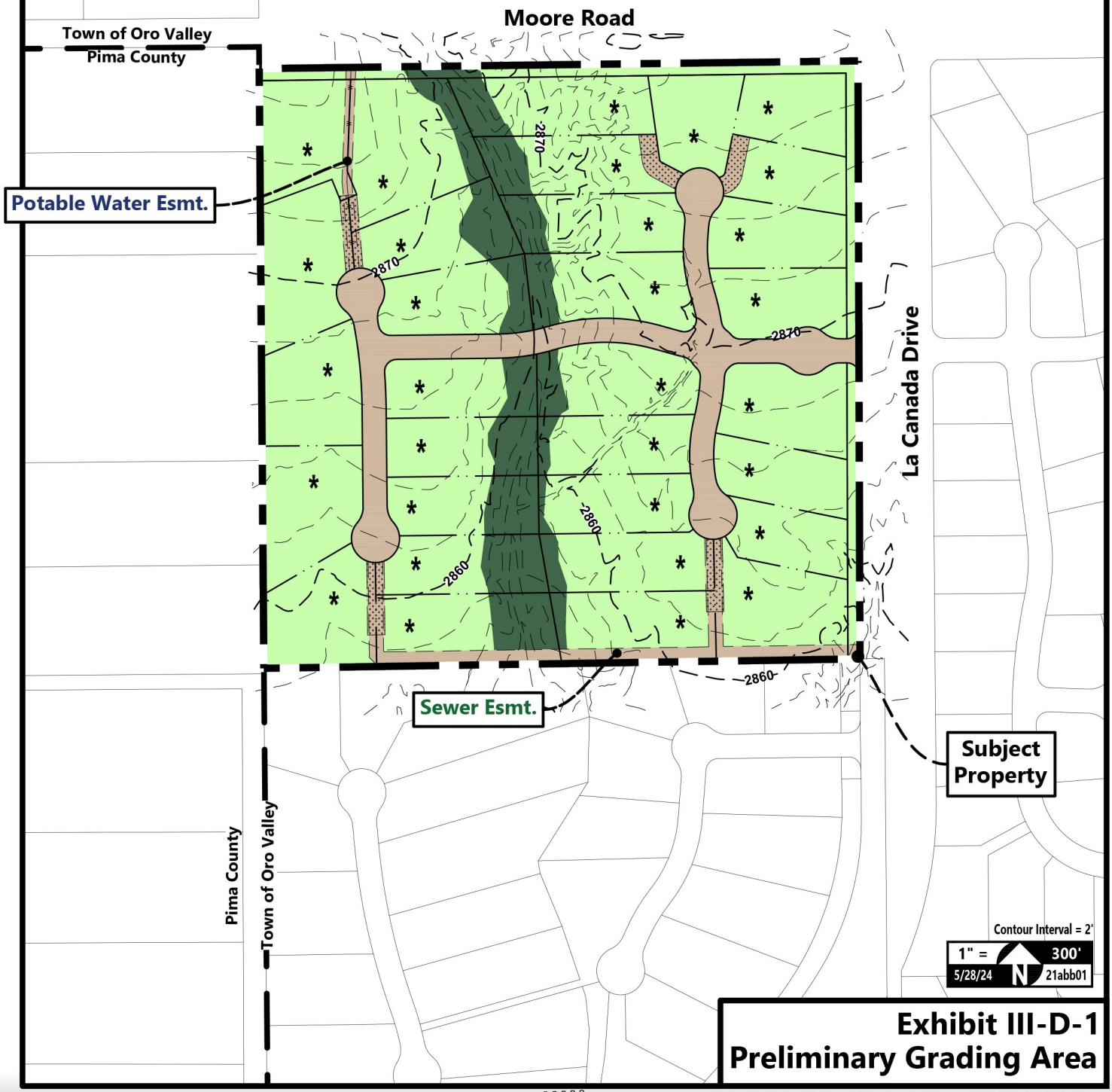

Exhibit III-D-1
Preliminary Grading Area

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E. CULTURAL / ARCHAEOLOGICAL / HISTORIC RESOURCES

1. Resource Protection

   If any cultural resources are discovered during construction, State and local rules will be followed regarding the handling and treatment of such cultural resources.

2. Treatment Plan

   The Property was recently surveyed by Bowers Environmental in January of 2022. No archaeological sites were recorded within the subject property and no further archaeological study of the project area is recommended. In the unlikely event that buried archaeological features or human remains are unearthed during construction, all work should stop in the immediate vicinity of the discovery and an archaeologist should be contacted to verify the discovery and assess its significance.

F. POST-DEVELOPMENT HYDROLOGY

1. Design Response to Site Hydrology

   This project will incorporate appropriate mitigation measures in accordance with the Town of Oro Valley Floodplain Management Code and the Drainage Criteria Manual. The upstream flows will be directed through the project site via drainage improvements to convey both the existing offsite flows and the onsite generated runoff. Minor encroachments into the existing floodplain are expected. Erosion protection will be installed as necessary to protect improvements within such encroachments. See Exhibit III-F-1: Post-Development Hydrology.

2. Modification of Drainage Patterns

   Onsite stormwater flows will generally continue to follow their existing patterns. The central onsite wash, which is the only regulated floodplain, will remain in its natural condition except for encroachments for the central roadway crossing, drainage infrastructure, utilities, and house pads. Stormwater that falls on individual lots will sheet flow around the house pads so that it generally continues to mimic existing conditions along the Property's downstream boundary. During platting the builder will determine if EHS encroachment is necessary for building pad construction. If it is necessary, the minimum 15' EHS will apply per Town Ordinance.

   In order to prevent increases to pre-development flow volumes and velocities, additional stormwater runoff created by the proposed impervious surfaces will be collected in small storage basins throughout the site. The proposed design flows will then be metered to eliminate impacts to downstream properties.

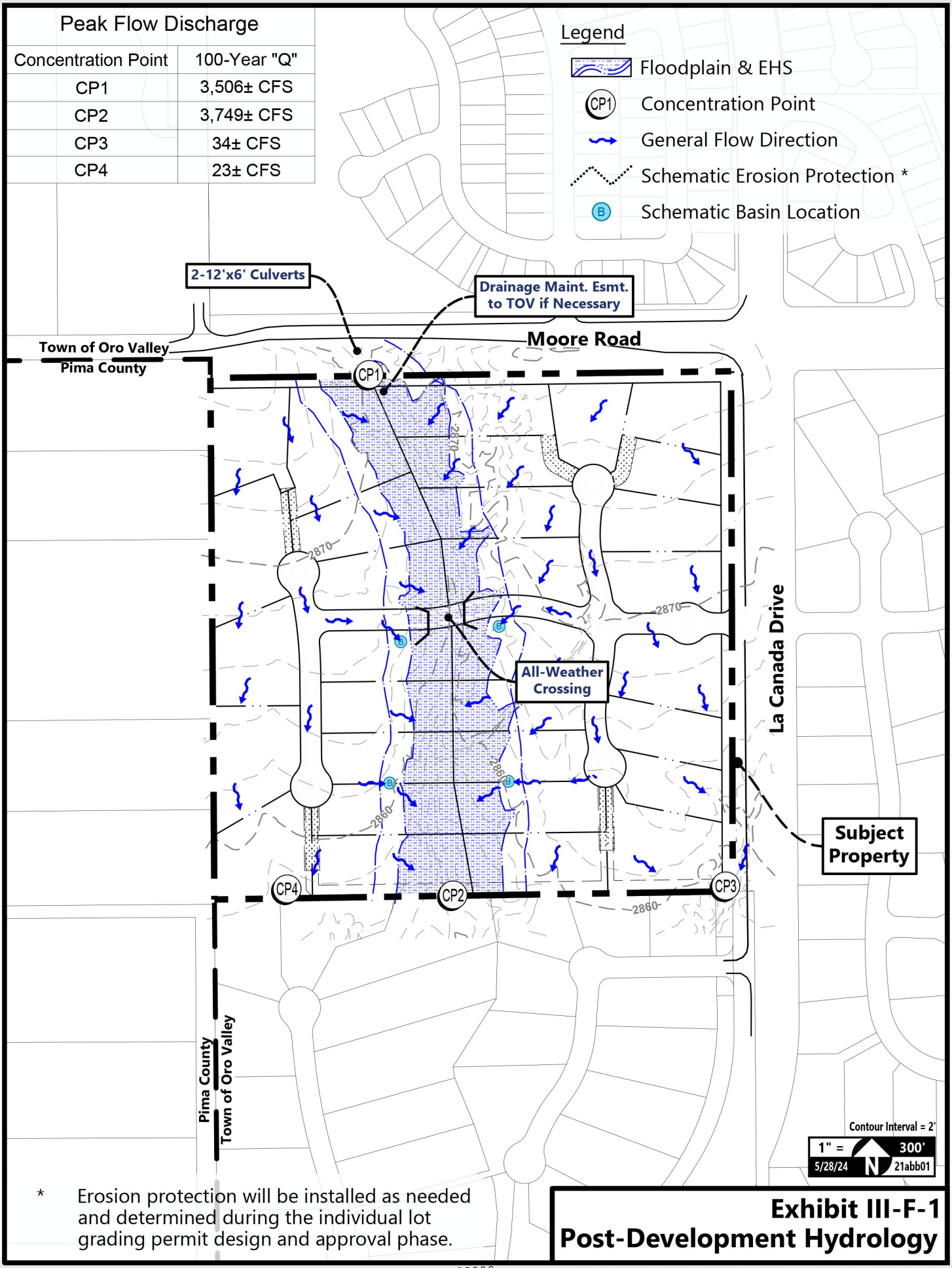
3. Mitigation

   Drainage improvements and roadway construction within the proposed development will capture and convey offsite and onsite surface flows through the subdivision via storm drains and drainage channels. The drainage design will be based on the Town Floodplain Management Code and Drainage Criteria Manual. Channel geometry will follow accepted engineering standards regarding erosion and flow velocity constraints. Finished floor elevations will be set at a minimum, one foot above the adjacent flow depths within channels and washes. Pima County indicates that this Property is within a critical basin. Stormwater retention and detention will therefore be provided within the project so that post-development flows exiting the site are reduced by 10% from pre-development flows.

4. Town Policy

   Drainage improvements will be designed to satisfy the Town Floodplain Management Code and Drainage Criteria Manual.

Peak Flow Discharge	
Concentration Point	100-Year "Q"
CP1	3,506± CFS
CP2	3,749± CFS
CP3	34± CFS
CP4	23± CFS



* Erosion protection will be installed as needed and determined during the individual lot grading permit design and approval phase.

Exhibit III-F-1
Post-Development Hydrology

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G. VEGETATION

There are a number of saguaros and mature trees onsite that meet the Town's definition of significant vegetation. Other existing native vegetation will be inventoried, and viable specimens will be transplanted or mitigated per the Town's native plant preservation ordinance. Significant vegetation that meets the Town's transplant requirements, and significant vegetation to be preserved in place have been shown on the Site Resource Inventory. See Appendix 'B': Site Resource Inventory. Native plants will be reintroduced throughout the development and open space areas in accordance with the Town's landscape design guidelines. Each lot will contain undisturbed native vegetation, while natural open space is mainly provided along the critical resource area that runs through the central portion of the Property. Revegetated open space will be located within disturbed areas throughout the development. Landscaping will be installed within the required bufferyards along Moore Road and La Canada Drive. All installed landscaping will be drought tolerant per Oro Valley's guidelines. Native plants are drought tolerant and uniquely suited for the local climate, and further meet the primary objective of development a sustainable and environmentally sensitive residential community.

H. WILDLIFE

The Critical Resource Area that runs through the middle of the Property provides a corridor for wildlife movement to the north and south of the project. The low-density residential nature of this development is also very compatible with wildlife movement, similar to the La Canada Ridge subdivision to the south.

I. VIEWSHEDS

1. Design Response to Site Viewsheds

   This proposed residential development will consist of all one-story homes with a maximum building height of 18 feet. Bufferyards will be provided along Moore Road and La Canada Drive in accordance with Town standards. The low-density, low-profile, architecturally appropriate nature of this project will result in minimal, if any, viewshed impacts.

2. ORSCOD / TRCOD Conformance

   This project is within the outer edge of the Tangerine Road Corridor Overlay District, but is not visible from Tangerine Road.

J. TRAFFIC

1. Traffic Impact Analysis

i. Proposed Internal Circulation and Access to/from Arterial Streets

The gated entry to the neighborhood will connect to La Canada Drive at the existing median break aligned with White Diamond Place. New roadways within the development will be constructed to Town of Oro Valley standards and will be private.

ii. Offsite Road Improvements

None are anticipated. La Canada Drive already contains a curb cut into the site and a median break with a left turn lane. No access is proposed onto Moore Road. The roadways adjacent to and within one mile of the subject property are in good condition and will not require any additional improvements.

iii. Projected ADT for Internal Circulation System at Build Out & Level of Service to all Streets

With an average daily trip (ADT) of 8-10 trips per home, the 31 single-family homes proposed will generate approximately 293 ADT. La Canada Drive and Moore Road are operating below capacity and will be able to accommodate traffic generated from this project.

iv. Impact to Existing Development Abutting Off-site Streets

Rezoning the subject property from R1-144 (Single-Family Residential) to R1-36 (Single-Family Residential) and R1-20 (Single-Family Residential) will have minimal traffic impacts to surrounding developments and off-site streets.

v. Capacity Analyses for Proposed Internal & Off-site Streets.

The following table is from the traffic impact analysis by M Esparza Engineering, which has included as an appendix to this site analysis.

Road	*Segment*	*Travel Lanes*	*Speed Limit*	*Sidewalk/ Share Use Path*	*Oro Valley Bike Map Designation*	*Bus Service*	*ADT*	*ADT Year*	*Source*	*LOS D Capacity (vpd)*
Moore Road	West of La Canada Drive	2	35 MPH	SW: North Side	Signed Bike Route w/ On-Street Multipurpose Lane to Kingair Drive	Oro Valley-Catalina Dial-A-Ride ADA Transit Service	3,726	2022	PAG	13,320
Moore Road	East of La Canada Drive	4	35 MPH	SW: Both Sides	Signed Bike Route w/ On-Street Multipurpose Lane	Oro Valley-Catalina Dial-A-Ride ADA Transit Service	6,290	2023	Estimated from FDS/PAG Counts	29,160
La Canada Drive	North of Moore Road	2/4	35 MPH	SW: Both Sides	Paved Shared Use Path	Oro Valley-Catalina Dial-A-Ride ADA Transit Service	6,295	2022	PAG	13,986 (2-lanes); 29,160 (4-lanes)
La Canada Drive	South of Moore Road	4	45 MPH	SW: West Side; SUP: East Side	Signed Bike Route w/ On-Street Multipurpose Lane	Oro Valley-Catalina Dial-A-Ride ADA Transit Service	10,150	2023	FDS	35,820

FDS - Field Data Services of Arizona
PAG - Pima Association of Governments

vi. Improvements Required for Those Streets Described in Sub-paragraph v. Above

La Canada Drive and Moore Road are in good condition and will not require any improvements to accommodate this development.

vii. Party / Agency to be Responsible for Making Necessary Improvements

Not applicable.

viii. Evidence that Proposed Turning Movements Will Meet Safety Standards in Relationship to Traffic Volumes

The only ingress/egress point into this project will be located at the existing curb cut on La Canada Drive. A median break and left-turn lane already exist within La Canada Drive to accommodate this project. This median break will allow full traffic movements for vehicles exiting the property. Vegetation adjacent to the project's ingress/egress point will be maintained to provide safe site visibility for vehicles entering and exiting the site and will allow safe turning movements to and from the site. The proposed internal roadways will meet the Town of Oro Valley Minimum Design Standards.

2. Proposed Rights-of-Way

The internal neighborhood streets have been designed to create safe traffic movements. These new roadways will be private and will be constructed to Oro Valley's Subdivision Street Standards.

3. Proposed Pedestrian / Bicycle Circulation

This development will make pedestrian and bicycle connections to La Canada Drive, which contains striped multi-use lanes, a sidewalk, and a paved multi-use path. Moore Road and Tangerine Road have existing striped multi-use lanes, sidewalks, and multi-use pathways. Sidewalks will be constructed along all newly planned roadways within this development except in the vicinity of the wash crossing where the sidewalk will only be on one side of the roadway.

K. RECREATION & TRAILS

1. Off-site Trail Access

   This project will provide a pedestrian connection to the existing trail (Trail #325) that runs through the center of the site and to the sidewalk along La Canada Drive. The existing trails and pathways along La Canada Drive and Moore Road connect to the greater Oro Valley trail system.

2. Open Space Ownership

   The open spaces within this development will be owned by individual lot owners. The project may include a centrally located private trailhead that will connect to the existing trail running through the site. If the developer elects to construct a trailhead, it will likely be within a common area tract that would be owned and maintained by the HOA. The trail will be slightly realigned and then during the platting process it will be granted to the Town as a public non-motorized trail easement.

L. SCHOOLS

1. Student Generation

   This proposed development is expected to generate approximately 7 elementary students, 7 middle school students, and 4 high school students (using the accepted standard student multiplier of 0.2075 single-family elementary students per household, 0.2197 single-family middle school students per household, and 0.1282 single-family high school students per household).

2. School Capacity

   According to the letter supplied by the Amphitheater School District, there is available capacity for this proposed development. See Exhibit III-L-1: School District Letter. A number of students from this neighborhood will undoubtedly attend the area's quasi-governmental charter schools and non-governmental private schools. Other children will attend Painted Sky Elementary, Coronado K-8 Middle School, and Ironwood Ridge High School, all of which have capacity to support this development. Oro Valley also has a thriving homeschool community, which further reduces the number of students expected to attend nearby government schools.

AMPHITHEATER
Public Schools

LEGAL DEPARTMENT
Michelle H. Tong, J.D.
Associate to the Superintendent
General Counsel
(520) 696-5156 • FAX (520) 696-5074
701 W. Wetmore Road • Tucson, AZ 85705 • (520) 696-5000 • www.amphi.com

December 8, 2022

Delivered via electronic mail

Clay Goodwin
Paradigm Land Design, LLC
claygoodwin816@outlook.com

RE: SWC La Canada Dr. and Moore Rd. Parcel number 219-49-003A

Dear Mr. Goodwin:

I am responding to your request for information regarding the capacity of Amphitheater schools impacted by your proposed development.

Using 2000 demographic multipliers developed by the U.S. Department of Census, Bureau of Census, and adjusted for Amphitheater District's school organizational patterns, we project the following student populations to result from this project when built:

Academic Level	40 Single family Units
Elementary	8
Middle	9
High School	5

The census multipliers we use to obtain these projections are 0.2075 single-family elementary students per household, 0.2197 single-family middle school students per household, and 0.1282 single-family high school students per household.

The schools that would be impacted by this population are listed below, along with the physical capacity available at each school *presently*. Please note that these schools will also be impacted by other developments in this area which may have already been approved by the Council but which are not yet built.

Exhibit III-L-1: School District Letter (cont'd.)

School Name	School Capacity	Spaces Currently Available
Painted Sy Elementary	778	408
Wilson K-8 Middle	800	317
Ironwood Ridge High	2286	725

If I can provide any additional information, please feel free to contact me.

Sincerely,

Kristin Magdziasz

Kristin Magdziasz
Administrative Assistant to the Legal Department

M. WATER

1. Water Demand

   A good estimate for domestic water usage is 230 gallons per day ("GPD") per residence dry weather flow. Based on that figure, the following table summarizes the approximate maximum water demand under existing zoning versus the proposed water demand.

	Existing Zoning (R1-144)	Proposed Zoning (R1-36 & R1-20)
Maximum Density	10 Homes	31 Homes
Potable Water Demand	2,300 GPD	7,130 GPD

2. Water Service Provider & Capacity

   Oro Valley Water has the capacity and infrastructure available to serve this project. This project will connect to the existing water main lines within the Moore Road and La Canada Drive rights-of-way.

N. SEWER

1. Sewer Service Method

   Pima County Regional Wastewater Reclamation Department will provide sewer service to this development. Capacity is currently available for this project in the public sewer G-98-104, downstream from manhole 4809-03. See Exhibit III-N-1: Sewer Capacity Letter.

PIMA COUNTY
WASTEWATER RECLAMATION
201 NORTH STONE AVENUE
TUCSON, ARIZONA 85701-1207

JACKSON JENKINS
DIRECTOR

PH: (520) 724-6500
FAX: (520) 724-9635

December 8, 2022

Paul Oland
Paradigm Land Design, LLC
7090 N Oracle Road
Tucson, Arizona 85704

Sewerage Capacity Investigation No. P22WC00352 Type I

RE: **SWC La Canada & Moore, Parcel 21949003A**
Estimated Flow 8,640 gpd (ADWF)

Greetings:

The above referenced project is tributary to the Tres Rios Water Reclamation Facility via the Canada del Oro Interceptor.

Capacity is currently available for a project this size in the public sewer G-98-104 downstream from manhole 4809-03.

This letter is not a reservation or commitment of treatment or conveyance capacity for this project. It is not an approval of point and method of connection. It is an analysis of the system as of this date. Allocation of capacity is made by the Type III Capacity Response.

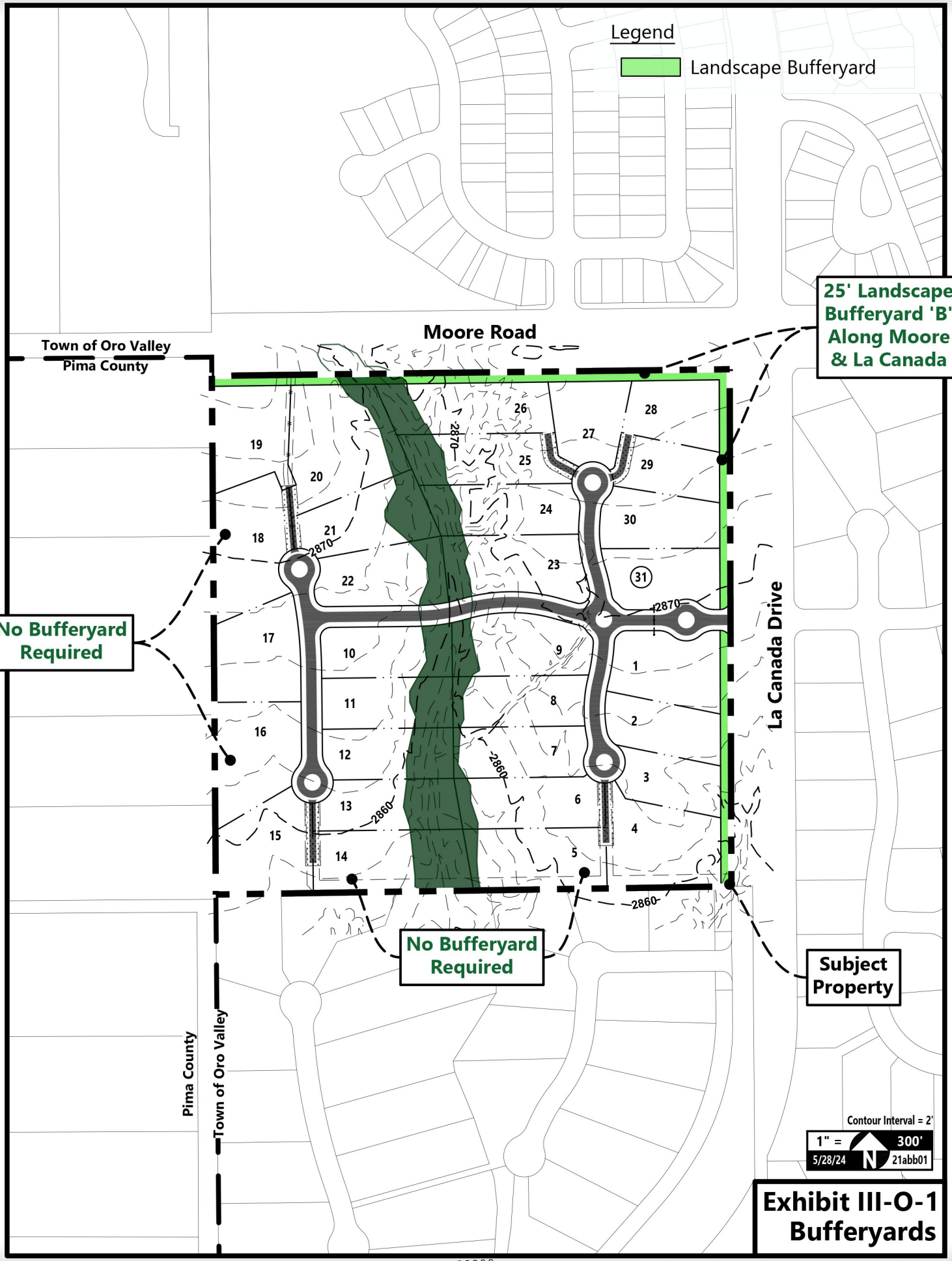
If you need further information, please feel free to contact me at (520) 724-6488.

Reviewed by: Mirela Hromatka, Planner Sr.

O. BUFFERYARDS

1. Mitigation

A 25' landscape bufferyard 'B' will be provided along La Canada Drive and Moore Road as required by the Oro Valley Zoning Code. View impacts from nearby residential areas will be negligible due to this project's single-story, low-density nature. See Exhibit III-A-1: Tentative Development Plan and Exhibit III-O-1: Bufferyards .



"G:\Projects\21ab La Canada & Moore SWC\b01 Rezone\0230\Site Analysis\Exhibits\Exh 3-O-1 Bufferyards Subm 2.dwg"

APPENDIX A – ENVIRONMENTALLY SENSITIVE LANDS MAPPING

ENVIRONMENTALLY SENSITIVE LANDS MAPPING:
SW CORNER OF MOORE RD + LA CANADA | Parcel 21949003A

DECEMBER 26, 2022

Prepared For
Insight Homes
3561 East Sunrise Drive #201
Tucson, AZ 85718

Prepared By
Wilder Landscape Architects
Attn. Jennifer Patton, PLA
2738 E. Adams St.
Tucson, AZ 85716
520-320-3936
jennifer@wilderla.com

WILDER
Landscape Architects

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MAPS

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INTRODUCTION

The 35.37 acre +/- site (parcel 21949003A) at the southwest corner of La Cañada and Moore Roads within unincorporated Pima County is proposed for annexation into Oro Valley with subsequent rezoning. The potential developer, Insight Homes, developed the La Cañada Ridge neighborhood directly south of the project site.

The parcels to the north, east, and south of the site are within the Town of Oro Valley limits. Current site zoning is SR (Suburban Ranch), intended for low-density single-family residences with a minimum lot size of one hundred forty-four thousand square feet.

Refer to the Regional Overview Map, and Project Area Map, pg. 2-3.

As part of the annexation and rezoning process, the Town of Oro Valley Environmentally Sensitive Lands (ESL) map will be amended to add any resource areas determined on the site. Wilder Landscape Architects (Wilder) was contracted by Insight Homes to provide ESL mapping.

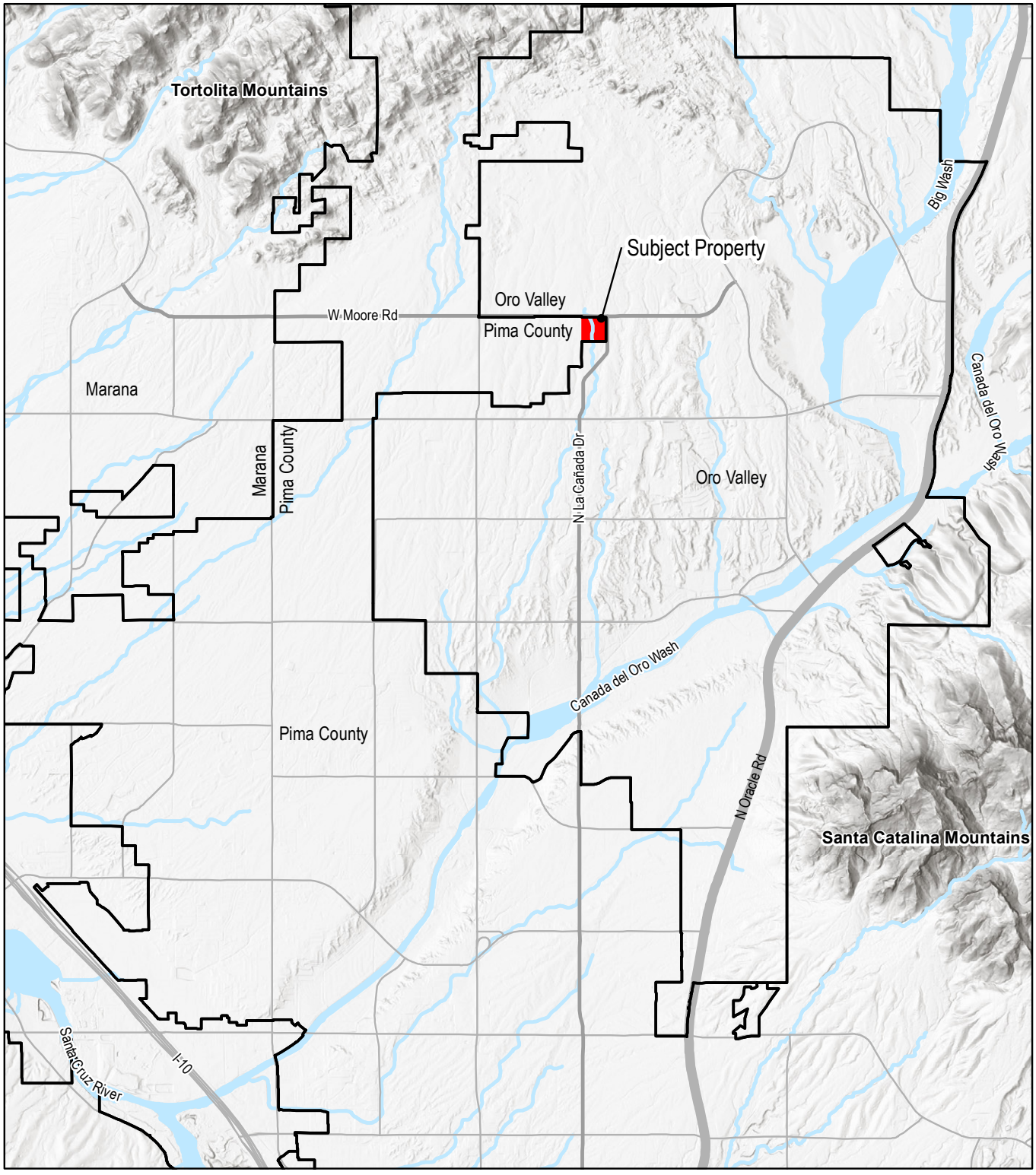
Per the Town of Oro Valley (TOV) Zoning Code, Section 27.10.D, Environmentally Sensitive Lands Conservation System, *ESL represents an interconnected system of resource conservation. The components of the system include seven (7) distinct categories for the purpose of conserving resources as open space*.

Key and essential biological resources are included in four (4) ESL categories:
a. Major wildlife linkage;
b. Critical resource;
c. Core resource; and
d. Resource management.

Environmentally sensitive resource categories that are non-biologically based include:
e. Cultural resources;
f. Scenic resources; and
g. Hillside areas.

This report looks at each of the seven categories in relationship to the project site.

REGIONAL OVERVIEW MAP

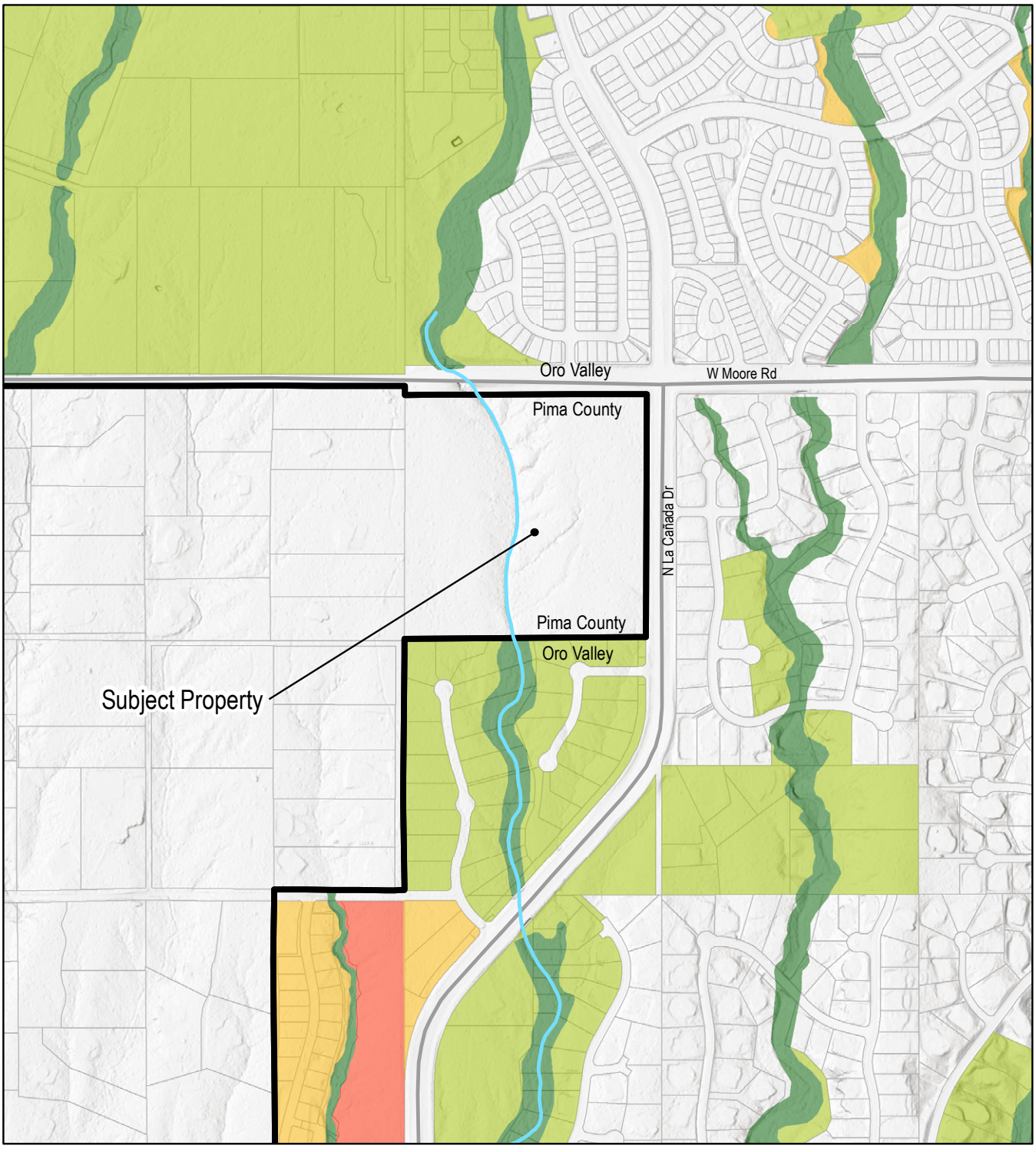


Regional Map - Legend

- Jurisdictional Boundaries
- Streets
- Major Wash > 10,000 CFS
- Major Wash > 2,000 CFS

0 1 2 3 Miles

PROJECT AREA MAP



Project Area - Legend

- TOV ESL CRA
- TOV ESL RMA Tier 1
- TOV ESL RMA Tier 2
- TOV ESL RMA Tier 3
- Major Wash > 2,000 CFS
- Jurisdictional Boundaries

0 0.1 0.2 0.3 Miles

BIOLOGICAL RESOURCES

Wilder (with RECON Environmental as a consultant) addressed the biological resource sections of the ESL requirements. Team members are RECON Senior Wildlife Biologist / Environmental Planner Susy Morales, GIS specialist / landscape designer Ben Wilder (Wilder) and registered Landscape Architect Jennifer Patton (Wilder). All evaluative work and mapping of resources was completed in accordance with applicable Town of Oro Valley ESL requirements in Section 27.10 and Addendum G.

a. Major Wildlife Linkage (MWL) Category
Not applicable. TOV defines the MWLs as large mammal corridors / landscape linkages between public preserves and open spaces.

b. Critical Resource Area
CRA mapping (inclusive of wildlife assessment, vegetative volume fieldwork and boundary mapping) was conducted in December of 2022. The watercourse through the project site meets the criteria for designation as a Critical Resource Area Riparian Area/Minor Wildlife Linkage based on the Total Vegetation Volume (TVV) measurements, presence of minor wildlife linkages, and the watercourse characteristics.

Refer to the CRA Characteristics and Mapping section of this report for detailed information.

c. Core Resource Area
Not applicable.

d. Resource Management Area
The project site outside of the CRA area meets the criteria for Management Area (RMA) Tier 1. Refer to the ESL Mapping Report (Dec. 20, 2022) provided by RECON Environmental (Appendix A). The report Assessment Results (report p. 4) are as follows:

"The remainder of the study area (upland portions) meet the criteria for Resource Management Area (RMA) Tier 1 based on the following:

- *The study area is located within the Pima County MMBCLS Multiple Use Management Area category.*
- *The study area has modeled potential habitat for more than three priority vulnerable species as listed in the MSCP (see Table 1).*
- *The study area wildlife linkage connects open space and RMA Tier 1 (66 percent open space) areas north of Moore Road with RMA Tier 1 areas to the south."*

Mesquite and thornscrub species (hackberry, wolfberry, and greythorn) are relatively dense along the watercourse.

NON-BIOLOGICALLY BASED RESOURCES

e. Cultural
A Class III cultural resources survey was conducted in 2021 by MCA Consulting (Joseph Howell and Michael Cook). Fieldwork was done on Dec 28-29, 2021. The Report date is January 3, 2022. This report is included as Appendix B.

The report summary (report p. 9, Comments) is as follows:
"No new or previously recorded sites, structures, buildings, or districts are present in the Project Area. The isolates documented in the Project Area do not meet the ASM definition of an archaeological site. They have been thoroughly documented, and they lack further research potential. Accordingly, the isolated cultural resources documented during this project are recommended ineligible for inclusion on the National Register of Historic Places (NRHP). MCA recommends a finding of No Historic Properties Affected. No further archaeological investigations are recommended."

f. Scenic Resources
The project site is ¾-mile from Tangerine, making the area technically within the Tangerine Road Corridor Overlay District (TRCOD). However, given that there is no visibility to the project site, the Town of Oro Valley has approved a waiver on the visual analysis requirements of the TRCOD.

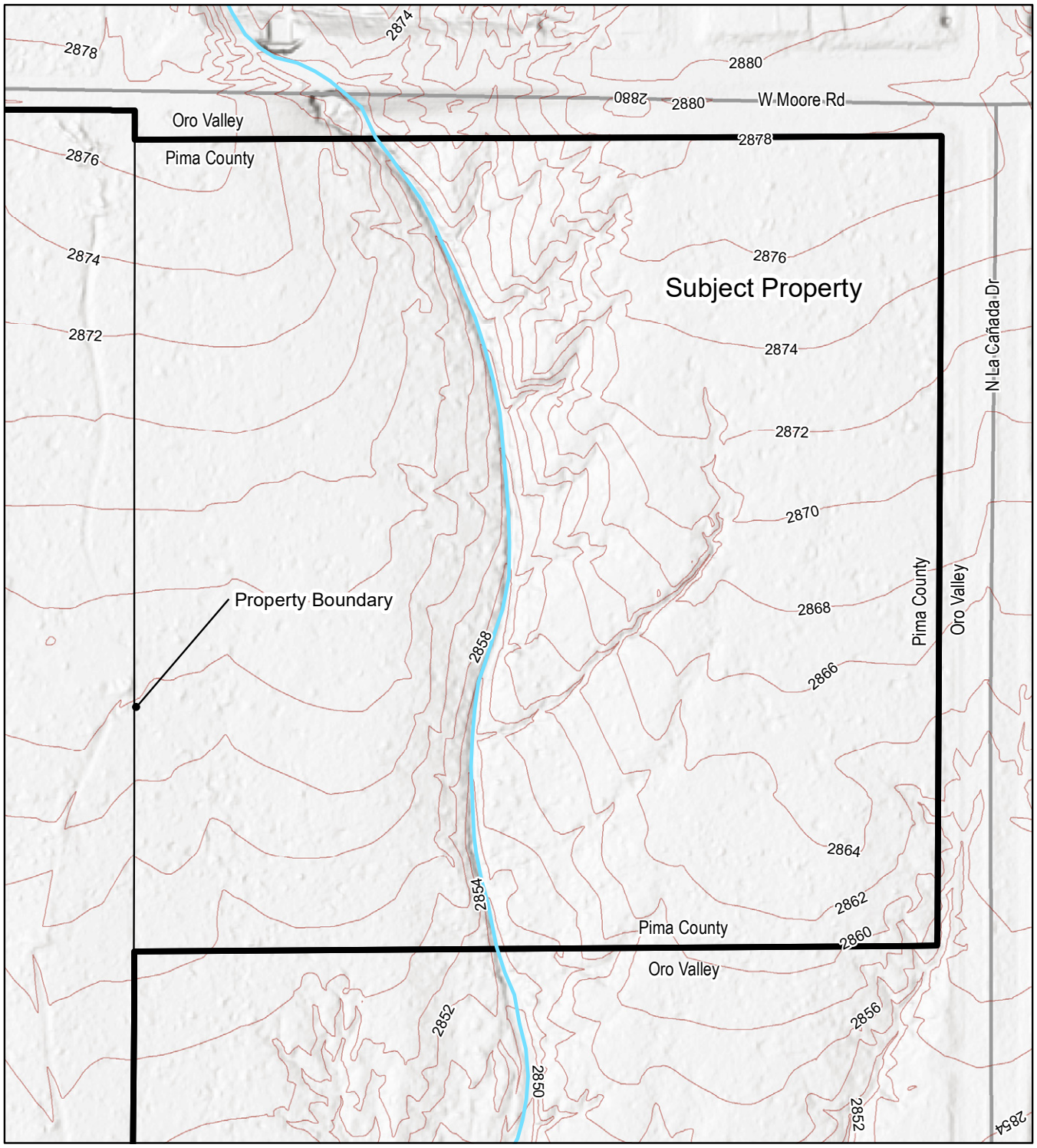
g. Hillside Areas
Town of Oro Valley Zoning Code, Section 27.10.D.3.g, Hillside Area Category, The Hillside Area requirements apply to:

a. *Sloped areas of fifteen percent (15%) and greater where the sloped area is greater than one hundred fifty (150) feet in length and no less than fifty (50) feet wide and greater than seven and one-half (7 1/2) feet vertically.*
b. *Sloped areas of fifteen percent (15%) and greater contiguous to any area defined in subsection D.3.g.ii.a of this section.*
c. *Ridges, as defined in Chapter 31, with an elevation change of twenty-five (25) feet or more.*

There are no areas within the project limits that meet the above code requirements. Refer to Project Site Topography Map, p. 6.

View looking south from the north side of Moore Rd. The watercourse flows under Moore and enters the project site. Wildlife tracks heading under Moore Rd. are abundant.

PROJECT SITE TOPOGRAPHY



Project Site Topography - Legend

- Major Wash > 2,000 CFS
- Jurisdictional Boundaries
- PAG 2-foot Contours

0 150 300 450 Feet

View looking south from Moore Rd, east of drainage culverts. Classic palo verde saguaro forest is on the left, xeroriparian vegetation (denser trees, heavy with mesquite and acacia) is evident in the background on the right.

CRA CHARACTERISTICS AND MAPPING

RECON Senior Wildlife Biologist / Environmental Planner Susy Morales, GIS specialist / landscape designer Ben Wilder (Wilder) and registered Landscape Architect Jennifer Patton (Wilder) conducted a site visit and collected transects on December 16, 2022. All evaluative work and mapping of resources was completed in accordance with applicable Town of Oro Valley ESL requirements in Section 27.10 and Addendum G.

The watercourse through the project site meets the criteria for designation as a Critical Resource Area Riparian Area/Minor Wildlife Linkage based on the Total Vegetation Volume (TVV) measurements, presence of minor wildlife linkages, and the watercourse characteristics. This section, as well as Appendix A, ESL Mapping Letter, detail the findings.

CRA boundary mapping was completed by Wilder and is shown on the Project Site Map, p. 13. Boundary mapping was based on the criteria from both the Town of Oro Valley Zoning Code Addendum G: ESL Resource Science Specifications and Definitions as well as Section 2.3.1 of the Pima County Regional Flood Control District Technical Procedure 116: Quantitative Methods for Regulated Riparian Habitat Boundary Modifications and On-Site Vegetation Surveys. These methods are outlined under the CRA Boundary Mapping section of this report.

General Site Conditions
The project site is undeveloped. Prior to the heavy off-road vehicle use occurring sometime post 2021, the site was relatively undisturbed. The site slopes from the north to the south, with an elevation of 2878' along the northeastern boundary, falling to 2852' at the southern edge where the watercourse exits the site.

The unnamed watercourse is a tributary of the Cañada del Oro Wash, which it joins approximately four miles south of the site. Pima County Riparian Habitat Mapping depicts the area around and inclusive of the watercourse as Xeroriparian B regulated riparian habitat. Xeroriparian B habitat is defined as moderately dense, with a Total Vegetative Volume less than or equal to 0.856 m^3/m^2 and greater than 0.675 m^3/m^2.

The watercourse enters the project site at the northern edge through culverts underneath Moore Rd. The watercourse flows in a single channel, with no braiding. Incising of the channel is more pronounced at the northern end.

Trails / Off Road Vehicle Use: Prior to the 2015 aerial imagery, the site is relatively undisturbed. In 2015, the path, in use today, west of the watercourse has been established. Between the 2021 and 2022 aerial images significant off-road vehicle use occurred over much of the site.

Rilling: There is significant rilling within the site (deep channels flowing into the watercourse) which is unusual. In review of Pima County aerial imagery, W. Moore Road was a dirt road in 2002. In 2005, Moore Road was widened and paved. The right of way north the of the project site was entirely graded, except for a few trees at the NW end. Stabilization of this area (a slope from the roadway edge to the northern project boundary) was not successfully achieved. Over the years since the Moore Road construction, it appears that this area has been used as a construction staging area. In 2011 it appears to have been re-cleared. With no established vegetation on this slope to slow the flow of water and encourage infiltration, the flow of water into the project site has increased. It appears that the additional water flow has been a factor in the deep (several feet) rilling that flows into the site's central drainage course.

View looking west along Moore Rd. The project site is to the left, at the base of the slope.

Vegetation within the Project Site

The project site is within the Sonoran palo verde-mixed cacti-mixed scrub series of the Arizona Upland Subdivision of the Sonoran Desertscrub biotic community (Turner and Brown 1994). This community is characterized by an overstory of paloverde trees and saguaro cacti, with a relatively dense scrubby understory.

The xeroriparian area that runs through the center of the site from north to south is defined by the presence of velvet mesquite (*Prosopis velutina*), whitethorn acacia (*Vachellia constricta*), blue palo verde (*Parkinsonia florida*), and catclaw acacia (*Senegalia greggii*). Foothill palo verde (*Parkinsonia microphylla*), the dominant tree species on site, is found in smaller numbers (but larger size specimens) along the wash.

Shrubs are relatively thick along the watercourse. Dominant xeroriparian shrubs include desert hackberry (*Celtis pallida*), Warnock's snakewood (*Condalia warnockii*), wolfberry (*Lycium sp.*) and graythorn (*Ziziphus obtusifolia*). Common sub-shrubs are burroweed (*Isocoma tenuisecta*), canyon bursage (*Ambrosia ambrosoides*), triangleleaf bursage (*Ambrosia deltoidea*), globemallow (*Sphaeralcea ambigua*), Wright's desertpeony (*Acourtia wrightii*), rough menodora (*Menodora scabra*) and abutilon (*Abutilon sp.*).

Shrubs and sub-shrubs present in smaller numbers are Mormon tea (*Ephedra sp.*), fourwing saltbush (*Atriplex canescens*), odora (*Porophyllum gracile*), snakeweed (*Gutierrezia sarothrae*), paperflower (*Psilostrophe cooperi*), brittlebush (*Encelia farinosa*), desert zinnia (*Zinnia acerosa*) and brickellbush (*Brickellia sp.*).

Dominant cacti within the xeroriparian area are barrel cacti (*Ferocactus wislizeni*), Christmas cholla (*Cylindropuntia leptocaulis*), pincushion cacti (*Mammillaria sp.*), and prickly pear (*Opuntia engelmannii*).

Grasses carpet a large amount of the xeroriparian ground surface. Most common is the annual six-weeks needle grama (*Bouteloua aristidoides*) followed by bush muhly (*Muhlenbergia porteri*). Fluff grass (*Dasyochloa pulchella*) and purple threeawn (*Aristida purpurea*) are also present.

Outside of the xeroriparian area, the dominant tree is foothill palo verde (*Parkinsonia microphylla*). Common shrubs include cheesebush, (*Ambrosia salsola*), range ratany (*Krameria parvifolia*), triangleleaf bursage (*Ambrosia deltoidea*) and creosote (*Larrea tridentata*). Mormon tea (*Ephedra sp*), Warnock's snakewood (*Condalia warnockii*) and trixis (*Trixis californica*) are also present.

Dominant cacti outside of the xeroriparian area include saguaro (*Carnegiea gigantea*), chainfruit cholla (*Cylindropuntia fulgida*), staghorn cholla (*Cylindropuntia versicolor*), buckhorn cholla (*Cylindropuntia acanthocarpa*), Christmas cholla (*Cylindropuntia leptocaulis*), barrel cacti (*Ferocactus wislizenii*), pincushion cacti (*Mammillaria sp.*), and hedgehog (*Echinocereus sp.*).

Invasive Plant Species

The site is relatively free of invasive plant species, with the exception of soft feather pappusgrass (*Enneapogon cenchroides*) which is found throughout the site. Like buffelgrass, this grass is native to Africa, and displaces native vegetation; it is also a fire fuel source. Buffelgrass (*Pennisetum ciliare*) is present at the north end of the site within the rock outfall of the culverts that run underneath Moore Rd. This should be treated and eradicated to prevent seeds and plants from establishing downstream. Continual monitoring for invasive species, and removal, is recommended.

Wildlife within the Project Site

A variety of mammal tracks within and near the watercourse, along with numerous coyote and rodent dens, were observed on the site. Refer to the ESL Mapping Report (Dec. 20, 2022) provided by RECON Environmental (Appendix A) for wildlife habitat descriptions and assessments.

Riparian Classification Vegetation Survey and Survey Methods

Vegetative Volume

Mapping of vegetation volume was conducted in accordance with the Pima County Regional Flood Control District Technical Procedure 116: Quantitative Methods for Regulated Riparian Habitat Boundary Modifications and On-Site Vegetation Surveys. Mapping was performed in December of 2022. Many of the plants (especially the dominant trees species – velvet mesquite, acacias, and blue palo verde) along the watercourse are deciduous, so did not have leaves. Vegetation volume measurements would have been higher had trees been leafed out.

Six transects were conducted along the watercourse on December 16, 2022. Locations were selected prior to the site visit based on equal distribution along the length of the wash. The southernmost transect was re-positioned in the field as the original location was too dense to transit. The transect locations are shown on the Project Site Map, p. 13.

TVV (Total Vegetative Volume) sampling was conducted at 1-meter intervals along each of the six 25-meter transects. At each interval, the vegetative volume was measured starting from the ground surface and reaching to the top of the plant canopy. Vegetative volume data sheets are included as Appendix D.

TVV results: The total mean TVV measurement for the six transects is 0.919 m^3/m^2 – well above the TOV minimum 0.500 m^3/m^2 threshold for xeroriparian (refer to TOV Addendum G, ESL Resource Science Specifications and Definitions). The TVV Table, this page, contains the six transect results. Other xeroriparian indicators include the distinct water course channel and evidence of sediment and vegetative debris deposition, as well as the presence of xeroriparian tree species (and absence of mesoriparian species) – all factors that indicate flow as well as sediment and nutrient transport.

Belt transects were conducted within the established TVV transects. For each belt transect, information of plant density and diversity was recorded. Refer to the Vegetation Density Datasheet, p. 11, for density tables.

- Plant Diversity: all species present along the transect and within 1 meter on either side (2-meter width x 25-meter length) are recorded.
- Plant Density: all woody perennials, whether alive, dead, or dormant, that are rooted within the 2-meter width x 25-meter transect, are counted.

Total Vegetation Volume, SW Corner La Canada & Moore, Pima County, Arizona, December 2022

Transect Number	Total Vegetation Volume (m^3/m^2)
1	0.948
2	1.308
3	0.82
4	0.608
5	0.704
6	1.128
Total Mean	**0.919**

VEGETATION DENSITY DATASHEET (BELT TRANSECTS)									
PLANT SPECIES		TRANSECT #							
Botanical Name	Common Name	1	2	3	4	5	6	Total Density	Average Density / AC
TREES									
Parkinsonia florida	blue palo verde	1	2	1				4	54.0
Parkinsonia microphylla	foothill palo verde				1			1	13.5
Prosopis velutina	mesquite	1		1				2	27.0
Senegalia greggii	cactclaw acacia				1			1	13.5
Vachellia constricta	whitethorn acacia	1	7	4	4	3	2	21	283.3
SHRUBS / SUB-SHRUBS									
Abutilon sp.	abutilon			15				15	202.3
Acourtia wrightii	Wright's desertpeony			1	2	9		12	161.9
Ambrosia ambrosoides	canyon bursage	7	1		6			14	188.9
Ambrosia deltoidea	triangleleaf bursage		3			11	2	16	215.8
Ambrosia salsola	cheesebush				2			2	27.0
Atriplex canescens	fourwing saltbush		1					1	13.5
Brickellia sp.	brickellbush						1	1	13.5
Celtis pallida	desert hackberry	1	1	2		3	1	8	107.9
Condalia warnockii	condalia		1	1		5		7	94.4
Encelia farinosa	brittlebush						1	1	13.5
Ephedra sp.	Mormon tea			2				2	27.0
Gutierrezia sarothrae	snakeweed		1					1	13.5
Isocoma tenuisecta	burroweed		11			6		17	229.3
Lycium sp	wolfberry				2			2	27.0
Menodora scabra	rough menodora		5					5	67.4
Porophyllum gracile	odora		1		1			2	27.0
Psilostrophe cooperi	paperflower					2		2	27.0
Sphaeralcea sp.	globemallow	5		4	1		2	12	161.9
Zinnia acerosa	desert zinnia					2		2	27.0
Ziziphus obtusifolia	graythorn				1		1	2	27.0
CACTI									
Cylindropuntia leptocaulis	Christmas cholla		2	5				7	94.4
Echinocereus engelmannii	Engelmann's hedgehog				1		1	2	27.0
Ferocactus wislizenii	fishhook barrel		1	1		1		3	40.5
Mammillaria grahamii	pincushion	2	2	1		3		8	107.9
Opuntia engelmannii	prickly pear	1			4	3	2	10	134.9
OTHER / GRASSES									
Aristida purpurea	purple threeawn					2		2	27.0
Maurandya antirrhiniflora	snapdragon vine		1					1	13.5
Muhlenbergia porteri	bush muhly	1	1			1		3	40.5

CRA Boundary Mapping

CRA mapping was conducted during the site visit in accordance with TOV Addendum G, ESL Resource Science Specifications and Definitions, as well as Section 2.3.1 of the Pima County Regional Flood Control District Technical Procedure 116: Quantitative Methods for Regulated Riparian Habitat Boundary Modifications and On-Site Vegetation Surveys (PC Section 2.3.1). The boundary was field-mapped with GPS and then smoothed.

The CRA boundary was delineated based on the following:

- Addendum G.1.b, *"The lateral riparian boundary is a contiguous line along the canopy margins of the predominant overstory vegetation species parallel to a riparian area, where the lateral distance between canopy margins of individuals of the predominant plant species is less than two times the height of the tallest individuals. Where the distance between canopy margins parallel to the channel are greater than two times the height of the tallest individuals, the boundary is considered to be the top of bank of the channel."*
- PC Section 2.3.1, *"The boundaries of homogenous riparian habitat units will be field verified and mapped on current aerial photographs, rectified to the proposed project's engineering and planning base maps. Mapping should be based upon 1"=200' aerial photographs and the basis and rational for the delineation of the riparian from upland habitat clearly articulated. When the transition of riparian and upland areas is gradual, the line shall be drawn at the point where the habitat is clearly upland based upon factors such as species composition, vegetation density, and topography."*

Mapped CRA is shown on the Project Site Map, p. 13. The CRA is defined by the density of vegetation (including distance between tree canopies), the higher presence of xeroriparian species such as mesquite and thornscrub, and the absence / lower density of plant species typical of the upland habitat. Refer to Vegetation within the Project Site, p. 9, for detailed plant species presence. It should be noted that the xeroriparian plant species are more abundant in riparian areas, but not restricted to these areas. These riparian facultative species are also found outside of the riparian area, but in lower numbers.

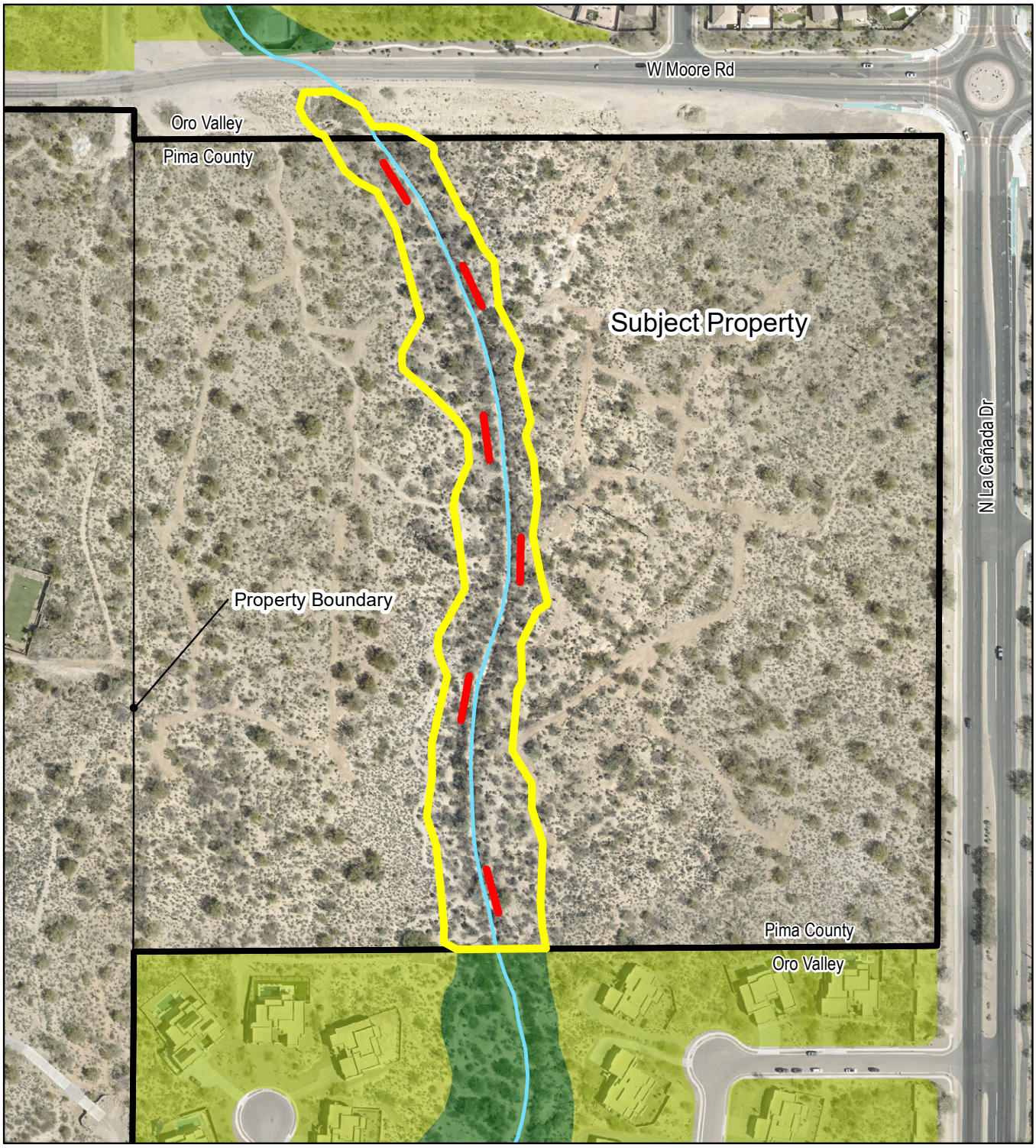
Additional CRA criteria

There are no rock outcrop / boulder formations meeting the Town criteria (D.3.b.iii.b), *"Rock outcrops and boulders are comprised of exposed bedrock formations and boulder piles and scatters with a minimum size of one hundred (100) square feet as measured horizontally, and a minimum of ten (10) vertical feet."*

The site does not contain any Distinct Habitat Resources as defined in Town criteria D.3.b.iii.c:

1. *Natural caves, crevices, or mine shafts with a minimum cavity area of two hundred twenty (220) cubic feet (approximately six (6) feet by six (6) feet by six (6) feet). Excavations or test pits are not included.*
2. *Groundwater seeps, whether intermittent or perennial.*

PROJECT SITE MAP WITH MAPPED CRA BOUNDARY + TRANSECT LOCATIONS



Project Site - Legend

- Transect Location
- CRA - Mapped
- Jurisdictional Boundaries
- TOV ESL CRA
- TOV ESL RMA Tier 1
- Major Wash > 2,000 CFS

0 150 300 450 Feet

Aerial Date: May 19, 2022
Source: PimaMaps

View looking north up the watercourse from the southern project site boundary.

View looking south down the watercourse from Moore Rd (just north of the northern site boundary).

REFERENCES

Pima County. 2020. Sonoran Desert Conservation Plan. [accessed 2022 Dec 19] https://pimamaps.pima.gov/HtmlPubViewer/index.html?configBase=https://pimamaps.pima.gov/Geocortex/Essentials/PublicPM/REST/sites/sdcpsite/viewers/sdcpmap/virtualdirectory/Resources/Config/Default&layertheme=undefined

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Zaimes G, Nichols M, Green D. 2007. Characterization of riparian areas. In: Zaimes G, editor. Understanding Arizona's riparian areas. Arizona Cooperative Extension. College of Agriculture and Life Sciences. University of Arizona. Tucson, AZ. pp. 15-29. [accessed 2022 Dec 19] https://extension.arizona.edu/sites/extension.arizona.edu/files/pubs/az1432.pdf

APPENDIX A: ESL MAPPING LETTER

RECON

An Employee-Owned Company

December 20, 2022

Ms. Jennifer Patton
Principal
Wilder Landscape Architects
2738 E. Adams Street
Tucson, AZ 85716

Reference: Oro Valley Environmentally Sensitive Lands Mapping for the 35-Acre Property at North La Cañada and West Moore Road (RECON Number 10273)

Dear Ms. Patton:

RECON Environmental, Inc. (RECON) assisted Wilder Landscape Architects to evaluate and map an approximately 35-acre property (study area) for Environmentally Sensitive Lands for annexation by the Town of Oro Valley. The study area is located west of the intersection of north La Cañada Road and West Moore Road in Pima County, Arizona. RECON evaluated the study area for wildlife habitat, wildlife corridors, Pima County Maeveen Marie Behan Conservation Lands System (MMBCLS), Pima County Multi-Species Conservation Plan resources, and Town of Oro Valley's Environmentally Sensitive Lands (ESL) resources (Zoning Code Section 27.10).

Wildlife Habitat and Corridors within the Study Area

The study area was assessed searching for signs of wildlife presence, foraging, and travel within the study area. Tracts, scat, dens, burrows, and evidence of foraging were noted. Mammal species identified using the area include javelina (*Tayassu tajacu*), mule deer (*Odocoileus hemionus*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), desert cottontail (*Sylvilagus audubonii*), desert woodrat (*Neotoma lepida*), also known as pack rats, round-tail ground squirrel (*Xerospermophilus tereticaudus*), Harris's antelope squirrel (*Ammospermophilus harrisii*), kangaroo rats (*Dipodomys* spp.), and desert mice (*Perognathus* spp.).

A variety of bird species were found within the study area, including Gambel's quail (*Callipepla gambelii*), white winged dove (*Zenaida asiatica*), mourning dove (*Zenaida macroura*), phainopepla (*Phainopepla nitens*), Gila woodpecker (*Melanerpes uropygialis*), ladder-backed woodpecker (*Picoides scalaris*), common raven (*Corvus corax*), cactus wren (*Campylorhynchus brunneicapillus*), house sparrow (*Passer domesticus*), hummingbirds (likely Costa's or Anna's [*Calypte* spp.]), verdin (*Auriparus flaviceps*), curve-billed thrasher (*Toxostoma curvirostre*), black-tailed gnatcatcher (*Polioptila melanura*), house finch (*Carpodacus mexicanus*), and Cooper's hawk (*Accipiter cooperii*).

Although no reptiles (snakes, amphibians, and lizards) where observed during the site visit due to the temperature range, habitat for these species occurs throughout the study area and a variety of snakes and lizards are likely to occur. Adjacent to the riparian area/wash, two potential Sonoran Desert tortoise (*Gopherus morafkai*) burrows were observed.

Wildlife habitat features within the study area include diverse native vegetation used for nesting, foraging, and roosting, with higher density vegetation found along the riparian area/wash located in the central portion. Several coyote dens were found adjacent to the riparian area/wash (Attachment 1: Photographs 1-3). Several javelina bed down areas were also found under trees adjacent to the riparian area/wash (Attachment 1: Photographs 4 and 5). A variety of tracks were found within the riparian area/wash sandy bottom, including javelina, coyote, deer, and bobcat

(Attachment 1: Photo 6) indicating extensive use of the area for wildlife movement between habitats. Wildlife tracks (primarily coyote and javelina) were also found throughout the study area.

In addition, wildlife tracks were found outside and within culverts located at the north end of the study area. Wildlife tracks were also found within the culvert leading to the study area that passes under Moore Road.

Pima County Maeveen Marie Behan Conservation Lands System

The study area is located within the Pima County MMBCLS, which identifies locations of priority biological resources and provides policy guidelines for the conservation of these resources. The study area is mapped under the Multiple Use Management Area category (Pima County 2022), defined below:

> **Multiple Use Management Areas** are those areas where biological values are significant, but do not attain the level associated with Biological Core Management Areas. They support populations of vulnerable species, connect large blocks of contiguous habitat and biological reserves, and support high value potential habitat for three or more priority vulnerable species.
> *Landscape conservation objective: 66²/³% undisturbed natural open space.*

Pima County Multi-Species Conservation Plan

The study area is located within the Pima County Planning Area for the Multi-Species Conservation Plan (MSCP), specifically within the Tortolita Fan Subarea. Species covered under the MSCP with modeled potential habitat/ potential for occurrence are shown in Table 1 below.

Table 1
MSCP Listed Species Habitat Models and Potential for Occurrence

Species (Common Name/Scientific Name)	Habitat Model	Potential for Occurrence
Birds		
Abert's towhee (*Melozone aberti*)	Low	Potential habitat within riparian area/wash in central portion of study area.
Arizona Bell's vireo (*Vireo bellii arizonae*)	Medium to Low	Potential habitat within riparian area/wash in central portion of study area.
Cactus ferruginous pygmy owl (*Glaucidium brasilianum cactorum*)	High (uplands) Low (riparian area/wash)	Potential habitat based on presence of multiple large saguaros with cavities in upland areas. Study area located within Zone 1 for pygmy owl surveys. Study area is located within the Priority 1 Priority Conservation Area for pygmy owl.
Rufous-winged sparrow (*Aimophila carpalis*)	Medium to Low	Potential habitat primarily within upland portions of study area. The study area is located within the Priority Conservation Area for this species.
Swainson's hawk (*Buteo swainsoni*)	Medium to Low	Potential habitat primarily within upland portions of study area.
Western burrowing owl (*Athene cunicularia hypugaea*)	Medium to Low	Potential habitat primarily within upland portions of study area.

Table 1 MSCP Listed Species Habitat Models and Potential for Occurrence		
Species (Common Name/Scientific Name)	Habitat Model	Potential for Occurrence
Mammals		
California leaf-nosed bat (*Macrotus californicus*)	High to Medium	High potential within central portion and medium potential within remainder of study area.
Lesser long-nosed bat (*Leptonycteris yerbabuenae*)	High to Medium	High potential within central portion and medium potential within remainder of study area.
Merriam's mouse (*Peromyscus merriami*)	Medium	Study area is potential habitat for this species.
Mexican long-tongued bat (*Choeronycteris mexicana*)	Medium to Low	Medium potential within central portion and low potential within remainder of study area.
Pale Townsend's big-eared bat (*Corynorhinus townsendii pallescens*)	High, Medium, and Low	Primarily low potential habitat, with medium within central portions and a small area of high potential habitat along a portion of the riparian area/wash.
Western red bat (*Lasiurus blossevillii*)	Low	Minimal potential habitat within study area.
Western yellow bat (*Lasiurus xanthinus*)	Medium to Low	Medium potential within riparian area/wash and low potential within remainder of study area.
Reptiles		
Tucson shovel-nosed snake (*Chionactis occipitalis klauberi*)	Medium to Low	Medium potential within riparian area/wash and low potential within remainder of study area.
Plants		
Tumamoc globeberry (*Tumamoca macdougalii*)	Medium to Low	Medium potential within central portion and low potential within remainder of study area.
SOURCE: Pima County 2020.		

Wildlife Habitat Assessment Results

Zoning Code

As detailed in the ESL Zoning Code 27.10 D.1 (Town of Oro Valley 2019), the ESL represents an interconnected system of resource conservation. The components of the system include seven distinct categories for the purpose of conserving resources as open space. Key and essential biological resources are included in four ESL categories:

a. Major wildlife linkage;
b. Critical resource;
c. Core resources; and
d. Resource management.

As detailed in ESL Zoning Code 27.10 D.3.b, the critical resource area open space category includes the following environmentally sensitive resources:

a. Riparian areas and minor wildlife linkages
b. Major rock outcrops and boulders
c. Distinctive habitat resource

Riparian areas occur in association with a spring, cienega, lake, water course, river, stream, creek, wash, arroyo, or other body of water, either surface or subsurface, or any channel having banks and beds through which water flows, at least periodically.

Minor wildlife linkages are composed of upland areas and degraded riparian areas. Degraded areas include hardened drainage ways and constricting drainage structures. These minor links are important in maintaining connectivity within the open space system identified in the ESL.

Assessment Results

The riparian area/wash portion of the study area meets the criteria for designation as a Critical Resource Area Riparian Area/Minor Wildlife Linkage based on the following:

- The study area includes a wash/drainage channel having banks and beds through which water flows periodically.
- The wash/drainage is connected in the north and south to an ESL mapped Critical Resource Area wash (Attachment 2: Town of Oro Valley ESL Sensitive Lands map).
- Evidence of wildlife use through the wash/drainage area, including use of culverts under Moore Road to the north.

The remainder of the study area (upland portions) meet the criteria for Resource Management Area (RMA) Tier 1 based on the following:

- The study area is located within the Pima County MMBCLS Multiple Use Management Area category.
- The study area has modeled potential habitat for more than three priority vulnerable species as listed in the MSCP (see Table 1).
- The study area wildlife linkage connects open space and RMA Tier 1 (66 percent open space) areas north of Moore Road with RMA Tier 1 areas to the south.

Thank you for the opportunity to conduct this ESL mapping project. Please contact us if you have any questions or need any additional information.

Sincerely,

Susana M. Morales

Susy Morales
Senior Wildlife Biologist/Environmental Planner

SMM:sh

Attachments

References Cited

Pima County

2020 Sonoran Desert Conservation Plan Maps. Pima Maps. Website accessed on December 19, 2022. https://pimamaps.pima.gov/HtmlPubViewer/index.html?configBase=https://pimamaps.pima.gov/Geocortex/Essentials/PublicPM/REST/sites/sdcpsite/viewers/sdcpmap/virtualdirectory/Resources/Config/Default&layertheme=undefined

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Town of Oro Valley

2019 Oro Valley Zoning Code 27.10: Environmentally Sensitive Lands. Ordinance (O)19-06, passed July 31, 2019. 90 pp.

ATTACHMENTS

ATTACHMENT 1

Photographs

PHOTOGRAPH 1
Coyote Den (1) Found within the Study Area

PHOTOGRAPH 2
Coyote Den (2) Found within the Study Area

PHOTOGRAPH 3
Coyote Den (3) Found
within the Study Area

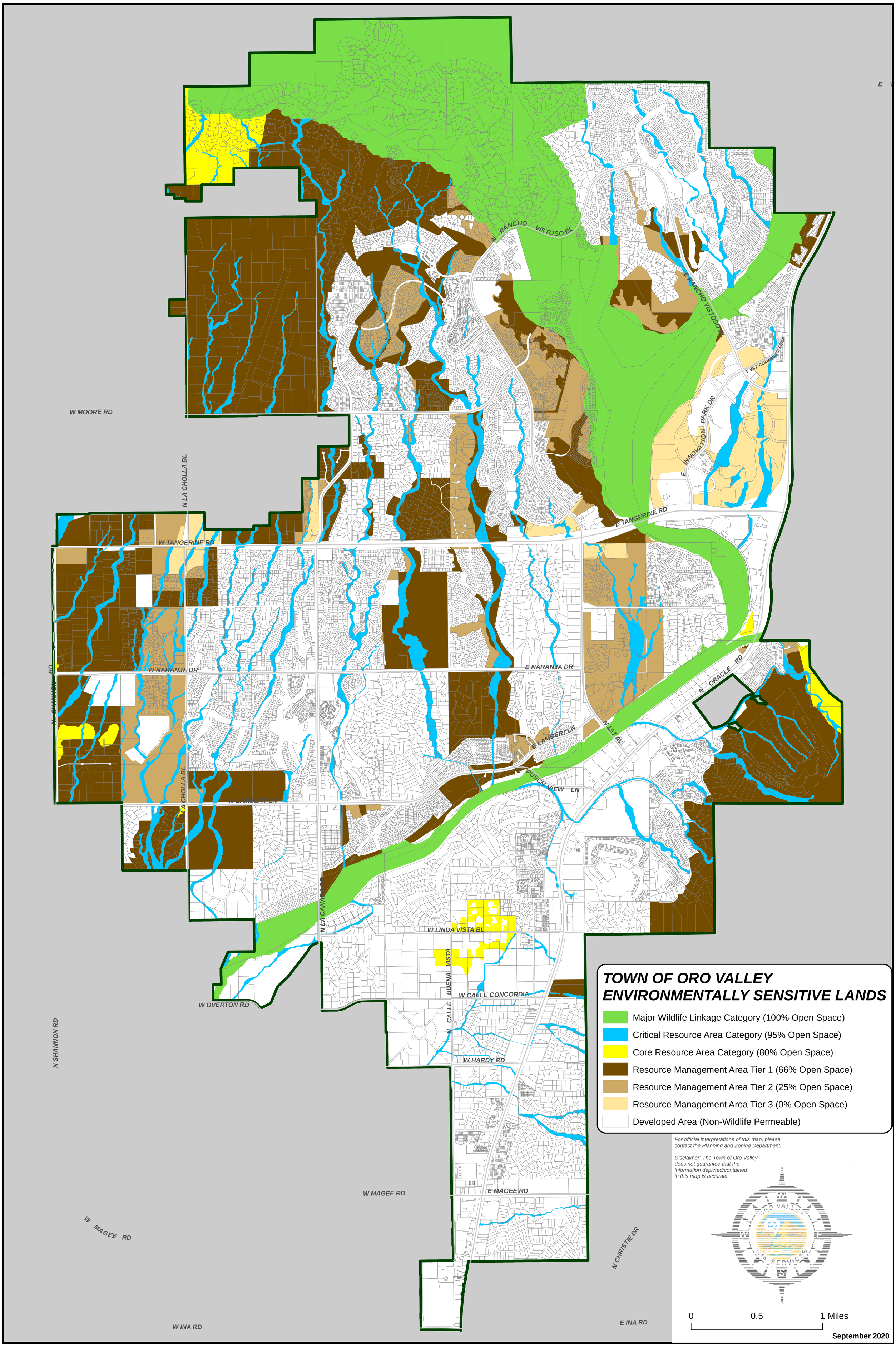
PHOTOGRAPH 4
Javelina Bed Down Area (1) Found
within the Study Area

PHOTOGRAPH 5
Javelina Bed Down Area (2) Found within the Study Area

PHOTOGRAPH 6
Riparian Area/Wash Wildlife Tracks Found within the Study Area

ATTACHMENT 2

Town of Oro Valley ESL Sensitive Lands Map



TOWN OF ORO VALLEY
ENVIRONMENTALLY SENSITIVE LANDS

- Major Wildlife Linkage Category (100% Open Space)
- Critical Resource Area Category (95% Open Space)
- Core Resource Area Category (80% Open Space)
- Resource Management Area Tier 1 (66% Open Space)
- Resource Management Area Tier 2 (25% Open Space)
- Resource Management Area Tier 3 (0% Open Space)
- Developed Area (Non-Wildlife Permeable)

For official interpretations of this map, please contact the Planning and Zoning Department.

Disclaimer: The Town of Oro Valley does not guarantee that the information depicted/contained in this map is accurate.

0 0.5 1 Miles

September 2020

APPENDIX B: ESL CULTURAL RESOURCES REPORT

A CLASS III CULTURAL RESOURCES SURVEY ACROSS 36.4 ACRES OF PRIVATE LAND, PARCEL 219-49-003A, PIMA COUNTY, ARIZONA

Prepared for:
Bowers Environmental

Prepared and submitted by:
MCA Consulting
Joseph Howell and Michael Cook
12190 North Tall Grass Drive
Oro Valley, Arizona 85755

January 3, 2022
MCA Cultural Resources Report No. 2021.058

1. REPORT TITLE
1a. Report Title: A Class III Cultural Resources Survey Across 36.4 Acres of Private Land, Parcel 219-49-003A, Pima County, Arizona

1b. Report Authors: Joseph Howell, Michael Cook

1c. Report Date: January 3, 2022 **1d. Report No.:** MCA 2021.058

2. PROJECT REGISTRATION/PERMITS
2a. ASM Accession Number: N/A

2b. AAA Permit Number: N/A

2c. ASLD Permit Application Number: N/A

2d. Other Permit Numbers: N/A

3. ORGANIZATION/CONSULTING FIRM
3a. Name: MCA Consulting

3b. Internal Project Number: MCA 2021.058

3c. Internal Project Name: Moore Road and La Canada Class III

3d. Contact Name: Michael Cook

3e. Contact Address: 12190 N. Tall Grass Dr., Oro Valley, Arizona 85755

3f. Contact Phone: (520) 203-4902

3g. Contact Email: mike@mca-arizona.com

4. SPONSOR/LEAD AGENCY
4a. Sponsor: Bowers Environmental on behalf of private developer

4b. Lead Agency: Pima County Office of Cultural Resources and Historic Preservation

4c. Agency Project Number: N/A

4d. Agency Project Name: N/A

4e. Funding Source: Private

4f. Other Involved Agencies: N/A

4g. **Applicable Regulations**: Arizona Antiquities Act, A.R.S. §41-841 *et seq.*, and all implementing rules; Pima County Board of Supervisors Policy C 3.17 and Pima County Board of Supervisors Resolution 1983-104

5. DESCRIPTION OF PROJECT OR UNDERTAKING: Residential development

6. PROJECT AREA: The Project Area consists of one rectangular 36.4-acre parcel.

7. PROJECT LOCATION
7a. Address: Parcel 219-49-003A

7b. Route: N/A

7c. Mileposts Limits: N/A

7d. Nearest City: Oro Valley, Arizona

7e. County: Pima

7f. Project Locator UTM: 500438 Easting; 358862 Northing

7g. NAD 83

7h. Zone: 12

7i. Baseline & Meridian: G&SRB&M

7j. USGS Quadrangle: *Oro Valley, Arizona*

7k. Legal Description: NW ¼ of the NW ¼ of Section 35, Township 11 South, Range 13 East

8. SURVEY AREA
8a. Total Acres: 36.4

8b. Survey Area.

1. Land Jurisdiction	2. Total Acres Surveyed	3. Total Acres Not Surveyed	4. Justification for Areas Not Surveyed
Private	36.4	0	N/A

9. ENVIRONMENTAL CONTEXTS
9a. Landform: Alluvial fan

9b. Elevation: 2,870 feet amsl

9c. Surrounding Topographic Features: The Project Area is dominated by the Tortolita Mountains to the northwest, and by the Santa Catalina Mountains to the east.

9d. Nearest Drainage: A prominent but unnamed drainage runs through the center of the surveyed parcel.

9e. Local Geology: The Project Area spans two geological units, the Quaternary surficial deposits, undivided unit (unconsolidated to strongly consolidated alluvial and eolian deposits that include coarse, poorly sorted alluvial fan and terrace deposits on middle and upper piedmonts and along large drainages; sand, silt and clay on alluvial plains and playas; and wind-blown sand deposits); and the Pliocene to middle Miocene deposits unit (moderately to strongly consolidated conglomerate and sandstone deposited in basins during and after late Tertiary faulting. Includes lesser amounts of mudstone, siltstone, limestone, and gypsum. These deposits are generally light gray or tan. They commonly form high rounded hills and ridges in modern basins, and locally form prominent bluffs. Deposits of this unit are widely exposed in the dissected basins of southeastern and central Arizona).

9f. Vegetation: The Project Area is within the Arizona Upland Subdivision, Semidesert Grassland biotic community (Brown 1994). Vegetation within the Project Area is consistent with plants typically found in this biotic community and includes mesquite, palo verde, cholla, prickly pear, catclaw, barrel cactus, datura, and annual grasses.

9g. Soils/Deposition: Soils in the Project Area include Hayhook-Sahuarita complex, 1 to 5 percent slopes; and Palos Verdes-Jaynes complex, 2 to 8 percent slopes (Natural Resources Conservation Service 2021). Soils observed during field survey consisted of loosely compacted sandy loam.

9h. Buried Deposits: Not likely

9i. Justification: Low potential for subsurface cultural deposits in Project Area.

10. BUILT ENVIRONMENT: Modern, paved roads (West Moore Road and La Canada Drive) run along the north and east Project Area boundaries. Barbed wire fencing runs along the western edge of the Project Area. An informal walking trail trends approximately north-south along the west side of a large drainage near the center of the Project Area. Modern residential houses are south of the Project Area.

Photo 1. Project Area overview; view to north.

11. INVENTORY CLASS COMPLETED
11a. Class I Inventory: ☒

11b. Class I Search Radius: ☒ 1 mile ☐ ½ mile

11b. Researcher: Joseph Howell

11c. Class II Survey: ☐

11d. Sampling Strategy: N/A

11e. Class III Inventory: ☒

12. BACKGROUND RESEARCH SOURCES
12a. AZSITE: ☒

12b. ASM Archaeological Records Office: ☐

12c. SHPO Inventories and/or SHPO Library: ☐

12d. NRHP Database: ☒

12e. ADOT Portal: ☐

12f. Land-Managing Agency Files: N/A

12g. Tribal Cultural Resources Files: N/A

12h. Local Government Websites: N/A

12i. GLO Maps: No historical structures or cultural features intersect the Project Area on the original General Land Office (GLO) plat encompassing the Project Area (Bureau of Land Management 2021a; GLO 1924).

12j. Original Land Patents: Historic land patent records for Section 35 of Township 11 South, Range 13 East were reviewed. The review indicated that the northern half of Section 35 was claimed under Patent No. 1050397, filed by William J. Hedgepeth, and dated October 12, 1931. This claim also encompassed portions of Section 26, immediately to the north. (Bureau of Land Management 2021b).

12k. USGS Topographic Maps: The Class I Study Area is covered by several historic USGS maps (USGS 2021). No historic features intersect the Project Area. However, some historic road features were adjacent or near the Project Area boundaries.

Map Name	Scale	Date	Cultural Features
Tucson	1:125,000	1904 (1957 edition)	No features depicted.
Tucson	1:125,000	1905 (1905 and subsequent editions)	No features depicted.
Tucson	1:250,000	1956 (1967	An unimproved dirt road borders the Project Area on the north.

Map Name	Scale	Date	Cultural Features
		edition)	
Mount Lemmon	1:62,500	1957 (1959 and subsequent editions)	An unimproved dirt road borders the Project Area on the north; Tangerine Road borders Section 35 on the south; a stock tank or similar water retention feature appears in the northwest corner of Section 36.
Tucson	1:250,000	1958 (1958 edition)	An unimproved dirt road borders the Project Area on the north; a corral is depicted just east of the stock tank in Section 36.
Tucson	1:250,000	1959 (1959 edition)	An unimproved dirt road borders the Project Area on the north; a corral is depicted just east of the stock tank in Section 36.
Tucson	1:250,000	1962 (1962 edition); 1964 (1964 edition)	An unimproved dirt road borders the Project Area on the north; the corral and stock tank are not depicted on these maps.

12l. Arizona Department of Water Resources (ADWR) Register: No wells are recorded within the Project Area. Numerous wells are located within the Class I Study Area, but only one is greater than 50 years of age (Registration No. 55-639929, construction completed December, 1970) (ADWR 2021).

12m. Historical Mining Records: No historical mining features or claims have been documented in the Project Area (Mineral Resource Data System 2021; Arizona Geological Survey 2021).

13. BACKGROUND RESEARCH RESULTS

13a. Previous Surveys Adjacent to the Project Area. The Project Area has not been previously surveyed. Four previous survey projects have been conducted adjacent to the Project Area.

1. Project No.	2. Project Name	3. Author	4. Year
2010-399.ASM	La Canada Moore Road	Granger	2009
2013-123.ASM	Kingair Road Cultural Resources Survey (P.A.S.T. Project 041652)	Stephen	2004
2003-568.ASM	Oro Valley Effluent Pipeline Survey and Monitoring	Wegener	2005
2018-454.ASM	TOV Northwest Recharge, Recovery, and Delivery System	Stone	2019

13b. Previously Recorded Cultural Resources Within Class I Study Area. No previously recorded sites have been documented within the Project Area. Fourteen sites have been documented within the Class I Study Area.

1. Site Number/Name	2. Affiliation	3. Site Type	4. Eligibility Status	5. Associated Reference(s)
AZ BB:9:180(ASM)	Hohokam, Ceramic period (A.D. 200-1500)	Artifact scatter	Not evaluated	Craig and Wallace 1987
AZ BB:9:181(ASM)	Hohokam, Ceramic period (A.D. 200-1500)	Artifact scatter with possible features	Not evaluated	Craig and Wallace 1987
AZ BB:9:182(ASM)	Hohokam, Ceramic period (A.D. 200-1500)	Artifact scatter	Not evaluated	Craig and Wallace 1987
AZ BB:9:183(ASM)	Hohokam, Ceramic period (A.D. 200-1500)	Artifact scatter with features	Not evaluated	Craig and Wallace 1987
AZ BB:9:184(ASM)	Hohokam, Ceramic period (A.D. 200-1500)	Artifact scatter	Not evaluated	Craig and Wallace 1987
AZ BB:9:185(ASM)	Hohokam, Ceramic period (A.D. 200-1500)	Artifact scatter	Not evaluated	Craig and Wallace 1987
AZ BB:9:188(ASM)	Hohokam Sedentary period (A.D. 950-1100)	Artifact scatter with feature	Not evaluated	Craig and Wallace 1987
AZ AA:12:779(ASM)	Hohokam, Ceramic period (A.D. 200-1500)	Artifact scatter	Not evaluated	Swartz 1995
AZ BB:9:299(ASM)	Hohokam, Ceramic period (A.D. 200-1500)	Artifact scatter	Not evaluated	Swartz 1995
AZ BB:9:392(ASM)	Hohokam, Ceramic period (A.D. 200-1500)	Artifact scatter with feature	Not evaluated	Stephen 2004
AZ BB:9:414(ASM)	Hohokam Classic period (A.D. 1100-1450)	Artifact scatter	Recommended eligible (recorder)	Cook and Harrison 2007
AZ A:12:1122(ASM)/ Tangerine Road	Historic period (A.D. 1500-1950)	Feature	Not evaluated	Deaver 2013
AZ BB:9:174(ASM)	Hohokam, Ceramic period (A.D. 200-1500)	Artifact scatter with features	Not evaluated	Craig and Wallace 1987
Newly Recorded Site				
AZ BB:9:359(ASM)	-	-	-	Stephen 2001

13c. Historic Buildings/Districts/Neighborhoods.
A review of NRHP properties indicates there are no listed historic properties within the review area. The nearest listed property is Steam Pump Ranch, about 3.2 miles southeast of the Project Area (National Park Service 2020).

14. CULTURAL CONTEXTS
14a. Prehistoric Culture: Archaic, Hohokam

14b. Protohistoric Culture: Spanish, A.D. 1452 to 1700s

14c. Indigenous Historic Culture: Apache, O'odham

14d. Euro-American Culture: Historic, 1870s to 1971

15. FIELD SURVEY PERSONNEL
15a. Principal Investigator: Michael Cook

15b. Field Supervisor: Michael Cook

15c. Crew: N/A

15d. Fieldwork Date: December 28th and 29th, 2021

16. SURVEY METHODS
16a. Transect Intervals: 20 m apart

16b. Coverage (%): 100

16c. Site Recording Criteria: Revised Site Definition Policy, Arizona State Museum (Fish 1995)

16d. Ground Surface Visibility: 85%

16e. Observed Disturbances: An informal walking trail trends approximately north-south along the west side of a large drainage near the center of the Project Area.

17. FIELD SURVEY RESULTS
17a. No Cultural Resources Identified: ☐

17b. Isolated Occurrences (IOs) Only: ☒

17c. Number of IOs Recorded: 12

1. IO	2. Description	3. Date Range	4. UTMs	
			NAD 1983	
			Easting	Northing
IO-1	1 plainware body sherd; 1 red-on-brown ware body sherd	Prehistoric, Ceramic period	500446	3588690
IO-2	2 plainware body sherds	Prehistoric, Ceramic period	500454	3588673
IO-3	1 plainware body sherd	Prehistoric, Ceramic period	500544	3588696
IO-4	1 plainware body sherd	Prehistoric, Ceramic period	500550	3588638
IO-5	1 plainware body sherd	Prehistoric, Ceramic period	500569	3588658
IO-6	1 plainware body sherd	Prehistoric, Ceramic period	500562	3588706
IO-7	2 plainware body sherds	Prehistoric, Ceramic period	500578	3588719
IO-8	1 plainware body sherd	Prehistoric, Ceramic period	500666	3588643
IO-9	1 core, multidirectional, rhyolite, 5-cm-diameter	Prehistoric	500721	3588751
IO-10	1 plainware body sherd	Prehistoric, Ceramic period	500733	3588853
IO-11	5 plainware body sherds, within 10-meter-area	Prehistoric, Ceramic period	500714	3588879
IO-12	1 core, multidirectional, basalt, 6-cm-diameter	Prehistoric	500711	3588891

18. COMMENTS: No new or previously recorded sites, structures, buildings, or districts are present in the Project Area. The isolates documented in the Project Area do not meet the ASM definition of an archaeological site. They have been thoroughly documented, and they lack further research potential. Accordingly, the isolated cultural resources documented during this project are recommended ineligible for inclusion on the National Register of Historic Places (NRHP). MCA recommends a finding of **No Historic Properties Affected**. No further archaeological investigations are recommended.

SECTION 19. ATTACHMENTS
19a. Project location map: ☒
19b. Land jurisdiction map: ☒
19c. Background research map, previous sites and surveys: ☒
19d. Historical General Land Office plat map (GLO 1924): ☒
19e. Results of field survey: ☒
19f. References: ☒

SECTION 20. CONSULTANT CERTIFICATION

I certify the information provided herein has been reviewed for content and accuracy and all work meets applicable agency standards.

Signature **Date**

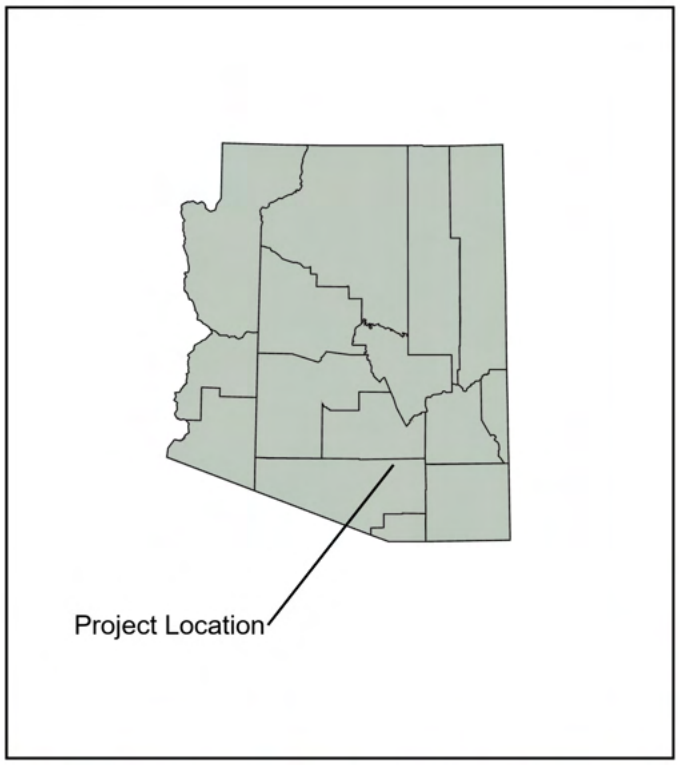
January 3, 2022

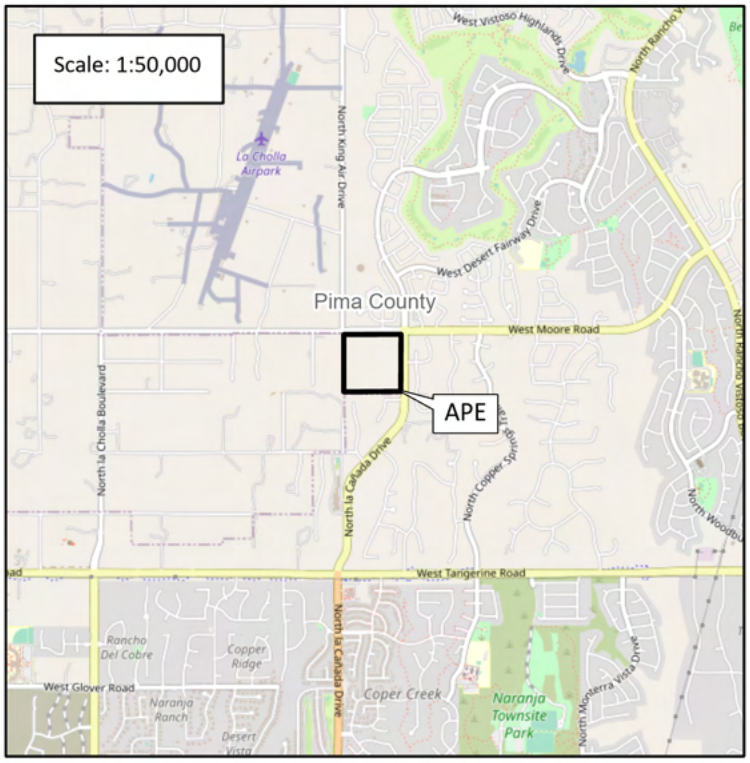
Owner, Principal Investigator

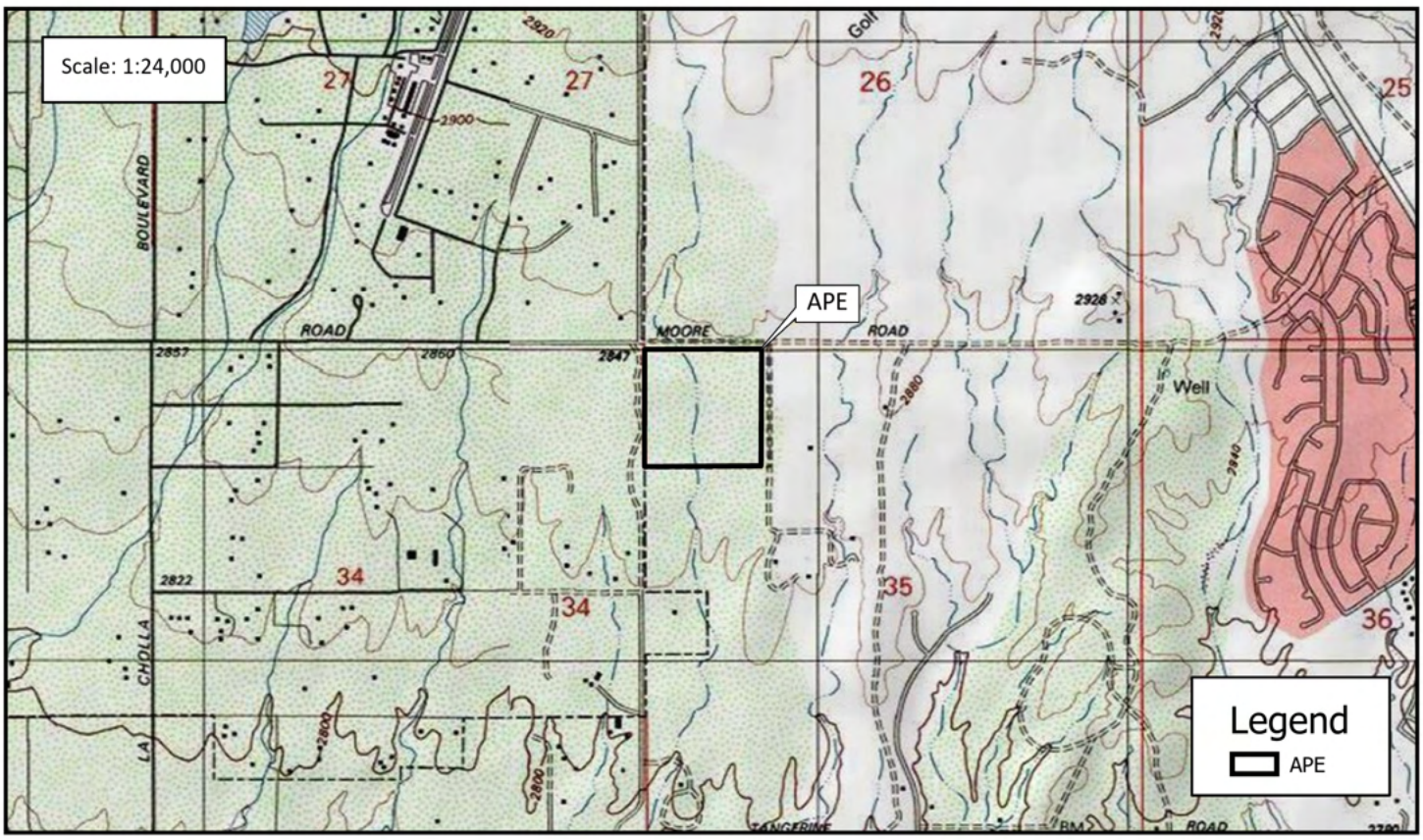
Title

SECTION 21. DISCOVERY CLAUSE

In the event previously unreported cultural resources are encountered during ground disturbing activities, all work must immediately cease within 30 meters (100 feet) until a qualified archaeologist has documented the discovery and evaluated its eligibility for the Arizona or National Register of Historic Places in consultation with the lead agency, the SHPO, and Tribes, as appropriate. Work must not resume in this area without approval of the lead agency. If human remains are encountered during ground-disturbing activities, all work must immediately cease within 30 meters (100 feet) of the discovery and the area must be secured. The Arizona State Museum, lead agency, SHPO, and appropriate Tribes must be notified of the discovery. All discoveries will be treated in accordance with NAGPRA (Public Law 101-601; 25 U.S.C. 3001-3013) or Arizona Revised Statutes (A.R.S. § 41-844 and A.R.S. § 41-865), as appropriate, and work must not resume in this area without authorization from ASM and the lead agency.





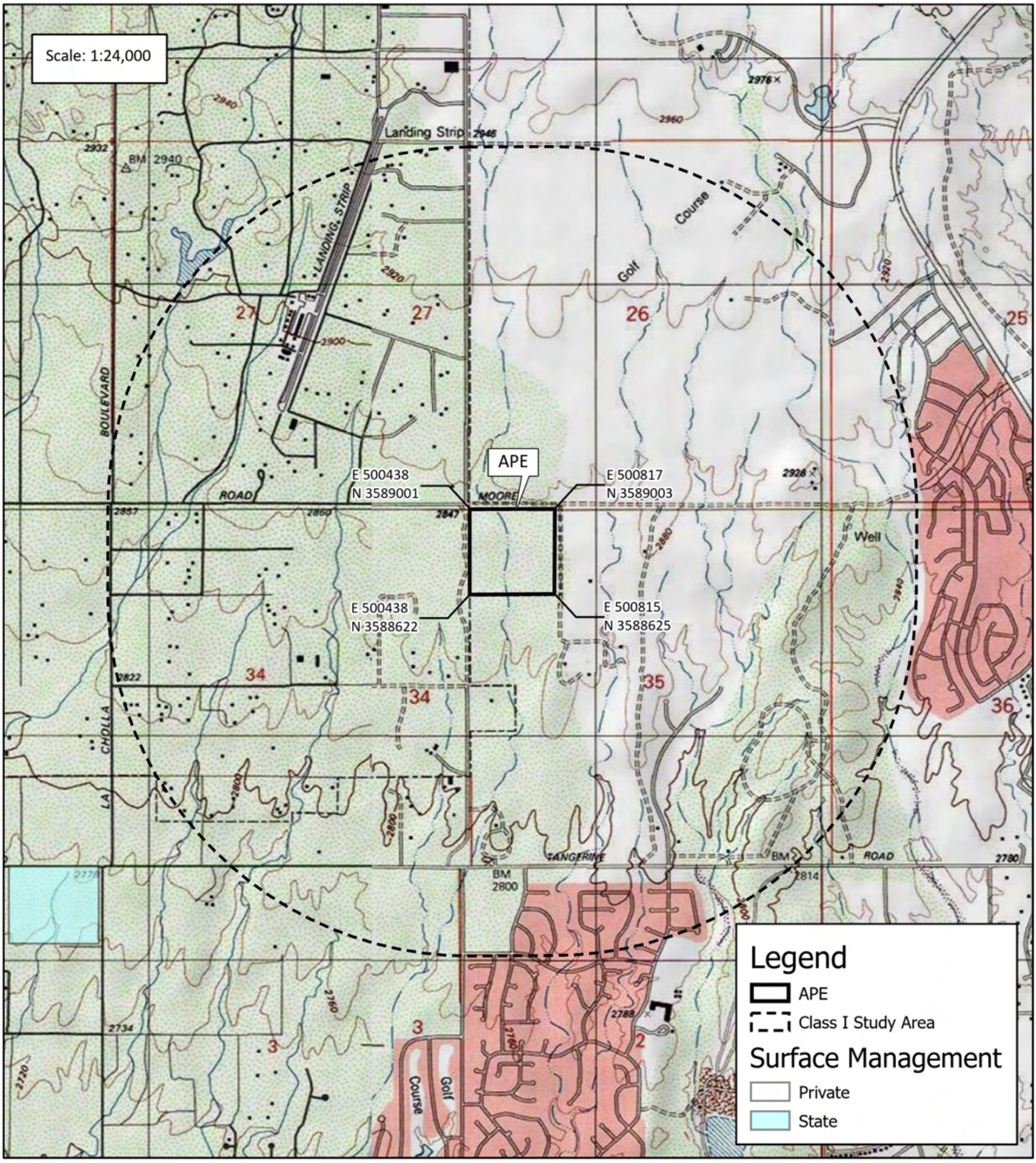


T11S, R13E, Portion of Section 35
Oro Valley, Arizona USGS Quadrangle
Pima County, Arizona
NAD 1983, Z12

m
0 300 600
feet
0 1,000 2,000

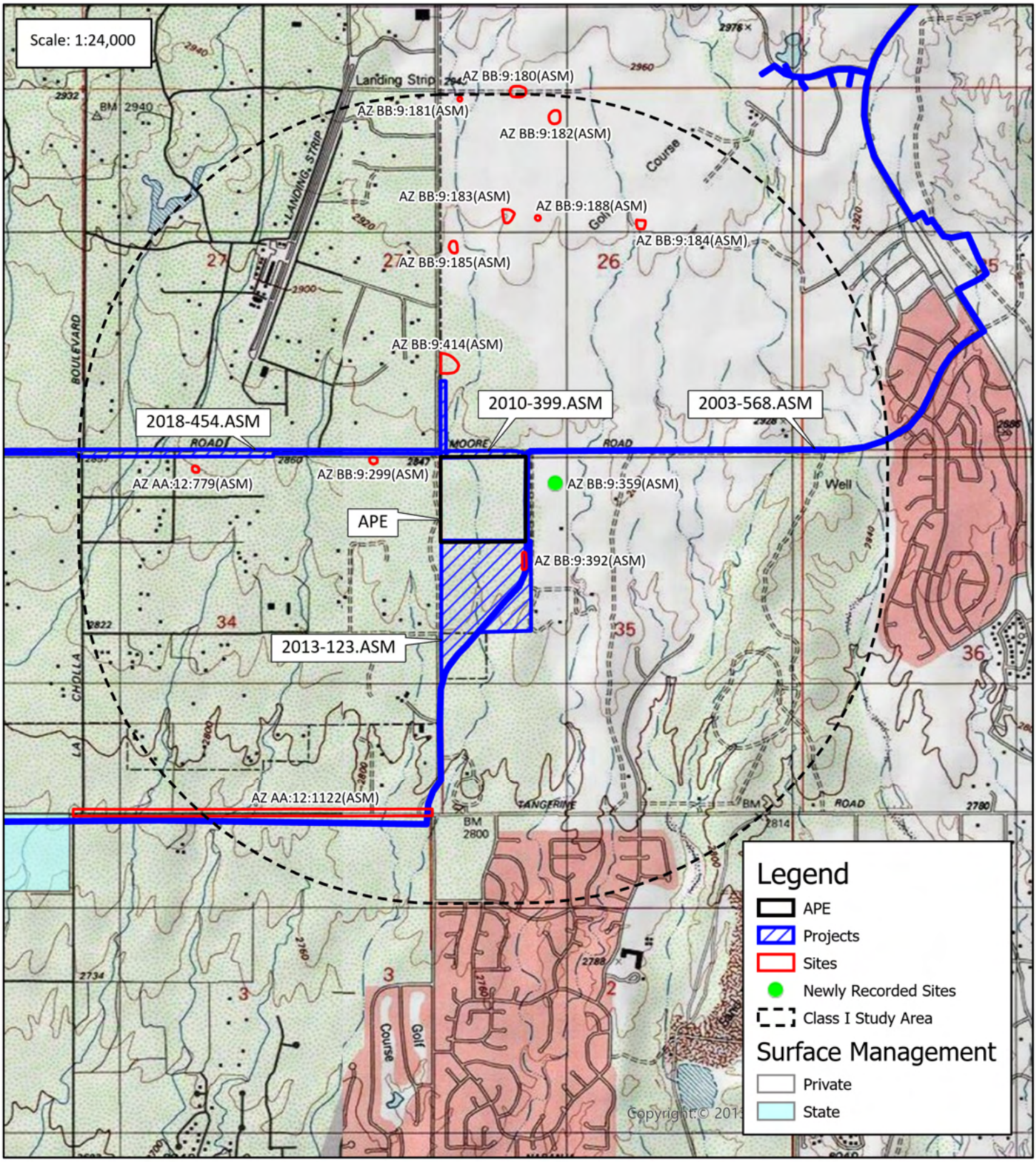
N

Attachment 19a. Project location map.



T11S, R13E, Portion of Section 35
Oro Valley, Arizona USGS Quadrangle
Pima County, Arizona
Surface Management: BLM 2019
NAD 1983, Z12

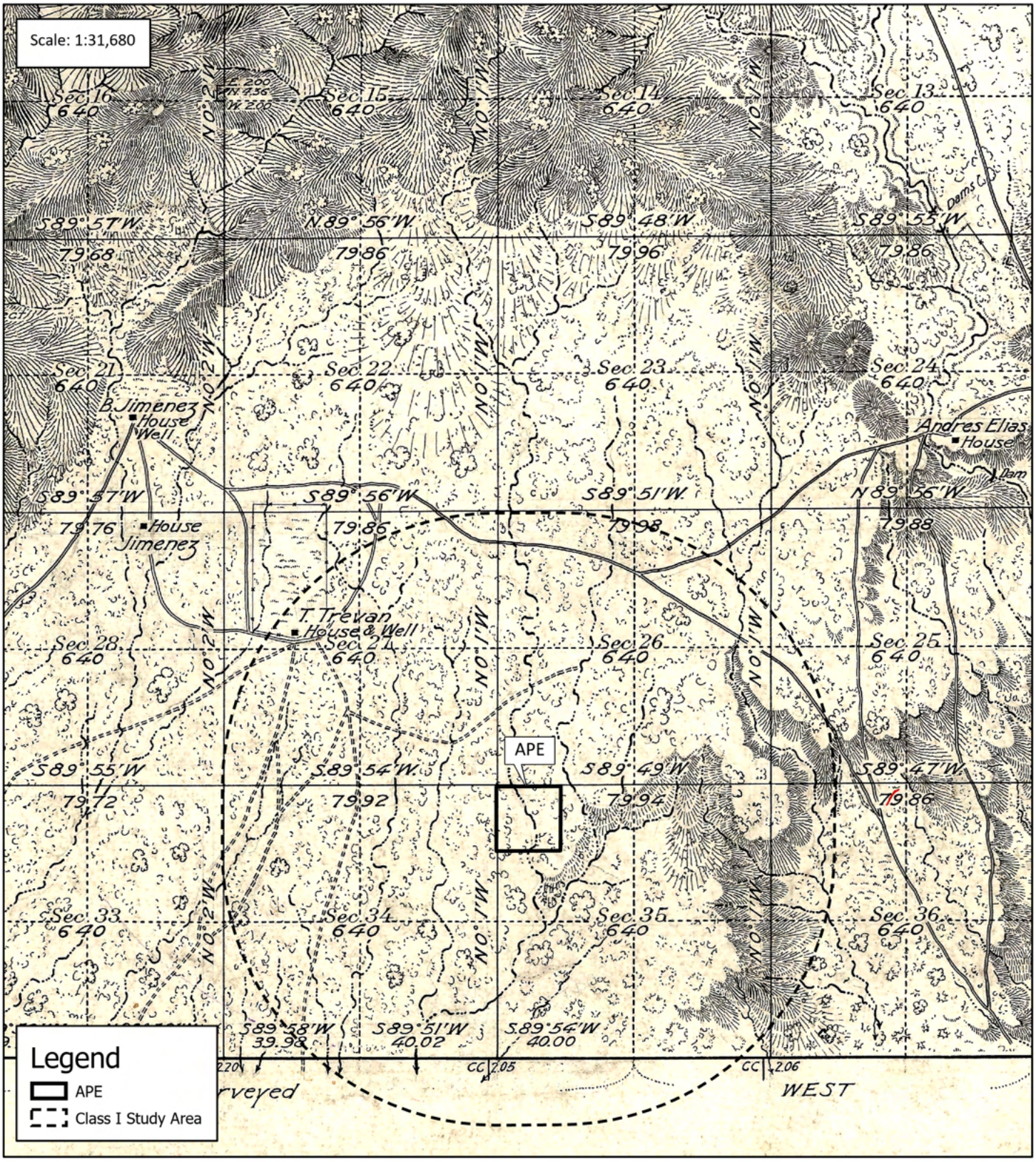
Attachment 19b. Land jurisdiction map.



T11S, R13E, Portion of Section 35
Oro Valley, Arizona USGS Quadrangle
Pima County, Arizona
Surface Management: BLM 2019
NAD 1983, Z12

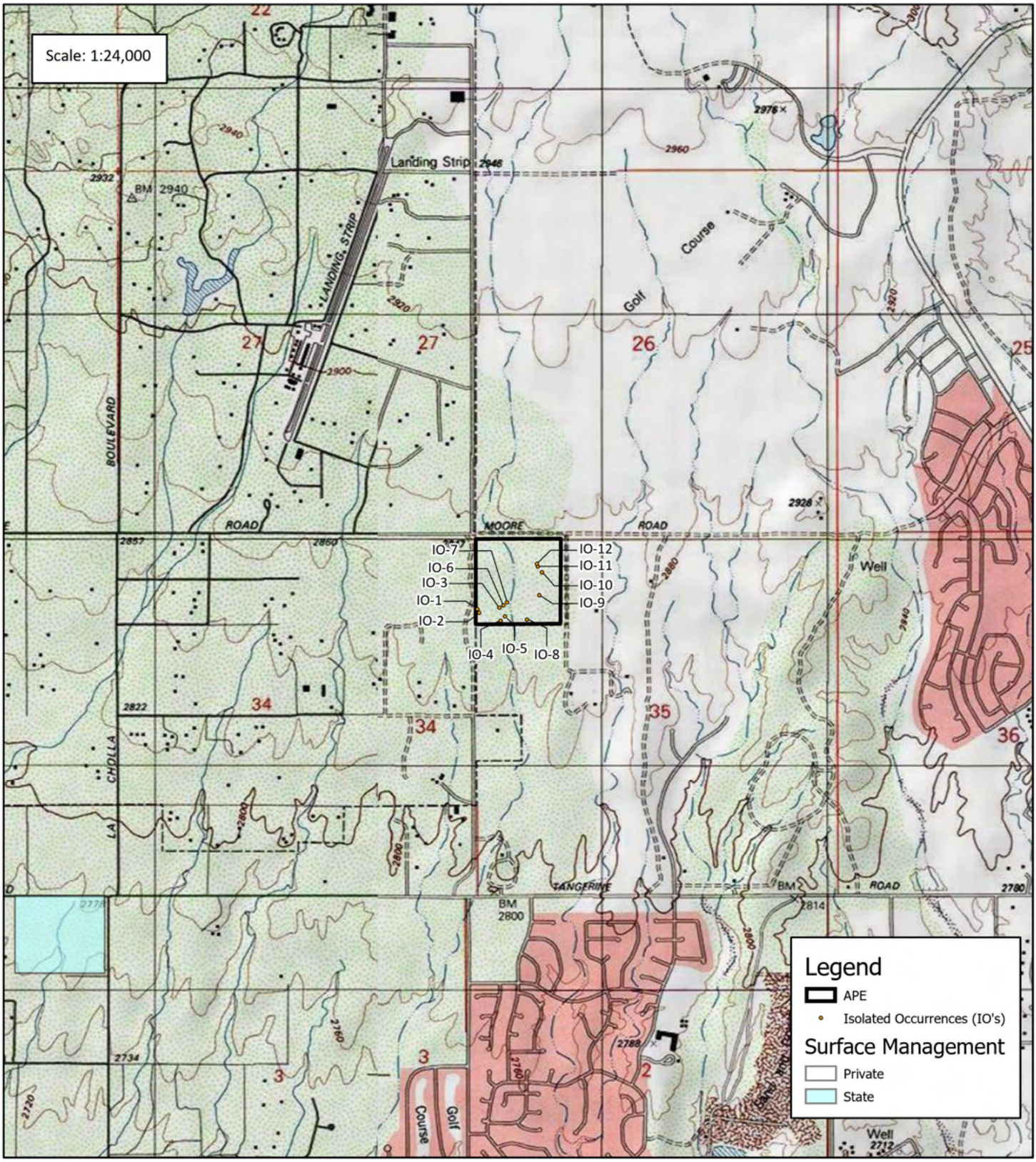
m
0 300 600
feet
0 1,000 2,000
N

Attachment 19c. Background research map, previous sites and surveys.



GLO Plat for Township 11 South, Range 13 East
Pima County, Arizona

Attachment 19d. Historical General Land Office plat map (GLO 1924).



T11S, R13E, Portion of Section 35
Oro Valley, Arizona USGS Quadrangle
Pima County, Arizona
Surface Management: BLM 2019
NAD 1983, Z12

Attachment 19e. Results of field survey.

Attachment 19f. References:

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General Land Office (GLO)
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Mineral Resource Data System
2021 Mineral Resources Data System map interface. Electronic document, http://mrdata.usgs.gov/mineral-resources/mrds-us.html, accessed January 3, 2022.

National Park Service
2020 National Register of Historic Places. Public, Non-Restricted Data Depicting National Register Spatial Data Processed by the Cultural Resources GIS facility. Electronic document, https://www.nps.gov/maps/full.html?mapId=7ad17cc9-b808-4ff8-a2f9-a99909164466, accessed December 27, 2021.

Natural Resources Conservation Service
2021 Web Soil Survey, Soil Survey Geographic Database. Natural Resources Conservation Service, United States Department of Agriculture. Electronic document, http://websoilsurvey.nrcs.usda.gov, accessed January 3, 2022.

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APPENDIX C: VEGETATIVE VOLUME TRANSECT PHOTOS

PHOTO 1: TRANSECT 1, LOOKING SOUTH

PHOTO 2: TRANSECT 1, LOOKING NORTH

PHOTO 3: TRANSECT 2, LOOKING SOUTH

PHOTO 4: TRANSECT 2, LOOKING NORTH

PHOTO 5: TRANSECT 3, LOOKING SOUTH

PHOTO 6: TRANSECT 3, LOOKING NORTH

PHOTO 7: TRANSECT 4, LOOKING SOUTH

PHOTO 8: TRANSECT 4, LOOKING NORTH

PHOTO 9: TRANSECT 5, LOOKING SOUTH

PHOTO 10: TRANSECT 5, LOOKING NORTH

PHOTO 11: TRANSECT 6, LOOKING SOUTH

PHOTO 12: TRANSECT 6, LOOKING NORTH

APPENDIX D: VEGETATIVE VOLUME DATA SHEETS

VEGETATION VOLUME DATA SHEET

Location: SW Corner La Canada & Moore
Pima County, AZ

Transect No. 1

Date: December 16, 2022

Personnel: Susy Morales, RECON
Jennifer Patton, Wilder
Ben Wilder, Wilder

	Horizontal Transect Samples (# of cubic decimeters containing vegetation within each vertical meter)																								
Vertical cubic meters	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	1		4	3							6			3	4	9	5	2	1		1	1			3
2		1	8	7	8						9	4				7			5	6	2				
3	1		4	4	6					5	3	2	5	1					9	10	1				
4	1							3	6	5	4	1	6	8				3	3	3					
5										3	8	2	6	6	2										
6										7	3	1	4		1										
7																									
8																									
9																									
10																									
Total	3	1	16	14	14	0	0	3	6	20	33	10	21	18	7	16	5	5	18	19	4	1	0	0	3

TVV = 0.948

Photos : 1, 2

VEGETATION VOLUME DATA SHEET

Location: SW Corner La Canada & Moore
Pima County, AZ

Transect No. 2

Date: December 16, 2022

Personnel: Susy Morales, RECON
Jennifer Patton, Wilder
Ben Wilder, Wilder

	Horizontal Transect Samples (# of cubic decimeters containing vegetation within each vertical meter)																							
Vertical cubic meters	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	9	4	3	6	5	4	10	7	2	6	3		1	1		4	8	3	3	1	1	3	4	6	4
2	4	8	2	9	4	3	1	6	8	6			2			8	7	7	6		5	3	6	2	
3	2	4	3					8	4	6						2	8	10	7	5	10	1	4	3	
4		1				6	7	5	7	5						1	7	1	4						
5							2	4	2										3						
6																									
7																									
8																									
9																									
10																									
Total	15	17	8	15	9	13	20	30	23	23	3	0	3	1	0	15	30	21	23	6	16	7	14	11	4

TVV = 1.308

Photos : 3, 4

VEGETATION VOLUME DATA SHEET

Location: SW Corner La Canada & Moore
Pima County, AZ

Transect No. 3

Date: December 16, 2022

Personnel: Susy Morales, RECON
Jennifer Patton, Wilder
Ben Wilder, Wilder

	Horizontal Transect Samples (# of cubic decimeters containing vegetation within each vertical meter)																							
Vertical cubic meters	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	2	4	6	4	1	3	5	2	2	2	1	7	5	1		5	7	6	6	1	4	6	1	1	
2	3	1	3	9	9	4	2			2	5	9	1	4			5			2					
3			2	2	8					2	7	6	10	6											2
4					4	5					2	5	3												
5																									
6																									
7																									
8																									
9																									
10																									
Total	5	5	11	15	22	12	7	2	2	6	15	27	19	11	0	5	12	6	6	3	4	6	1	1	2

TVV = 0.820

Photos : 5, 6

VEGETATION VOLUME DATA SHEET

Location: SW Corner La Canada & Moore
Pima County, AZ

Transect No. 4

Date: December 16, 2022

Personnel: Susy Morales, RECON
Jennifer Patton, Wilder
Ben Wilder, Wilder

	Horizontal Transect Samples (# of cubic decimeters containing vegetation within each vertical meter)																							
Vertical cubic meters	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	6	10	7						2	3	8	8	1	2	1				1	2	4	2	5	6	3
2	1									2	6	3											6	2	
3	7	3																							10
4	6	1																				9		4	7
5	1																					5		5	3
6																									
7																									
8																									
9																									
10																									
Total	21	14	7	0	0	0	0	0	2	5	14	11	1	2	1	0	0	0	1	2	4	16	11	17	23

TVV = 0.608

Photos : 7, 8

VEGETATION VOLUME DATA SHEET

Location: SW Corner La Canada & Moore
Pima County, AZ

Transect No. 5

Date: December 16, 2022

Personnel: Susy Morales, RECON
Jennifer Patton, Wilder
Ben Wilder, Wilder

	Horizontal Transect Samples (# of cubic decimeters containing vegetation within each vertical meter)																							
Vertical cubic meters	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	7	9	7	1	2	9	1		1		2		5	8	8	10	8	8	4	7		4	3	7	1
2	6	7					1							2	8	3	9		6			4	2	8	7
3														1											
4																									
5																									
6																									
7																									
8																									
9																									
10																									
Total	13	16	7	1	2	9	2	0	1	0	2	0	5	11	16	13	17	8	10	7	0	8	5	15	8

TVV = 0.704

Photos : 9, 10

VEGETATION VOLUME DATA SHEET

Location: SW Corner La Canada & Moore
Pima County, AZ

Transect No. 6

Date: December 16, 2022

Personnel: Susy Morales, RECON
Jennifer Patton, Wilder
Ben Wilder, Wilder

	Horizontal Transect Samples (# of cubic decimeters containing vegetation within each vertical meter)																							
Vertical cubic meters	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	3				1	1	1	1		3	1	9	5	3	5			2	3	2	5	8	1		5
2						4	3	1	4	6	7	5	8				2	6	8	6	3	1			1
3							6	5			4	7	2	4	2	9	5	2	10	6			2		
4							1	2					3	6	7	10	8	6	10	6					
5														3		5	7	2	6	7					
6																		5							
7																									
8																									
9																									
10																									
Total	3	0	0	0	1	5	11	9	4	9	12	21	18	16	14	24	22	23	37	27	8	9	3	0	6

TVV = 1.128

Photos : 11, 12

Appendix B – Site Resource Inventory

SITE RESOURCE INVENTORY
NORTH RIDGE ESTATES
2302611

PROJECT OVERVIEW

1. Single family homes are proposed for the site.
2. Existing Site Conditions and Vegetative Community: The 2022 aerial imagery accurately reflects the current site conditions. There is significant disturbance from off-road vehicle use. The project site is within the Sonoran palo verde-mixed cacti-mixed scrub series of the Arizona Upland Subdivision of the Sonoran Desertscrub biotic community (Turner and Brown 1994). This community is characterized by an overstory of paloverde trees and saguaro cacti, with a relatively dense scrubby understory. The dominant tree is foothill palo verde (*Parkinsonia microphylla*). Velvet mesquite (*Prosopis velutina*), whitethorn acacia (*Vachellia constricta*), blue palo verde (*Parkinsonia florida*), and catclaw acacia (*Senegalia greggii*) are present in smaller numbers and occur closer to the watercourse. Common shrubs include cheesebush, (*Ambrosia salsola*), range ratany (*Krameria parvifolia*), triangleleaf bursage (*Ambrosia deltoidea*), desert peony (*Acourtia wrightii*) and creosote (*Larrea tridentata*). Mormon tea (*Ephedra sp.*), Warnock's snakewood (*Condalia warnockii*) and trixis (*Trixis californica*) are also present. Xeroriparian shrubs along the watercourse include desert hackberry (*Celtis pallida*), Warnock's snakewood (*Condalia warnockii*), wolfberry (*Lycium sp.*) and graythorn (*Ziziphus obtusifolia*). Dominant cacti include saguaro (*Carnegiea gigantea*), chainfruit cholla (*Cylindropuntia fulgida*), staghorn cholla (*Cylindropuntia versicolor*), buckhorn cholla (*Cylindropuntia acanthocarpa*), Christmas cholla (*Cylindropuntia leptocaulis*), barrel cacti (*Ferocactus wislizenii*), pincushion cacti (*Mammillaria sp.*), and hedgehog (*Echinocereus sp.*).

GENERAL NOTES

1. The gross area of development is 35.40 +/- acres
2. Total acres of graded area: 4.56 +/- acres
3. Total acres of undisturbed area: 30.84 +/- acres
4. The Site Resource Inventory (SRI) was conducted for the proposed community roadways and utility easements in compliance with Town of Oro Valley (TOV) code requirements (TOV Zoning Code Section 27.6.B.3). Plants listed in Table C-1: Oro Valley Protected Native Plant List, meeting the criteria for significant vegetation, were inventoried.
5. Tagging and Flagging: All inventoried plants adhered to the following standards:
   - Tagging: Plants were tagged with a metal tag embossed with an inventory number that cross references the Native Plant Inventory List and Native Plant Inventory Plan.
   - Flagging: Color-coded flagging has been affixed to each inventoried plant:
     - White: Plants proposed for preservation in place (PIP)
     - Blue: Plants proposed for transplant on site (TOS)
     - Red: Plants proposed for removal from site (RFS)
6. Any spaded or boxed tree transplanted on site that dies due to neglect or lack of maintenance shall be replaced with the same size and species of the original salvaged tree, as required by the salvage plan.
7. No salvage of plants regulated by the Endangered Species Act and/or the Arizona Native Plant Law may occur without the issuance of the appropriate permit by the State Department of Agriculture.
8. Salvage operations shall not commence until the Zoning inspector has performed an inspection and given approval to be salvaged.
9. Temporary nursery shall be in conformance with Section 27.6.B.4.j.
10. Mitigation of Significant Vegetation shall be in accordance with Table 27-1 Mitigation of Significant Vegetation.
11. Any plant that meets the salvage criteria in Section 27.6.B.4 shall be preserved in place or transplanted on-site. Any plants that meet the salvage criteria that are destroyed shall be replaced on a one-to-one ratio of the same species and size as that destroyed. Five understory plants from the supplemental Arizona Department of Water Quality native plant list will be planted for every mitigated tree.
12. The limits of grading shall be staked in the field, in accordance with Section 27.6. B.7.c.ii. Disturbance outside the approved grading limits shall not be permitted.
13. Details for required protective fencing for significant saguaros and other vegetation to be preserved in place are provided on Sheet L4 of these Plans for reference. Refer to The Final Site Plan for all site grading and grading details.
14. A Native Plant Inventory shall be conducted, and Native Plant Plans shall be submitted with the Conceptual Site Plan or Final Site Plan (as directed by the Town) for the project.
15. Plant locations were determined with the assistance of a global positioning system. This system is accurate to within approximately one foot.

SIGNIFICANT VEGETATION INFORMATION

1. No stands of Significant Vegetation were noted.
2. Significant Vegetation Information:
   a. Total amount of Significant Vegetation present within Grading Limits (canopy diameter assessed as two times the height of tree): 41,428 SF
   b. Total amount being disturbed: 26,521 SF
   c. Total percentage disturbed: 64%
   d. Mitigation Ratio: 2:1
3. Required mitigation plants shall be reflected in the Landscape Plans for this project.

PLANT TRANSPLANTABILITY CRITERIA

Determination of Plant Transplantability is based upon the criteria listed in Section 27.6.B.c.iii of the TOV Zoning Code. All plants that meet the following criteria shall be preserved in place or salvaged. Plants that do not meet these criteria should not be considered for salvage and transplant.

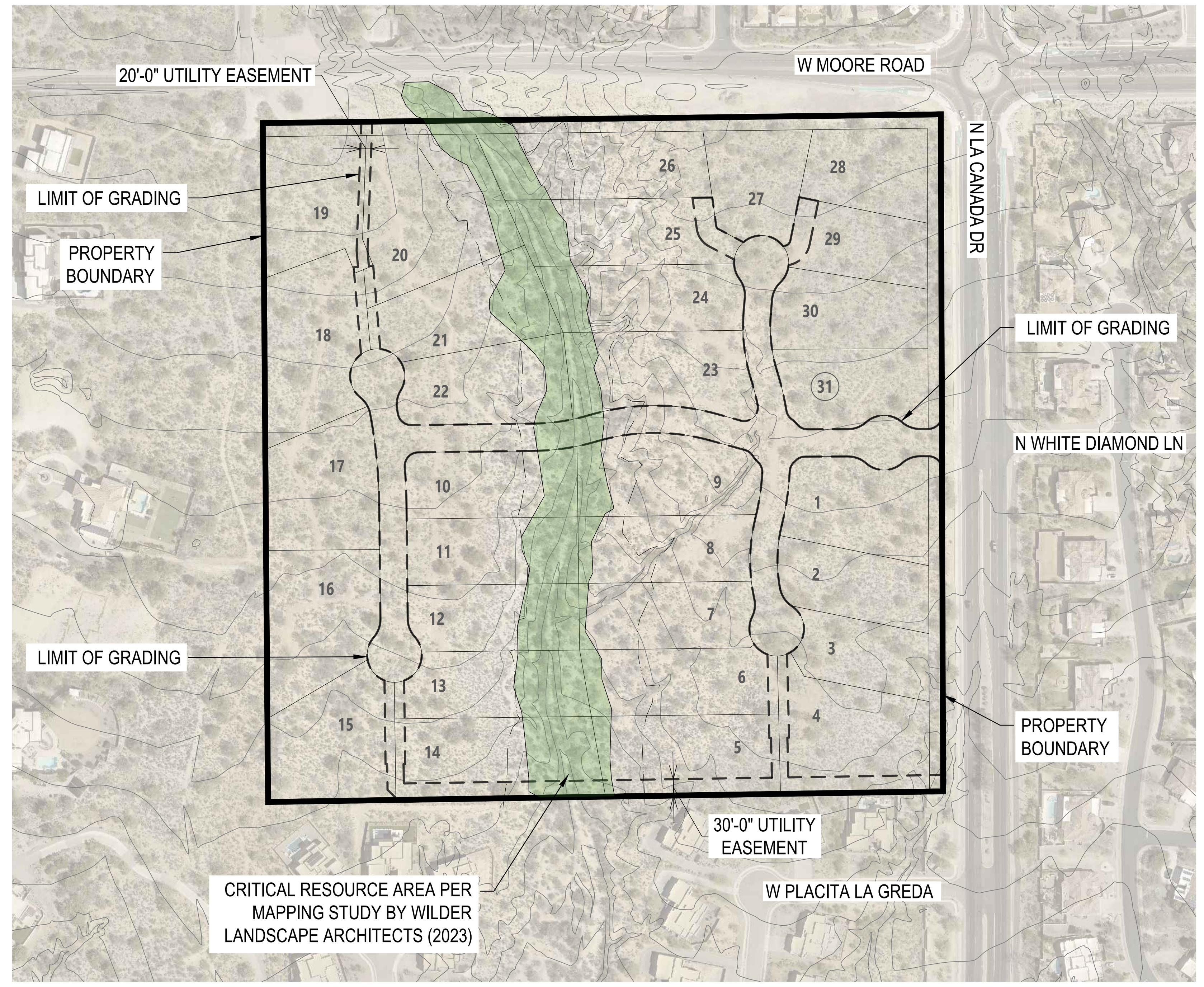
A. HEALTH: Plant health is good to excellent with no major infestations or apparent diseases. "Plant health" is defined as a plant in a sound state, free from disease and expected to survive for five (5) or more years.
B. SIZE & AGE: The plant is of a size and age to suggest a likely chance of transplant survival.
C. BOXABILITY/SPADEABILITY: Plant is undamaged and is conducive to box or spade transplanting (upright branching).
D. SOILS: Soils can be excavated, are cohesive, and appear capable of supporting a boxed or spaded root ball.
E. TOPOGRAPHY: Surrounding topography permits access with the appropriate equipment needed to box or spade and remove the plant.
F. ADJACENT PLANTS: Adjacent plants do not pose a likely interference with root systems or interfere with plant removal.
G. FORM: The overall form and character is representative of the species and is a valuable specimen for landscape or habitat purposes.

BOXING / SPADING FOR TREES TO BE TRANSPLANTED

1. Boxing, rather than spading, may be required for trees noted as 'Transplant' on the Site Resource Inventory Plans. These 'Significant' trees (12" + caliper) are often not conducive to spading - the amount of limbs that must be trimmed destroys the natural form of the tree, and in the case of palo verde, exposes the tree to scalding.
2. The Salvage Contractor shall identify each tree to be transplanted and the corresponding method of transplant (box or spade) with the selected box / spade size for approval by the Town of Oro Valley Planning Division prior to start of salvage. Written approval from the Town must be obtained prior to transplant of any tree.
3. When boxing is used, all tree boxing materials and construction details, including minimum box sizes, shall be in accordance with PAG Standard Specifications for Public Improvements, Section 809, Native Plant Salvage. Contractor may use larger box sizes, but not smaller, than those listed in the Specification.

INVASIVE SPECIES

1. The site has a low presence of invasive grass species. Buffelgrass (*Pennisetum ciliare*), an invasive grass species included on the Oro Valley Prohibited Plant List (Addendum E), was observed in the northeast portion of the site (locations are provided on the SRI Plan).
2. Invasive species within the project area should be removed (via mechanical or chemical means) from the site prior to the start of earth disturbance for construction.
3. Continual monitoring for invasive species, and removal, is recommended.



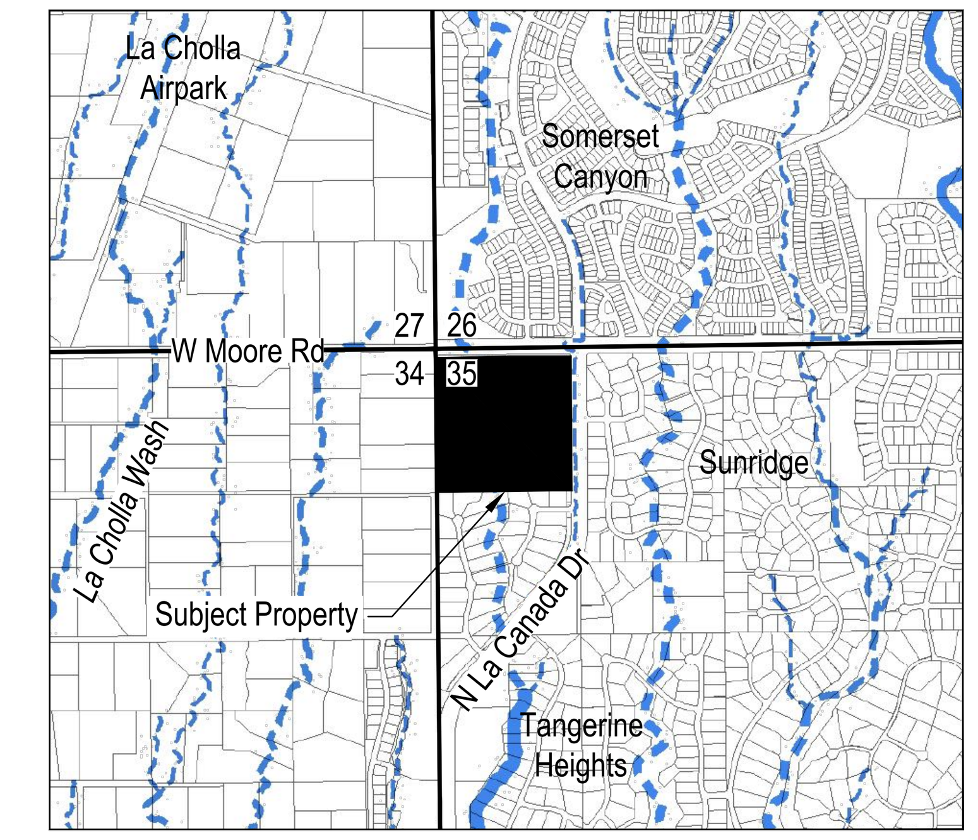
PROJECT OVERVIEW

200 100 0 200

1" = 200'-0"

SYMBOL / LINETYPE LEGEND

SYMBOL	ELEMENT
---x---x---x---	Preservation Fencing
(solid heavy line)	Property Boundary
(dashed line)	Limit of Grading
2795	Existing PAG Contour, 2' Interval
(green fill)	Proposed CRA per mapping study (Wilder 2023)



LOCATION MAP

A portion of Section 35, T11S, R13E, G&SRM, Oro Valley, Pima County, Arizona
ASSESSOR PARCEL NUMBER: 219-49-003A

3" = 1 Mile

SHEET INDEX

OWNER

THE ESTATE OF HOPSON D D H TREMONT
ATTN: GREG S. HEWETT, EXECUTOR
6110 E. SAN MARINO
TUCSON AZ 85715
PHONE: 520-241-6949
EMAIL: GREGHEWETT@ME.COM

DEVELOPER

INSIGHT HOMES
ATTN: MIKE JONES
3561 E. SUNRISE DRIVE #201
TUCSON, AZ 85718
PHONE: 520-577-6688
EMAIL: MIKE@INSIGHTHOMES.COM

LANDSCAPE ARCHITECT

WILDER LANDSCAPE ARCHITECTS
2738 E. ADAMS STREET
TUCSON, AZ 85716
PHONE: 520-320-3936
ATTENTION: JENNIFER PATTON, PLA
JENNIFER@WILDERLA.COM

SIGNIFICANT VEGETATION SUMMARY

Botanical Name	Common Name	Preserve in Place (White Flagging)	Transplant (Blue Flagging)	Remove from Site (Red Flagging)	Remove from Site (Health - Red Flagging)	Total per Species
Carnegiea gigantea	Saguaro	5	5			10
Parkinsonia florida	Blue Palo Verde		1			1
Parkinsonia microphylla	Foothill Palo Verde	8	8	27	16	59
Prosopis velutina	Velvet Mesquite	6	1	14	1	22
Senegalia greggii	Catclaw Acacia			1		1
Vachellia constricta	Whitethorn Acacia		1			1
TOTAL ALL SPECIES		19	16	42	17	94

SIGNIFICANT VEGETATION MITIGATION

Required mitigation is per Table 27-1 and % Significant Vegetation disturbance. 84 significant trees (67 viable) and 10 significant saguaros were inventoried. 42 viable trees are designated for removal. Percentage of viable Significant Vegetation to be removed from site (measured as the square footage of the ground cover area) is 64%.

Species	QTY of Viable SV to be Removed	Mitigation Ratio	Replacement Saguaros (same size or equal linear feet)	Replacement Trees (36" Box)	Replacement Trees (48" Box)	Understory Plants Required
Carnegiea gigantea (Saguaro)	0	N/A	0	0	0	0
Parkinsonia florida (Blue Palo Verde)	0	2:1		0	0	0
Parkinsonia microphylla (Foothill Palo Verde)	27	2:1		27	27	270
Prosopis velutina (Velvet Mesquite)	14	2:1		14	14	140
Senegalia greggii (Catclaw Acacia)	1	2:1		1	1	10
Vachellia constricta (Whitethorn Acacia)	0	2:1		0	0	0
TOTAL MITIGATION REQUIRED	**42**			**42**	**42**	**420**

Mitigation planting shall be shown on the Landscape Plan. Under-story plants shall be selected from the Supplemental Native Plant List, Addendum C, and shall either be transplanted from on-site or nursery plants.

APPROVAL

PLANNING & ZONING ADMINISTRATOR DATE

Contact Arizona 811 at least two full working days before you begin excavation
ARIZONA 811
Call 811 or click Arizona811.com

WILDER Landscape Architects
2738 East Adams Street
Tucson, Arizona 85716
Jennifer Patton, 520-320-3936
jennifer@wilderla.com

REGISTERED LANDSCAPE ARCHITECT
CERTIFICATE NO. 50915
JENNIFER PATTON
ARIZONA, U.S.A.
EXPIRES 6/30/2025

Date: June 9, 2024
Designed By: Wilder Team; Checked By: JP
REVISIONS:
Rev. # Date Description

SITE RESOURCE INVENTORY COVER SHEET AND SUMMARY TABLES
North Ridge Estates

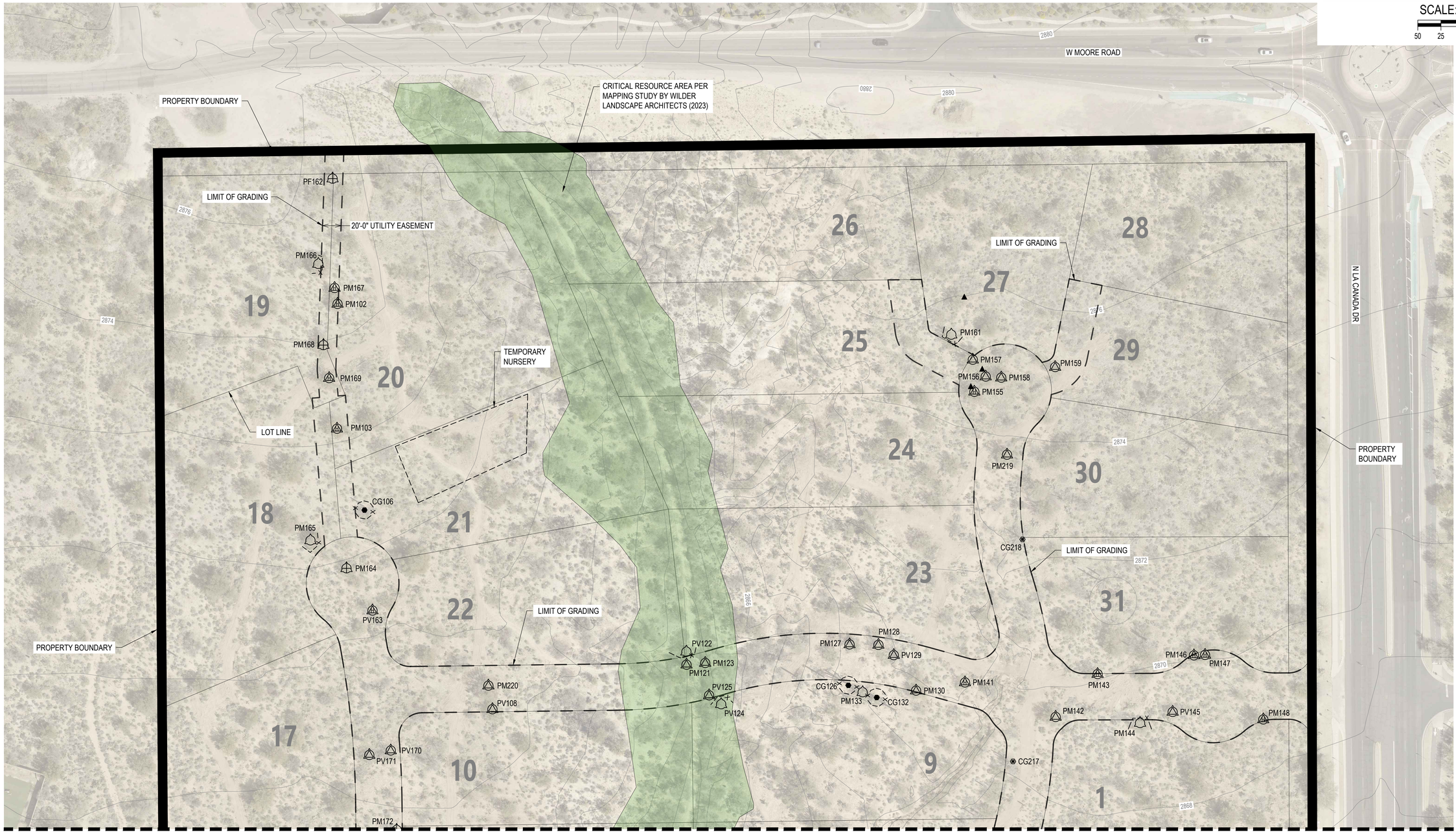
Portion of Section 35, Township 11S, Range 13E
S.R.M., Town of Oro Valley, Pima County, Arizona

ORO VALLEY CASE #: 2302611
RELATED CASE #: 2203026

SITE RESOURCE INVENTORY PLAN

SCALE: 1" = 50'-0"

50 25 0 50



MATCHLINE - REFER TO SHEET 3

SYMBOL LEGEND
Significant Vegetation

Plant Type	Preserve in Place (PIP)	Transplant on Site (TOS)	Remove From Site (RFS)	Remove From Site (Health)
Tree, Significant	⏢	⏢	⏢	⏢
Saguaro, Significant	⬢	⬢		⏢

ID

SYMBOL	ELEMENT
PV1	Plant Identification Number. Refer to Schedule of Inventoried Plants.

INVENTORIED PLANTS

ABBRV	BOTANICAL NAME	COMMON NAME
CG	Carnegiea gigantea	Saguaro
PF	Parkinsonia florida	Blue Palo Verde
PM	Parkinsonia microphylla	Foothill Palo Verde
PV	Prosopis velutina	Velvet Mesquite
SG	Senegalia greggii	Catclaw Acacia
VC	Vachellia constricta	Whitethorn Acacia

Refer to SRI Tables for a list of inventoried plants.

INVASIVE PLANTS

SYMBOL	ABBRV	BOTANICAL NAME	COMMON NAME
▲	PC	Pennisetum ciliare	Buffelgrass

SYMBOL / LINETYPE LEGEND

SYMBOL	ELEMENT
— — — x — — — x — — — x —	Preservation Fencing
	Property Boundary
— — — — — —	Limit of Grading
2795	Existing PAG Contour, 2' Interval
	Proposed CRA per mapping study (Wilder 2023)

Contact Arizona 811 at least two full working days before you begin excavation
ARIZONA811 BLUE STAKE, INC.
Call 811 or click Arizona811.com

WILDER
Landscape Architects
2738 East Adams Street
Tucson, Arizona 85716
Jennifer Patton, 520-320-3936
jennifer@wilderla.com

REGISTERED LANDSCAPE ARCHITECT 50915 JENNIFER PATTON ARIZONA, U.S.A. EXPIRES 6/30/2025

Date: June 9, 2024
Designed By: Wilder Team; Checked By: JP

REVISIONS:
Rev. # Date Description

Portion of Section 35, Township 11S, Range 13E
S.R.M., Town of Oro Valley, Pima County, Arizona

SITE RESOURCE INVENTORY PLAN

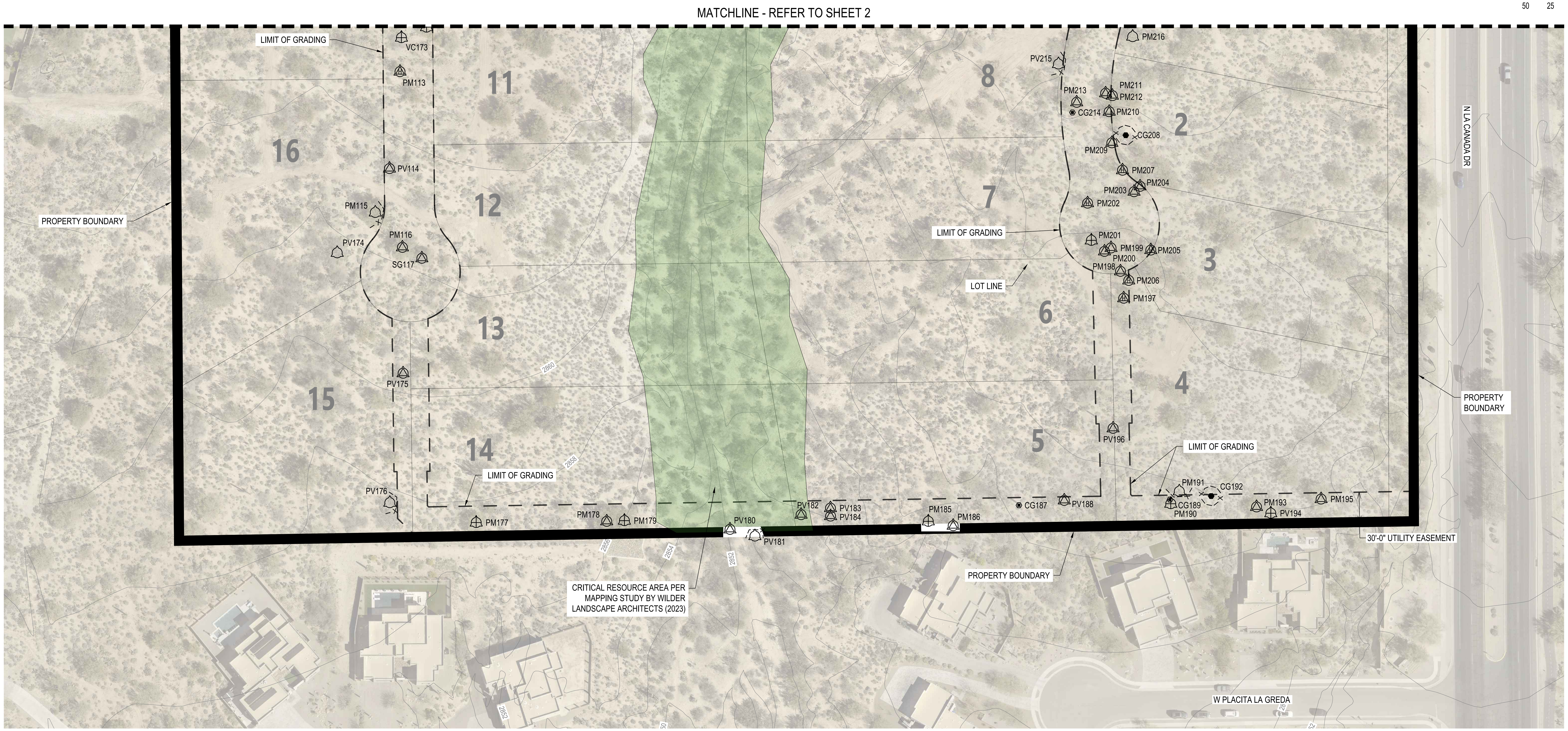
North Ridge Estates

ORO VALLEY CASE #: 2302611
RELATED CASE #: 2203026

SITE RESOURCE INVENTORY PLAN

SCALE: 1" = 50'-0"

50 25 0 50



SYMBOL LEGEND
Significant Vegetation

Plant Type	Preserve in Place (PIP)	Transplant on Site (TOS)	Remove From Site (RFS)	Remove From Site (Health)
Tree, Significant				
Saguaro, Significant	●			

ID

SYMBOL	ELEMENT
PV1	Plant Identification Number. Refer to Schedule of Inventoried Plants.

INVENTORIED PLANTS

ABBRV	BOTANICAL NAME	COMMON NAME
CG	Carnegiea gigantea	Saguaro
PF	Parkinsonia florida	Blue Palo Verde
PM	Parkinsonia microphylla	Foothill Palo Verde
PV	Prosopis velutina	Velvet Mesquite
SG	Senegalia greggii	Catclaw Acacia
VC	Vachellia constricta	Whitethorn Acacia

Refer to SRI Tables for a list of inventoried plants.

INVASIVE PLANTS

SYMBOL	ABBRV	BOTANICAL NAME	COMMON NAME
▲	PC	Pennisetum ciliare	Buffelgrass

SYMBOL / LINETYPE LEGEND

SYMBOL	ELEMENT
---x---x---x---	Preservation Fencing
	Property Boundary
— — — —	Limit of Grading
2795	Existing PAG Contour, 2' Interval
	Proposed CRA per mapping study (Wilder 2023)

WILDER
Landscape Architects
2738 East Adams Street
Tucson, Arizona 85716
Jennifer Patton, 520-320-3936
jennifer@wilderla.com

REGISTERED LANDSCAPE ARCHITECT
CERTIFICATE NO. 50915
JENNIFER PATTON
ARIZONA, U.S.A.
EXPIRES 6/30/2025

Date: June 9, 2024
Designed By: Wilder Team; Checked By: JP

REVISIONS:

Rev. #	Date	Description

Portion of Section 35, Township 11S, Range 13E S.R.M., Town of Oro Valley, Pima County, Arizona

SITE RESOURCE INVENTORY PLAN

North Ridge Estates

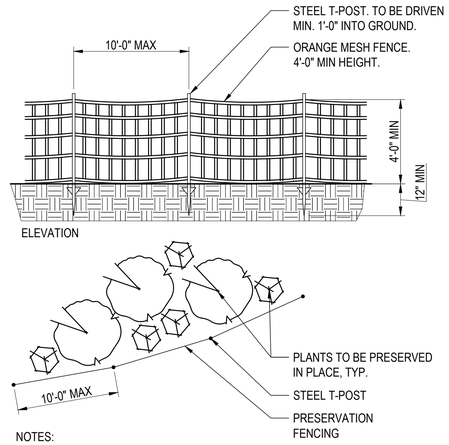
ORO VALLEY CASE #: 2302611
RELATED CASE #: 2203026

INVENTORIED SIGNIFICANT VEGETATION

ID	Caliper (Inches)	Height (Feet)	Trans-plantable	Criteria	Disposition	Notes
Carnegiea gigantea, Saguaro (CG)						
106		16	Yes		PIP	2 arms, young crest
126		24	No	B: Size and Age	PIP	4 arms, 7° lean
132		18	Yes		PIP	2 arms
187		15	Yes		TOS	8 arms
189		16	Yes		TOS	5 arms
192		16	Yes		PIP	4 arms
208		18	No	B: Size and Age	PIP	3 arms
214		18	Yes		TOS	4 arms
217		19	Yes		TOS	4 arms
218		17	Yes		TOS	5 arms
Parkinsonia florida, Blue Palo Verde (PF)						
162	12	12	No	B: Size and Age	TOS	
Parkinsonia microphylla, Foothill Palo Verde (PM)						
102	24	16	No	A: Health	RFS	scald, dropped limbs, dieback
103	24	15	No	A: Health	RFS	scald, dropped limbs, dieback
113	12	12	No	A: Health	RFS	scald, dropped limbs, dieback
115	32	16	No	B: Size and Age	PIP	Specimen
116	27	16	No	B: Size and Age	RFS	
121	19	18	No	B: Size and Age	RFS	
123	15	16	No	B: Size and Age	RFS	
127	13	12	No	B: Size and Age	RFS	
128	12	12	No	B: Size and Age	RFS	
130	14	15	No	B: Size and Age	RFS	
133	12	13	Yes		PIP	
141	14	12	No	A: Health	RFS	scald, dropped limbs, dieback
142	15	14	No	B: Size and Age	RFS	
143	12	14	No	A: Health	RFS	scald, dropped limbs, dieback
144	15	14	No	B: Size and Age	PIP	
146	16	14	No	A: Health	RFS	scald, dropped limbs, dieback
147	28	15	No	A: Health	RFS	scald, dropped limbs, dieback
148	20	18	No	A: Health	RFS	scald, dropped limbs, dieback
155	26	16	No	A: Health	RFS	scald, dropped limbs, dieback
156	14	13	No	B: Size and Age	RFS	
157	28	17	No	B: Size and Age	RFS	
158	14	15	No	B: Size and Age	RFS	
159	12	13	No	B: Size and Age	RFS	
161	12	15	No	B: Size and Age	PIP	
164	12	12	Yes		TOS	
165	22	16	No	B: Size and Age	PIP	Specimen
166	20	20	No	B: Size and Age	PIP	
167	16	12	No	A: Health	RFS	scald, dropped limbs, dieback
168	18	16	Yes		TOS	
169	20	18	No	A: Health	RFS	scald, dropped limbs, dieback
172	12	12	Yes		TOS	
177	12	13	Yes		TOS	
178	28	18	No	B: Size and Age	RFS	Specimen
179	13	15	Yes		TOS	
185	12	14	Yes		TOS	
186	20	13	No	B: Size and Age	RFS	
190	12	12	Yes		TOS	
191	18	13	No	B: Size and Age	PIP	
193	12	12	No	G: Form	RFS	
195	18	17	No	B: Size and Age	RFS	
197	15	16	No	A: Health	RFS	scald, dropped limbs, dieback
198	18	18	No	B: Size and Age	RFS	
199	12	13	No	G: Form	RFS	
200	27	18	No	B: Size and Age	RFS	
201	17	13	Yes		TOS	
202	13	14	No	A: Health	RFS	scald, dropped limbs, dieback
203	20	14	No	B: Size and Age	RFS	
204	17	13	No	B: Size and Age	RFS	
205	19	14	No	A: Health	RFS	scald, dropped limbs, dieback
206	12	12	No	A: Health	RFS	scald, dropped limbs, dieback
207	14	13	No	A: Health	RFS	scald, dropped limbs, dieback
209	15	14	No	B: Size and Age	RFS	
210	27	16	No	B: Size and Age	RFS	
211	12	13	No	G: Form	RFS	
212	12	12	No	G: Form	RFS	
213	15	17	No	B: Size and Age	RFS	
216	14	13	No	B: Size and Age	PIP	
219	18	16	No	B: Size and Age	RFS	
220	24	17	No	B: Size and Age	RFS	

ID	Caliper (Inches)	Height (Feet)	Trans-plantable	Criteria	Disposition	Notes
Prosopis velutina, Velvet Mesquite (PV)						
108	18	14	No	B: Size and Age	RFS	
114	19	13	No	B: Size and Age	RFS	
122	12	14	No	B: Size and Age	PIP	
124	22	15	No	B: Size and Age	PIP	
125	21	15	No	B: Size and Age	RFS	
129	14	12	No	B: Size and Age	RFS	
145	18	12	No	B: Size and Age	RFS	
163	24	14	No	A: Health	RFS	dropped limbs, dieback
170	12	12	No	B: Size and Age	RFS	
171	18	13	No	B: Size and Age	RFS	
174	18	15	No	B: Size and Age	PIP	
175	22	14	No	B: Size and Age	RFS	
176	13	12	No	B: Size and Age	PIP	
180	16	18	No	C: Spadeability	RFS	
181	24	12	No	B: Size and Age	PIP	
182	17	13	No	B: Size and Age	RFS	
183	20	12	No	B: Size and Age	RFS	
184	12	12	No	B: Size and Age	RFS	
188	12	12	No	B: Size and Age	RFS	
194	13	16	Yes		TOS	
196	15	13	No	B: Size and Age	RFS	
215	17	14	No	B: Size and Age	PIP	
Senegalia greggii, Catclaw Acacia (SG)						
117	12	12	No	B: Size and Age	RFS	
Vachellia constricta, Whitethorn Acacia (VC)						
173	12	12	Yes		TOS	

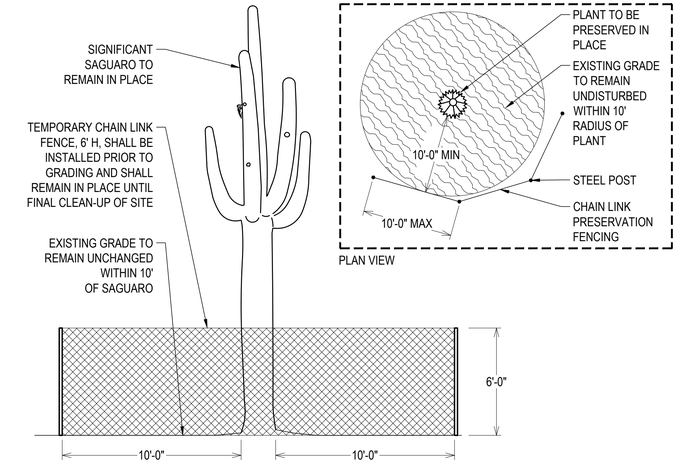
94 out of 120 ID numbers are shown in this table due to grading limits changing between inventories.



NOTES:
1. When excavating within 4'-0" from dripline of plants to be preserved in place, hand clear to minimize damage to root systems.
2. If roots are encountered during excavation, redirect roots into existing soil areas where possible. If redirection is not possible, cut roots cleanly with sharp pruning instruments.
3. Do not allow exposed and/or pruned roots to dry out. Provide temporary cover with peat moss, wrap with burlap, and maintain in a moist condition. Support and protect roots from further damage until they are permanently covered with soil.

1 PROTECTIVE FENCING

NTS



NOTES:
1. Protective fencing detail for significant saguaro is provided on this sheet for reference. Refer to The Final Site Plan for all site grading and grading details.
2. The existing grade within a 10' radius of plants to preserved in place shall remain in place - there will be no disturbance within this zone.

2 PROTECTIVE FENCING FOR SIGNIFICANT SAGUAROS (CARNEGIEA GIGANTEA) PRESERVED IN PLACE

Scale: ¼" = 1'

Contact Arizona 811 at least two full working days before you begin excavation
ARIZONA811
Call 811 or click Arizona811.com

WILDER
Landscape Architects
2738 East Adams Street
Tucson, Arizona 85716
Jennifer Patton, 520-320-3936
jennifer@wilderla.com

REGISTERED LANDSCAPE ARCHITECT 50915 JENNIFER PATTON ARIZONA U.S.A. EXPIRES 6/30/2025

Date: June 9, 2024
Designed By: Wilder Team; Checked By: JP
REVISIONS:
Rev. # Date Description

INVENTORY TABLES + DETAILS

North Ridge Estates

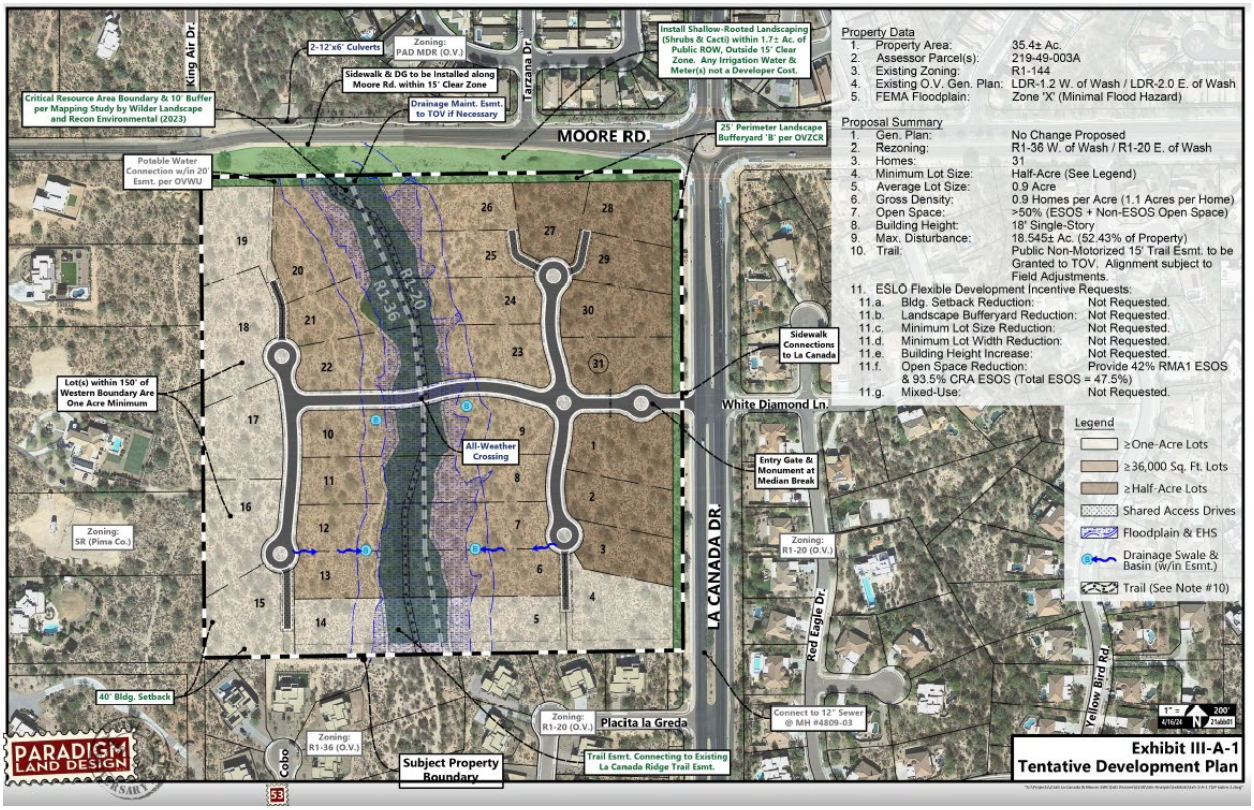
Portion of Section 35, Township 11S, Range 13E S.R.M., Town of Oro Valley, Pima County, Arizona

ORO VALLEY CASE #: 2302611
RELATED CASE #: 2203026

APPENDIX C – TRAFFIC IMPACT ANALYSIS

North Ridge Estates

Traffic Impact Analysis



Prepared for submittal to:

Town of Oro Valley, AZ

M Esparza Engineering, LLC
2934 W. Salvia Drive
Tucson, AZ 85745

November 17, 2023
Updated April 17, 2024

North Ridge Estates
Traffic Impact Analysis

Prepared for submittal to:

Town of Oro Valley, Arizona

Prepared by:
M Esparza Engineering, LLC
2934 W. Salvia Drive
Tucson, AZ 85745

Phone: (520) 207-3358
Project No. 2023.43
Marcos Esparza, P.E., Principal

November 17, 2023
Updated April 17, 2024

Table of Contents

List of Exhibits

1. Introduction and Executive Summary

Purpose of Report and Study Objectives

This updated report is provided to support a rezoning application and addresses the potential traffic impacts associated with the proposed single-family residential project located on the southwest corner of the La Canada Drive/Moore Road intersection in Oro Valley, Arizona. This update reflects the change in the number of residential lots from thirty-four to thirty-one. The project location is shown in Exhibit 1. A site plan showing the layout of the thirty-one residential lots is shown on the cover and in Exhibit 2. As shown on the site plan, access to the project will be gated and will be on La Canada Drive, opposite White Diamond Place.

The current zoning is R1-144. The proposed zoning is R1-36 and R1-20.

Exhibit 1 Project Location

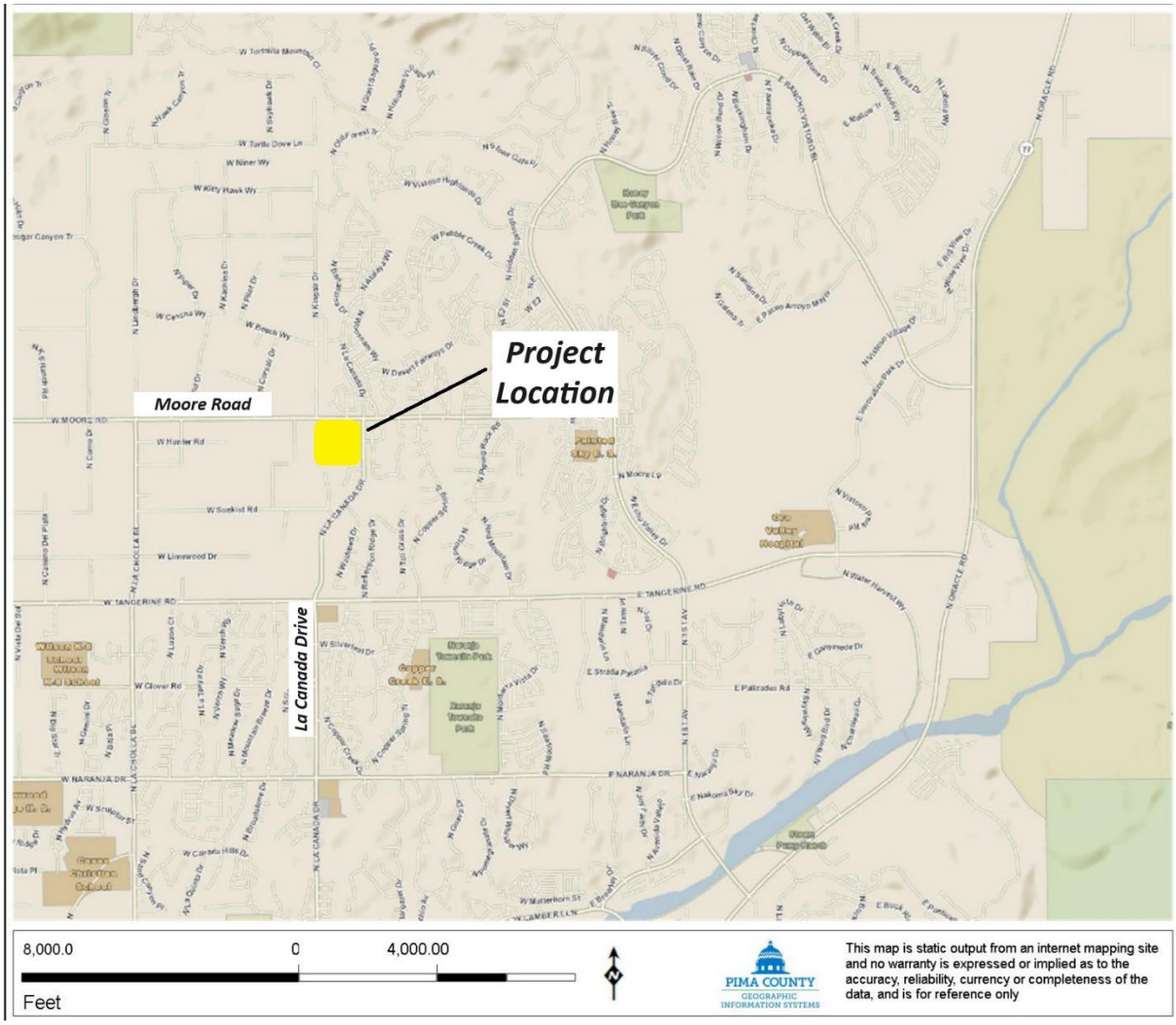
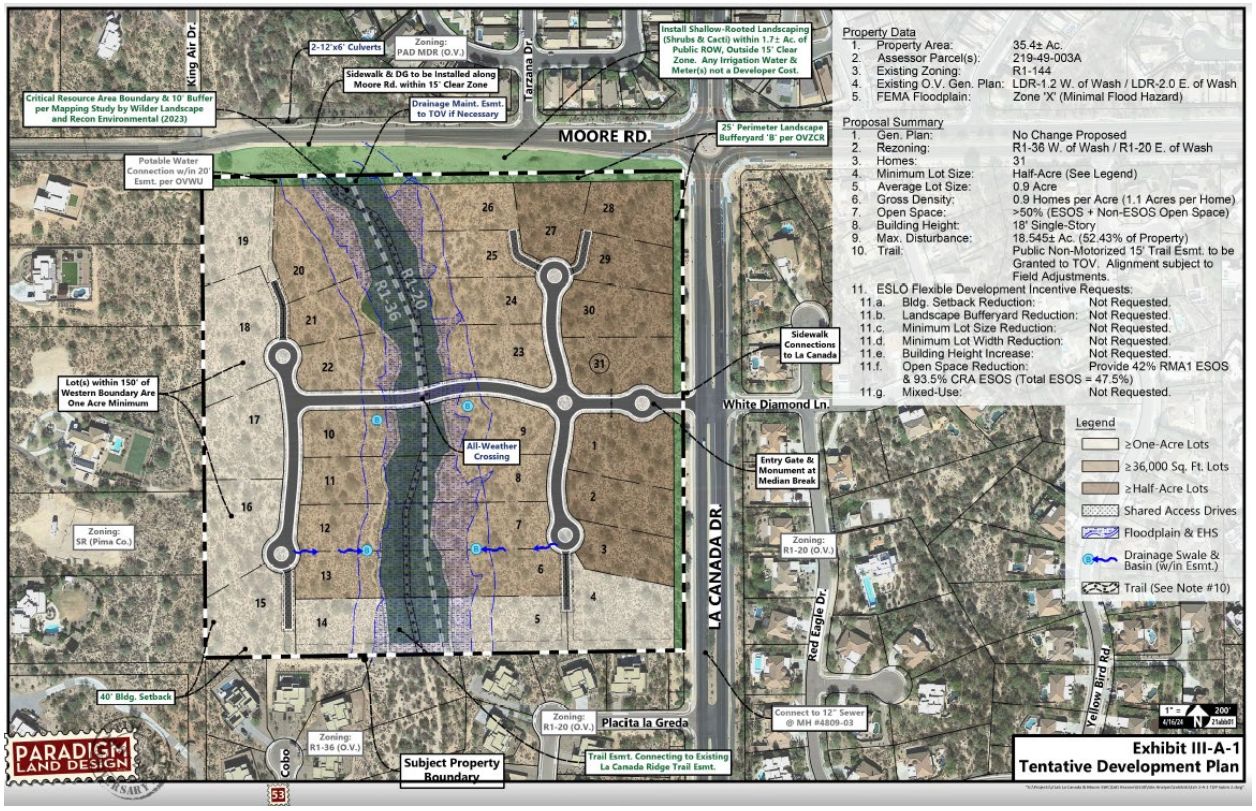


Exhibit 2 Site Plan



The objectives of this traffic study are to determine the traffic impacts of the project on the local transportation system and to recommend improvements to maintain efficient and safe traffic operations for motor vehicle uses, pedestrians, and bicyclists. This report focuses on access management, trip generation, operational analysis of the study area intersections and roadways, and the potential for a southbound right turn lane on La Canada Drive.

Summary of Findings

Study Area

The project is located south of Moore Road and west of La Canada Drive. The parcel is currently vacant. The Vistoso Highlands residential subdivision is east of the project. Other residential subdivisions are north, south, and west of the project site. The La Cholla Airpark is northwest of the site.

The study area includes the adjacent and nearby streets (La Canada Drive, Moore Road, White Diamond Place), and the intersections of La Canada Drive/White Diamond Place and La Canada Drive/Moore Road.

Development Description

The project includes thirty-one single family residential units. Access will be gated and will be on La Canada Drive opposite White Diamond Place

Principal Findings

1. The project will generate 292 daily trips, 22 AM peak hour trips and 29 PM peak hour trips.
2. All study area roadways and intersections will operate at LOS D or better based on projected 2025 daily and peak hour traffic volumes.
3. Based on a 2% background growth rate, the projected daily traffic volumes for 2025 without the project will not exceed the LOS D capacities of the project roadways and intersections.
4. A right turn lane is not numerically warranted for the southbound right turns from La Canada Drive into the project driveway.
5. The driveway spacing and corner clearances for the project driveway meet Pima County and Oro Valley standards.
6. The provision of gated entrances should conform to Oro Valley Subdivision Street Standards.
7. Roadway and subdivision design should conform to current jurisdictional standards. This includes ensuring that sight distance requirements are met.
8. All new traffic signs and markings, on-site and off-site, must comply fully with the *Manual on Uniform Traffic Control Devices* and Town requirements.

2. Proposed Development

Site Location

The project location is shown in Exhibit 1. The project is located on the southwest corner of the La Canada Drive/Moore Road intersection in Oro Valley, Arizona.

Land Use and Intensity

As shown in Exhibit 2, the project is a gated residential subdivision that will include thirty-one single family residential lots. It will be on a parcel currently zoned R1-144 which will be rezoned to R1-36 and R1-20.

Proposed Access

There is one proposed access locations off of La Canada Drive and opposite White Diamond Place. The access will be gated with keypad entry.

Development Phasing and Timing

For the purposes of this report, the buildout year is assumed to be 2025.

3. Study Area Conditions

Area Characteristics

Land Uses

The project area is adjacent to existing residential subdivisions on all sides. The site is currently vacant.

Anticipated Future Development

There are no major proposed development projects in the project study area, or in the vicinity of the project.

Program for Completion of Roadway and Intersection Improvements

There are no projects in the vicinity of the project listed in the 2022-2026 Pima Association of Governments Transportation Improvement Program.

Existing Roads

La Canada Drive and Moore Road will provide regional access to the site. Both are designated as major collectors in the Oro Valley General Plan. La Canada Drive is a north/south four-lane collector road east of the site. It has a posted speed limit of 35 mph north of Moore Road and a speed limit of 45 mph south of Moore Road.

Moore Road is a four-lane collector east of La Canada Drive. It narrows to a two-lane road west of La Canada Drive. It has a posted speed limit of 35 mph in the vicinity of the project.

Both roads have pedestrian and bicycle infrastructure in the vicinity of the project. Exhibit 3 provides a physical inventory of the roadways within or near the study area.

Exhibit 3 Roadway Inventory

Road	*Segment*	*Travel Lanes*	*Speed Limit*	*Sidewalk/ Share Use Path*	*Oro Valley Bike Map Designation*	*Bus Service*	*ADT*	*ADT Year*	*Source*	*LOS D Capacity (vpd)*
Moore Road	West of La Canada Drive	2	35 MPH	SW: North Side	Signed Bike Route w/ On-Street Multipurpose Lane to Kingair Drive	Oro Valley-Catalina Dial-A-Ride ADA Transit Service	3,726	2022	PAG	13,320
Moore Road	East of La Canada Drive	4	35 MPH	SW: Both Sides	Signed Bike Route w/ On-Street Multipurpose Lane	Oro Valley-Catalina Dial-A-Ride ADA Transit Service	6,290	2023	Estimated from FDS/PAG Counts	29,160
La Canada Drive	North of Moore Road	2/4	35 MPH	SW: Both Sides	Paved Shared Use Path	Oro Valley-Catalina Dial-A-Ride ADA Transit Service	6,295	2022	PAG	13,986 (2-lanes); 29,160 (4-lanes)
La Canada Drive	South of Moore Road	4	45 MPH	SW: West Side; SUP: East Side	Signed Bike Route w/ On-Street Multipurpose Lane	Oro Valley-Catalina Dial-A-Ride ADA Transit Service	10,150	2023	FDS	35,820

FDS - Field Data Services of Arizona
PAG - Pima Association of Governments

Access

There is one proposed access location for this project, on La Canada Drive.

Study Area

The study area includes the adjacent roadways and intersections.

Physical Characteristics

Roadway Characteristics

La Canada Drive and Moore Road are major collectors. White Diamond Place is a local road opposite the project site.

La Canada Drive is a major regional four-lane north-south collector that continues north as a four-lane divided residential collector through Moore Road, transitions to a two-lane divided road and terminates at Pebble Creek Drive. South of the project site, La Canada Drive continues south into unincorporated Pima County, and becomes Flowing Wells Road at River Road.

Moore Road is an east-west collector that continues east from La Canada Drive into Rancho Vistoso. West of La Canada Drive, it continues east as a two-lane roadway through unincorporated Pima County and into the Town of Marana.

The speed limit on Moore Road and on La Canada Drive north of Moore Road, the speed limit is 35 mph. The posted speed limit on La Canada Drive south of Moore Road is 45 mph. There are bicycle lanes and sidewalks or multi-use paths on each road, as indicated in Exhibit 3.

Existing Intersections

The study area intersections are La Canada Drive/Moore Road and La Canada Drive/White Diamond Place. La Canada/Moore is a four-leg roundabout intersection with yield control on each approach. La Canada Drive/White Diamond Place is a three-leg unsignalized intersection with stop sign control on the White Diamond Place approach.

Ground Photos

Ground photos of the project area are provided in Exhibit 4.

Exhibit 4 Ground Photographs

Looking West toward La Canada Drive from White Diamond Place. The project access will be opposite White Diamond Place.

Looking South on La Canada Drive from the Project Access.

Looking North on La Canada Drive toward Moore Road from the Project Access.

Transit Service

The area is served by Oro Valley Sun Shuttle Dial-A-Ride transit program.

Pedestrian/Bicycle Facilities

Oro Valley Bike Map designations for the project roadways are provided in Exhibit 3. There is good bicycle route connectivity adjacent to and in the vicinity of the project.

Traffic Volumes

Peak Periods

The study area includes the adjacent and nearby streets (La Canada Drive, Moore Road, White Diamond Place), and the intersections of La Canada Drive/White Diamond Place and La Canada Drive/Moore Road.

Field Data Services of Arizona collected peak period turning movement counts at these intersections in November 2023. Exhibit 5 shows the 2023 (Existing) peak hour turning movement volumes. Traffic data documentation is provided in the appendix.

Daily Traffic Volumes

Daily traffic volumes for most study area roadways are available on PAG's website. Field Data Services collected daily traffic volumes on La Canada Drive south of Moore in November 2023.

Level of Service

Level of service (LOS) is a qualitative description of how well a roadway or intersection operates under prevailing traffic conditions. A grading system of A through F, similar to academic grades, is utilized. LOS A is free-flowing traffic, whereas LOS F is forced flow and extreme congestion.

Intersection Performance

Under existing conditions, the operational analysis for the La Canada Drive/Moore Road and La Canada Drive/White Diamond Lane intersections found that all movements at the intersections operate at LOS D or better during the weekday peak hours The results are shown in Exhibit 6.

Roadway Performance

Exhibit 3 (Roadway Inventory) shows the estimated current traffic volumes, capacity, and LOS for the average weekday on the nearby roadway segments.

Exhibit 5 Existing Peak Hour Intersection Volumes

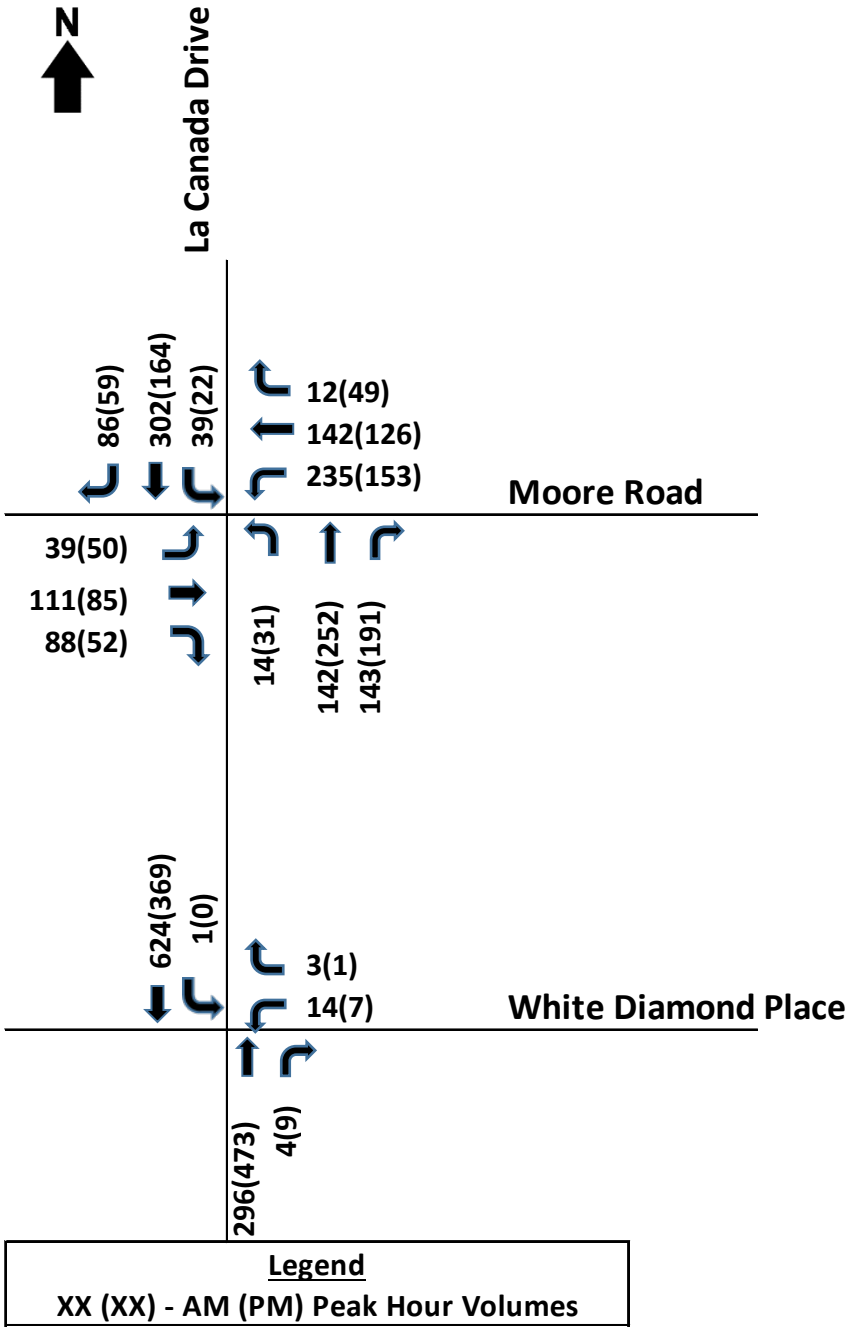


Exhibit 6 Existing Intersection Synchro Summary

La Canada/Moore	Existing 2023 AM Delay (sec/veh)	AM LOS	Existing 2023 PM Delay (sec/veh)	PM LOS
Eastbound				
Left/Through	7.8	A	5.1	A
Right	6.6	A	4.2	A
Approach	*7.4*	*A*	*4.9*	*A*
Westbound				
Left/Through	7.8	A	7.5	A
Right	3.3	A	4.2	A
Approach	*7.6*	*A*	*7.0*	*A*
Northbound				
Left/Through	4.7	A	5.5	A
Right	4.6	A	4.6	A
Approach	*4.7*	*A*	*5.1*	*A*
Southbound				
Left/Through	10.3	B	5.7	A
Right	5.2	A	4.3	A
Approach	*9.2*	*A*	*5.3*	*A*
Intersection	***7.4***	***A***	***5.7***	***A***

La Canada/White Diamond	Existing 2023 AM Delay (sec/veh)	AM LOS	Existing 2023 PM Delay (sec/veh)	PM LOS
Eastbound				
Left/Through/Right	N/A	N/A	N/A	N/A
Westbound				
Left/Through/Right	15.4	C	15.0	C
Northbound				
Left/U-Turn	0.0	A	0.0	A
Southbound				
Left	8.1	A	0.0	A

Safety Related Deficiencies

ADOT collects crash data for all roadways within the state. We reviewed the data for the intersections and roadways near the project site for the most recently available five-year period (2018-2022).

Roadway Segment Crashes

As shown in Exhibit 7a, there were seven roadway segment crashes on La Canada Drive and on Moore Road during the five-year period. Five were single vehicle crashes, one was a rear end crash, and one was a head on crash. Four of the seven were property-damage only crashes, two were injury crashes and there was one fatality. There were no recorded crashes on La Canada Drive south of Moore Road during the five-year period.

Intersection Crashes

As shown in Exhibit 7b, there were twelve intersection crashes at La Canada Drive/Moore Road during the five-year period. Most of the crashes were angle type crashes (5), although most of these occurred prior to the reconstruction of the intersection to a roundabout. Seven of the twelve were non-injury crashes. The five-year crash rate at this intersection was 0.50 crashes per million-entering-vehicles.

There was one intersection crash at the La Canada Drive/White Mountain Place intersection during the five-year period.

Exhibit 7a Crash Data – Roadway Segments

La Canada Drive: Moore Road to 1/2 Mile north of Moore Road

Crash Type	2018	2019	2020	2021	2022	2018-2022	%
Single Vehicle	1	1	2			4	100%
Crash Rate (per MVM)	0.87	1.74	0.00	0.00	3.48	0.70	

Severity						Total	%
Bodily Injury			1			1	25%
Property Damage	1	1	1			3	75%

Moore Road: La Canada Drive to 1/2 Mile west of La Canada Drive

Crash Type	2018	2019	2020	2021	2022	2018-2022	%
Single Vehicle	1					1	50%
Head On		1				1	50%
Crash Rate (per MVM)	1.47	1.47	0.00	0.00	0.00	0.59	

Severity						Total	%
Fatality		1				1	50%
Property Damage	1					1	50%

Moore Road: La Canada Drive to 1/2 Mile east of La Canada Drive

Crash Type	2018	2019	2020	2021	2022	2018-2022	%
Rear End					1	1	100%
Crash Rate (per MVM)	0.00	0.00	0.00	0.00	0.87	0.17	

Severity						Total	%
Bodily Injury						0	0%
Property Damage					1	1	100%

Note: MVM = Million Vehicle Miles

Exhibit 7b Crash Data – Intersections

La Canada/Moore

Crash Type	2018	2019	2020	2021	2022	Total	%
Single Vehicle				2	1	3	25%
Angle	2	1	1		1	5	42%
Rear End	1	1		1		3	25%
Other			1			1	8%
Total	3	2	2	3	2	12	
Crash Rate (per MVE)	0.62	0.41	0.41	0.62	0.41	0.50	

Severity						Total	%
Bodily Injury	3	1	1			5	42%
Property Damage		1	1	3	2	7	58%

La Canada/White Diamond

Crash Type	2018	2019	2020	2021	2022	Total	%
Single Vehicle			1			1	100%
Total	0	0	1	0	0	1	
Crash Rate (per MVE)	0.00	0.00	0.26	0.00	0.00	0.05	

Severity						Total	%
Bodily Injury						0	0%
Property Damage			1			1	100%

Note: MVE = Million Vehicles Entering the Intersection

4. Projected Traffic

Site Traffic Forecasting

Trip Generation

The future traffic from the project is estimated using the trip rates contained in the Institute of Traffic Engineers' *Trip Generation Manual,* 11th Edition. The number of trips generated is the mathematical product of land use intensity (building square footage, number of dwelling units, etc.) and the trip generation rate, based on an average rate or from a fitted curve equation. The result is the total number of one-way trips (not round trips) expected to be generated by the project. These trips represent the number of vehicles estimated to enter and leave the project.

Trip Generation

We applied the average trip rates for weekday, AM and PM peak hour trip generation from *Trip Generation Manual* to estimate trip generation for the land use, Single Family Detached Unit (ITE Land Use 210).

Exhibit 8 shows the trip rates and estimated trip generation. Based on the trip rates for the project land use, the project generates about 292 daily one-way trips with 22 during the AM peak hour and 29 during the PM peak hours.

Exhibit 8 Trip Generation

				Trip Generation Average Rates					
				Weekday AM		Weekday PM		Avg Weekday	
Land Use	*Unit*	*No. Units*	*ITE Categ.*	*In*	*Out*	*In*	*Out*	*In*	*Out*
Single Family Detached Unit	Units	31	210	0.7		0.94		9.43	
				26%	74%	63%	37%	50%	50%

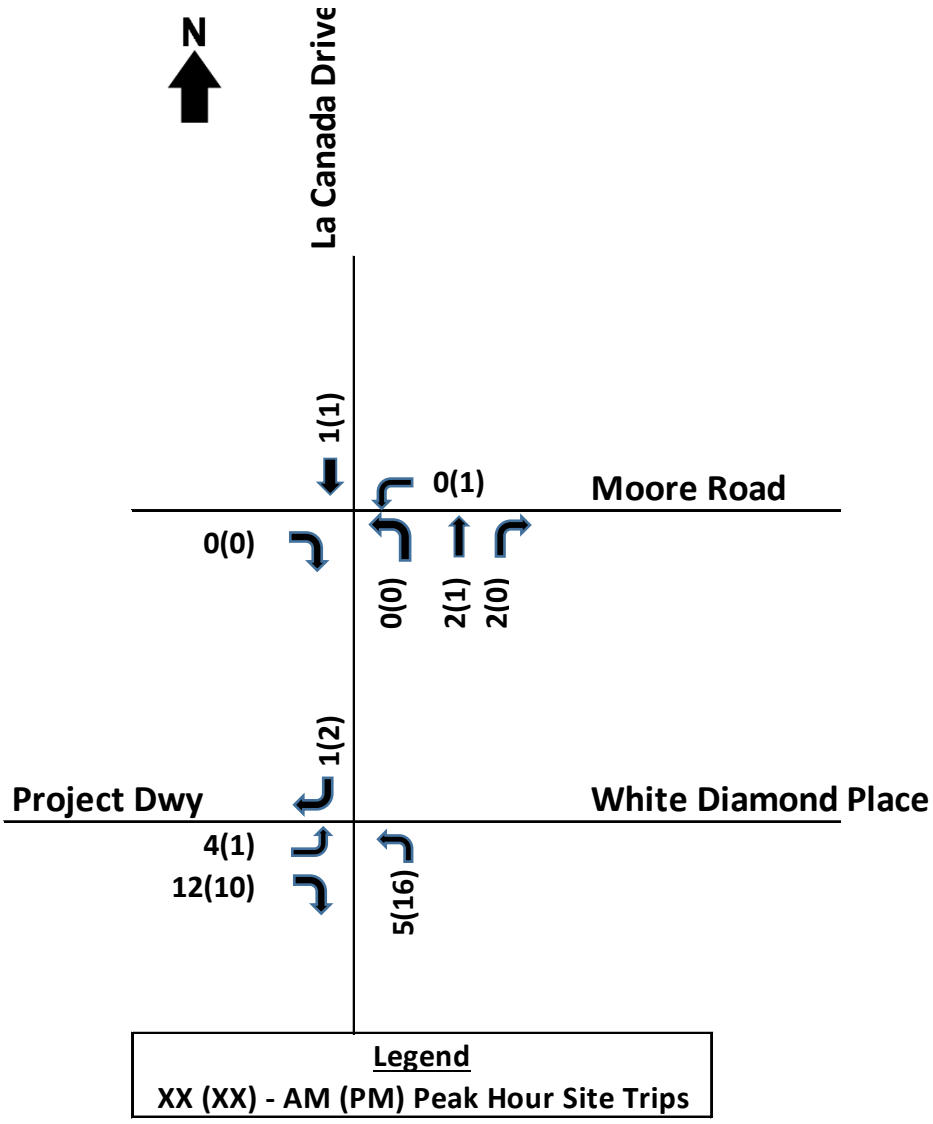
				Trip Generation					
				Weekday AM		Weekday PM		Avg Weekday	
Phase 1	*Unit*	*No. Units*	*ITE Categ.*	*In*	*Out*	*In*	*Out*	*In*	*Out*
Single Family Detached Unit	1000 SF	31	210	22		29		292	
				6	16	18	11	146	146

Note: AM, PM Rates based on Peak Hour of Adjacent Street Traffic (7-9 AM; 4-6 PM)

Trip Distribution and Assignment

We collected traffic data at the study area intersections to determine what the distribution of trips is on La Canada Drive and on Moore Road. Based on the existing volumes at this intersection, we applied a 90%/10% Southbound/Northbound distribution at the project access driveway to the project trips. The majority of the site traffic will be via La Canada Drive to the south. The site trip distribution and assignment are shown in Exhibit 9.

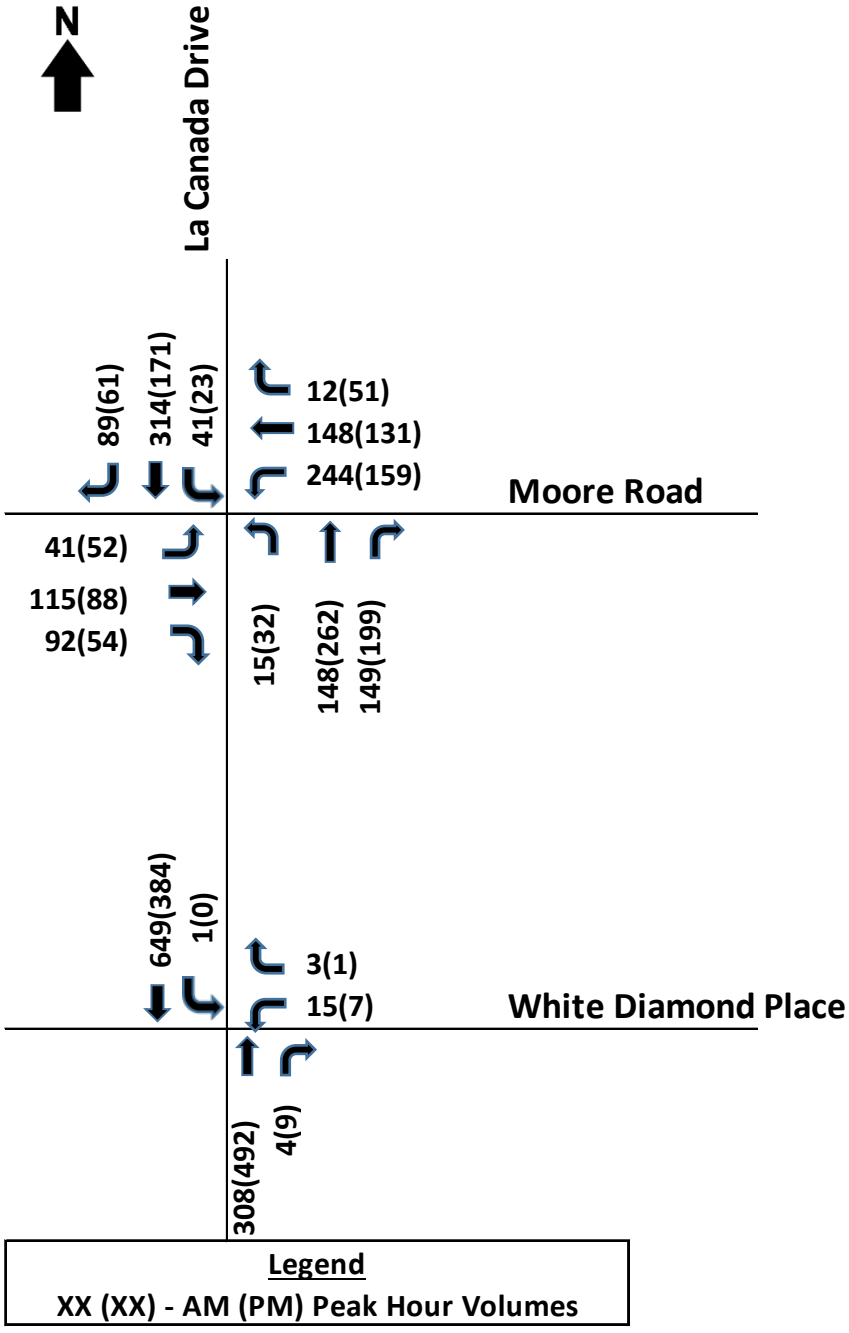
Exhibit 9 Site Traffic Assignment



Background Traffic

We applied a 2% per year growth factor to the recorded peak hour volumes at the project intersections and at the project roadways to estimate 2025 "no project" volumes. Year 2025 intersection peak hour intersection volumes for the no project condition are shown in Exhibit 10. Year 2025 daily roadway volumes for the no project condition are shown in Exhibit 11. As shown in Exhibit 11, the daily volumes under the no project condition are well below the LOS D daily volume threshold capacities.

Exhibit 10 Future Intersection Peak Hour Volumes – 2025 (No Project)



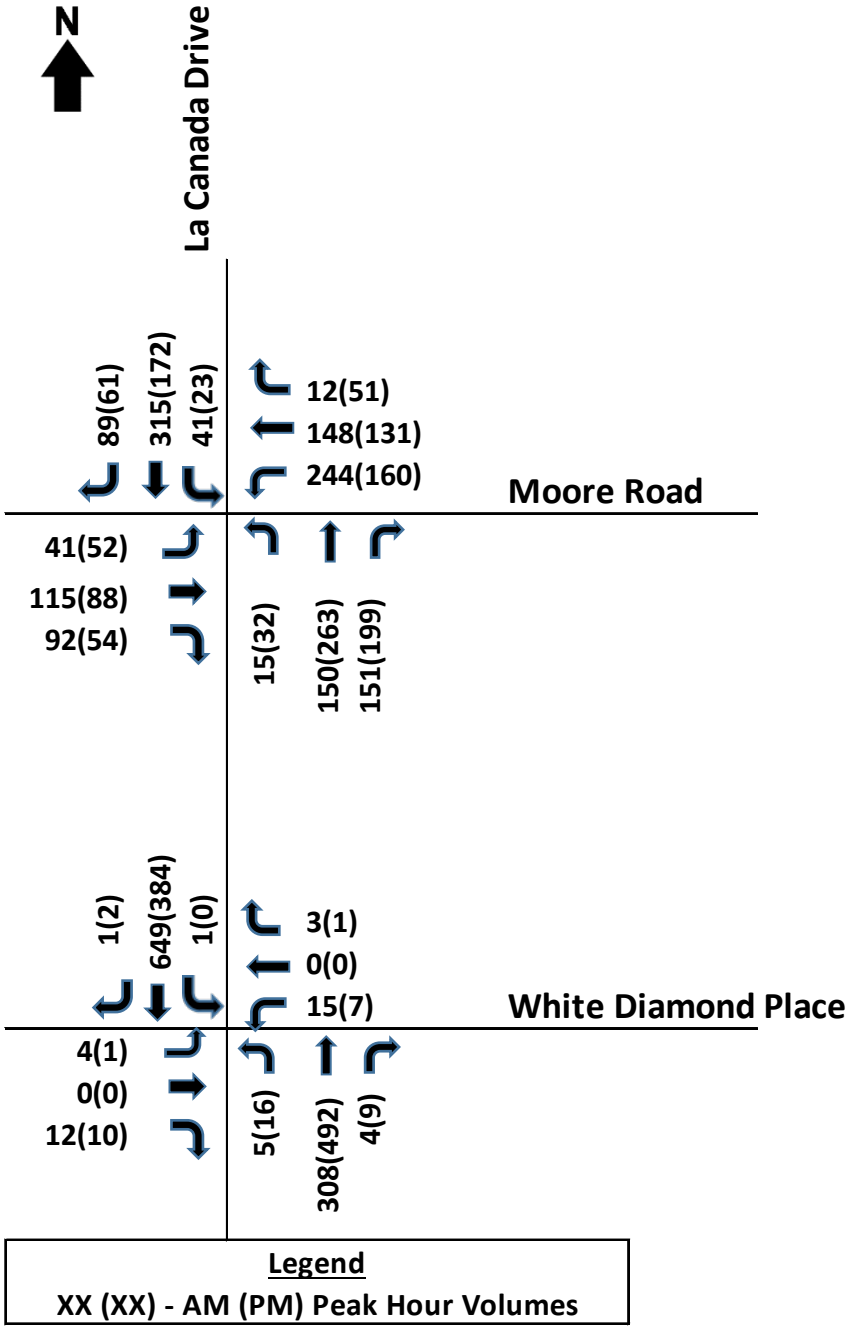
Total Traffic

We added the site trips to the 2025 no project volumes to estimate 2025 "with project" volumes. Year 2025 intersection with project peak hour intersection volumes are shown in Exhibit 12. Year 2025 daily roadway volumes are shown in Exhibit 11. As shown in Exhibit 11, the daily volumes are well below the LOS D daily volume threshold capacities.

Exhibit 11 Year 2025 Daily Traffic Volumes and Capacities

Road	*Segment*	*LOS D Capacity (vpd)*	*2025 ADT (No Project)*	*Daily Site Trips*	*2025 ADT (with Project)*
Moore Road	West of La Canada Drive	13,320	3,877	6	3,882
Moore Road	East of La Canada Drive	29,160	6,544	9	6,553
La Canada Drive	North of Moore Road	13,986 (2-lanes); 29,160 (4-lanes)	6,680	44	6,724
La Canada Drive	South of Moore Road	35,820	10,771	234	11,005

Exhibit 12 Future Intersection Peak Hour Volumes – 2025 (With Project)



5. Traffic and Improvement Analysis

Level of Service Analysis

With Project

We conducted intersection capacity analyses for the study area intersections for the build out year 2025 under the with project condition only. The results of the intersection analysis are shown in Exhibit 13. All movements operate at LOS D or better.

Exhibit 13 Intersection Level of Service – Future Conditions

	2025 With Project			
	AM		PM	
La Canada/Moore	**Delay (sec/veh)**	**LOS**	**Delay (sec/veh)**	**LOS**
Eastbound				
Left/Through	8.3	A	5.3	A
Right	6.9	A	4.3	A
Approach	*7.7*	*A*	*5.0*	*A*
Westbound				
Left/Through	8.2	A	7.9	A
Right	3.3	A	4.3	A
Approach	*8.0*	*A*	*7.3*	*A*
Northbound				
Left/Through	4.9	A	5.6	A
Right	4.7	A	4.7	A
Approach	*4.8*	*A*	*5.3*	*A*
Southbound				
Left/Through	11.0	B	5.9	A
Right	5.4	A	4.4	A
Approach	*9.9*	*A*	*5.6*	*A*
Intersection	***7.8***	***A***	***5.9***	***A***

	2025 With Project			
	AM		PM	
La Canada/White Diamond	**Delay (sec/veh)**	**LOS**	**Delay (sec/veh)**	**LOS**
Eastbound				
Left/Through/Right	14.8	B	10.4	B
Westbound				
Left/Through/Right	18.7	C	18.1	C
Northbound				
Left/U-Turn	9.5	A	8.3	A
Southbound				
Left	8.1	A	0.0	A

Off Site Improvements

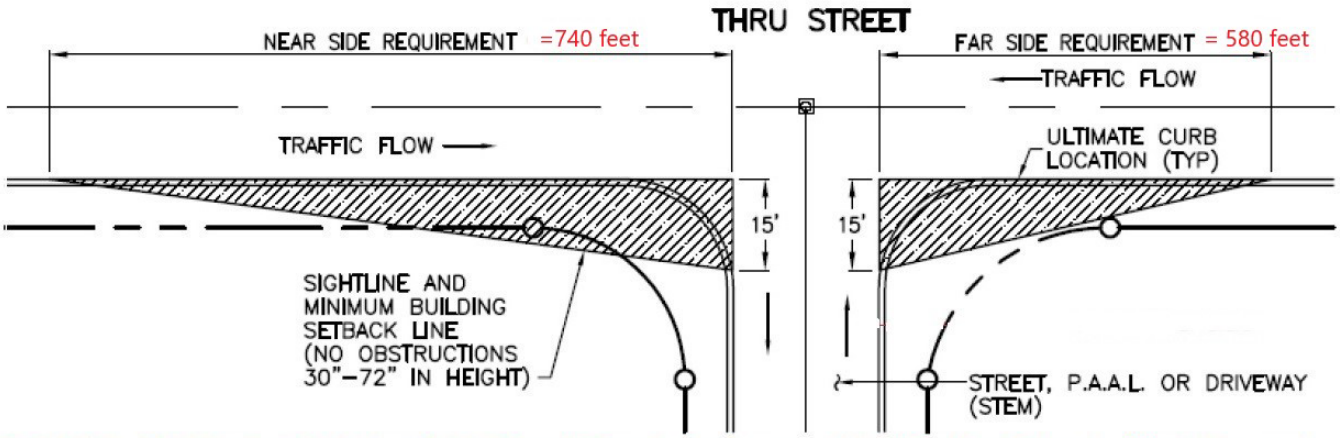
There is an existing curb cut on La Canada Drive at the proposed driveway location. The driveway will be designed to meet standards in the Oro Valley Subdivision Street Standards and Policies Manual.

Traffic Safety

Sight Distance

Sight distances at the project driveway should meet the criteria in Oro Valley's Subdivision Street Standards and Policies Manual. Based on the design speed of 50 mph (5 mph over the speed limit of 45 mph) on La Canada Drive (see Exhibit 14), the near side distance should be 740 feet. The far side distance should be 580 feet.

Exhibit 14 Sight Distance Requirements

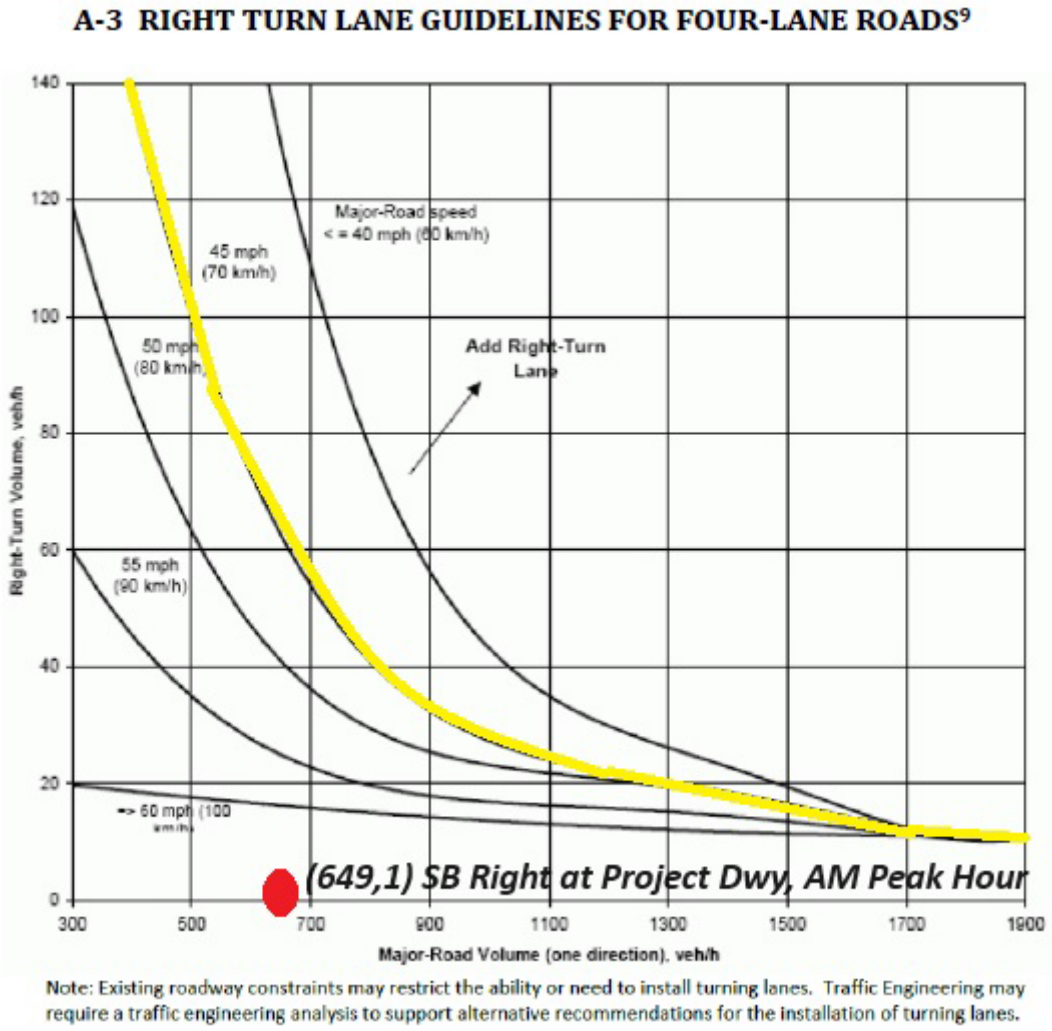


Per Oro Valley Subdivision Street Standards and Policies Manual, SVT must be 5 mph over speed limit (45 mph), so SVT based on 50 mph design speed.

Acceleration/Deceleration Lanes, Auxiliary Lanes

Turn lane warrant criteria from the *Pima County Subdivision and Development Street Standards* were applied to determine whether a southbound right turn lane is warranted at the project intersection on La Canada Drive, a 45-mph roadway. There is an existing two-way left turn lane along La Canada Drive at the project driveway, so only the right turn lane warrant analysis was conducted. Exhibit 15 shows the right turn lane warrant criteria and where the southbound right turn lane volumes under the 2025 With Project condition fall on the chart. A right turn lane is not warranted at the project driveway.

Exhibit 15 Right Turn Lane Warrant Chart



Note: First number within parentheses is the major road peak hour volume; second number is the projected peak hour right turn volume.
Source: Pima County Subdivision and Development Street Standards, 2016

Driveway Spacing

As shown in the site plan, the driveway is directly opposite White Diamond Place, and there are no other driveways within 230 feet of the driveway. Therefore, the location of the driveway meets Pima County standards for driveway spacing on a 45-mph road. Oro Valley defers to Pima County standards for driveway spacing.

Gated Access

The development will have gated access. Pima County includes guidance on the placement of gates at the entrances to residential developments in their Subdivision and Development Street Standards:

"Gated entrances shall be allowed for commercial/industrial developments such as apartments where on-site parking areas are privately maintained and for residential subdivisions with private streets. Gated entries shall meet the following requirements:

Stopping locations (keypads, card-readers, guard shacks, etc.) shall be set back from the right-of-way of the cross street to avoid interfering with through traffic and to provide protection for entering vehicles.

The gate may not encroach into the travel lane when open.

Each side of a median-divided roadway/driveway shall be at least 16 feet wide to provide accessibility of emergency vehicles.

Any equipment or obstructions such as keypads or card-readers shall be installed in a median island.

The design of the entrance shall allow vehicles that do not go past the gate to turn around without interfering with other traffic.

The turnaround area shall be located within the development boundary outside of the collector or arterial right-of-way.

Gate Queuing Analysis

Using a basic Poisson distribution methodology, it is possible to estimate the average queue at a gate. The entering volume of 18 entering volumes per hour at the project driveway was applied to this analysis. We also assume that it takes an average of 30 seconds for a driver to activate the gate and to enter. The following queue equation is applied:

$E(n) = \rho/(1-\rho) = \lambda/(\mu - \lambda)$,

Where:

λ = arrival rate, in this case 18 vehicles/hour, or 0.3/minute,
μ = service rate, in this case 30 seconds per vehicle/hour, or 2 vehicles/minute,
$\rho = \lambda/\mu = 0.15$. This is the traffic intensity, or utilization factor.

This equation estimates the average number of queued vehicles plus the vehicle entering the gate.

The average number of vehicles in the queue is then:

$0.15/(1-0.15) = 0.18$ vehicle on average at the gate.

The probability that there will be three vehicles at the gate is:

$P(3) = \rho^3 \times P(0)$, where P(0) is the probability of no queue, and $P(0) = 1-\rho = 0.85$,

$= 0.15^3 \times 0.85 = 0.003$, or less than a 1% probability of a queue of 3 vehicles.

The probability of four or more vehicles queued decreases rapidly, so it can be estimated that there is a 99% probability that entering vehicles will not back up to the street if storage for at least three vehicles

is provided between the gate and the street. For this reason, it is recommended that there be enough space for three to four vehicles to queue before the gate keypad.

Alternative Modes Considerations

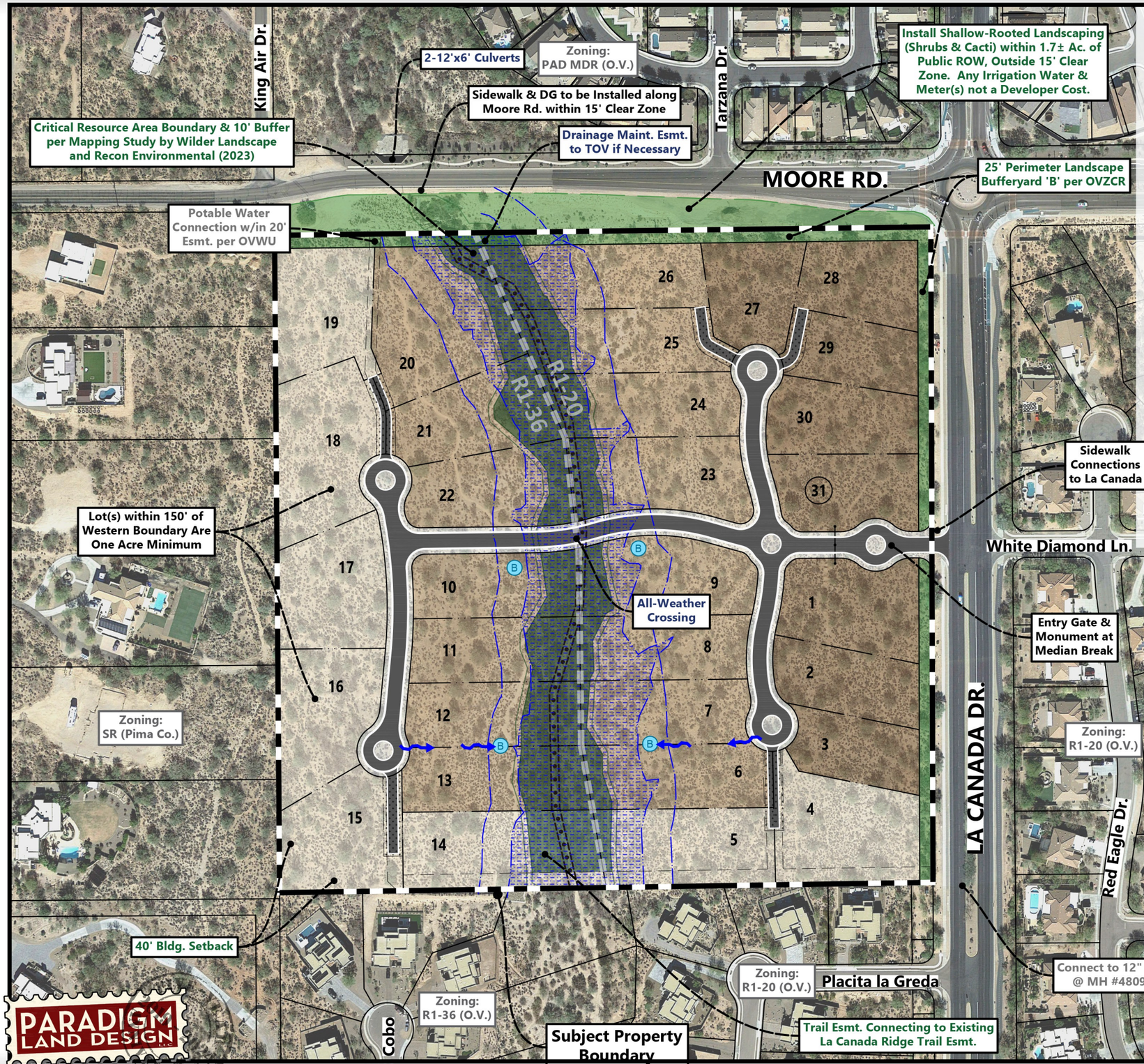
La Canada Drive has bike lanes, sidewalks and/or multi-use paths in the vicinity of the project. The area is well served for alternate modes.

6. Conclusions and Recommendations

1. The project will generate 292 daily trips, 22 AM peak hour trips and 29 PM peak hour trips.
2. All study area roadways and intersections will operate at LOS D or better based on projected 2025 daily and peak hour traffic volumes.
3. Based on a 2% background growth rate, the projected daily traffic volumes for 2025 without the project will not exceed the LOS D capacities of the project roadways and intersections.
4. A right turn lane is not numerically warranted for the southbound right turns from La Canada Drive into the project driveway.
5. The driveway spacing and corner clearances for the project driveway meet Pima County and Oro Valley standards.
6. The provision of gated entrances should conform to Oro Valley Subdivision Street Standards.
7. Roadway and subdivision design should conform to current jurisdictional standards. This includes ensuring that sight distance requirements are met.
8. All new traffic signs and markings, on-site and off-site, must comply fully with the *Manual on Uniform Traffic Control Devices* and Town requirements.

Appendix

- Site Plan
- Traffic Data
- Synchro Analysis



Property Data

1.	Property Area:	35.4± Ac.
2.	Assessor Parcel(s):	219-49-003A
3.	Existing Zoning:	R1-144
4.	Existing O.V. Gen. Plan:	LDR-1.2 W. of Wash / LDR-2.0 E. of Wash
5.	FEMA Floodplain:	Zone 'X' (Minimal Flood Hazard)

Proposal Summary

1.	Gen. Plan:	No Change Proposed
2.	Rezoning:	R1-36 W. of Wash / R1-20 E. of Wash
3.	Homes:	31
4.	Minimum Lot Size:	Half-Acre (See Legend)
5.	Average Lot Size:	0.9 Acre
6.	Gross Density:	0.9 Homes per Acre (1.1 Acres per Home)
7.	Open Space:	>50% (ESOS + Non-ESOS Open Space)
8.	Building Height:	18' Single-Story
9.	Max. Disturbance:	18.545± Ac. (52.43% of Property)
10.	Trail:	Public Non-Motorized 15' Trail Esmt. to be Granted to TOV. Alignment subject to Field Adjustments.
11.	ESLO Flexible Development Incentive Requests:	
11.a.	Bldg. Setback Reduction:	Not Requested.
11.b.	Landscape Bufferyard Reduction:	Not Requested.
11.c.	Minimum Lot Size Reduction:	Not Requested.
11.d.	Minimum Lot Width Reduction:	Not Requested.
11.e.	Building Height Increase:	Not Requested.
11.f.	Open Space Reduction:	Provide 42% RMA1 ESOS & 93.5% CRA ESOS (Total ESOS = 47.5%)
11.g.	Mixed-Use:	Not Requested.

Legend

- ≥One-Acre Lots
- ≥36,000 Sq. Ft. Lots
- ≥Half-Acre Lots
- Shared Access Drives
- Floodplain & EHS
- Drainage Swale & Basin (w/in Esmt.)
- Trail (See Note #10)

1" = 200'
4/16/24 N 21abb01

PARADIGM LAND DESIGN

Exhibit III-A-1
Tentative Development Plan

"G:\Projects\21ab La Canada & Moore SWC\b01 Rezone\0230\Site Analysis\Exhibits\Exh 3-A-1 TDP Subm 2.dwg"

Intersection Turning Movement
Prepared by:

FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745

veracitytrafficgroup

N-S STREET: La Canada Dr DATE: 11/02/23 LOCATION: Oro Valley

E-W STREET: White Diamond Pl DAY: THURSDAY PROJECT# 23-1537-002

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	2	0	1	2	0	0	0	0	0	1	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	0	49	0	0	157	0	0	0	0	4	0	2	212
7:15 AM	0	65	1	0	196	0	0	0	0	2	0	1	265
7:30 AM	0	85	1	1	164	0	0	0	0	5	0	0	256
7:45 AM	0	97	2	0	107	0	0	0	0	3	0	0	209
8:00 AM	0	80	2	0	96	0	0	0	0	1	0	1	180
8:15 AM	0	91	1	1	95	0	0	0	0	1	0	0	189
8:30 AM	0	89	1	0	131	0	0	0	0	3	0	0	224
8:45 AM	0	91	2	0	101	0	0	0	0	1	0	0	195
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	0	647	10	2	1047	0	0	0	0	20	0	4	1730
Approach %	0.00	98.48	1.52	0.19	99.81	0.00	####	####	####	83.33	0.00	16.67	
App/Depart	657	/	651	1049	/	1067	0	/	12	24	/	0	

AM Peak Hr Begins at: 700 AM

PEAK													
Volumes	0	296	4	1	624	0	0	0	0	14	0	3	942
2025 NP	0	308	4	1	649	0	0	0	0	15	0	3	
Site Trips	5					1	4		12				
2025 WP	5	308	4	1	649	1	4	0	12	15	0	3	
Approach %	0.00	98.67	1.33	0.16	99.84	0.00	####	####	####	82.35	0.00	17.65	

PEAK HR. FACTOR:	0.758	0.797	0.000	0.708	0.889

CONTROL: 1-Way Stop (WB)
COMMENT 1:
GPS: 32.436510, -110.991071

Intersection Turning Movement

FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745
veracitytrafficgroup

N-S STREET: La Canada Dr
0
E-W STREET: White Diamond Pl

DATE: 11/02/23
DAY: THURSDAY

LOCATION: Oro Valley
PROJECT# 23-1537-002

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	2	0	1	2	0	0	0	0	0	1	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	0	113	3	0	105	0	0	0	0	1	0	1	223
4:15 PM	0	127	2	0	89	0	0	0	0	1	0	0	219
4:30 PM	0	134	1	0	85	0	0	0	0	2	0	0	222
4:45 PM	0	99	3	0	90	0	0	0	0	3	0	0	195
5:00 PM	0	127	2	1	76	0	0	0	0	2	0	0	208
5:15 PM	0	90	3	1	73	0	0	0	0	3	0	0	170
5:30 PM	0	126	5	0	81	0	0	0	0	3	0	1	216
5:45 PM	0	97	2	0	74	0	0	0	0	1	0	0	174
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	0	913	21	2	673	0	0	0	0	16	0	2	1627
Approach %	0.00	97.75	2.25	0.30	99.70	0.00	####	####	####	88.89	0.00	11.11	
App/Depart	934	/	915	675	/	689	0	/	23	18	/	0	

PM Peak Hr Begins at: 400 PM

PEAK													
Volumes	0	473	9	0	369	0	0	0	0	7	0	1	859
2025 NP	0	492	9	0	384	0	0	0	0	7	0	1	
Site Trips	16					2	1		10				
2025 WP	16	492	9	0	384	2	1	0	10	7	0	1	
Approach %	0.00	98.13	1.87	0.00	100.00	0.00	####	####	####	87.50	0.00	12.50	

PEAK HR. FACTOR:	0.893	0.879	0.000	0.667	0.963

CONTROL: 1-Way Stop (WB)
COMMENT 1: 0
GPS: 32.436510, -110.991071

Intersection Turning Movement
Prepared by:

FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745

veracitytrafficgroup

N-S STREET: La Canada Dr DATE: 11/02/23 LOCATION: Oro Valley

E-W STREET: Moore Rd DAY: THURSDAY PROJECT# 23-1537-001

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	1	0	1	1	0	1	1	0	1	1	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	3	12	36	15	75	12	7	20	22	60	25	1	288
7:15 AM	3	30	33	14	89	30	7	31	30	77	43	2	389
7:30 AM	4	52	29	3	79	21	9	24	21	65	36	3	346
7:45 AM	4	48	45	7	59	23	16	36	15	33	38	6	330
8:00 AM	3	42	36	3	45	23	24	26	10	41	26	4	283
8:15 AM	6	43	42	5	44	14	15	15	16	36	22	9	267
8:30 AM	4	52	33	8	72	32	9	16	22	37	32	8	325
8:45 AM	3	56	32	3	65	10	11	20	8	28	16	4	256
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	30	335	286	58	528	165	98	188	144	377	238	37	2484
Approach %	4.61	51.46	43.93	7.72	70.31	21.97	22.79	43.72	33.49	57.82	36.50	5.67	
App/Depart	651	/	470	751	/	1049	430	/	532	652	/	433	

AM Peak Hr Begins at: 700 AM

PEAK													
Volumes	14	142	143	39	302	86	39	111	88	235	142	12	1353
2025 NP	15	148	149	41	314	89	41	115	92	244	148	12	
Site Trips	0	2	2		1				0	0			
2025 WP	15	150	151	41	315	89	41	115	92	244	148	12	
Approach %	4.68	47.49	47.83	9.13	70.73	20.14	16.39	46.64	36.97	60.41	36.50	3.08	

PEAK HR. FACTOR:	0.771	0.803	0.875	0.797	0.870

CONTROL: Round a bout
COMMENT 1:
GPS: 32.438370, -110.991084

Intersection Turning Movement

FIELD DATA SERVICES OF ARIZONA, INC.
520.316.6745

veracitytrafficgroup

N-S STREET: La Canada Dr
0
E-W STREET: Moore Rd

DATE: 11/02/23
DAY: THURSDAY

LOCATION: Oro Valley
PROJECT# 23-1537-001

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	1	0	1	1	0	1	1	0	1	1	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	8	59	47	5	44	17	12	17	13	48	45	11	326
4:15 PM	7	68	52	4	43	16	15	22	11	35	24	10	307
4:30 PM	9	75	50	7	36	17	11	25	13	36	21	16	316
4:45 PM	7	50	42	6	41	9	12	21	15	34	36	12	285
5:00 PM	14	53	60	1	31	8	13	18	13	33	28	15	287
5:15 PM	6	47	37	2	40	14	7	23	9	25	18	14	242
5:30 PM	11	69	47	2	48	13	8	26	13	20	26	11	294
5:45 PM	11	51	35	1	38	13	10	21	7	29	15	11	242
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	73	472	370	28	321	107	88	173	94	260	213	100	2299
Approach %	7.98	51.58	40.44	6.14	70.39	23.46	24.79	48.73	26.48	45.38	37.17	17.45	
App/Depart	915	/	660	456	/	675	355	/	571	573	/	393	

PM Peak Hr Begins at: 400 PM

PEAK													
Volumes	31	252	191	22	164	59	50	85	52	153	126	49	1234
2025 NP	32	262	199	23	171	61	52	88	54	159	131	51	
Site Trips	0	1	0		1				0	1			
2025 WP	32	263	199	23	172	61	52	88	54	160	131	51	
Approach %	6.54	53.16	40.30	8.98	66.94	24.08	26.74	45.45	27.81	46.65	38.41	14.94	

PEAK HR. FACTOR:	0.884	0.928	0.954	0.788	0.946

CONTROL: Round a bout
COMMENT 1: 0
GPS: 32.438370, -110.991084

Prepared by: Field Data Services of Arizona/Veracity Traffic Group (520) 316-6745

Volumes for: Thursday, November 2, 2023 City: Oro Valley Project #: 23-1537-003

Location: La Canada Dr south of Moore Rd

AM Period	NB		SB		EB	WB		PM Period	NB		SB		EB	WB	
00:00	5		1					12:00	71		68				
00:15	2		1					12:15	83		79				
00:30	3		4					12:30	69		74				
00:45	2	12	0	6			18	12:45	90	313	77	298			611
01:00	2		0					13:00	71		70				
01:15	1		1					13:15	73		72				
01:30	0		0					13:30	88		99				
01:45	2	5	0	1			6	13:45	85	317	72	313			630
02:00	1		0					14:00	91		97				
02:15	0		1					14:15	89		87				
02:30	0		2					14:30	84		107				
02:45	0	1	2	5			6	14:45	109	373	128	419			792
03:00	0		2					15:00	134		95				
03:15	1		2					15:15	131		65				
03:30	2		6					15:30	114		130				
03:45	2	5	6	16			21	15:45	116	495	98	388			883
04:00	2		9					16:00	114		105				
04:15	6		9					16:15	127		89				
04:30	4		13					16:30	134		85				
04:45	3	15	20	51			66	16:45	99	474	90	369			843
05:00	1		16					17:00	127		77				
05:15	7		22					17:15	90		74				
05:30	13		33					17:30	127		81				
05:45	13	34	31	102			136	17:45	97	441	74	306			747
06:00	18		45					18:00	97		65				
06:15	16		64					18:15	90		56				
06:30	33		69					18:30	75		51				
06:45	56	123	93	271			394	18:45	86	348	40	212			560
07:00	51		157					19:00	72		34				
07:15	66		196					19:15	77		21				
07:30	85		165					19:30	62		37				
07:45	97	299	107	625			924	19:45	56	267	23	115			382
08:00	81		96					20:00	60		21				
08:15	91		96					20:15	34		17				
08:30	89		131					20:30	54		28				
08:45	91	352	101	424			776	20:45	58	206	23	89			295
09:00	93		96					21:00	39		8				
09:15	64		74					21:15	39		9				
09:30	42		99					21:30	26		13				
09:45	64	263	74	343			606	21:45	21	125	6	36			161
10:00	74		79					22:00	17		7				
10:15	49		85					22:15	16		9				
10:30	67		78					22:30	15		7				
10:45	68	258	61	303			561	22:45	17	65	6	29			94
11:00	72		82					23:00	7		6				
11:15	68		88					23:15	13		2				
11:30	63		64					23:30	6		3				
11:45	84	287	72	306			593	23:45	7	33	1	12			45
Total Vol.		1654		2453			**4107**			3457		2586			**6043**

GPS Coordinates: 32.437413, -110.991086

Daily Totals

NB	SB	EB	WB	Combined
5111	5039			**10150**

	AM			PM		
Split %	40.3%	59.7%	**40.5%**	57.2%	42.8%	**59.5%**
Peak Hour	08:15	07:00	**07:00**	15:00	15:30	**14:45**
Volume	364	625	**924**	495	422	**906**
P.H.F.	0.98	0.80	**0.88**	0.92	0.81	**0.93**

Intersection	
Int Delay, s/veh	0.3

Movement	WBL	WBR	NBU	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Vol, veh/h	14	3	0	296	4	1	624
Future Vol, veh/h	14	3	0	296	4	1	624
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free	Free
RT Channelized	-	None	-	-	None	-	None
Storage Length	0	-	215	-	-	160	-
Veh in Median Storage, #	0	-	-	0	-	-	0
Grade, %	0	-	-	0	-	-	0
Peak Hour Factor	71	71	76	76	76	80	80
Heavy Vehicles, %	2	2	2	2	2	2	2
Mvmt Flow	20	4	0	389	5	1	780

Major/Minor	Minor1		Major1			Major2	
Conflicting Flow All	784	197	780	0	0	394	0
Stage 1	392	-	-	-	-	-	-
Stage 2	392	-	-	-	-	-	-
Critical Hdwy	6.84	6.94	6.44	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.52	-	-	2.22	-
Pot Cap-1 Maneuver	330	811	459	-	-	1161	-
Stage 1	652	-	-	-	-	-	-
Stage 2	652	-	-	-	-	-	-
Platoon blocked, %				-	-		-
Mov Cap-1 Maneuver	330	811	459	-	-	1161	-
Mov Cap-2 Maneuver	330	-	-	-	-	-	-
Stage 1	652	-	-	-	-	-	-
Stage 2	651	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.4	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBU	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	459	-	-	369	1161	-
HCM Lane V/C Ratio	-	-	-	0.065	0.001	-
HCM Control Delay (s)	0	-	-	15.4	8.1	-
HCM Lane LOS	A	-	-	C	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0	-

Intersection	
Intersection Delay, s/veh	7.4
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	270	487	388	535
Demand Flow Rate, veh/h	276	497	396	546
Vehicles Circulating, veh/h	736	251	224	500
Vehicles Exiting, veh/h	310	369	788	248
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	7.4	7.6	4.7	9.2
Approach LOS	A	A	A	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	R	LT	R
Assumed Moves	LT	R	LT	R	LT	R	LT	R
RT Channelized								
Lane Util	0.630	0.370	0.970	0.030	0.520	0.480	0.799	0.201
Follow-Up Headway, s	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.544	4.544	4.544	4.544	4.544	4.544	4.544	4.544
Entry Flow, veh/h	174	102	482	15	206	190	436	110
Cap Entry Lane, veh/h	727	727	1130	1130	1158	1158	901	901
Entry HV Adj Factor	0.980	0.980	0.980	1.000	0.982	0.979	0.980	0.982
Flow Entry, veh/h	170	100	472	15	202	186	427	108
Cap Entry, veh/h	712	713	1108	1130	1137	1134	883	885
V/C Ratio	0.239	0.140	0.427	0.013	0.178	0.164	0.484	0.122
Control Delay, s/veh	7.8	6.6	7.8	3.3	4.7	4.6	10.3	5.2
LOS	A	A	A	A	A	A	B	A
95th %tile Queue, veh	1	0	2	0	1	1	3	0

Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBU	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Vol, veh/h	7	1	0	473	9	0	369
Future Vol, veh/h	7	1	0	473	9	0	369
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free	Free
RT Channelized	-	None	-	-	None	-	None
Storage Length	0	-	215	-	-	160	-
Veh in Median Storage, #	0	-	-	0	-	-	0
Grade, %	0	-	-	0	-	-	0
Peak Hour Factor	67	67	89	89	89	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2
Mvmt Flow	10	1	0	531	10	0	419

Major/Minor	Minor1		Major1			Major2	
Conflicting Flow All	746	271	419	0	0	541	0
Stage 1	536	-	-	-	-	-	-
Stage 2	210	-	-	-	-	-	-
Critical Hdwy	6.84	6.94	6.44	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.52	-	-	2.22	-
Pot Cap-1 Maneuver	349	727	779	-	-	1024	-
Stage 1	551	-	-	-	-	-	-
Stage 2	805	-	-	-	-	-	-
Platoon blocked, %				-	-		-
Mov Cap-1 Maneuver	349	727	779	-	-	1024	-
Mov Cap-2 Maneuver	349	-	-	-	-	-	-
Stage 1	551	-	-	-	-	-	-
Stage 2	805	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBU	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	779	-	-	373	1024	-
HCM Lane V/C Ratio	-	-	-	0.032	-	-
HCM Control Delay (s)	0	-	-	15	0	-
HCM Lane LOS	A	-	-	C	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0	-

Intersection	
Intersection Delay, s/veh	5.7
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	197	415	538	263
Demand Flow Rate, veh/h	201	423	549	268
Vehicles Circulating, veh/h	402	382	169	396
Vehicles Exiting, veh/h	262	336	434	409
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	4.9	7.0	5.1	5.3
Approach LOS	A	A	A	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	R	LT	R
Assumed Moves	LT	R	LT	R	LT	R	LT	R
RT Channelized								
Lane Util	0.721	0.279	0.851	0.149	0.597	0.403	0.761	0.239
Follow-Up Headway, s	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.544	4.544	4.544	4.544	4.544	4.544	4.544	4.544
Entry Flow, veh/h	145	56	360	63	328	221	204	64
Cap Entry Lane, veh/h	985	985	1003	1003	1218	1218	990	990
Entry HV Adj Factor	0.981	0.982	0.980	0.984	0.979	0.982	0.983	0.984
Flow Entry, veh/h	142	55	353	62	321	217	200	63
Cap Entry, veh/h	966	967	983	987	1193	1196	973	975
V/C Ratio	0.147	0.057	0.359	0.063	0.269	0.181	0.206	0.065
Control Delay, s/veh	5.1	4.2	7.5	4.2	5.5	4.6	5.7	4.3
LOS	A	A	A	A	A	A	A	A
95th %tile Queue, veh	1	0	2	0	1	1	1	0

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↰	↑↑↱		↰	↑↑↱	
Traffic Vol, veh/h	4	0	12	15	0	3	5	308	4	1	649	1
Future Vol, veh/h	4	0	12	15	0	3	5	308	4	1	649	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	215	-	-	160	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	71	71	71	76	76	76	80	80	80
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	0	13	21	0	4	7	405	5	1	811	1

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1031	1238	406	830	1236	205	812	0	0	410	0	0
Stage 1	814	814	-	422	422	-	-	-	-	-	-	-
Stage 2	217	424	-	408	814	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	187	174	594	263	175	802	810	-	-	1145	-	-
Stage 1	338	390	-	580	587	-	-	-	-	-	-	-
Stage 2	765	585	-	591	390	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	185	172	594	255	173	802	810	-	-	1145	-	-
Mov Cap-2 Maneuver	185	172	-	255	173	-	-	-	-	-	-	-
Stage 1	335	390	-	575	582	-	-	-	-	-	-	-
Stage 2	754	580	-	578	390	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.8	18.7	0.1	0
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	810	-	-	383	288	1145	-	-
HCM Lane V/C Ratio	0.008	-	-	0.045	0.088	0.001	-	-
HCM Control Delay (s)	9.5	-	-	14.8	18.7	8.1	-	-
HCM Lane LOS	A	-	-	B	C	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.3	0	-	-

Intersection	
Intersection Delay, s/veh	7.8
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	283	505	410	556
Demand Flow Rate, veh/h	289	515	418	567
Vehicles Circulating, veh/h	765	266	234	519
Vehicles Exiting, veh/h	321	386	820	262
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	7.7	8.0	4.8	9.9
Approach LOS	A	A	A	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	R	LT	R
Assumed Moves	LT	R	LT	R	LT	R	LT	R
RT Channelized								
Lane Util	0.630	0.370	0.971	0.029	0.522	0.478	0.801	0.199
Follow-Up Headway, s	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.544	4.544	4.544	4.544	4.544	4.544	4.544	4.544
Entry Flow, veh/h	182	107	500	15	218	200	454	113
Cap Entry Lane, veh/h	708	708	1115	1115	1148	1148	885	885
Entry HV Adj Factor	0.980	0.981	0.981	1.000	0.982	0.980	0.980	0.982
Flow Entry, veh/h	178	105	490	15	214	196	445	111
Cap Entry, veh/h	694	695	1093	1115	1127	1125	868	870
V/C Ratio	0.257	0.151	0.449	0.013	0.190	0.174	0.513	0.128
Control Delay, s/veh	8.3	6.9	8.2	3.3	4.9	4.7	11.0	5.4
LOS	A	A	A	A	A	A	B	A
95th %tile Queue, veh	1	1	2	0	1	1	3	0

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	0	10	7	0	1	16	492	9	0	384	2
Future Vol, veh/h	1	0	10	7	0	1	16	492	9	0	384	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	215	-	-	160	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	67	67	67	89	89	89	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	0	11	10	0	1	18	553	10	0	436	2

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	750	1036	219	812	1032	282	438	0	0	563	0	0
Stage 1	437	437	-	594	594	-	-	-	-	-	-	-
Stage 2	313	599	-	218	438	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	300	230	785	271	231	715	1118	-	-	1005	-	-
Stage 1	568	578	-	458	491	-	-	-	-	-	-	-
Stage 2	672	489	-	764	577	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	296	226	785	264	227	715	1118	-	-	1005	-	-
Mov Cap-2 Maneuver	296	226	-	264	227	-	-	-	-	-	-	-
Stage 1	559	578	-	451	483	-	-	-	-	-	-	-
Stage 2	660	481	-	753	577	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.4	18.1	0.3	0
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1118	-	-	682	287	1005	-	-
HCM Lane V/C Ratio	0.016	-	-	0.018	0.042	-	-	-
HCM Control Delay (s)	8.3	-	-	10.4	18.1	0	-	-
HCM Lane LOS	A	-	-	B	C	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.1	0	-	-

Intersection	
Intersection Delay, s/veh	5.9
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	205	434	561	276
Demand Flow Rate, veh/h	209	442	573	282
Vehicles Circulating, veh/h	421	398	176	413
Vehicles Exiting, veh/h	273	351	454	427
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	5.0	7.3	5.3	5.6
Approach LOS	A	A	A	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	R	LT	R
Assumed Moves	LT	R	LT	R	LT	R	LT	R
RT Channelized								
Lane Util	0.722	0.278	0.851	0.149	0.597	0.403	0.762	0.238
Follow-Up Headway, s	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.544	4.544	4.544	4.544	4.544	4.544	4.544	4.544
Entry Flow, veh/h	151	58	376	66	342	231	215	67
Cap Entry Lane, veh/h	968	968	989	989	1210	1210	975	975
Entry HV Adj Factor	0.981	0.983	0.981	0.985	0.980	0.978	0.978	0.985
Flow Entry, veh/h	148	57	369	65	335	226	210	66
Cap Entry, veh/h	950	951	969	974	1185	1184	954	961
V/C Ratio	0.156	0.060	0.380	0.067	0.283	0.191	0.220	0.069
Control Delay, s/veh	5.3	4.3	7.9	4.3	5.6	4.7	5.9	4.4
LOS	A	A	A	A	A	A	A	A
95th %tile Queue, veh	1	0	2	0	1	1	1	0

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