February 5, 2018 JPA Board Meeting

TO: JPA Board of Directors

FROM: Facilities & Operations

Subject : Pure Water Project Las Virgenes-Triunfo: Advanced Water Treatment Plant Draft Preliminary Siting Study

SUMMARY:

On February 6, 2017, the JPA Board accepted a proposal from Woodard & Curran to perform an advanced water treatment plant preliminary siting study. The siting study is intended to utilize a rigorous screening process and comparative analysis to develop a shortlist of sites, rather than to recommend a particular preferred site. The results of the siting study will be important elements of the Title XVI Feasibility Study and environmental documentation for the project.

Starting with over 13,000 potential sites, screening criteria was applied using five filters to develop a list of 26 sites. These 26 sites were scored based upon the following factors: construction cost, operational cost, proximity to sensitive receptors, the need to drive through residential streets, utility access, environmental considerations and acquisition timing. The comparative analysis resulted in a shortlist of six sites, two of which were included in the previous Basis of Design Report (Sites A and F). Following is a table that shows the six sites along with their overall scores. A higher overall score indicates a more suitable site for the project; the maximum possible score is five.

Site	Description	Overall Score
F	30800 Agoura Road (JPA has a purchase option)	3.90
A	At Las Virgenes Reservoir across the lake from the filter plant (owned by LVMWD)	3.80
D	Canwood Street west of Kanan Road (vacant property)	3.60
T	Canwood Street west of Kanan Road (vacant property)	3.50
K	Agoura Road east of Roadside Road (Brightview Landscape Yard)	3.40
Z	Rancho Las Virgenes Farm Sprayfields (owned by JPA)	3.30

RECOMMENDATION(S):

Consider the Advanced Water Treatment Plant Draft Preliminary Siting Study and provide any feedback to staff.

FISCAL IMPACT:

No

ITEM BUDGETED:

Yes

FINANCIAL IMPACT:

There is no financial impact associated with this recommendation.

DISCUSSION:

Background:

On February 6, 2017, the JPA Board accepted a proposal from Woodard & Curran to perform an advanced water treatment plant preliminary siting study. The siting study is intended to utilize a rigorous screening process and comparative analysis to develop a shortlist of sites, rather than to recommend a particular preferred site. The results of the siting study will be important elements of the Title XVI Feasibility Study and environmental documentation for the project.

Geographic Information System (GIS) software was used for the initial potential site identification, drawing information from parcels within the JPA's joint service area in Los Angeles and Ventura counties. Five filters were sequentially applied to over 13,000 potential sites through a screening process, narrowing the list to 26 sites that were further evaluated through a more detailed comparative analysis process.

Screening Process:

The initial site identification using GIS resulted in a list of over 13,000 parcels. Then, five filter criteria were sequentially applied to the parcels, resulting in 26 sites used in the comparative analysis. The first filter evaluated the proximity of the potential sites to critical facilities such as Las Virgenes Reservoir and the JPA's recycled water backbone system. A target zone focused on a swath of land one mile wide that generally traverses along the recycled water backbone system, beginning at the Rancho Las Virgenes Farm Sprayfields and continuing to Las Virgenes Reservoir. Parcels outside this zone were excluded, producing an initial list of 13,251 potential sites.

The second filter was designed to exclude parcels located in areas prone to earthquake-induced hazards such as liquefaction and/or landslides. United States Geological Survey seismic hazard maps were used to identify areas of concern, and parcels within these areas were excluded. This second filter narrowed the original list of potential sites to 11,256.

The third filter was based upon parcel size. Developed sites with gross areas of less than two acres or undeveloped sites with gross areas of less than five acres were excluded. The third filter narrowed the result to 182 sites.

The fourth filter involved a review of the parcels' land use designations. Developed sites designated as residential, park, lake, institutional, school, recreational, active parking lot or drainage were excluded. Undeveloped sites designated for planned development were also excluded. The fourth filter resulted in 141 sites.

The fifth filter involved a rapid-assessment of property improvements. Developed sites with assessed improvements greater than $2 million were excluded. Also, undeveloped sites with challenging topography were excluded. This final and fifth filter resulted in 26 parcels that were subsequently evaluated through the comparative analysis process.

Comparative Analysis Process:

Next, a comparative analysis was utilized to evaluate the remaining sites based upon the following seven criteria: construction cost, operational cost, proximity to sensitive receptors, access through residential neighborhoods, utility access, environmental implications and acquisition timing.

- *Construction Cost Factor:* This factor considered the estimated costs for pipelines (recycled water, purified water to the reservoir and brine), site acquisition and site preparation. The scoring was from 1 to 5 with a higher score indicating a lower estimated cost.
- *Operational Cost Factor:* This factor considered the estimated energy cost required to pump recycled water, purified water or brine to and/or from the site. The scoring was from 1 to 5 with a higher score indicating a lower estimated cost.
- *Proximity to Sensitive Receptors:* This factor considered the distance of the site from residential areas or schools. The scoring was from 1 to 5 with a higher score indicating a larger separation from sensitive receptors.
- *Residential Driving Required:* This factor considered the need to drive through residential streets to access the site. The scoring was 5 equals no, 3 equals potentially in the future, and 1 equals yes.
- *Utility Access:* This factor considered whether the site had immediate access to basic utilities. The scoring was 5 equals yes and 1 equals no.
- *Environmental Considerations:* This factor considered the level of effort anticipated for environmental compliance. The scoring was from 1 to 5 with a higher score indicating a more straightforward environmental review process.
- *Acquisition Timing:* This factor considered the ability of the JPA to acquire the site in a timely manner. The score was 5 equals the JPA currently owns or has an option to purchase the site, 3 equals the site is actively listed for sale, and 1 equals other.

The 26 sites were scored using the comparative analysis criteria. Using seven different weighting scenarios, the scores for the 26 sites were compared, and 17 sites consistently scored the highest. Comprehensive field visits were conducted for the 17 sites by JPA staff and representatives of Woodard & Curran to verify the initial scores, physically inspect the sites and gain local knowledge from staff familiar with the areas.

Following the field visits, an additional ten sites were eliminated, and the remaining seven sites were scored using the following weighting factors: 20% construction cost, 10% operational cost, 10% proximity to sensitive receptors, 10% access through residential streets, 10% utility access, 20% environmental considerations and 20% acquisition timing. The results of the comparative analysis process are provided in the table below. Table 14 of the draft Siting Study provides details on the comparative criteria scoring for each site. Site Y is proposed to be eliminated from the final shortlist because of its low score.

Site	Description	Overall Score
F	30800 Agoura Road (JPA has a purchase option)	3.90
A	At Las Virgenes Reservoir across the lake from the filter plant (owned by LVMWD)	3.80
D	Canwood Street west of Kanan Road (vacant property)	3.60
T	Canwood Street west of Kanan Road (vacant property)	3.50
K	Agoura Road east of Roadside Road (Brightview Landscape Yard)	3.40
Z	Rancho Las Virgenes Farm Sprayfields (owned by JPA)	3.30
Y	End of Liberty Canyon Road (private parcel within State Park)	1.90

Next Steps:

The results of the siting study will be important elements of the Title XVI Feasibility Study and future environmental documentation for the Pure Water Project Las Virgenes-Triunfo. The study provides a rigorous review of potential sites for the advanced water treatment plant, allowing various alternatives to be considered in future studies. The top scoring sites were Site F, 30800 Agoura Road, and Site A, at Las Virgenes Reservoir, both of which were identified in the Basis of Design Report. The JPA has a purchase option for Site F, and a decision to exercise the option needs to be made by March 12, 2018. Staff will present a recommendation to the Board regarding the purchase option at the March JPA meeting.

Prepared by: David R. Lippman, P.E., Director of Facilities and Operations

ATTACHMENTS:

Advanced Water Treatment Plant Draft Preliminary Siting Study

AWTP Preliminary Siting Study Report

Pure Water Project - AWTP Preliminary Siting Study

Subject:	**AWTP Preliminary Siting Study Report**
Prepared For:	David Lippman, Las Virgenes Municipal Water District John Zhao, Las Virgenes Municipal Water District Eric Schlageter, Las Virgenes Municipal Water District
Prepared By:	Brian Dietrick, P.E., Woodard & Curran Jehan Anketell, Woodard & Curran
Reviewed by:	Tom Richardson, P.E., Woodard & Curran
Date:	January 26, 2018
Reference:	0254-004

1 Background

The Las Virgenes-Triunfo Joint Powers Authority (JPA) between Las Virgenes Municipal Water District (LVMWD) and the Triunfo Sanitation District (TSD) is seeking to diversify its water resources portfolio, reduce the use of imported water, and more proactively manage treated effluent from the Tapia Water Reclamation Facility (WRF) while reducing discharges to Malibu Creek. Based on the *Las Virgenes-Triunfo Joint Powers Authority Recycled Water Seasonal Storage Basis of Design Report* (BODR) and associated stakeholder outreach process completed in 2016, the JPA determined that a Reservoir Water Augmentation (RWA) project that introduces purified water into the Las Virgenes Reservoir (LVR) would best address these water supply and effluent management issues. The JPA has embarked on a series of investigations to further refine this project, referred to as the Pure Water Project

As part of this effort, Woodard & Curran is performing a Siting Study to determine a set of candidate sites for a new Advanced Water Treatment Plant (AWTP), which would produce the purified water to be discharged to LVR. The objective of this Siting Study is to identify an initial broad set of candidate sites, screen for technical and institutional considerations, and then conduct a comparative analysis on the remaining sites to identify the best candidate sites that would receive further consideration as the project moves forward. AWTP components and capacities identified in the BODR serve as the basis for this Siting Study.

This Siting Study was conducted in three general steps:

- Initial Site Identification and Screening Process
- Comparative Analysis
- Final Recommendation of Candidate Sites

This report compiles the background, methodology, and findings from these three general steps.

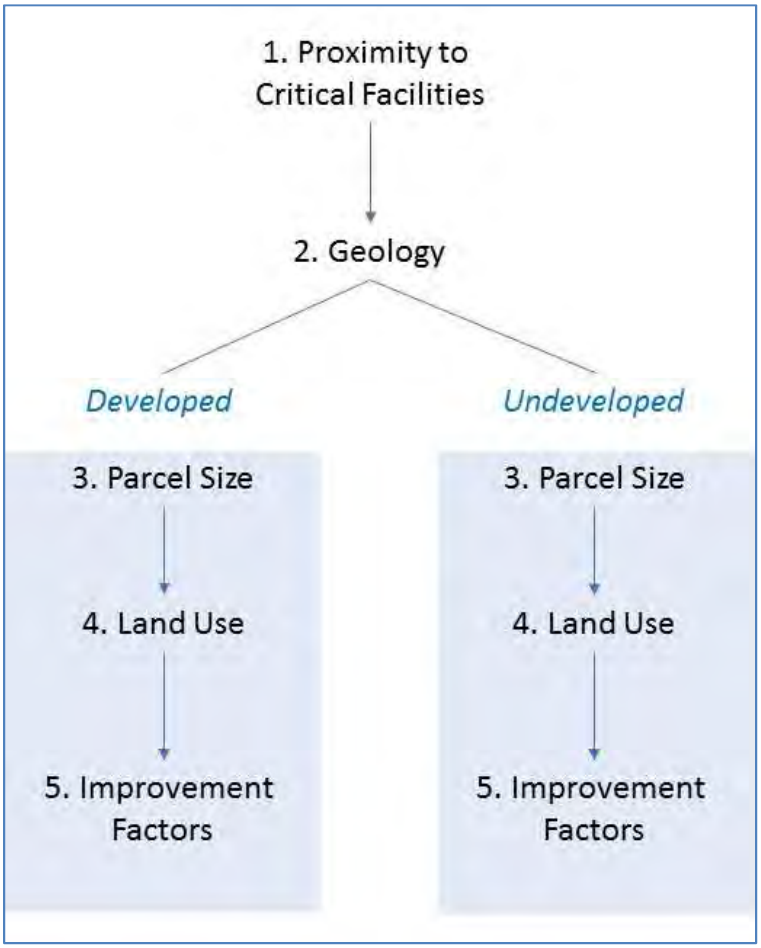
2 Initial Site Identification and Screening Methodology

The initial site identification and screening was conducted with Geographic Information System (GIS) software using shapefiles which contain Los Angeles and Ventura County parcel data, including parcel size, land use designations, building age, and dollar value of improvements. Five filter criteria were applied

sequentially to screen the number of parcels from many thousands of sites in the study area to a "shortlist" of 26: (1) proximity to critical facilities, (2) geology, (3) parcel size (acreage), (4) land use, and (5) improvement factors.

A diagram illustrating the use of the five filter criteria is shown in **Figure 1**, including separate, parallel pathways for developed (graded) and undeveloped (greenfield) candidate sites. Each step is described in more detail in the sections that follow.

Figure 1: **Initial Site Identification and Screening Methodology**



2.1 Proximity to Critical Facilities

The BODR identified critical facilities that would factor into locating the AWTP. These facilities include Tapia WRF, LVR, the Salinity Management Pipeline (SMP), and the existing recycled water distribution system. Siting the AWTP near the existing recycled water system allows for use of existing infrastructure to deliver tertiary feed water a portion of the distance from Tapia WRF to the new AWTP. Per the 2016 BODR, the 24-inch diameter backbone pipeline of the existing recycled water system should have adequate capacity to carry AWTP influent flows of 7.4 million gallons per day (MGD), sufficient source flow for a target AWTP production of 6.0 mgd. The AWTP is expected to operate during the off-peak demand season

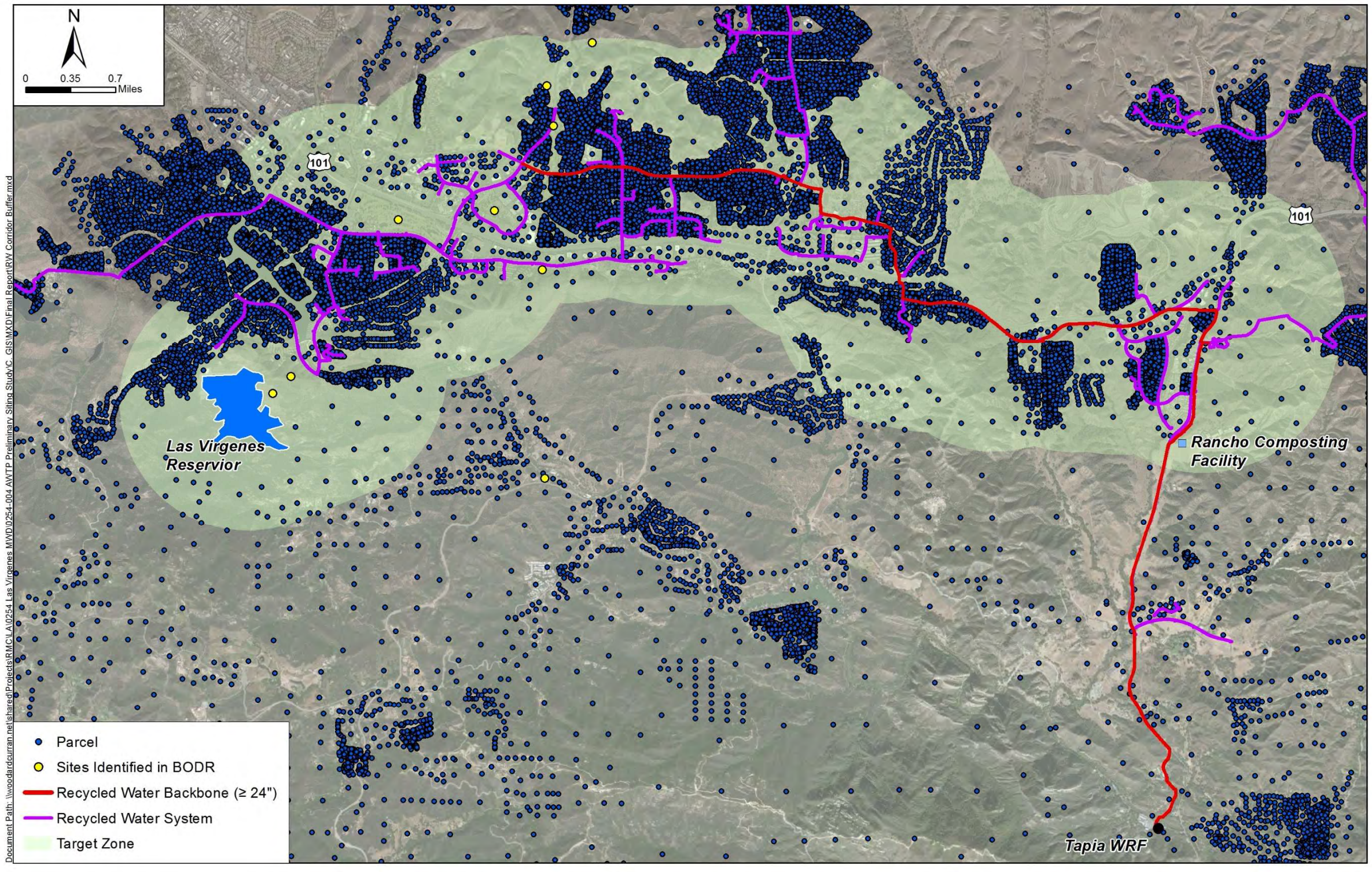
(November to April), and it is assumed that the existing recycled water system will have the capacity to carry the AWTP influent flows in addition to the flows for non-potable demands.[1] Construction of a new pipeline would be required to deliver the tertiary water from the closest feasible tie-in point on the existing 24-inch diameter backbone pipeline to the AWTP.

Considering the LVR location, the proposed location of the SMP extension, and the available capacity of the backbone recycled water system closest to LVR, a corridor extending one mile from either side of the 24-inch diameter backbone pipeline was selected as the candidate site target zone. The target zone extends past the western terminus of the backbone pipeline to include LVR. A two-mile width was chosen to provide an adequate set of sites to assure a robust analysis, while limiting the candidate field to a manageable number.

Figure 2 illustrates the project area, the recycled water distribution system (with backbone pipeline), key facilities, the limits of the candidate site target zone, and the potential sites both inside and outside of the zone. As part of the BODR, a preliminary evaluation of nine potential sites was conducted. These nine sites are specifically denoted in the figure and in subsequent screening and candidate site assessment.

[1] Appendix C describes a preliminary hydraulic analysis that was performed to support this assumption.

Figure 2: Candidate Sites Target Zone



2.2 Geology

Siting an AWTP in areas prone to earthquake-induced hazards such as liquefaction and landslides could require expensive and difficult construction methods, as well as an extensive permitting process. Due to these issues, seismic hazards were selected as the next screening criterion. United States Geologic Survey (USGS) seismic hazard maps were used to identify zones of concern for landslide and liquefaction, and parcels located in these liquefaction or landslide zones were removed from further consideration.

2.3 Parcel Size (Acreage)

The 2016 BODR report included descriptions and sizing information for facilities required for the proposed AWTP. The AWTP facility footprint developed in the report estimated the required footprint to be approximately 2 acres including the process building, parking and access roads.

In July 2017, Woodard & Curran performed an evaluation of one of the parcels of interest at 30800 Agoura Road. Although the Agoura Road site gross acreage is 7.1 acres, the actual space available for an AWTP is limited due to issues with oak tree removal, grading, and unusable riparian areas, among other concerns. Using the 2016 BODR as a reference for facility components, an example site layout for the Agoura Road site was developed. To minimize space requirements, underground wet wells were assumed. The total footprint of the Agoura Road AWTP site layout was 1.7 acres.

As the Agoura Road site analysis suggests, for undeveloped sites, the amount of usable space is often much smaller than the gross acreage of the parcel. For developed sites, this issue is less significant because the parcels are already graded to accommodate building improvements. To accommodate the differences in acreage needs between developed and undeveloped sites, two separate, parallel acreage screens were developed. For developed sites that have a high percentage of usable acreage, parcels with a gross acreage of two acres or more were deemed adequate to accommodate an AWTP footprint. For undeveloped sites, the percentage of usable acreage on a given parcel can be highly variable. To examine the gross acreage necessary to accommodate the AWTP footprint, a sample of sites was selected upon which the Agoura Road site footprint was placed. Using this process, it was concluded that undeveloped parcels with a size of less than five acres are unlikely to accommodate an AWTP footprint.

Below is a summary of criteria for the Parcel Size (Acreage) screen:

- Developed sites - exclude sites with gross areas less than two acres
- Undeveloped sites - exclude sites with gross areas less than five acres

2.4 Land Use

Building upon the parcel size criterion, the objective of the land use screening criterion was to eliminate sites which have land use designations that are incompatible with an AWTP. For developed parcels, a residential designation clearly fits in the category of non-compatible land use. These parcels were screened out. Developed parcels with other incompatible land uses were also screened out, including parks, lakes, institutional, schools, recreational, active parking lots, and drainage canals. The land uses types that were not eliminated in this step included commercial and industrial.

For undeveloped parcels, designations that indicated “planned development” were screened from further consideration. Furthermore, it is recognized that undeveloped residential sites that are not currently planned for development could nonetheless face public opposition. Any candidate sites with this land use designation would need to undergo additional scrutiny concerning public acceptance viability. This additional scrutiny was undertaken at the comparative analysis phase of the Siting Study.

Below is a summary of criteria for the Land Use screen:

- Developed sites - exclude sites designated as residential, parks, lakes, institutional, schools, recreational, active parking lots, and drainage canals
- Undeveloped sites - exclude sites designated for planned development

2.5 Improvement Factors

For the final screening step, the sites remaining through the previous screening steps were analyzed using high resolution aerial views and available parcel records. The purpose of this step was to more closely examine the remaining sites and remove undeveloped sites which were deemed "undevelopable" (i.e., un-improvable) or developed commercial/industrial sites with improvement values above a specified assessed value.

Older commercial and industrial sites can be suitable locations for an AWTP; especially where there are businesses that are underutilizing a particular space. For developed sites, assessed valuation of the existing improvements was used as a metric to identify appropriate parcels. Those parcels with improvements that are equal to or greater than the value of a typical vacant lot (estimated to be $2 million) were deemed financially infeasible and were removed from consideration. The rationale is that the JPA would not likely be willing to pay more than twice the value of a vacant lot, then demolish the improvements at additional cost and construct an AWTP.

For undeveloped sites, parcels with extremely difficult topographic conditions (identified with high resolution aerial views) were removed from further consideration.

Below is a summary of criteria for the Improvement Factors screen:

- Developed sites - exclude sites with assessed improvement values that are greater that the value of a typical empty lot ($2 million)
- Undeveloped sites - exclude sites with difficult topographic conditions

2.6 Screening Results

The screening process described in this Section resulted in the identification of 26 potential sites. **Table 1** provides an overview of each screening step, and **Figure 3** illustrates the number of candidate sites remaining after each step. **Figures A1** through **A5** in **Appendix A** show the remaining sites following each screening step, and a detailed final list of remaining sites for the Land Use and Improvement Factors screens is included in **Appendix B**. The 26 site locations that remain for the comparative analysis are shown in Figure4. Letters have been assigned to each site to simplify identification.

A preliminary hydraulic analysis was also conducted to validate the hydraulic feasibility of siting an AWTP at these locations (included as **Appendix C**).

Figure 3: **Initial Site Identification and Screening Methodology (with Remaining Parcels)**

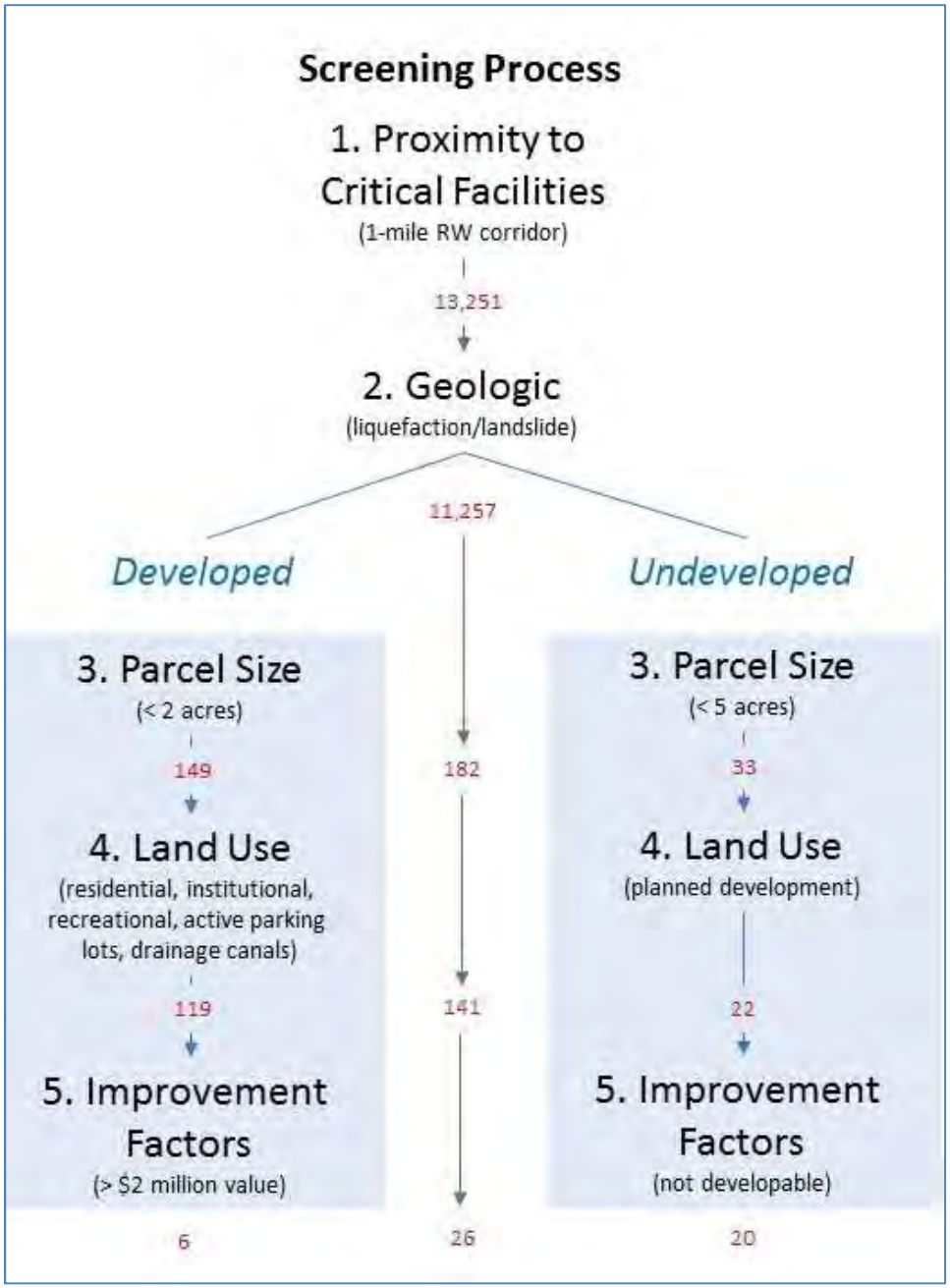
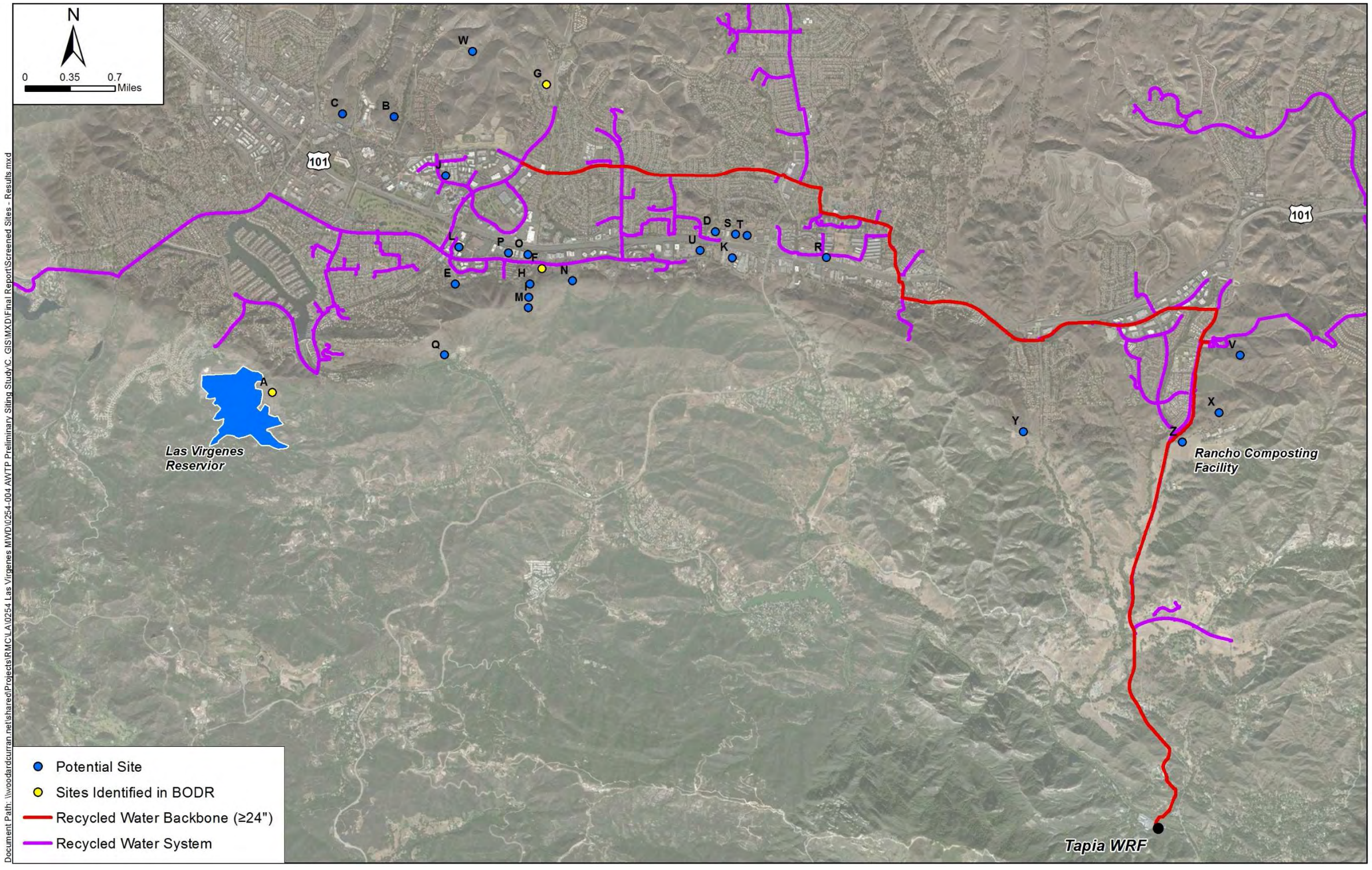


Table 1: Overview of Screening Methodology

Screen #	# Sites	# BODR Sites	Screening Criteria	Rationale	BODR Sites Remaining
1	13,251	8	1 mi distance from RW backbone, extended to include LVR – exclude parcels outside target zone	Parcels located further than 1 mile will present increasing cost challenges for JPA. Per kickoff, defined as 24" RW backbone alignment spanning from LVR to District's Rancho Composting facility.	Lindero Cyn, Lindero Country Club, Triunfo Cyn Rd, Westlake Golf Course, Mortuary, Agoura Rd, Las Virgenes Reservoir, Lindero Cyn (Ventura Cty)
2	11,257	7	Exclude Liquefaction and Landslide	Parcels located in liquefaction or landslide zones will require expensive and difficult construction methods and will require extensive permitting.	Lindero Cyn, Lindero Country Club, Westlake Golf Course, Mortuary, Agoura Rd, Las Virgenes Reservoir, Lindero Cyn Ventura Cty
3	182	6	Developed – exclude less than 2 acres Undeveloped – exclude less than 5 acres	Parcels less than 2 or 5 acres in size, respectively, are unlikely to have space to accommodate a 1.7 acre AWTP footprint based on an initial examination of available area and stringent development requirements in these locations.	Lindero Cyn, Westlake Golf Course, Mortuary, Agoura Rd, Las Virgenes Reservoir, Lindero Cyn Ventura Cty
4	141	5	Developed - exclude residential, institutional, parks, lakes, recreational, active parking lots, drainage canals Undeveloped – exclude planned development	Parcels with the stated land use designations are unlikely to be compatible with operation of an AWTP.	Lindero Cyn, Westlake Golf Course, Mortuary, Agoura Rd, Las Virgenes Reservoir
5	26	3	Developed – exclude sites with assessed improvement values greater than the value of an empty lot ($2 million) Undeveloped – exclude un-developable sites	Developed parcels with existing improvements that have assessed values greater than the value of a typical vacant lot ($2 million) are unlikely to be financially feasible. Undeveloped parcels with difficult topographic conditions are unlikely to be financially feasible.	Lindero Cyn, Agoura Rd, Las Virgenes Reservoir

*BODR sites in red indicate site is removed based on that screening criterion.

Figure 4: Results of Screening Methodology (26 Sites Remaining)



3 Comparative Analysis

A comparative analysis of sites was conducted to further narrow the field of candidate sites. This section describes the assumptions and methodology used for the comparative analysis of the 26 remaining sites. To develop meaningful differentiations between the sites, seven criteria and associated metrics were identified. These criteria are:

- Construction Cost Factor
- Operational Cost Factor
- Proximity to Sensitive Receptors
- Access through Residential Neighborhoods
- Utility Access
- Environmental Implications
- Acquisition Timing

This section describes these criteria and the scoring methodology applied. Note that for each criterion, a "1" to "5" scoring system is employed, with 5 representing the best score and highest ranking. Aerial photos for each of the 26 sites with important features shown are included in **Appendix D**.

3.1 Construction Cost Factor

One of the most important criteria for comparing potential sites is construction cost. To achieve the best comparison, this analysis focuses only on those costs components that would vary between sites, rather than total construction costs. At this level of comparison, AWTP components and layouts are assumed to be similar for all sites, so associated costs are not considered in this comparison. This criterion is referred to as the "Construction Cost Factor" to clarify that it is differential construction costs that are being compared, not total construction costs.

The following construction cost categories are considered differentiators. The methodologies for developing scores are described in the sections that follow:

- Conveyance construction costs
- Site acquisition costs
- Site preparation costs
- Access road construction costs

3.1.1 Conveyance Construction Costs

This category includes construction costs for the three main conveyance systems that will be necessary for operation of the AWTP. First, a pipeline will be needed to convey tertiary-treated source water from the LVMWD recycled water distribution system to the AWTP; second, a pipeline will be needed to convey purified water from the AWTP to LVR; third, a pipeline will be needed to convey concentrate from the reverse osmosis (RO) process to the Salinity Management Pipeline in Ventura County for disposal. Sanitary sewer (which would accommodate AWTP residuals other than RO concentrate) and storm drain connection differentiation between the sites is addressed under a separate criterion, Utility Access.

Conveyance construction costs were estimated by laying out preliminary alignments for each of the three pipelines described above, corresponding to each of the 26 potential sites. Preliminary alignments were selected based on shortest distance and use of major streets, when possible.

An example set of alignments is shown in **Figure 5** for Site "L". In the figure, the LVMWD existing recycled water system is shown in purple, with the large 24-inch diameter backbone pipeline shown in red. Alignments for the source water, purified water, and RO concentrate are shown in green, yellow, and orange, respectively. RO concentrate pipeline alignments are based on Alternative Alignment 1 from the BODR. A map similar to **Figure 5** was developed for each of the 26 potential sites.

To estimate construction costs, each of the alignments was measured and the lengths were multiplied by an estimated unit cost. The source water pipeline was assumed to be a 24-inch diameter conduit; the purified water pipeline was assumed to be a 20-inch diameter conduit; and the RO concentrate pipeline was assumed to be an 8-inch diameter conduit, also based on the 2016 BODR. Major crossings, defined for the purposes of this analysis as freeways or major flood control channels, were identified and included in the cost estimates, assuming trenchless construction. It should be noted that, when feasible, a dual crossing was assumed for multiple pipelines (using the same conduit).

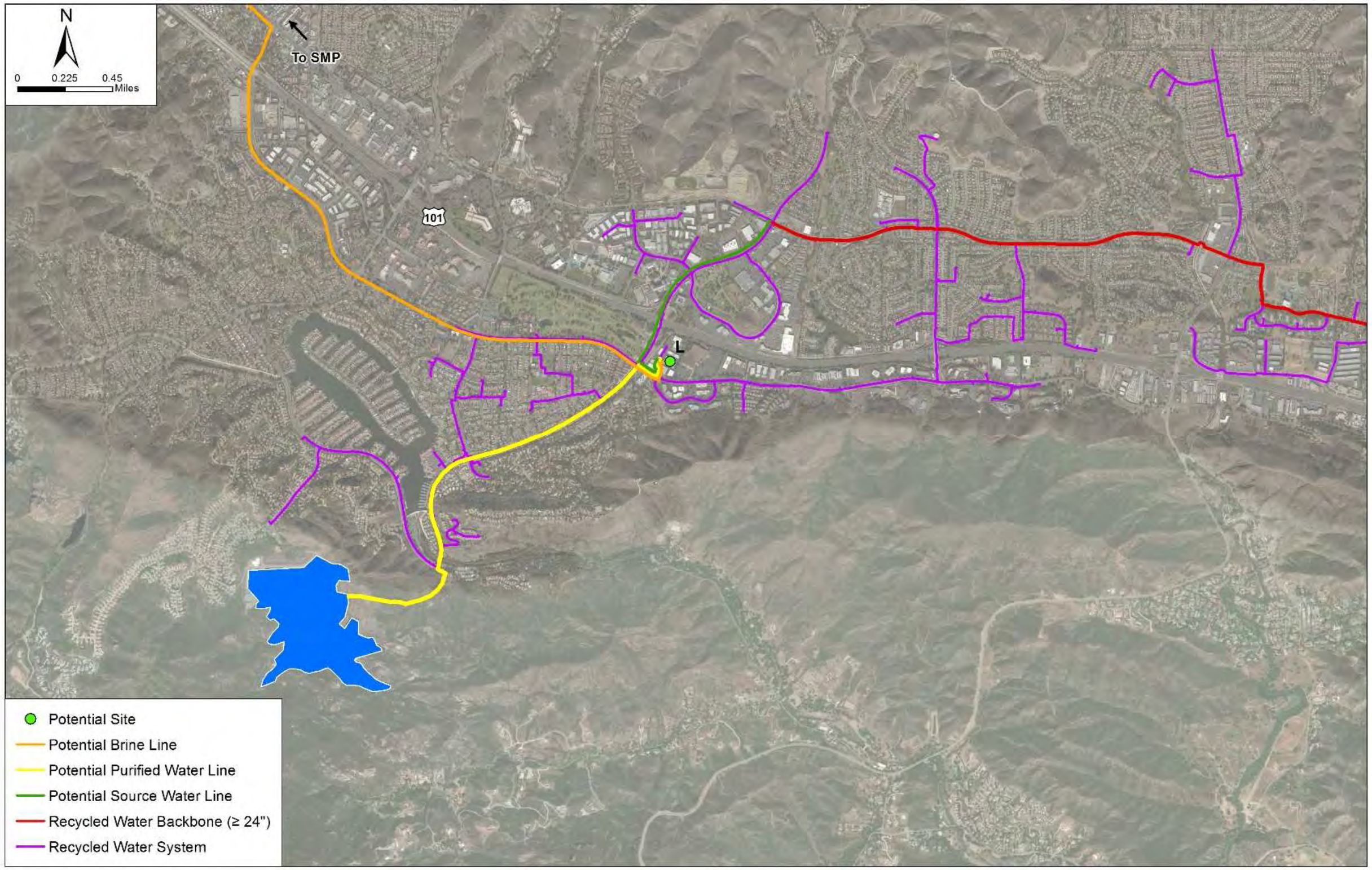
A summary of the conveyance design basis is shown in **Table 2,** including the cost basis information for pipeline construction unit costs and major crossings.

Table 2: Conveyance Pipeline Design Basis

Conveyance Pipeline	Estimated Flow Requirement	Assumed Diameter	Cost Basis
Source water to AWTP	7.4 mgd (5,140 gpm)	24-inch	$16.7/in-dia./linear foot
Purified water to LVR	6.0 mgd (4,170 gpm)	20-inch	$18/in-dia./linear foot
RO concentrate to Salinity Management Pipeline	1.1 mgd (760 gpm)	8-inch	$20/in-dia./linear foot
Major Crossings (freeway or flood control)	n/a	n/a	$1 million per single pipe crossing
			$1.5 million per dual pipe crossing

Source for flow data: 2016 BODR

Figure 5: Sample Pipeline Alignment Map for Site "L"



3.1.2 Site Acquisition Costs

Of the 26 sites, twenty are undeveloped and six are developed. Site acquisition costs were estimated for all sites using market data and other online resources. Unit costs were developed for land (dollars per acre) and for existing buildings (dollars per square foot) and were applied to the reported parcel acreages and building areas for both developed and undeveloped sites.[2] Parcels that were on the market at the time of this analysis were assigned a purchase value based on the asking price.

Also, for developed sites, costs were included for demolition of existing buildings, based on building size, and for spot removal and disposal of asbestos (assumed for all structures due to the year constructed, as reported by the County Assessor's Office). The estimates do not include relocation costs, and clear titles are assumed for every site.[3] Cost basis information for these estimates is included in **Appendix E**.

3.1.3 Site Preparation Costs

Site preparation costs were estimated for all 26 sites using available geological and topographic data. Each site was characterized according to topography/terrain and potential for encountering difficult geotechnical conditions. Topography/terrain was characterized for each site on the basis of grade (e.g., gentle, moderate, steep); geotechnical conditions were characterized on the basis of soil (e.g., favorable bedding, possible difficult excavation, potential need for blasting). The combined features of topography and geotechnical conditions were then combined into an overall rating for site preparation that was assigned a cost value. Information on rankings and cost basis is included in **Appendix E**.

3.1.4 Access Road Costs

Access road construction costs were estimated for all sites that are not directly adjacent to a roadway. First, for these sits, the approximate distances from the nearest roadways to the likely AWTP locations were measured. Then, the *2010 Alternative Study for Access Road to 5.0 MG Tank Site C at the Las Virgenes Reservoir* was used as a basis for estimating construction costs (LVMWD, 2010). Using the average total cost for three alternative construction options, and adjusting for 2017 ENR/CCI factors, a unit cost was developed and applied to the measured distances. Information on cost basis is included in **Appendix E**.

3.1.5 Construction Cost Factor Scoring

The construction costs for each of the three pipelines, including major crossings, were summed with site acquisition, site preparation, and access road costs to obtain estimated values for the Construction Cost Factor criterion. These differential cost values ranged from approximately $22 million to over $40 million. The values for the estimated pipeline construction costs were by far the largest component of the Construction Cost Factor criterion, ranging from approximately 70 percent to 95 percent.

To provide context, the construction cost estimate from the 2016 BODR, including the AWTP facility, land acquisition, three pipelines, and a mixing system, was $95.3 million.

Finally, scores were assigned to each of the 26 sites according to the range of differential construction costs, as indicated in **Table 3**.

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[2] It should be noted that the land acquisition costs and existing building costs do not constitute appraisals and are not intended to be used as appraisals. Actual appraised values may vary.

[3] Although parcels currently owned by LVMWD were not assigned a site acquisition cost, it is acknowledged that currently owned sites do possess a "value" that could be considered as the preferred sites resulting from this comparative analysis are further evaluated.

Table 3: Construction Cost Factor Scoring

Differential Construction Costs	Assigned Score
$21.5 - $25.5 million	5
$25.5 - $29.5 million	4
$29.5 - $33.5 million	3
$33.5 - $37.5 million	2
$37.5 - $41.5 million	1

Note: Differential costs only (conveyance, site acquisition, site preparation, access road).

3.2 Operational Cost Factor

The second criterion used in the comparative analysis was operational costs. Similar to construction costs, this analysis focuses only on those operational costs that will vary between sites. For example, AWTP labor and chemical costs are assumed to be similar for any site and are not considered in this comparison.

The most significant operational cost differentiator for the planned AWTP is the cost of energy associated with conveyance. To estimate the differential energy needs for each of the 26 sites, representative elevations were determined by identifying likely locations for a 2-acre AWTP facility on each site. Then, lift requirements were determined for each of the three conveyance pipelines to move source water, purified water, and RO concentrate to the AWTP, LVR, and Salinity Management Pipeline, respectively. Regarding the source water feed, it is assumed that only site locations above the Indian Hills Tank elevation (1,200 feet) would exert an additional pumping/energy requirement to move recycled water to the site. Also, for lower elevation sites, and at this level of preliminary analysis, no energy recovery on the feed water was assumed. For the purified water and RO concentrate, lift requirements incorporated head loss calculations determined from the pipeline lengths, diameters, materials, and minor losses (using the Hazen-Williams equation), along with elevation differential. The annual energy requirement (in kWh) was calculated for each of the three conveyance pipelines and summed to obtain a total energy requirement for conveyance associated with each of the 26 sites. Finally, the present worth of a 30-year energy cost was calculated for each site using the annual energy requirement assuming a unit cost of $0.13/kWh and a 5.5% discount rate. Calculations for head loss and energy costs are included in **Appendix F**.

These values for 30-year energy present value were used to assign scores according to the ranges indicated in **Table 4**.

Table 4: Operational Cost Factor Scoring

30-Year Energy Cost	Assigned Score
0 - $1.5 million	5
$1.5 - $3.0 million	4
$3.0 – $4.5 million	3
$4.5 - $6.0 million	2
$6.0 million +	1

3.3 Proximity to Sensitive Receptors

The third criterion was proximity to sensitive receptors. This criterion was included to assess the distance between each of the 26 sites and the nearest residential area or school, recognizing the potential for public opposition. First, a Google Map search of all schools was conducted to confirm that all were captured. Residential areas were then identified on aerial photos and the distances were measured. Proximities were measured as "line of sight" distances. For settings with a ridgeline between the site and receptor, distances over a ridgeline were used. Scores for Proximity to Sensitive Receptors were assigned according to the following ranges in **Table 5.**

Table 5: Proximity to Sensitive Receptors Scoring

Proximity to Nearest Residential Area or School	Assigned Score
0.4 miles or greater	5
0.3 – 0.4 miles	4
0.2 - 0.3 miles	3
0.1 – 0.2 miles	2
Less than 0.1 mile	1

3.4 Access through Residential Neighborhoods

The fourth criterion, Access through Residential Neighborhoods, was included to assess whether truck access (for maintenance or chemical deliveries) to a given site requires driving on streets in a residential area. This criterion addresses the potential for public opposition due to increased truck traffic. Arterial streets with residential properties nearby (e.g., Agoura Road) were not considered as "residential streets" for the purpose of this analysis. Each site was scored a "1" or "5" based on whether access to the site required driving through a small residential street. Undeveloped sites zoned as "residential" were assumed to require truck traffic through areas that could transition to residential in the future, so were assigned a "3". Scores for Residential Driving Required were then assigned as indicated in **Table 6**.

Table 6: Access through Residential Neighborhood Scoring

Requires Driving on Residential Streets?	Assigned Score
No	5
Undeveloped but zoned as future residential	3
Yes	1

3.5 Utility Access

Utility access was included as the fifth criterion to assess a particular site's access to sanitary sewer, storm drain, electrical, gas, and other basic utilities. Sites in developed urban areas have readily available utilities, whereas remote sites may not. This criterion assesses the relative difficulty of a particular site accessing the array of utilities required to support an AWTP. Scores for Utility Access were then assigned as indicated in **Table 7**.

Table 7: Utility Access Scoring

Site Located in Developed Urban Corridor?	Assigned Score
Yes	5
No	1

3.6 Environmental Considerations

The sixth criterion considers potential environmental constraints associated with each site. To support this criterion, a series of investigations were conducted to assess the number of environmental hurdles that would be encountered. The following list summarizes these investigations:

- Biology (vegetation type) from general plans and from documentation of known endangered species
- Hydrology (stream/wetlands) from United States Geologic Survey (USGS, water features), United States Fish and Wildlife Service (USFWS, wetlands), and general plans (flood hazards)
- Cultural from general plans
- Geology (faults) from general plans - safety sections
- Fire Hazards from general plans (city sites) and California Department of Forestry and Fire Protection (Cal Fire, county sites); this aspect of the analysis did not differentiate between any of the 26 sites
- Environmental Justice from the Department of Water Resources (DWR) disadvantaged community and economically distressed area (DAC/EDA) mapping tool
- Hazardous Materials/Toxic – from GeoTracker and EnviroStor databases

Therefore, the Environmental criterion includes consideration of potential biological, hydrological, cultural, geological, and safety impacts. A site with five points has no known hurdles. Points are deducted for any hurdles under Biology (-1 point if sensitive vegetation exists and/or if known endangered species exist), Hydrology (-1 point if National Hydrography Dataset [NHD] flowline exists on parcel), Cultural (-1 point if located on culturally sensitive area), or HazMat/Toxics (-1 point if near Leaking Underground Storage Tank [LUST]). The other two environmental categories (Geology and Environmental Justice) are the same for all sites under consideration. Supporting information for the Environmental evaluation and scoring is included in **Appendix G**.

This analysis revealed that all 26 sites are located in fire hazard zones, so that factor is not a differentiator and was dropped as a factor in the scoring criterion. Also, only one site had a HazMat/Toxic finding, which turned out to be a closed LUST cleanup site. Therefore, this factor is not a differentiator either.

3.7 Acquisition Timing

The seventh and final criterion considers the likelihood of the JPA being able to acquire a site within a 6-month period. Sites that score highest are those that are already owned or optioned by the JPA. Sites that receive a middle-range score are those that are actively listed for sale. All other sites receive a low score for this criterion. The scoring for Acquisition Timing is shown in **Table 8**. Active listing documentation that was obtained for this analysis is included as **Appendix H**.

Table 8: Acquisition Timing

Status of Parcel	Assigned Score
JPA-owned or optioned	5
Active Listing	3
Other	1

3.8 Criteria and Scoring Summary

Table 9 presents a summary of the criteria, definition, and basis of scoring, with 5 representing the best score and highest ranking.

Table 9: Summary Table of Criteria and Scoring

Criterion	Measurement	Metric	Definition	Basis of Scoring
Construction Cost Factor	Costs for pipelines, crossings, site acquisition, site preparation, and access roads	$ million	Higher score indicates lower cost	$21.5 - $25.5 M: 5 $25.5 - $29.5 M: 4 $29.5 - $33.5 M: 3 $33.5 - $37.5 M: 2 $37.5 - $41.5 M: 1
Operational Cost Factor	Energy cost required to operate three conveyance pipelines over 30 years	$ million	Higher score indicates lower cost	$0 - $1.5 M: 5 $1.5-$3.0 M: 4 $3.0-$4.5 M: 3 $4.5-$6.0 M: 2 $6.0 M +: 1
Proximity to Sensitive Receptors	Distance to nearest residential area or school	Miles	Higher score indicates lower proximity	0.40 mi. + 5 0.30 – 0.39 mi. 4 0.20 - 0.29 mi. 3 0.10 – 0.19 mi. 2 Less 0.1 mi. 1
Residential Driving Required	Need to drive through residential streets for truck access to site	Yes/No (or zoned for future residential)	Higher score indicates access does not require residential streets	No 5 Future 3 Yes 1
Utility Access	Immediate access to basic utilities	Yes/No	Higher score indicates utilities are readily available	Yes 5 No 1
Environmental Considerations	Amount of effort required for environmental compliance	Number of environmental hurdles	Higher score indicates fewer environmental issues	No likely hurdles: 5 Minor hurdles: 4 Mod. hurdles: 3 Major hurdles: 2 Extreme hurdles: 1
Acquisition Timing	Likelihood of being able to acquire rapidly	District-owned or optioned vs. active listing vs. other	Higher score indicates greater likelihood of acquisition	District-Owned: 5 Active Listing: 3 Other: 1

Scores assigned for each of the 26 sites are shown in **Table 10**.

Table 10: Criteria Scores Assigned to 26 sites

Site ID	Parcel No.	Improved (Yes/No)	Year Built	Site Size (Acres)	Zoning Definition	Jurisdiction	Construction Cost Score	Operational Cost Score	Prox. to Sensitive Receptors Score	Residential Driving Required	Utility Access Score	Environmental Considerations Score	Acquisition Timing Score
A	2059025906	No		28.6	Open Space	Westlake Village	5	5	3	5	1	2	5
B	6800230755	No		27.6	Open Space	Thousand Oaks	5	5	1	1	5	3	1
C	6800230585	No		13.2	Open Space	Thousand Oaks	5	5	1	1	5	3	1
D	2053001008	No		3.2	Business Park/Office Retail	Agoura Hills	4	3	1	5	5	4	3
E	2057022902	No		6.9	Business Park	Westlake Village	5	4	1	1	5	4	1
F	2061001025	No		7.1	Business Park/Office Retail	Agoura Hills	4	4	1	5	5	3	5
G	2056002900	No		41.3	Open Space	Westlake Village	5	5	1	5	5	5	3
H	2061001903	No		15.3	Residential	Agoura Hills	4	5	1	3	1	3	1
I	2061001005	No		20.0	Residential	Agoura Hills	4	5	2	3	1	3	1
J	2054028047	Yes	1969	3.3	Business Park	Westlake Village	4	5	2	5	5	5	1
K	2061004036	Yes	1927	3.3	Business Park/Manufacturing	Agoura Hills	3	3	5	5	5	4	1
L	2057001021	Yes	1974	2.5	Business Park	Westlake Village	4	4	2	5	5	5	1
M	2061001007	No		74.4	Residential	Agoura Hills	4	4	3	3	1	3	1
N	2061002096	No		30.4	Commercial/Business Park	Agoura Hills	4	5	4	5	5	3	3
O	2057001014	Yes	1969	2.1	Business Park	Westlake Village	4	4	1	5	5	4	1
P	2057001005	Yes	1967	2.2	Business Park	Westlake Village	4	4	1	5	5	5	1
Q	2063001901	No		19.6	Rural Residential	Unincorporated LA County	4	4	1	3	1	3	1
R	2048011034	No		2.8	Business Park/Office Retail	Agoura Hills	3	3	3	5	5	5	1
S	2053001005	No		5.7	Business Park/Office Retail	Agoura Hills	3	3	2	5	5	5	3
T	2053001004	No		8.7	Business Park/Office Retail	Agoura Hills	2	3	2	5	5	5	3
U	2061003027	No		5.2	Business Park Manufacturing	Agoura Hills	2	3	5	5	5	4	3
V	2069011910	No		71.8	Open Space/Deed Restricted	Calabasas	1	3	3	5	1	3	5
W	6800052585	No		352.8	Open Space	Thousand Oaks	3	5	1	5	1	3	1
X	4455025902	No		14.5	Open Space/Deed Restricted	Calabasas	1	2	3	5	1	4	5
Y	2063048005	No		9.8	Light Ag/Residential	Unincorporated LA County	2	1	2	1	1	4	1
Z	4455026900	No		127.2		Calabasas	1	2	3	5	5	3	5

3.9 Criteria "Weighting" Scenarios

A key factor in comparison analysis is the relative importance of criteria used. Indication of relative importance is achieved through the assignment of relative "weights" to each criterion. Additionally, a comparative analysis can consider varying weightings for a set of criteria to assess the robustness of an outcome. For this analysis, where the desired outcome was to identify a "group" of preferred candidate sites to visit in the field, a series of weighting "scenarios" were considered to identify a robust set of preferred sites. This produced a weighted score for each site for each of the weighting scenarios.

Since overall costs are likely to be the most important consideration in site selection for the AWTP facility, four scenarios were developed that each weight the Construction Cost Factor criterion differently, progressing from a low weighting to a high weighting, then to a zero weighting. Three additional scenarios were developed to emphasize Proximity to Sensitive Receptors, Environmental Considerations, and Acquisition Timing. These seven scenarios are defined in **Table 11**, and the focus criterion for each scenario is shown in bold.

Table 11: Weighting Scenarios

Criterion	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7
Construction Cost Factor	**25%**	**50%**	**90%**	**0%**	1.7%	1.7%	1.7%
Operational Cost Factor	12.5%	8.3%	1.7%	16.7%	1.7%	1.7%	1.7%
Proximity to Sensitive Receptors	12.5%	8.3%	1.7%	16.7%	**90%**	1.7%	1.7%
Access through Residential	12.5%	8.3%	1.7%	16.7%	1.7%	1.7%	1.7%
Utility Access	12.5%	8.3%	1.7%	16.7%	1.7%	1.7%	1.7%
Environmental Considerations	12.5%	8.3%	1.7%	16.7%	1.7%	**90%**	1.7%
Acquisition Timing	12.5%	8.3%	1.7%	16.7%	1.7%	1.7%	**90%**

3.10 Preliminary Results and Final Screening

The application of the weighting scenarios produced a set of seven different overall rankings for the 26 sites. Detailed scoring/ranking tables for each of the seven scenarios may be found in **Appendix I.** Examination of the scoring/ranking tables revealed that seventeen (17) of the sites consistently appeared in the top portion of the rankings.

These 17 sites were selected for the final step in the comparative analysis, a screening based on site visits by JPA staff and the consultant team. These site visits enabled the project team to more closely view the conditions and status of the sites, and incorporate local knowledge offered by JPA staff.

The seventeen sites that consistently ranked high during the "weighting scenarios" analysis, along with the findings from the January 11th site visits, are presented in **Table 12**. As a result of these site visits (and as noted in the table), ten (10) additional sites were screened from further consideration.

Table 12: Findings Derived from 17 Site Visits

Site ID	Parcel No.	Improved (Yes/No)	Year Built	Site Size (Acres)	Description	Findings	Comments
A	2059025906	No		28.6	Las Virgenes Reservoir	Two potential routes for access road; two endangered species in habitat	
D	2053001008	No		3.2	Empty lot	Buffer road between site and freeway	
F	2061001025	No		7.1	Agoura Road		
G	2056002900	No		41.3	Lindero Canyon	Woodland Hills; previous community park denied	Remove from additional consideration
J	2054028047	Yes	1969	3.3	Commercial Park; Crossfit	Active business with building and parking lot	Remove from additional consideration
K	2061004036	Yes	1927	3.3	Brightview Landscaping	Site may be under-utilized; very small building; buffer road between site and freeway	
L	2057001021	Yes	1974	2.5	Commercial Park	Active business with building and parking lot	Remove from additional consideration
N	2061002096	No		30.4	Hilton property	Known cultural resources previously identified	Remove from additional consideration
O	2057001014	Yes	1969	2.1	Warner Communications	Active business with building and parking lot	Remove from additional consideration
P	2057001005	Yes	1967	2.2	Smith Pipe Company	Active business with building and parking lot	Remove from additional consideration
R	2048011034	No		2.8	Empty lot; freeway adjacent	Site has difficult shape and very little extra space; site abuts freeway directly	Remove from additional consideration
S	2053001005	No		5.7	Empty lot; freeway adjacent	Planned development is underway	Remove from additional consideration
T	2053001004	No		8.7	Empty lot; freeway adjacent	Buffer road between site and freeway	
U	2061003027	No		5.2	Site next to animal shelter	Planned development is underway	Remove from additional consideration
X	4455025902	No		14.5	Area behind Rancho Las Virgenes digesters	Fairly inaccessible; Site Z is preferred	Remove from additional consideration
Y	2063048005	No		9.8	Buddy Ebsen property	Very remote site	
Z	4455026900	No		127.2	Rancho Las Virgenes spray fields	Some liquefaction zones, but AWTP can be located outside these areas	

4 Final "Shortlist" of Preferred Sites

Seven (7) potential sites emerged from the sequence of screening and comparative analyses described in the sections above. These seven sites were then subjected to a traditional alternatives analysis with fixed weights for each of the seven criteria established previously (i.e., without use of different scenarios). The weights assigned for each criterion are shown in **Table 13.**

Table 13: Weightings for Alternatives Analysis of Final Seven Sites

Criterion	Weighting
Construction Cost Factor	20%
Operational Cost Factor	10%
Proximity to Sensitive Receptors	10%
Access through Residential	10%
Utility Access	10%
Environmental Considerations	20%
Acquisition Timing	20%

The sites and the scores assigned for each of the seven criteria are listed in

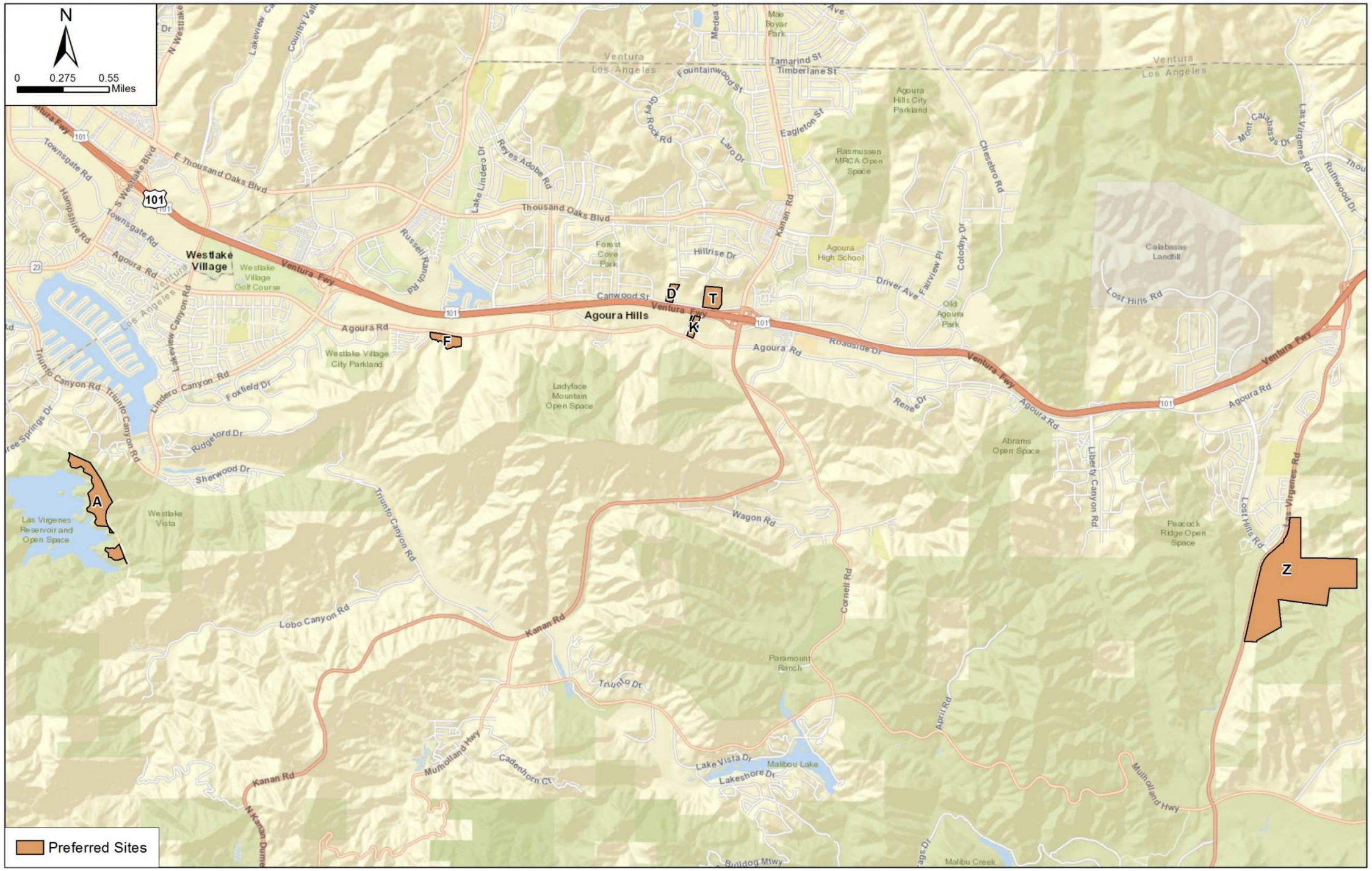
Table 14. One of the sites, Site Y, received a score substantially lower than the other six sites and is removed from further consideration. These remaining six (6) sites are presented here as the preferred sites for the proposed AWTP facility. A map of the six preferred sites is shown in **Figure 6**.

Table 14: Seven Preferred Sites and Criteria Scoring

Site ID	Parcel No.	Improved (Yes/No)	Year Built	Site Size (Acres)	Zoning Definition	Jurisdiction	LVMWD Parcel	Construction Cost Score	Operational Cost Score	Prox. to Sensitive Receptors Score	Access Thru Res Street Score	Utility Access Score	Environmental Score	Acquisition Timing Score	Overall Score
F*	2061001025	No		7.1	Business Park/Office Retail	Agoura Hills	OPTION	4	4	1	5	5	3	5	3.90
A*	2059025906	No		28.6	Open Space	Westlake Village	YES	5	5	3	5	1	2	5	3.80
D	2053001008	No		3.2	Business Park/Office Retail	Agoura Hills		4	3	1	5	5	4	3	3.60
T	2053001004	No		8.7	Business Park/Office Retail	Agoura Hills		2	3	2	5	5	5	3	3.50
Z	4455026900	Partial	n/a	133.4		Calabasas	YES	1	2	3	5	5	3	5	3.30
K	2061004036	Yes	1927	3.3	Business Park/Manufacturing	Agoura Hills		3	3	5	5	5	4	1	3.40
Y	2063048005	No		9.8	Light Ag/Residential	Unincorporated LA County		2	1	2	1	1	4	1	1.90

*Indicates a site that was identified in the 2016 BODR.
Note: Site Y was removed from further consideration because it received a much lower score compared to the other six sites.

Figure 6: Map of Six Preferred Sites



5 References

Alternative Study for Access Road to 5.0 MG Tank Site C at the Las Virgenes Reservoir, AECOM Technical Services, Inc., December 2010.

County of Ventura Assessor's Office (http://assessor.countyofventura.org).

Las Virgenes-Triunfo Joint Powers Authority Recycled Water Seasonal Storage Basis of Design Report, MWH/Stantec, September 2016.

Los Angeles County Office of the Assessor (http://maps.assessor.lacounty.gov).

National Wetlands Inventory: USFWS (https://www.fws.gov/wetlands/Data/State-Downloads.html).

National Hydrology Dataset: USGS (https://nhd.usgs.gov/data.html).

Preliminary Evaluation of 30800 Agoura Road Site, Woodard & Curran, July 2017.

RS Means Heavy Construction Cost Data 2017.

Appendix A – Screening Step Figures

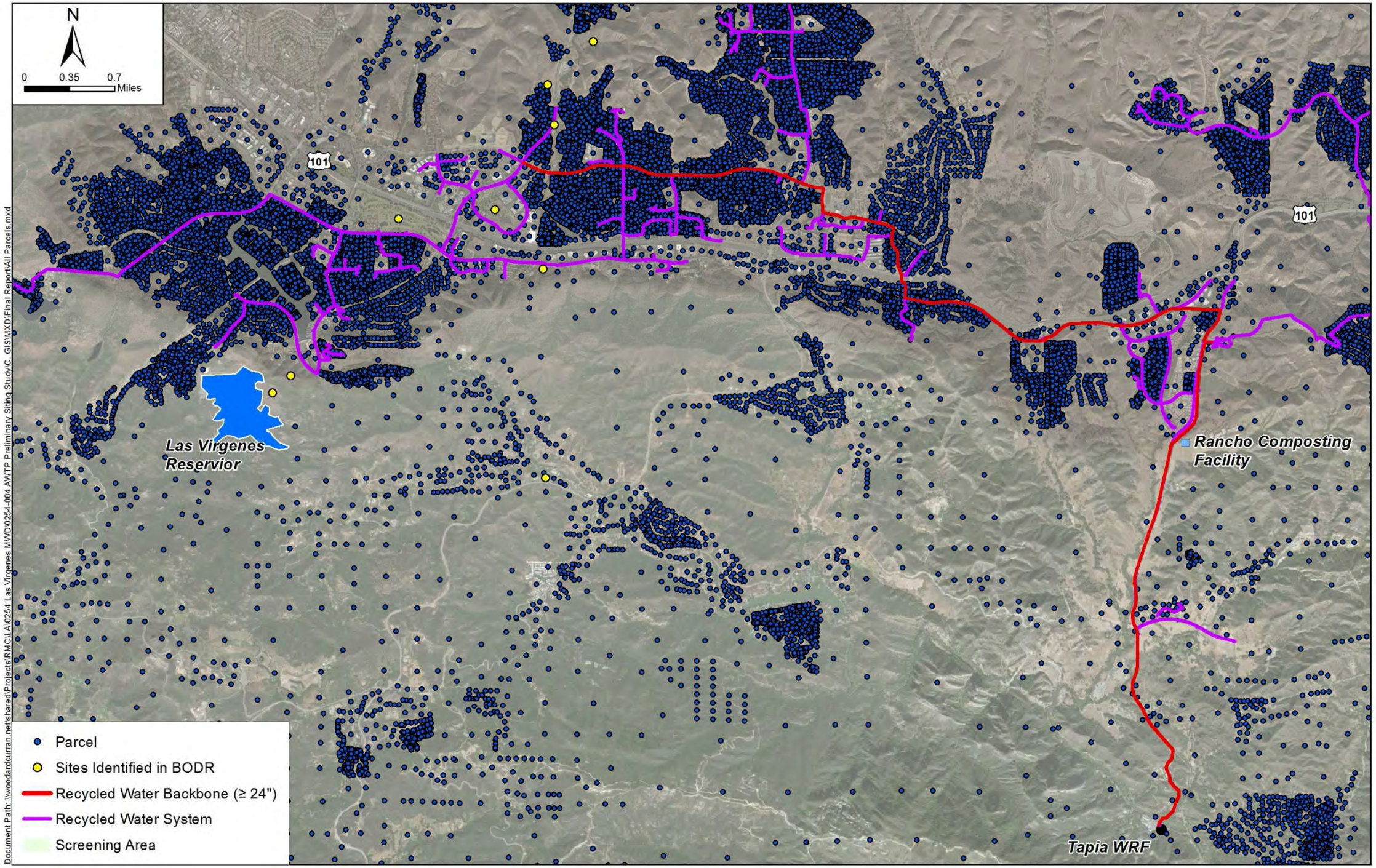


Figure A1: All Parcels in JPA Study Area

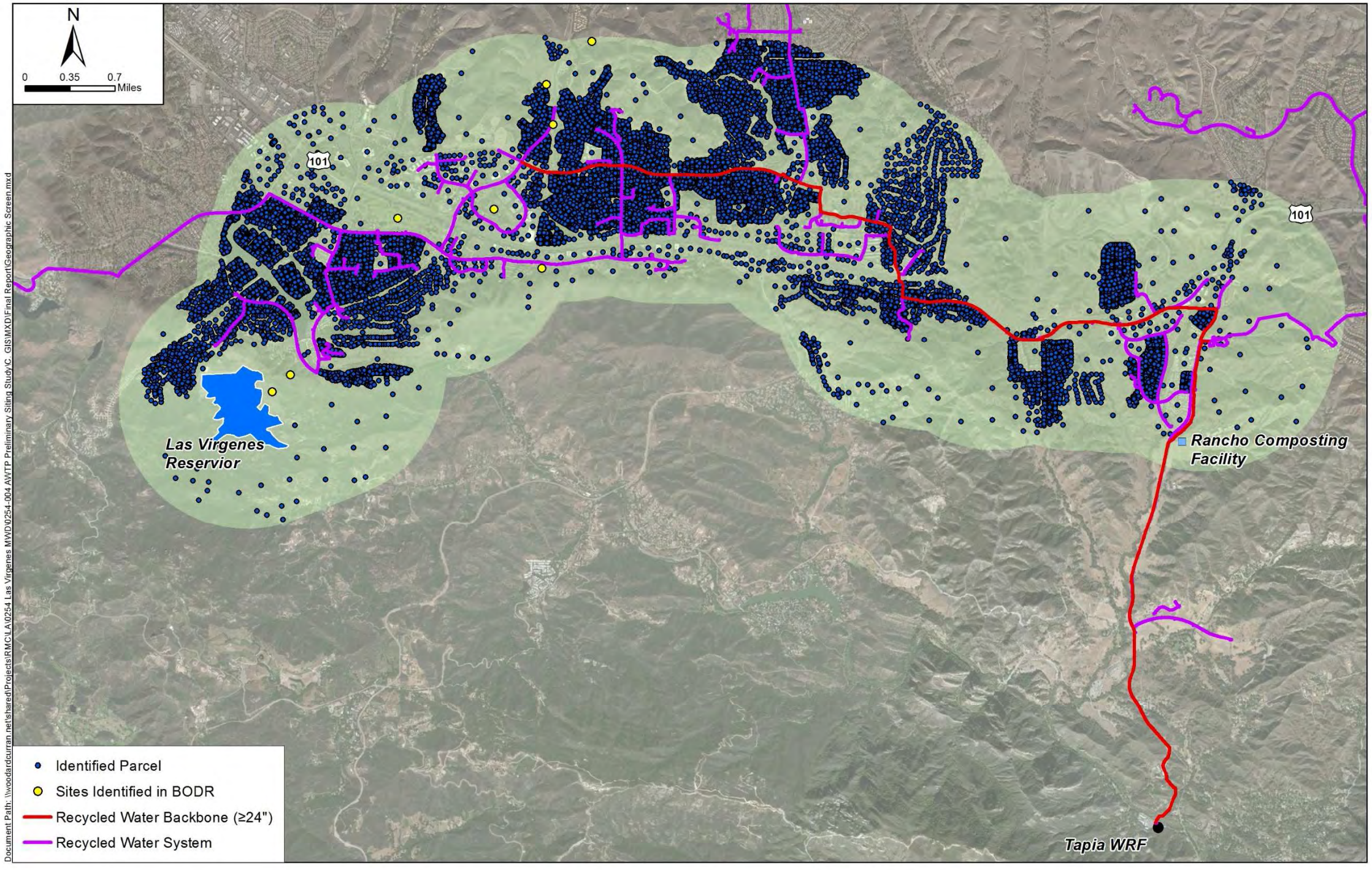


Figure A2: Proximity to Critical Facilities (Target Zone) Screen (13,251 Sites Remaining)

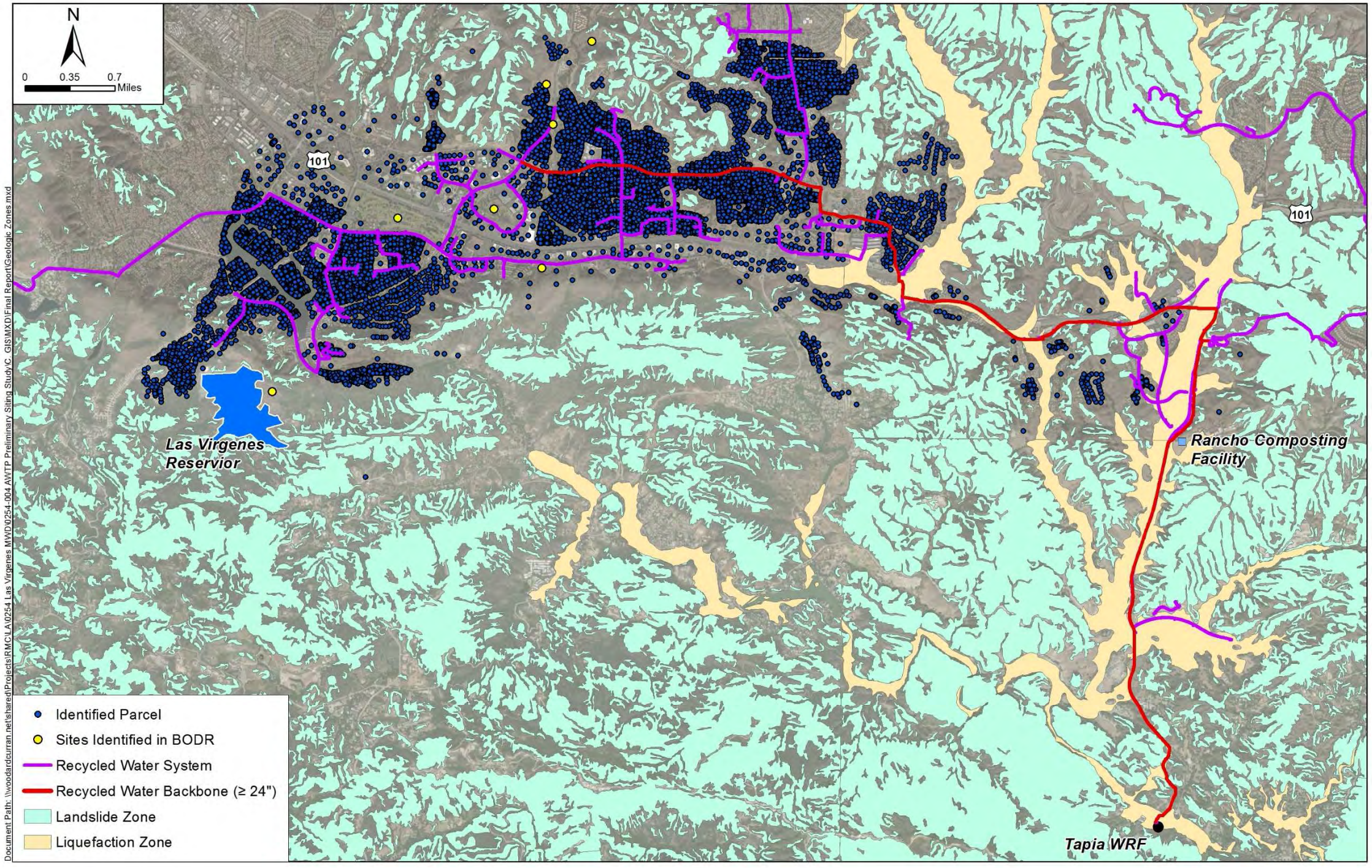


Figure A3: Geology Screen (11,257 Sites Remaining)

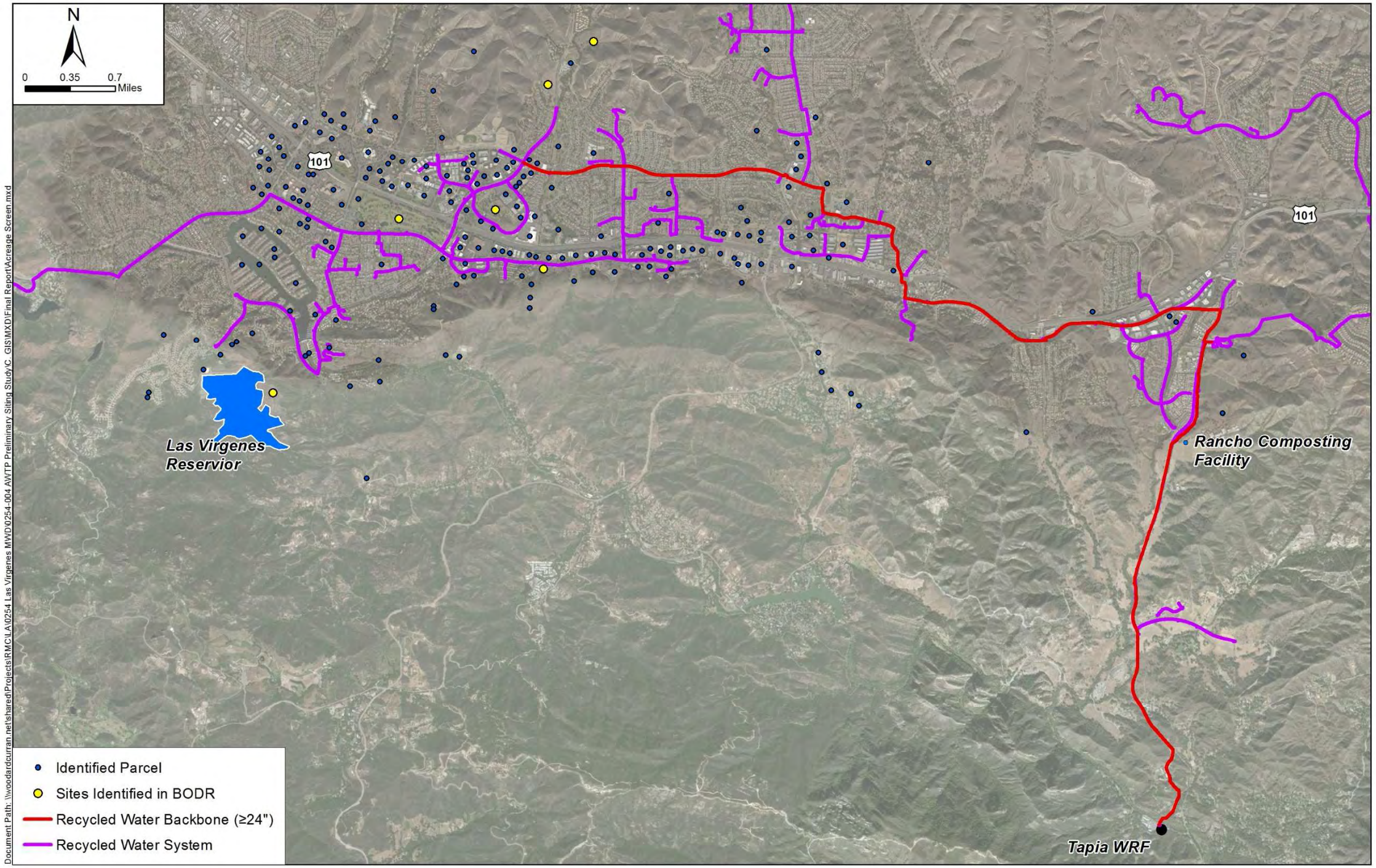


Figure A4: Parcel Size (Acreage) Screen (182 Sites Remaining)

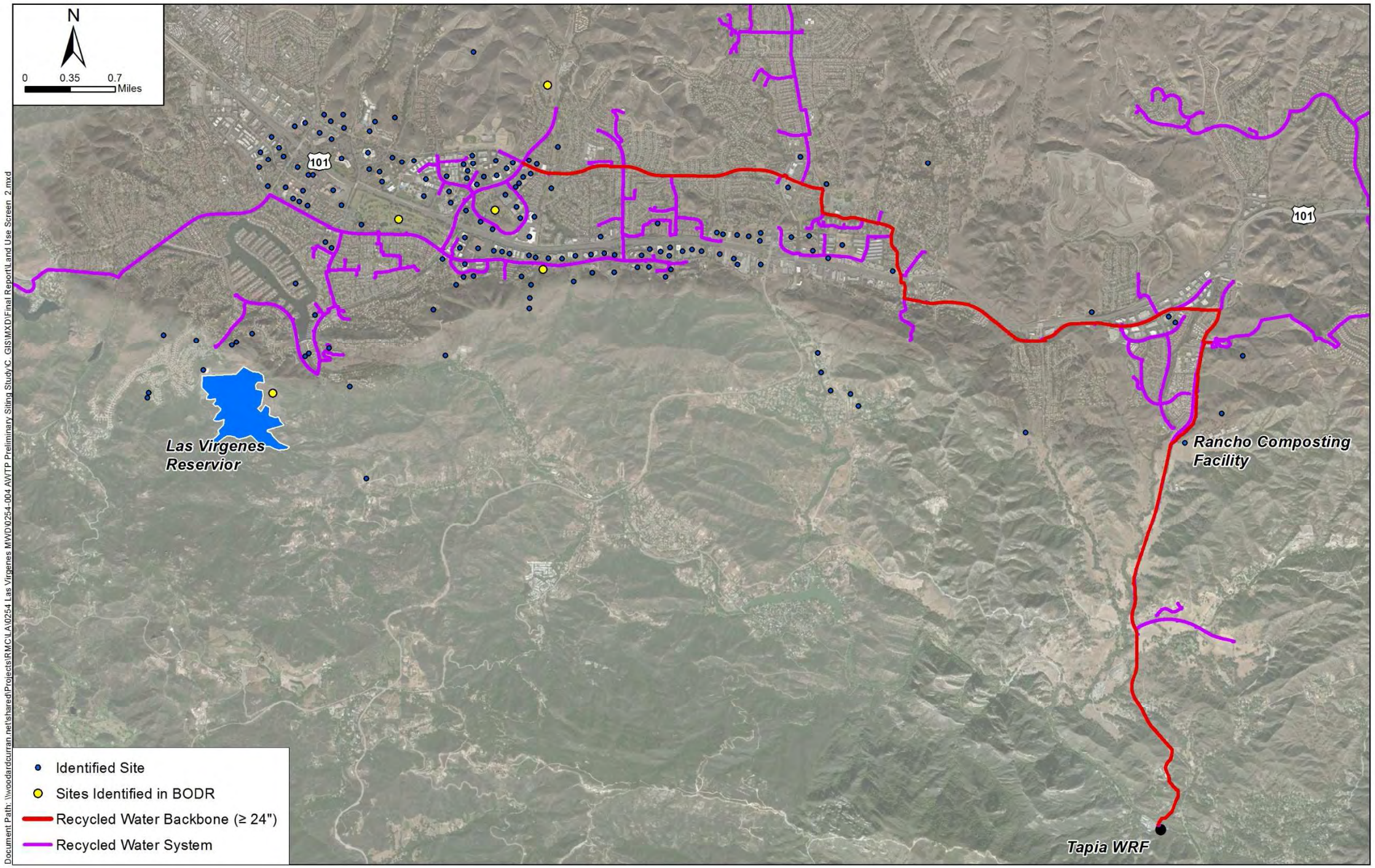


Figure A5: Land Use Screen (141 Sites Remaining)

Appendix B – List of Resulting Sites

(PLACEHOLDER FOR LIST OF SITES PDF)

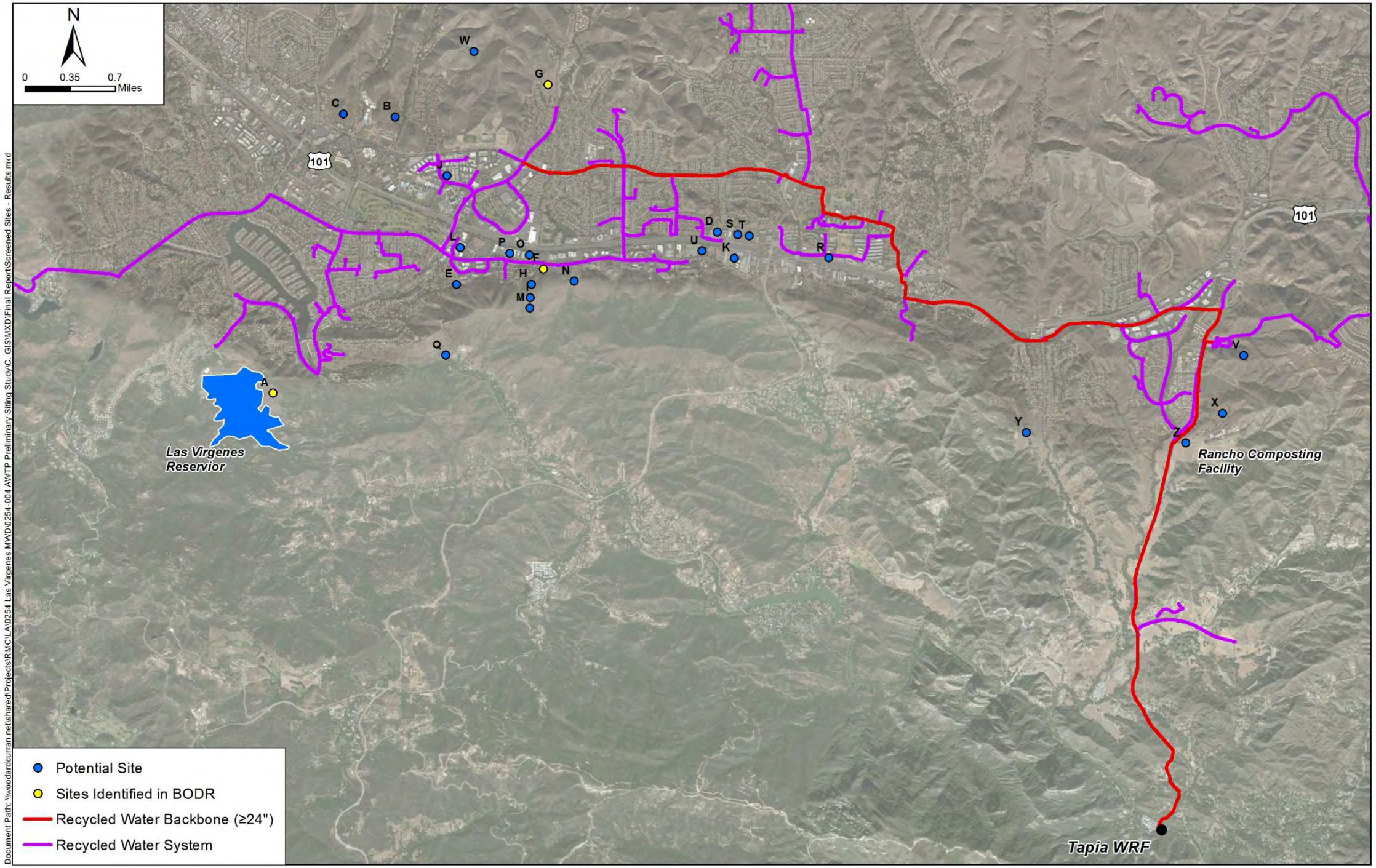


Figure 9: Improvement Factors Screen (26 Sites Remaining)

Appendix C – Results of Hydraulic Analysis

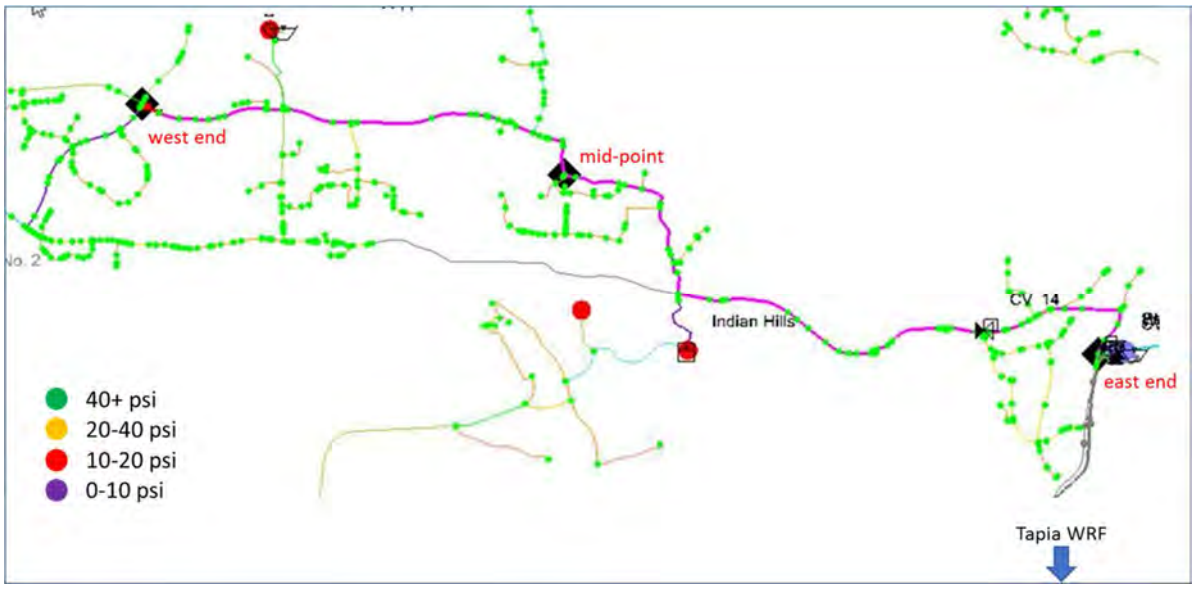
Preliminary Hydraulic Analysis

A preliminary hydraulic analysis was performed to confirm that placement of an AWTP with 7.4 mgd of influent demand (sufficient source flow for a target AWTP production of 6.0 mgd) is hydraulically feasible. For this analysis LVMWD's updated, calibrated WaterGEMS hydraulic model was used. In the model, a 7.4 mgd demand node was added at three locations in the recycled water distribution system that correspond to three "clusters" of the remaining candidate sites (see Figure 10): (1) western end of 24-inch backbone pipeline, (2) near the middle of the 24-inch backbone pipeline near Indian Hills High School (Kanan Road and Thousand Oaks Blvd.), (3) eastern end of the 24-inch backbone pipeline, near LVMWD headquarters. Average day demands (annual) and peak hour for the Western System were used to approximate an assumed "maximum winter day" (April) and associated peak hour demands.

With existing non-potable demands, connection of the AWTP at Node 1, Node 2, and Node 3 did not cause significant pressure issues. With the future demand scenario however, connection at Node 1 caused significant pressure issues, Node 2 caused minor pressure issues, and Node 3 caused no pressure issues. The model results are illustrated in the diagrams below.

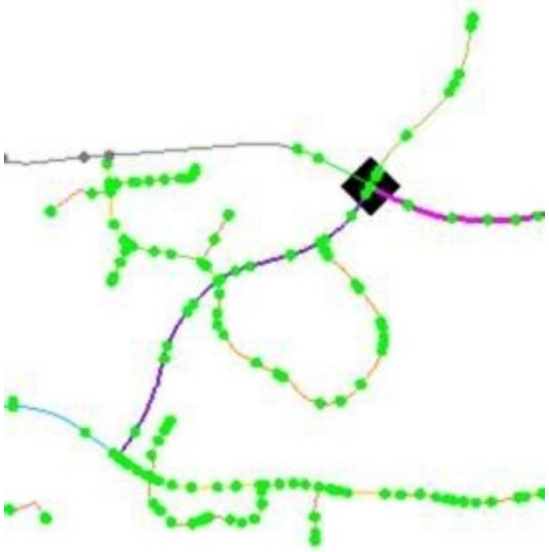
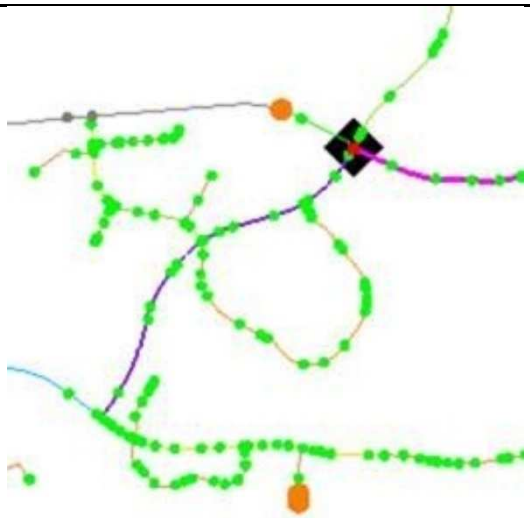
Findings from the hydraulic analysis indicate that future expansion of non-potable customers may need to be curbed in order to operate the AWTP at capacity without affecting service to existing customers. The findings also validate the feasibility of the Pure Water Program and support three of the LVMWD-Triunfo JPA Recycled Water System Policy Principles, including:

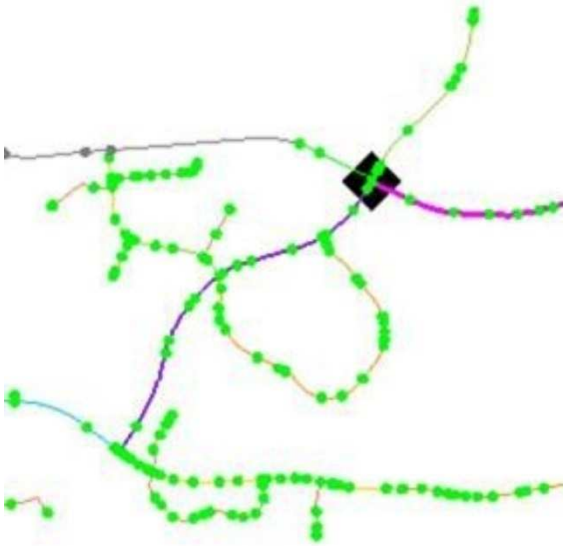
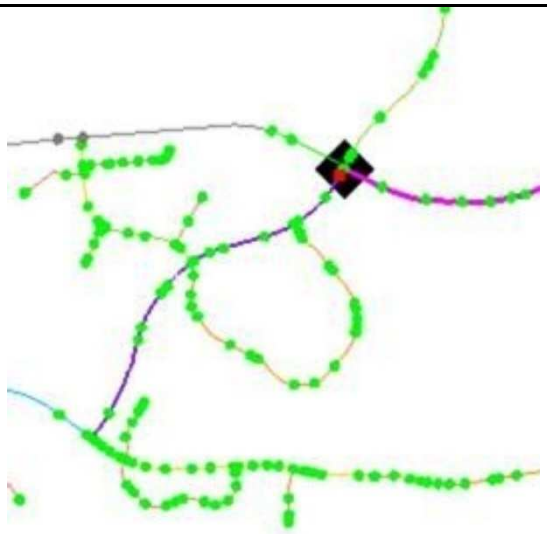
- Continue to supply recycled water to its member agencies such that they can maintain the current level-of-service to their existing customers.
- The JPA and member agencies will not pursue extension of the recycled water system for the sole purpose of increasing demand for recycled water; however, extensions may be considered to improve system redundancy and/or reliability.
- Strive to maximize the water available to the Pure Water Project Las Virgenes-Triunfo by considering additional sources, including not limited to, dry-weather urban runoff, groundwater and wastewater.

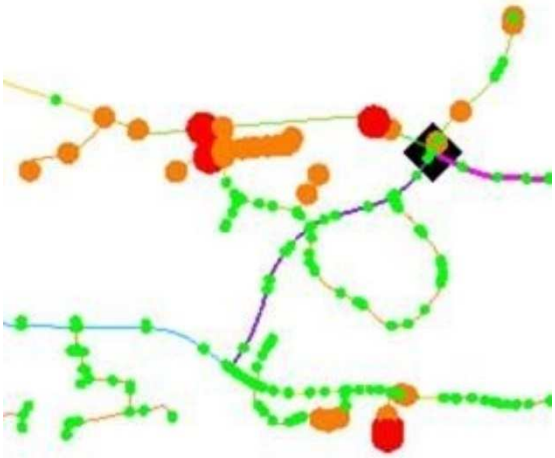
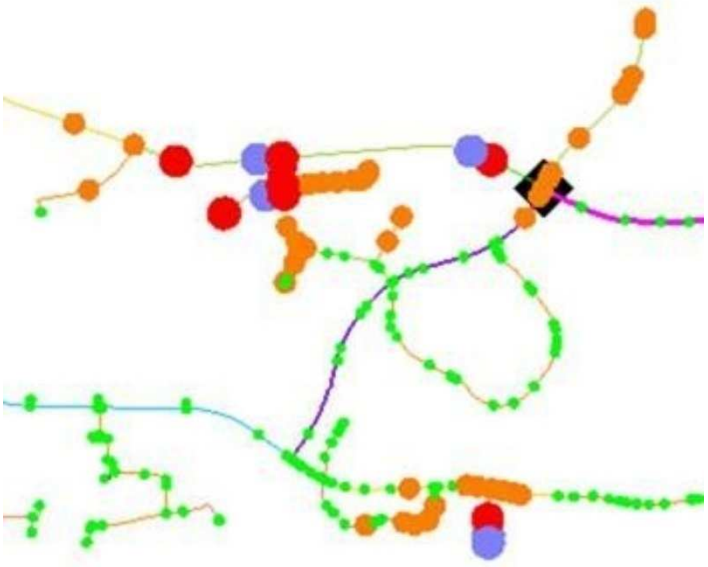


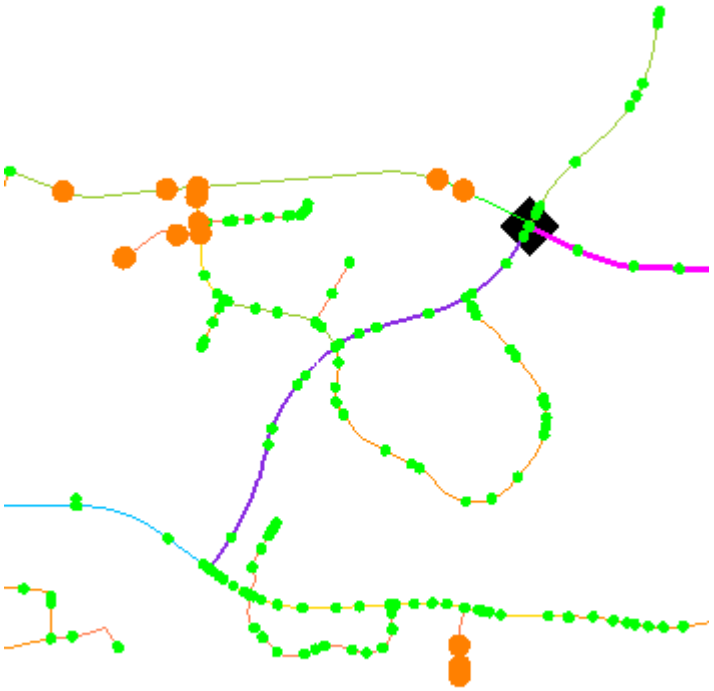
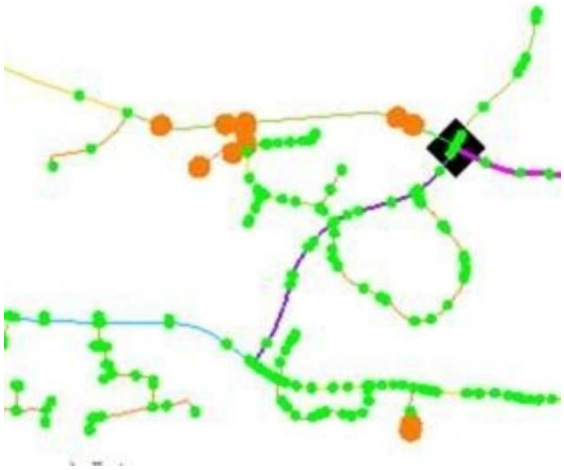
LVMWD Recycled Water System (Western) with 2014 Supplies and Demands

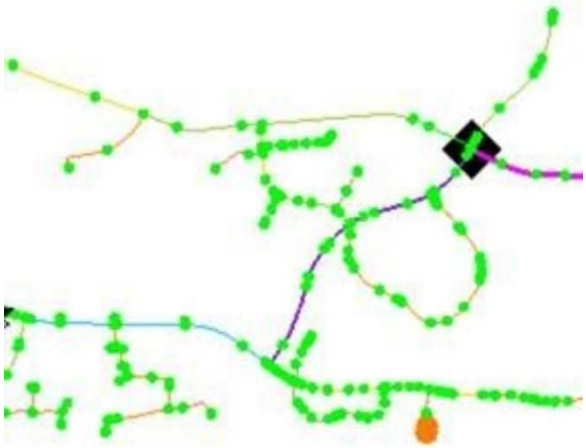
WaterGEMS Hydraulic Model Preliminary Results:

Time Frame	Scenario	Results at Western End of 24-inch RW Pipeline
Existing	**Maximum Day (no 7.4 mgd connection)** Based on full year (Jan-Dec)	
	Average Day + 7.4 mgd at <u>west end</u> of 24" Pipe Based on Avg. Annual (Jan-Dec) assumed for April (max of winter months, Nov - Apr)	

	Average Day + 7.4 mgd at <u>mid-point</u> of 24" Pipe Based on Avg. Annual (Jan-Dec) assumed for April (max of winter months, Nov - Apr)	
	Average Day + 7.4 mgd at <u>east end</u> of 24" Pipeline Based on Avg. Annual (Jan-Dec) assumed for April (max of winter months, Nov - Apr)	

Future - Alternative 5 with improvements	**Maximum Day (no 7.4 mgd connection)**	
	Average Day + 7.4 mgd at <u>west end</u> of 24" Pipeline Based on Avg. Annual (Jan-Dec) assumed for April (max of winter months, Nov - Apr)	Average Day, Peak hour:  Average day, Average hour:

		
	Average Day + 7.4 mgd at <u>mid-point</u> of 24" Pipeline Based on Avg. Annual (Jan-Dec) assumed for April (max of winter months, Nov - Apr)	

	Average Day + 7.4 mgd at <u>east end</u> of 24" Pipeline Based on Avg. Annual (Jan-Dec) assumed for April (max of winter months, Nov - Apr)	

Appendix D – Site Maps/Aerial Photos

Appendix E – Construction Cost Factor Calculations

Appendix F – Operational Cost Factor Calculations

Appendix G – Environmental Considerations

Appendix H – Active Listings

Appendix I – Weighting Scenarios

ITEM 10A

INFORMATION ONLY

February 5, 2018 JPA Board Meeting

TO: JPA Board of Directors

FROM: Facilities & Operations

Subject : Pure Water Project Las Virgenes-Triunfo: Modeling of Las Virgenes Reservoir for Indirect Potable Reuse through Surface Water Augmentation

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SUMMARY:

On February 6, 2017, the JPA Board approved a proposal from Trussell Technologies, Inc. (Trussell), to preform 3-D hydrodynamic modeling of Las Virgenes Reservoir related for indirect potable reuse through surface water augmentation. The purpose of the modeling was to confirm that the project would comply with surface water augmentation regulations issued by the State Water Resources Control Board (SWRCB) and to provide recommendations for future modeling, studies and facility improvements.

Overall, the results of the modeling were favorable and demonstrate that the Pure Water Project Las Virgenes-Triunfo will meet the SWRCB's proposed surface water augmentation regulations, which are expected to be approved shortly. Trussell staff will present the results of the modeling effort at the Board meeting and will provide recommendations that could be considered to improve mixing in the reservoir.

FISCAL IMPACT:

No

ITEM BUDGETED:

Yes

FINANCIAL IMPACT:

The cost of the work is allocated 70.6% to LVMWD and 29.4% to Triunfo Sanitation with a portion reimbursed by the U.S. Bureau of Reclamation through a Title XVI Feasibility Study Grant.

DISCUSSION:

Background: