Canyon Oaks Park Recycled Water Main Extension Project

Preliminary Design Report

Prepared by:

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Chapter 1 Introduction

This Preliminary Design Report (Report) defines the proposed project components including facility sizing, preliminary design criteria, pipeline alignment, pipeline materials, construction cost estimates, permitting and right-of-way requirements. This Report also includes recommended next steps for project implementation. The purpose of this Report is to define the project in sufficient detail to allow the project partners to make a determination of commitment on whether to proceed with final design upon acceptance of this Report.

1.1 Project Overview

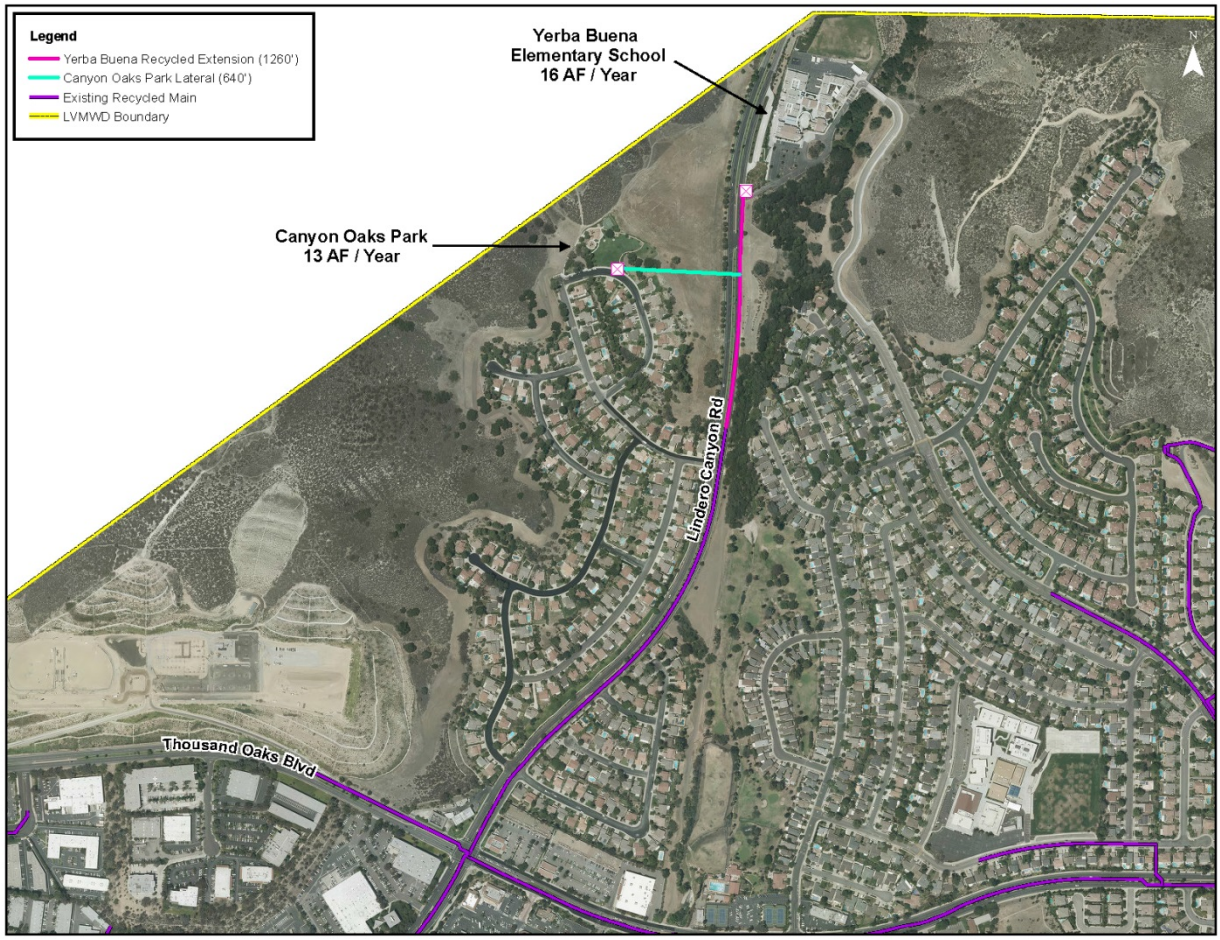
The Canyon Oaks Recycled Water Main Extension would serve the City of Westlake Village's Canyon Oak's Park and eliminate a long private service line that currently serves Yerba Buena Elementary School within the City of Agoura Hills. The extension is located within the Las Virgenes Municipal Water District (LVMWD) service area just south of the Ventura / LA County line. The recycled water main extension includes funding in the amount of $173,106 as part of the Greater Los Angeles County Integrated Regional Water Management Group's approved Proposition 84 grant obtained by LVMWD. The Canyon Oaks Park recycled water main extension was included within the overall scope of work submitted in the grant application as a component to the Calleguas Intertie Project. A map of the project is shown in **Figure 1-1**.

1.2 Report Contents

This Report consists of six chapters organized as follows:

- **Chapter 1 - Introduction:** This chapter describes the Project in general terms, states the purpose of this Report and its contents.
- **Chapter 2 – Hydraulic Evaluation:** This chapter describes customer demands, hydraulic criteria, and sizing recommendations.
- **Chapter 3 – Pipeline Alignment and Installation Criteria:** This chapter includes a summary of the pipeline alignment evaluation, horizontal and vertical installation recommendations, utility information, and a discussion of construction methods.
- **Chapter 4 – Pipeline Materials and Appurtenances:** This chapter includes an evaluation of pipeline materials and presents proposed design criteria for the pipeline and appurtenances.
- **Chapter 5 – Preliminary Construction Cost Estimates:** This chapter presents preliminary construction and implementation cost estimates for the proposed project and the basis for the cost estimates.
- **Chapter 6 – Project Implementation:** This chapter presents the recommendations for project implementation, including CEQA compliance, permitting, easement acquisition and final design.

Figure 1-1: Canyon Oaks Park Recycled Water Main Extension Project



Chapter 2 Customer Demands and Hydraulic Evaluation

This chapter presents a summary of the project demands, hydraulic evaluation criteria, and facility sizing recommendations.

2.1 Customers, Demand and Delivery Criteria

The recycled water main extension will provide recycled water service for Canyon Oaks Park and Yerba Buena Elementary School.

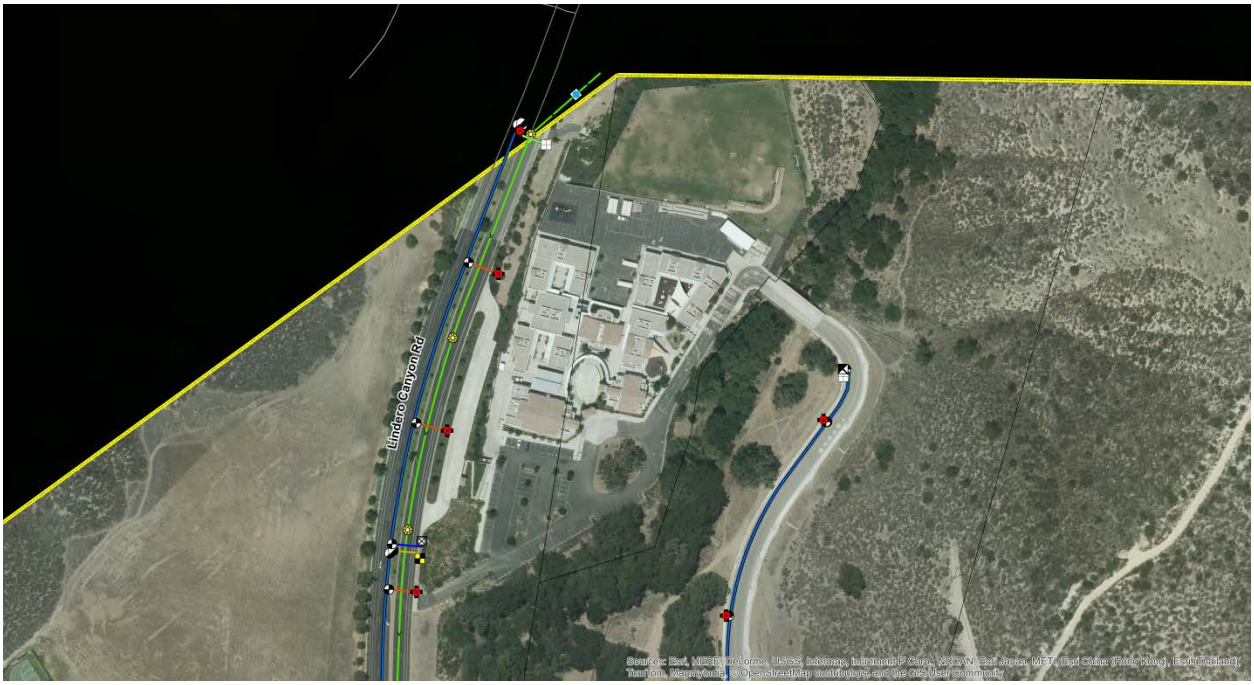
The customers' annual demands were estimated based on information from the 2014 LVMWD Recycled Water Master Plan as well as historical irrigation demands of each customer.

2.1.1 Canyon Oaks Park

Canyon Oaks Park is a community park maintained and operated by the City of Westlake Village Parks and Recreation Department located at 6200 Hedgewall Drive. The park features a children's play area, dog station, fitness trail, half-court basketball, picnic area tables and drinking fountains and has approximately 2.46 acres of irrigated area. Based on demand records, Canyon Oaks Park has an estimated recycled water demand of 13 AFY.

2.1.2 Yerba Buena Elementary School

Yerba Buena Elementary School is a public neighborhood school located in the foothills within the City of Agoura Hills between Reyes Adobe and Lindero Canyon and is the newest elementary school campus in the Las Virgenes Unified School District. The school includes a large baseball and athletic field and landscaping throughout the school campus. Based on demand records, Yerba Buena Elementary has an estimated recycled water demand of 16 AFY. While the school is currently served recycled water from the JPA's recycled water system, the service for the school is located approximately 1,260-feet from the school where the existing recycled waterline terminates. Recycled service is brought to the school through a long 4-inch service line located within private property within the school's parcel. The proposed main extension would extend the JPA's system north along Lindero Canyon Rd. to a service location near the schools existing irrigation pump. Due to pressure requirements of the schools irrigation system an onsite irrigation booster pump provides the pressures necessary to serve the system.



2.1.3 Demand Summary

Demands to be served by the Canyon Oaks Park Recycled Water Main Extension Project are summarized in **Table 2-1**. The minimum pressures required reflect the static pressures that are currently provided to each customer through the existing potable water system or through the long service line.

Table 2-1: Non-Potable Demands

Customer Name	Annual RW Demand (AFY)	Hours per Day / Time of Day	PHD Demand (gpm)	Minimum Static Pressure Available (psi)	Proposed Dynamic Pressures Provided (psi)
Canyon Oaks Park	13	8 hours (10pm-6am)	53	62	60
Yerba Buena Elementary School	16	8 hours (10pm-6am)	66	80	78

2.2 Hydraulic Design Criteria,

Hydraulic design criteria are summarized in **Table 2-2**. Required service pressures for Canyon Oaks Park and Yerba Buena Elementary are as presented in Table 2-1.

Table 2-2: Non-Potable Hydraulic Modeling Criteria

Category	Criteria
Maximum Velocity	8 fps
Maximum Headloss	10 ft/1,000 ft
C value	130
Typical Max Service Pressure	130 psi
Typical Min Service Pressure	40 psi
Min to Air Gap	20 psi

2.3 Hydraulic Evaluation Results and Recommendations

2.3.1 Pipeline Diameter

The proposed tie-in location to the existing recycled water system is limited by a 6-inch diameter service line. The system extension was modeled using the customer demands listed in **Table 2-1** as well as the proposed lengths of pipeline. System pressure losses were calculated based upon simultaneous demands by each customer which reflects the times that irrigation typically occurs for each site.

Both 6-inch and 4-inch diameter PVC pipe was evaluated. Currently, the system gradient and the elevations of each customer provide limited pressures to each property. The proposed pipeline sizing minimizes head-loss to maximize the amount of volume and pressure available to each property and minimize pressure losses in order to provide equivalent pressures to what each customer is currently provided.

Table 2-3: Customer Pressures

Customer	Pipe Diameter (inch)	Length of Pipe (feet)	Max. Pressure (psi)	Min. Pressure (psi)
Canyon Oaks Park	4	640	62	60
Yerba Buena Elementary School	6/4	870/390	80	78

2.4 Maximum Working Pressure

Maximum working pressure will occur under static conditions at the Indian Hills Tank high water level of 1,225 feet. Maximum working pressure in the proposed pipeline will range from approximately 62 psi at the highest elevation along the pipeline route to approximately 100 psi at the lowest elevation. The maximum pressures listed correlate to the elevation of the proposed service connections to each customer.

Chapter 3 Pipeline Alignment and Installation Criteria

This chapter presents the results of the alignment evaluation and describes pipeline installation criteria.

3.1 Pipeline Alignment

Potential alignment routes were identified based on available aerial mapping of the project area, utility mapping, site visits, topographic survey and discussions with City of Westlake Village staff. The following criteria were utilized to determine pipeline alignment.

- **Constructability** – Constructability challenges along the various alignment segments include utility congestion, utility service crossings, space limitations, grade limitations such as steep slopes, and creek crossings.
- **Traffic considerations** - Traffic considerations during construction include potential impacts to vehicular circulation, pedestrian and bicycle facilities, public transit, on-street parking and access to residential areas, schools and commercial businesses.
- **Right-of-way and easement requirements** - Availability of right-of-way, agency with jurisdiction over the right-of-way, and encroachment permit requirements. Where the alignment crosses private property, it was assumed that an easement would be necessary for the Canyon Oaks Park lateral from the City of Westlake Village.
- **Geotechnical constraints** - A preliminary geotechnical and geohazards assessment along the proposed pipeline alignment segments was prepared. The assessment provided a summary of anticipated geotechnical conditions and potential geohazards that may exist along the alternative alignment segments.

3.1.1 Preferred Alignment

The existing recycled water system terminates along the eastern northbound lane along Lindero Canyon Road. Due to its location and the separation requirements for the proposed Calleguas Intertie pipeline along the southbound lanes of Lindero Canyon, the preferred alignment for the recycled main extension is along the same alignment as the existing main. The offset of the alignment is 30-feet east of the Lindero Canyon Rd. centerline.

Optional Alignment:

Based on the recommended pipeline sizes there may be an alternative alignment to consider. A 6-inch pipeline is required along Lindero Canyon Rd. to the service connection point for Canyon Oaks Park. From this point north only a 4-inch service line is required to provide service to Canyon Oaks Park and Yerba Buena Elementary School. Since Yerba Buena Elementary school already maintains a 4-inch service line within their property there may be an opportunity to terminate the main extension just north of the Canyon Oaks Park lateral and connect to the school's 4-inch service line. This alternative will need to be further evaluated during the design phase of the project. This alternative would reduce the cost of the main extension by eliminating approximately 390-feet of pipeline installed within the paved right-of-way.

3.2 Pipeline Horizontal Separation Criteria

The horizontal location of the pipeline within the roadways will need to be refined and adjusted after design topographic survey and utility research and mapping is complete.

A basic criteria for establishing pipeline horizontal alignment within the roadway is the separation requirements from potable water pipelines described in Chapter 16 – California Waterworks Standards of Title 17 of the California Code of Regulations (California Regulations Related to Drinking Water). The requirements for separation of new recycled water mains are:

- 4-foot minimum horizontal separation from existing water mains
- 1-foot horizontal separation from existing water mains with special permission and special design (i.e., no pipe joints, concrete encasement, etc.), approved by the Department of Public Health on a case-by-case basis

There are no regulatory separation requirements for recycled water pipelines from sanitary sewers or storm drains. A target clear separation distance of 4 feet from any existing utility lines and structures is recommended when feasible. Where adjacent to existing parallel structures or pipelines, the pipeline must be located to prevent undermining of the adjacent improvement. Where this is not possible, the construction must utilize continuously supported excavation methods or other mitigating installation techniques to prevent damage to the adjacent improvement.

3.3 Vertical Depth Criteria

The basic criteria for establishing the vertical pipeline profile should be to maintain a minimum cover depth of 42" over the pipeline to meet JPA design standards for recycled water mains. Deeper installation may be necessary where crossing under existing utilities. Pipeline profile grade should be established to provide minimum 1-foot clearance between the new pipeline and existing utilities where possible. The one-foot clear criteria meets the separation guidelines for crossing below water mains. Where the recycled water pipeline must go over an existing water main, no rubber gasket joints are allowed in the recycled water pipeline within 10 feet of the crossing.

3.4 Existing Utilities

One of the biggest challenges to design and installation of the pipeline will be avoiding conflicts with and impacts to existing utilities.

During final design the depiction of utility location and depth should be based on a combination topographic survey (mapping) of above ground evidence of utilities and structure inverts, utility mapping provided by agencies, and utility locating efforts such as potholing.

The Project specifications should also require the construction contractor to pothole all utilities crossing the pipeline or located within 4 feet horizontally from the alignment. Potholing information should be provided to the engineering team, if applicable, in order to identify pipe conflicts and adjust the design alignment and profile to avoid the conflicts. These revisions to the design should be made ahead of pipe fabrication/procurement and trenching operations.

3.5 Pipeline Installation

It is anticipated that the pipeline will be installed by open cut methods. The following are special considerations that should be incorporated into the project specifications.

- **Controlled Low Strength Material (CLSM) for Backfill Material.** CLSM is required by the City of Westlake Village (defined as 1-sack slurry unless otherwise noted within the encroachment permit) for trench backfill material. No mechanical compaction is required using

CLSM, therefore the trench width can be reduced when possible. Laborer time in the trench is reduced significantly, which benefits safety, especially in deeper trenches. The material cost of CLSM, however, is higher than that of native material or imported granular backfill.

- **Recycled Water Identification.** The pipeline and its appurtenances should be specified with the appropriate coloring and markings for recycled water in accordance with the California/Nevada Section American Water Works Association's (AWWA) "Guidelines for Distribution of Non-Potable Water".
- **Final Backfill and Pavement Restoration.** Final backfill and pavement restoration will be in accordance with City of Westlake Village standard details or as otherwise required by the permitting authority.
- **Work Area Limits.** Contractor working area limits should be shown on the final design Drawings. In general, the contractor should be allowed to utilize the public right-of-way within streets, while maintaining minimum travel lanes open during construction. On all streets, a minimum of one travel lane in each direction should remain open. Parking areas along streets may also be impacted during construction.
- **Dewatering.** If dewatering is required, no water shall be discharged through surface streets as runoff or through storm drain facilities.

Chapter 4 Pipeline Materials and Appurtenances

Recycled water pipeline and appurtenance design should meet or exceed the JPA design standards. JPA design standards for recycled water pipelines are the Standard Plans and Specifications for the Construction of Water Mains and Facilities (dated June 1, 1997), including standard drawings PW-101 through PW-140 and reclaimed water standard drawings No. R-1 through R-8.

4.1 Pipeline Materials

Acceptable pipe materials for recycled water mains in the range of 4-inch to 6-inch diameter include ductile iron, steel, polyvinyl chloride (PVC) and high density polyethylene (HDPE). Due to cost, ease of installation, and to match the pipe material of the existing recycled pipeline, PVC is the recommended material.

4.1.1 PVC

PVC pipe would be in accordance with AWWA C900. PVC in accordance with AWWA C900 is available in pressure class up to 305 psi (DR 14).

The maximum normal working pressure is approximately 100 psi for the proposed pipeline. Because of the relatively low working pressure of the pipeline DR 18, which is rated up to 235 psi working pressure, is recommended and also provides a conservative factor of safety due to the rated pressure.

Fittings for PVC pipe should be ductile iron class 350 mechanically restrained by flanged connections or restrained mechanical joint fittings. Joint deflections should be limited to 3-degrees for bell and spigot connections as well as mechanical joint connections to fitting and valves.

4.2 Pipeline Design Criteria

4.2.1 Design Methodology

In addition to JPA standards, pipeline design should be in accordance with the recommendations of AWWA M23 for PVC pipe. The following additional considerations should be included in design of the pipe.

- **Maximum operating pressure.** The maximum operating pressures will be dictated by the high water elevation of the Indian Hills Tank (1225 feet). Maximum operating pressure in the proposed pipeline will range from approximately 62 psi at the highest elevation along the pipeline route to approximately 100 psi at the lowest elevation.

4.2.2 Pipeline Design Criteria

Table 4-1: Summary of Pipeline Design Criteria

Item	Criteria
Hydraulics and Sizing	
Design Operating Pressure	100 -150 psig max (used for valves and appurtenance design)
Allowable Transient Pressure	50 psig
Test Pressure	200 psig max at low point
Pipe Size	
Mainline	6-inch nominal diameter
Lateral	4-inch nominal diameter
Pipe Materials	
PVC Pipe (AWWA C900)	
4 – 6 inch Pipe Pressure Class	DR18 (235 psi)

Item	Criteria
Fitting Material	Ductile Iron CL 350
External Corrosion Barrier (fittings)	Polyethylene Sleeve/Baggies (AWWA C105)
Pipe and Fitting Field Joints	Restrained MJ
Gate Valve Joints	Restrained MJ or Flanged
Field Closures	Restrained MJ Adapter Sleeve
Pipe Design	
PVC Pipe (AWWA C900)	AWWA M23

4.3 Pipeline Appurtenances

Pipeline appurtenances should be designed in accordance with JPA standards. Appurtenant requirements are described below:

4.3.1 Isolation Valves

Isolation valves should be in accordance with applicable JPA standards, as described below.

Mainline and Appurtenant Piping Isolation Valves

Isolation valves for appurtenant piping 4 inches to 8 inches in diameter shall be resilient wedge gate valves in accordance with AWWA C509 for working pressures up to 250 psi.

4.3.2 Air Valves

Combination Air Valves

Combination air valves perform the function of both air release valves and air/vacuum valves. Combination air valves should generally be provided where the functions of both air/vacuum valves and air release valves are required.

Air Valve Recommendations

Air valves should be located in above-grade enclosures designed in accordance with JPA standards. Piping material for air valve assemblies should match the piping material for the mainline pipe.

4.3.3 Blowoffs

Blowoffs should be provided at selected low points and on the up-gradient side of isolation valves along the pipeline to facilitate pipeline dewatering. Blowoffs may also be used to maintain water quality during low flow conditions by opening the blowoff to flush aged water.

Where possible, blowoffs should be located conveniently close to sanitary sewers for disposal of recycled water via a hose connection. If no sanitary sewer system is available for convenient disposal, water must either be off-hauled or used where land disposal (e.g. irrigation) is permitted. Piping material for blowoffs should match the piping material for the mainline pipe.

4.3.4 Applicable Standards

All applicable standards related to the pipeline and appurtenances shall be per LVMWD standards.

Pavement repair and reconstruction of improvements such as sidewalk, curb and gutter should be in accordance with the applicable City of Westlake Village requirements.

Chapter 5 Preliminary Construction Cost Estimates

This chapter presents an estimate of project construction costs and the basis for preparing the cost estimate.

5.1 Cost Estimate Basis

5.1.1 Unit Costs

5.1.2 Key Design Assumptions

Pipeline installation costs include CLSM (slurry) in the pipe zone and trench backfill. Pipeline costs assume full joint restraint (locking segment push-on restrained joints for PVC). Surface restoration assumes t-cut and asphalt patch for all streets. Additional paving may be required as determined by the City of Westlake Village.

5.1.3 Implementation Costs

Allowances for the following implementation costs are included based on a percentage of construction cost unless otherwise noted. The construction cost estimate is based on the unit prices within the 2014 Recycled Water Master Plan and do not include customer conversions. The percentage for engineering, labor and general and administrative expenses are based on the JPA's most recent 5-year Infrastructure Investment Plan.

Final Design Engineering

Final design costs include the follow up evaluations presented in this report as well as preparation of plans and specifications suitable for completive bidding. A final design engineering cost allowance of 10% of the total construction cost estimate is included.

Easement Acquisition

An easement will be required for the Canyon Oaks Park lateral from the City of Westlake Village. It is anticipated that a no-cost easement will be granted by the City.

Prop 84 IRWP Grant

Grant funding in the amount of $173,106 as part of the Greater Los Angeles County Integrated Regional Water Management Group's approved Proposition 84 reduces the capital cost of the project.

Capitol Cost Estimate

Table 5-1: Cost Estimate

Canyon Oaks Park Recycled Water Main Extension	
Construction	$354,000
Engineering (10%)	$35,400
Labor (12%)	$42,480
G&A (20%)	$8,496
Prop 84 IRWP Grant	($173,106)
Total Cost	**$267,270**

Chapter 6 Project Implementation

6.1 CEQA

A Mitigated Negative Declaration (MND) is being prepared for the Calleguas Intertie Project of which the Canyon Oaks Park Recycled Water Main Project is a component of. Calleguas Municipal Water District (CMWD) is acting as the lead agency in the preparation of the CEQA environmental documents. LVMWD will be a responsible agency with respect to the interconnection. The MND covers the project from the existing LVMWD/JPA system north into CMWD's service area.

The project design and construction must be in accordance with the project description as defined in the MND. Variation from the project described in the MND may require additional CEQA analysis. In addition, the requirements of the Mitigation, Monitoring and Reporting Program (MMRP) in the final MND must be addressed in the construction documents or separately. Depending on the type of mitigation, many requirements of the MMRP can be incorporated during the design phase for implementation by the construction contractor during construction.

6.2 Permitting

6.2.1 City of Westlake Village

The City of Westlake Village will require an encroachment/use of right-of-way permit prior to conducting work within the public right-of-way. The construction contractor will be required to obtain this permit from the City Public Works Department, Inspections/Construction Division and comply with its requirements. The design should reflect the permit requirements including meeting City trenching and restoration standards, and the Bid Documents should also include the permitting requirements such as work hour restrictions, and traffic control requirements.

Traffic control can be in accordance with the Work Area Traffic Control Handbook (WATCH) manual or as otherwise approved by the City's Traffic Engineer. Lane closures must be approved when more than one lane is closed, at any intersection, and at any turn pocket.

The final design team should meet with the City of Westlake Village and obtain input on the design and preliminary permit requirements that can be incorporated into the bid documents.

6.3 Easement Requirements

An easement will be required for the Canyon Oaks Park extension. The extension traverses the property between Lindero Canyon Road and Canyon Oaks Park which is owned by the City of Westlake Village. Based on initial discussions with City staff as well as the benefits that the project provides to the City, the acquisition of the easement should be easily attainable.