

Final

Valiano Conceptual Sewer Study

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Valiano Sewer Study

December 2015

1. Introduction

The proposed Valiano development (project) is located on approximately 239 acres within the unincorporated area known as Eden Valley located in northern San Diego County. The property is located approximately one mile south of State Route 78 (SR-78) and the Nordahl Road exit along Country Club and Hill Valley Drives. When fully developed, the project will contain 326 residential units on varying lot sizes within five neighborhoods. The project is being processed as a General Plan Amendment and Specific Plan with the County of San Diego (County). See **Figure 1** for project location within the County.

Project Description. The proposed Valiano development will consist of 326 residential units (with up to 51 secondary units), a recreation center, and neighborhood park encompassing approximately 239 acres located in the unincorporated area known as Eden Valley, just west of the city of Escondido.

Although a majority of the project is within the Escondido Sphere of Influence, except for approximately 50 acres to the southwest, the project will remain and be developed in the unincorporated area of San Diego County.

Located a short distance to the northeast of the property is a light industrial business park and high-density mobile home park, to the west are single family homes within the city of San Marcos, to the east are semi-rural single family homes and small equestrian facilities, and to the south is Harmony Grove Village, a 736 unit residential project under construction, also being developed in the County.

1.2 Study Purpose

The purpose of this study is to provide the County Wastewater Management an overall sewer service plan in support of the proposed project's tentative map, including a feasibility level evaluation and discussion of sewer service alternatives with the City of Escondido, the Harmony Grove Village Sewer Service Area (SSA), Vallecitos Water District (WD) and Rincon Del Diablo Municipal Water District (Rincon MWD).

The sewer study will also determine the requirements for an on-site collection system under each sewer option, including pipeline sizes and slopes and lift station location and capacities. In addition, the study presents wastewater treatment and disposal options, including a proposed new County wastewater treatment and water reclamation facility (WTWRF); conveyance of flows either to the Harmony Grove Water Reclamation Plant (WRP), Escondido's Hale Avenue

Wastewater Treatment and Reclamation Facility or the Vallecitos WD sewer system; and development of a new sewer system and WTWRF owned and operated by Rincon MWD through activation of latent powers.

A draft Valiano Sewer Study was submitted to the County in July 2013 which primarily focused on on-site sewer service, including treatment, provided by the County and an off-site conveyance alternative to Harmony Grove WRP. Comments were received on the Valiano Sewer Study in October 2013 which requested more detailed evaluation of sewer service options and technical related items related to the on-site WTWRF and ability to expand Harmony Grove WRP. Additional comments were received from the County in an Internal Memorandum dated January 15, 2015 and a Final Report was submitted to the County in March 2015 and was included as part of the Environmental Impact Report (EIR) for public review. The revised final sewer study incorporates comments received from agencies and stakeholders as part of the public review.

Purpose:

1. Lay-out and size the on-site sewer collection system consistent with the project Tentative Map revised October 2015.
2. Determine the site requirements and develop a conceptual layout for an on-site "Aero-Mod"-style WTWRF.
3. Present alternatives to a County WTWRF including connecting to the City of Escondido's sewer system, the Harmony Grove WRP, Vallecitos WD sewer system, and a new Rincon MWD sewer service area.

1.3 Summary of Sewer Disposal Options

Based on project investigations and comments from the County and stakeholders, there are several potential wastewater treatment disposal options that offer opportunities for sewer service:

1. On-site "Aero-Mod" style WTWRF owned and operated by the County
2. A re-rated or re-operated Harmony Grove WRP due to lower projected sewer flows from the Harmony Grove Village development
3. Sewer service agreement between the County and the City of Escondido for wastewater treatment and disposal
4. Annexation to Vallecitos WD for sewer service only
5. Activation of Rincon MWD latent powers for sewer service and development of a new sewer system, including an on-site WTWRF

An evaluation of each sewer option is presented, at a conceptual level, in support of the environmental review process with consideration of environmental impacts, community concerns, regulatory constraints, service efficiency, and implementation challenges. A new County WTWRF

is the preferred sewer disposal option, although depending on regulatory and institutional changes other sewer options could be implemented.

2. Project Wastewater Flows

Estimated project unit wastewater flows are based on the County design criteria, utilized for the Harmony Grove SSA, of one equivalent dwelling unit (EDU) equaling 215 gallons per day (gpd). Typical residential wastewater flows in San Diego County have been observed between 60 to 70 gallons per person over the past several years resulting from reduced indoor water use due in part to water conservation and economic impacts. Based on an estimated residential density for Valiano of 2.9 people per house, average unit wastewater flows should range from 175 gpd/EDU to 215 gpd/EDU. The project includes an option for up to 51 secondary units. It is assumed that the 2.9 population density per unit includes occupancy of a potential secondary unit. Therefore, it is not necessary to account for any additional sewer flow for the secondary unit when utilizing sewer flow estimates by gallon per person. In summary, for planning purposes, including sizing of the on-site collection system and the WTWRF, a sewer generate rate of 215 gpd/EDU is used for all single family units including those with secondary units.

The Valiano project will generate approximately 71,500 gpd of average wastewater flow, assuming 326 residential units (with up to 51 secondary units), a recreation center, and neighborhood park with a wastewater generation assumed at 215 gpd/EDU.

Table 1 summarizes the average and peak wastewater flows based on County design criteria. Peak on-site wastewater flows for the Valiano project will be approximately 286,120 gpd or approximately 199 gallons per minute (gpm) under a peak hour weather condition.

Table 1 Project Wastewater Generation

Site	Units/Acres	Unit (gpd/unit)	Average Flow (gpd)	PDWF (gpd)	PWWF (gpd)
Condominium Residential (detached)	53 units	180	9,540	23,090	38,160
Single Family Residential	273 ¹ units	215	58,695	142,050	234,800
Neighborhood Park ²	2.7 ac	450	1,220	2,950	4,880
Recreation Center ³	2.3 ac	900	2,070	5,010	8,280
Total			71,525	173,100	286,120

¹ The 273 single-family units and 326 total units include 51 secondary units in the wastewater generation estimates.

² Park includes only restroom facility assumed at 90% of water use for return to sewer flow.

³ Recreation center assumed at 90% of water use for return to sewer flow.

Note: Design criteria for the WTWRF facility is a peaking factor of 2.11 per County e-mail, with design flows for WTWRF being 150,630 gpd.

Pump station design flows: Peak Dry Weather Flow (PDWF) PF = 2.42; Peak Wet Weather Flow (PWWF) PF = 4.0

Future Sewer Basin Considerations

With the increase in development activity in the Eden Valley and Harmony Grove area, a preliminary estimate was developed for the County for future development and potential sewer connections that may need to be considered depending on the ultimate sewer option implemented. None of these areas are currently within a sewer service jurisdiction. **Table 2** summarizes potential future residential sewer connections within the basin, not including the Harmony Grove SSA.

In summary, this County area and sewer drainage basin could develop sewer service for potentially 680 residential units, including planned development with Valiano and Harmony Meadows, and future septic conversions. This would result in a total potential average wastewater flow of 146,200 gpd.

Table 2 Future Sewer Considerations in “Eden Valley/Harmony Grove Basin”

Project Description	Location	Estimated Residential Units	Comments
Valiano Specific Plan	North of Harmony Grove Villages	326 ¹	Processing County General Plan amendment
Harmony Meadows Development	South of Harmony Grove Villages	200	A new land plan being studied with higher density. Proposed units shown is consistent with new County General Plan.
County in-fill areas Sphere	Within sewer basin area	150	Potential future development and/or parcels with septic systems requiring conversions.
Total		676	

¹ The 326 total units for Valiano include up to 51 secondary units.

Note: Harmony Grove Village is under construction and will be sewerred by the County's Harmony Grove SSA and is not included.

3. On-site County Sewer System Option

This section presents an on-site sewer system option, similar to the Harmony Grove SAA, with on-site collection system and a new WTWRF owned and operated by the County. Recycled water would be conveyed to Rincon MWD for on-site irrigation and disposal. The WTWRF, lift station(s) design capacity, emergency over flow storage and wet weather storage volumes will be reviewed and approved by the County Director of Public Works at the project design phase.

3.1 On-site Sewer Collection System

The County has requested an on-site sewer study to analyze flows, pipeline sizing, need for lift stations, and sewer depths, as part of the proposed tentative map entitlements. A revised Tentative Map has been prepared by Fuscoe Engineering, dated October 2015. **Figure 2** illustrates the proposed on-site sewer collection system, required lift stations, and the proposed WTWRF site.

Based on the project topography, the proposed on-site sewer system would flow from north to south to a low point in the southeast portion of the project, at the proposed WTWRF site, however, there will be a need for a series of lift stations. Appendix A includes hydraulic calculations for the on-site sewer system sizing. All on-site sewer pipeline sizes are a minimum of 8 inches.

The Valiano on-site sewer system will generally flow by gravity from the northwest to the southeast of the development to a proposed on-site WTWRF. One County sewer lift station is proposed for the northern portion of the development. Two small private sewer lift stations would also be required.

A sewer lift station is required to convey flows from the northern portion of the project. Because of the size of the sewer sub-basin served (estimated at 115 EDUs) it is assumed the County will own and operate the lift station (LS 2), which is designed to County standards. Preliminary sizing of the lift station includes two 120-gpm pumps and approximately 6,000 gallons of emergency storage, assuming storage for six hours of average flow. A preliminary design report would be prepared and submitted to the County for approval outlining the specific lift station design requirements. Preliminary lift station capacity requirements are presented in **Table 3**.

Table 3 On-site Sewer Lift Stations

Lift Station ⁽¹⁾	EDUs	Average Flow (gpd)	PDWF (gpd)	PWWF (gpd)	Force Main (LF)	FM Size (inches)	Power (HP)
1	10	2,150	5,200	8,600	640	2	1
2	115	24,150	58,440	96,600	1,000	3	3
3	37	7,955	19,250	31,820	1,900	2	2

⁽¹⁾ LS 2 will be County-owned. LS 1 and LS 3 will be privately owned and maintained by the HOA.

Pump station design flows: Peak Dry Weather Flow (PDWF) PF = 2.42; Peak Wet Weather Flow (PWWF) PF = 4.0

Two smaller lift stations (LS 1 and LS 3) each serving only about 10 to 37 homes are assumed privately owned and maintained by a Homeowner Association (HOA). The flows from these lift stations are conveyed to the collection system and then to the County-owned lift station for conveyance to the WTWRF.

Figure 2 illustrates the location of the County proposed lift station as well as the smaller privately owned lift stations. Stand-by power in the form of a diesel generator would be provided for the County lift station only. The County lift station will be enclosed with a fence, have security, flow meter and SCADA. The smaller lift stations will have a manual transfer switch for a portable emergency generator. Lot size shall be sized to accommodate the construction of the lift station, emergency overflow storage basin per County of San Diego standards, and an access area for maintenance.

3.2 Proposed On-site “Aero-Mod”-style WTWRF

The Valiano project is assumed to require an on-site WTWRF, under the County sewer service option, to accommodate the project’s wastewater treatment and disposal needs within the project’s development timeline. The Harmony Grove SSA and its wastewater treatment plant may not be expandable to serve the Valiano project as noted under the Harmony Grove Community Plan; accordingly, the Valiano project may need to explore other sewer disposal options, subject to the County’s further evaluation of the Harmony Grove WRP once operationally accepted. A new Valiano on-site WTWRF would produce recycled water; therefore providing a benefit as a new local water supply for the Rincon MWD.

A 71,500 gpd average daily flow “Aero-mod”-style WTWRF, about 40 percent the size of the Harmony Gove WRP, can provide wastewater treatment capacity for the Valiano project and supply recycled water to Rincon MWD.

The capacity requirements, preliminary wastewater treatment process and site layout as well as a range of probable construction and operation costs for the Valiano WTWRF are presented below.

Wastewater composition assumptions for development of the 71,500 gpd “Aero-Mod”-style WTWRF are based on the wastewater loading rates developed in the Harmony Grove Design Report. Based on the County’s comments and review, a similar preliminary design effort would be undertaken for the new WTWRF as part of the design and engineering phase.

The project will construct wet weather storage to meet the Regional Board’s minimum requirement of 84 days of recycled water storage or approximately 6.0 million gallons (mg) of storage. Given the WTWRF site area constraints, a wet-weather storage site has been identified, about 1,500 feet to the northwest. A lined storage basin has been assumed, and its final size and configuration would be determined during pre-design of the WTWRF. As discussed further under the alternative sewer options, the wet weather site has added value and could remain should the City of Escondido or the Harmony Grove SSA be able to provide wastewater treatment for the project.

Extended Aeration

The County as part of the Harmony Grove WRP design has developed specific design criteria and standards for an “Aero-Mod”-style WTWRF, a plant process design that currently is being used in the Rancho Santa Fe Community Facilities District. “Aero-Mod” is a company based in Kansas that offers a packaged wastewater treatment plant approach based on the extensive use of common-wall construction between basins, performing a version of the extended aeration wastewater treatment process. Extended aeration is an activated sludge process that relies upon treating the wastewater for an extended period of time (approximately 24 hours on average).

Based on the loading and design criteria used in the Harmony Grove WRP plant design, a smaller scaled-down version could be constructed to serve the Valiano development. This treatment

approach has already gained County approval in the case of the Harmony Grove WRP and only a few minor refinements are proposed.

Figure 3 includes a preliminary site lay-out of all required components of an “Aero-Mod”-style plant, within the approximately 0.4-acre plant site. **Figure 3A** presents the proposed “Aero-Mod”-style treatment process and required components. A summary of major plant components include:

- **Headworks** providing fine screening of the influent wastewater.
- **Equalization basin** to balance out variations in flow by storing a portion of the peak flows received for treatment in the plant during low-flow periods.
- **Aeration basins and anoxic basins** performing the activated sludge process along with biological nitrogen removal.
- **Clarifier basins** to settle most of the solids out of the wastewater to yield a clarified flow that goes to filters for further turbidity removal.
- **Filters** for further removal of turbidity to produce reclaimed water meeting Title 22 standards for effluent clarity. Rotating cloth disk filters to be located in the Operations Building would be proposed at the Valiano WTWRF, instead of sand filters given the smaller plant flow.
- **Chlorine contact basins** for disinfection of the reclaimed water by chlorine solution.
- **Residual solids processing.** The “Aero-Mod”-style process typically includes digester basins for further reduction of the settled solids produced by the treatment process. Assuming a similar design as Harmony Grove WRP a centrifuge dewatering system can be provided on site and is included as part the site plan on **Figure 3**. However, at a plant as small as the Valiano site it may be more efficient to thicken the solids and transfer them via a small sludge pump system and forcemain or hauling to the Harmony Grove WRP for further processing.
- An **operations/laboratory building** containing separate rooms for: tertiary disk filters, blowers for the AeroMod process, chemical storage and metering pumps, and potentially centrifuge dewatering. The building will also provide space for employees to store their personal items, restrooms and showers for employees. The existing laboratory at Harmony Grove would be shared with the WTWRF for the proposed project.

The proposed WTWRF would be located on a 0.4-acre site adjacent to a proposed park site, with a common access driveway at the south end of the park site off Country Club Lane. A proposed storm water detention basin is located to the west, and an existing equestrian area is immediately to the south. A pre-design report would be prepared prior to the final engineering phase

Figure 3 shows a preliminary layout of the proposed WTWRF. The layout of the equalization basin and the AeroMod treatment process was developed through discussions with the manufacturer. According to AeroMod, the process layout is customized by facility, and therefore there is flexibility in sizing and locating the process tanks and equipment, especially on a tight or even irregular site. AeroMod indicated that the space allocated for their process is sufficient for the proposed WTWRF. Other processes, such as the filters, chlorine contact tanks, etc. were sized and laid out according to the design of facilities with similar capacity. If during the preliminary design phase of this project solids holding and hauling are determined to not be more cost efficient, than the solids process and handling facilities, the site has been laid out to have sufficient space for a solids processing facility. The layout shown on **Figure 3** is conceptual, and serves to demonstrate that the tanks, buildings and equipment required for the proposed WTWRF can potentially fit within the allocated 0.4-acre site. The actual site layout will depend on system hydraulics, minimizing structural requirements for process tanks, and optimizing building space on site.

The County, during the design phase for the Valiano WTRWF and upon acceptance by the County of the Harmony Grove WRP, may consider additional capital and operating savings in operating two small treatment plants in close proximity to one another including staffing, reliability, and final sizing of certain plant components.

4. Harmony Grove SSA Sewer Alternative

This section describes the merits of potentially expanding capacity of the County's Harmony Grove SSA to include the project. Once the plant is built and operationally accepted by the County, should sewer generation rates be lower in Harmony Grove, there may be opportunities to accept flows from Valiano at the Harmony Grove WRP. This may require only minor design criteria modifications by the County to re-rate and/or re-operate the Harmony Grove "Aero-Mod"-style WRP.

4.1 Conveyance to Harmony Grove WRP

The Harmony Grove SSA alternative also assumes the on-site sewer collection system (see **Figure 2**) would be constructed by the Developer and maintained by the County, but instead of treating the wastewater at a new on-site WTWRF, the sewage will be pumped directly to the headworks of the Harmony Grove WRP, which is currently under construction. This alternative is depicted in **Figure 4**.

Approximately 4,500 linear feet of 6-inch force main will be required to convey the sewage to the Harmony Grove WRP. The force main would be located in existing or proposed County streets, namely Country Club Lane. The Harmony Grove Village development is constructing improvements to Country Club Lane, including sections within Valiano.

A new sewer lift station would be located at the on-site Valiano plant site, referenced as LS 4 on **Figure 4** and would be operated and maintained by the County. The lift station will be a duplex station with full redundancy of 400 gpm at 84 feet total dynamic head for each pump. The pumps are expected to be dry-pit submersible pumps controlled by wet well level. The discharge will be monitored with a flow meter. The lift station will have back-up emergency generator for power failures, have site security, and SCADA system.

The County, during the design phase for Valiano and upon operational acceptance of the Harmony Grove WRP, may alternatively consider conveying sewer flows from Valiano via gravity through the Harmony Grove sewer system and the Harmony Grove Influent Sewer Pump Station should the Harmony Grove SSA's residential sewer flows be much lower than anticipated.

4.2 Modifications to Harmony Grove WRP

The Harmony Grove WRP is currently under construction as an 180,000 gpd "Aero-Mod"-style WTWRF that will be owned and operated by the County to serve the Harmony Grove Village wastewater flows. As part of a comprehensive assessment of technically feasible wastewater disposal options, a review was performed of the current design to assess the possibilities associated with expanding the Harmony Grove WRP by an additional 40 percent capacity. The July 2013 draft sewer study includes various engineering design modifications. However, given the Harmony Grove WRP construction schedule, such a design change was not feasible due to constraints associated with environmental review, regulatory permitting and institutional issues.

It appears the better opportunity for sewer service to Harmony Grove WRP would occur if the County experiences lower flows from Harmony Grove, during the initial phases of operation of the "Aero-Mod"-style plant. Subject to the County's approval, additional flows could be accepted which may include modifications to the process criteria that would allow increased flow. Modifications to the process criteria may include reducing the hydraulic retention and solids retention basin times, and using the standby "Aero-mod" basin in the treatment train since redundancy can be accommodated in other basins. In the future, the County, as owners and operators of the plant, could re-evaluate the possibility of increasing the number of connections to the Harmony Grove WRP. A summary of the possible conditions or changes which might allow more sewer connections include:

1. Average wastewater flows are 20 to 25 percent lower than the design flow of 215 gpd/EDU.
2. Reduced peaking on the sewer system that allow for more equalization capacity.
3. Revisions to plant redundancy criteria to allow use of dedicated standby treatment trains.

This sewer option is evaluated under the assumption that the plant cannot be re-designed at this time and therefore would require changes to the process and design criteria once the plant is operated by the County to determine the opportunity to connect Valiano to the Harmony Grove WRP. A recent survey of average sewer generation rates within the Olivenhain Municipal Water District found average flows were 30 to 50 percent lower than designed. Given the rising cost of

imported water, the regions drought, and increased conservation, it is possible unit sewer flows could range from 150 to 180 gpd/EDU. This option may require the County to amend the Harmony Grove Waste Discharge Permit with the Regional Board. It should be noted that the proposed Valiano on-site wet-weather storage site would be available under this option to meet any increase flows and re-rating at the Harmony Grove WRP. It is assumed the County and Regional Board would accept a separate storage basin to meet the minimum 84 days.

5. County Sewer Service Agreement with Escondido

Escondido owns and operates a wastewater collection, treatment, and disposal system, including the Hale Avenue Resource Recovery Facility (HARRF), a wastewater treatment and recycling plant located approximately 4,200 feet from the project site, and currently has excess average dry weather wastewater capacity that could be made available for the project with the recent trends in lower sewer generation rates. Furthermore, Escondido provides sewer service to the Rancho Bernardo area of the city of San Diego, through a sewer service agreement for treatment and disposal. San Diego's wastewater flows are reported to be well below the capacity provided for in the agreement, approximately 2.5 million gallons per day (mgd) out of capacity rights up to 5.3 mgd.

The Escondido sewer option could include a similar arrangement between the County of San Diego and the City of Escondido for the treatment and disposal of approximately 71,500 gpd. HARRF currently operates on an average of about 12 mgd; Valiano would represent less than 0.6 percent of the total flow to HARRF. Alternatively, the County could possibly acquire 71,500 gpd directly from San Diego possibly via a sewer transportation agreement, for treatment and disposal at HAARF, by accessing San Diego unused treatment capacity rights at HAARF.

Escondido does experience a peak wet weather capacity constraint on the Escondido land outfall system, which could require mitigation. The peak events occur for a very short duration during the rainy season. In consideration for the project's impacts on the Escondido peak wet weather plant capacity and its land outfall disposal system, the Valiano project could provide the planned wet weather storage facility site (for the County on-site WTWRF option) for the temporary storage of Title 22 recycled water during peak wet weather storm events.

Based on information from preliminary discussions with Escondido, an added benefit for the Escondido sewer collection system would be for the project to assist with the realignment of Escondido sewer LS 12 force main and to a lesser extent replacement of LS 12.

The Escondido sewer option would be based on the following:

1. The County will own and maintain the on-site gravity system within Valiano.
2. A new Escondido owned and operated LS 12 would be constructed at the WTWRF site and would require approximately 2,700 linear feet of 8 and 12-inch sewer main in Country Club Drive between the abandoned LS 12 and the new LS 12. Approximately 500 feet of

8-inch deep sewer would need to be jack and bored to avoid a high point in the roadway (see **Figure 5**).

3. The Valiano flow plus the Escondido flow (existing connections within the sub-basin for existing LS 12) would be conveyed through approximately 1,600 linear feet of 8-inch force main to the existing gravity main in Kauna Loa Drive.
4. The 71,500 gpd of sewage from Valiano would be treated at HARRF.
5. Escondido would own the wet weather storage facility at the Valiano site and approximately 950 linear feet of a 12-inch sewer to the gravity main in Country Club Drive to the new LS 12. The wet weather facility could be filled via the Rincon recycled water system during wet weather and drained back to HARRF using the County and Escondido sewer system.
6. Escondido would own the new LS 12, gravity mains between the abandoned LS 12 and the new LS 12 upstream from the abandoned LS 12, the new 8-inch force main, and a gravity main between the wet weather storage and the main in Country Club Drive.
7. The new LS 12 would be a duplex submersible type with wet well level control, emergency generator, security fencing, flow meter, and SCADA.
8. The City of Escondido would own the lift station facility so the facility will be designed to Escondido standards.

The sewer system required to convey flows to Escondido are similar whether the County acquires sewer capacity directly from Escondido or indirectly via the City of San Diego. This system is depicted in **Figure 5**.

6. Annexation to Vallecitos Water District

Another potential sewer option would be to explore annexation into Vallecitos WD, the water and sewer provider for most of the city of San Marcos and nearby portions of unincorporated San Diego County. The nearest point of connection from Valiano to the Vallecitos WD sewer system would be approximately 1,500 feet northeast of the project.

There are numerous challenges associated with obtaining sewer service to Vallecitos WD that would need to be overcome through the planning and engineering phase of the project.

- The project is not located within the Vallecitos WD sphere of influence.
- Local Agency Formation Commission (LAFCO) would need to revise the sphere boundary for sewer service.
- Vallecitos WD typically provides both water and sewer service and may require both services for annexation.

- The project and tributary area was never considered in the Vallecitos WD *Water, Wastewater and Recycled Water Master Plan* (November 2010).
- The project drains away from the Vallecitos WD sewer system and would require lift stations to connect to the existing sewer system. These lift stations would need to be maintained by Vallecitos WD, which may not be cost effective.
- The project plus contributing future EDUs will require substantial off-site upgrades to the Vallecitos WD system to convey ultimate basin flows to the Encina Water Pollution Control Facility.
- The Vallecitos WD land outfall and disposal system is required to be upgraded in the future and there are unknowns as to the timing and requirements of portions of this facility on area that is being annexed.

The on-site sewer system is assumed to be owned and operated by Vallecitos WD under this sewer option and shall be designed according to their standards; as such the on-site gravity system will be modified slightly as shown on **Figure 6**. In lieu of the Valiano WTWRF, a new Vallecitos WD lift station (LS 4) will be required to convey a large portion of the project wastewater flows north to LS 1 which will convey the flows to the existing Vallecitos WD gravity sewer as shown in **Figure 7**. Note that LS 2 will also have a different discharge point. The private LS 3 will remain unchanged from previous alternatives.

LS 1 will be a much larger lift station than in the previous alternatives because it will convey all project flows through approximately 3,400 linear feet of 6-inch force main to the existing Vallecitos WD 8-inch gravity main located in the La Moree Mobile Home Estates as shown in **Figure 7**. It is assumed that the three larger lift stations (LS 1, LS 2, and LS 4) will be owned and operated by Vallecitos WD. LS 1 and LS 2 are assumed to be a duplex submersible type with wet well level control, emergency generator, security fencing, flow meter, and SCADA. LS 3 will be package pump station with security fencing, flow meter, and an automatic transfer switch for a portable generator. LS 4 will be a progressive cavity pump lift station due to the high head. The lift station will also have an upstream grinder, emergency generator, security fencing, flow meter, and SCADA. Lift station information is provided in **Table 4**.

Table 4 Vallecitos WD On-site Sewer Lift Stations

Lift Station	Pump Flow (gpm)	Force Main Length (linear feet)	Force Main Size (inches)	Power (HP)
1	265	3,350	6	15
2	170	1,700	4	25
3	22	1,900	2	2
4	135	7,000	4	20

Note: LS 3 will be owned by the HOA.

Based on a preliminary review of the Vallecitos WD *Water, Wastewater and Recycled Water Master Plan* (November 2010), this sewer option will potentially require upgrades to the Vallecitos WD sewer system as follows:

- Approximately 3,200 linear feet of pipeline through the mobile home park and on Barham Drive (from 8 inch to 12 inch)
- Approximately 500 linear feet of pipeline under SR-78 from Barham Drive to Rancheros Drive (from 8 inch to 12 inch)

Additional off-site facilities were reviewed, which may require upgrading, have been identified in the Vallecitos WD *Water, Wastewater and Recycled Water Master Plan* (November 2010) and may be required as a condition of development by Vallecitos WD or contribution through annexation and connection fees (see **Figure 8**). The Vallecitos WD *Water, Wastewater, and Recycled Water Master Plan Final Program EIR SCH No. 2010071073* (March 2011) includes the following capital improvement projects:

- **SP-2** – replace 3,200 linear feet of 21-inch sewer with 39-inch sewer
- **SP-11** – replace 1,400 linear feet of 21-inch sewer with 36-inch sewer, and install 800 linear feet of 8-inch sewer
- **SP-12** – replace 2,000 linear feet of 21-inch sewer with 36-inch sewer
- Possible improvements to the Land Outfall

As part of the annexation process Vallecitos WD would review the project and sphere of influence areas to determine the potential impacts.

7. Activation of Rincon MWD Latent Powers for Sewer Service

The proposed project is located within Rincon MWD for water and recycled water service as Rincon MWD does not currently provide sewer service. The Rincon MWD Board has recently authorized staff to evaluate sewer service, specifically in the Eden Valley area. Rincon MWD does maintain latent powers and could potentially provide sewer service to unincorporated areas within Rincon MWD. Activation of sewer latent powers will require technical and environmental studies, currently under scoping by Rincon MWD, and eventual action by the Rincon MWD Board and LAFCO.

Under this option, the previously proposed County on-site wastewater collection system and the proposed WTWRF would instead be owned and operated by Rincon MWD and are depicted in **Figure 9**.

One alternative treatment recommendation for this sewer option would be for Rincon MWD to consider the construction of a membrane bioreactor (MBR) wastewater treatment plant, which could potentially be constructed at a lower capital cost, produce very high quality recycled water, and fit better on the small treatment plant site. A preliminary layout and requirements for the MBR system are presented in Appendix B.

One of the advantages of the MBR system would be the opportunity to design the site for additional expansions should additional areas be served sewer by Rincon MWD, including areas of potentially failing septic tanks. Rincon MWD will evaluate the extent of its sewer service area in a future technical study prepared for LAFCO. The Title 22 recycled water produced by the Valiano WTRWF would have to be fully disposed of on site through dedicated landscape irrigation and will also require the wet weather storage site. Section 8 (below) includes an overview of the required recycled water system and integration with the proposed Harmony Grove Villages and existing Rincon MWD recycled water systems.

The potential benefits of the Rincon MWD options include:

- Rincon MWD would have control of a new local water supply (71,500 gpd or 80 acre feet per year)
- Assists Rincon MWD in reducing its demand on imported water
- May create opportunities to expand sewer service and increase local water supply
- Protects groundwater basin by providing sewer options for failing sewer septic tanks

8. Recycled Water System

Rincon MWD will be the purveyor for recycled water for the project and will require the construction of a recycled water system for irrigation. Because of the on-site treatment plant options, the Valiano development must develop sufficient on-site irrigation demands to dispose of all effluent generated from the project on an average annual basis. In essence, similar to Harmony Grove Village, on-site irrigation will serve as a “spray field” for effluent disposal. In concept, approximately 71,500 gpd of irrigation water consumption is required.

The proposed Valiano project will develop sufficient on-site landscape irrigation demand to beneficially reuse all the effluent from the WTRWF on an average annual demand basis. This will be accomplished through development of significant common area landscape irrigation for streetscapes, manufactured slopes, and public and private parks. In total, it is estimated that approximately 36.5 acres of permanent landscape area will be irrigated. Except for the parks, the slopes and streetscapes will be a Mediterranean-type landscape requiring between 2.2 and 2.5 acre-feet per year (afy) per acre of irrigation. In comparison, the Harmony Grove Villages landscape irrigation was based on average of approximately 3.0 afy per acre for similar effluent disposal requirements from their on-site water reclamation plant. In summary, with a WTRWF

disposal requirement of approximately 71,500 gpd, an average irrigation rate of 1,960 gpd/acre (2.2 afy per acre is required) is well within the proposed landscaping irrigation rate. During final design a detailed water balance and irrigation master plan will be developed to confirm the effluent disposal requirements are satisfied. **Figure 10** illustrates the proposed common irrigated areas to disposal of the Title 22 recycled water.

The Valiano Project proposes to manage and maintain approximately 35 acres of a proposed easement for potential agriculture use in the northwest hillside. Although the on-site agriculture is currently proposed to be irrigated with groundwater from an existing well, which was also used to irrigate previous avocado orchids, subject to availability from Rincon MWD and the City of Escondido, recycled water may be used to supplement or replace the groundwater for agriculture purposes. It is estimated the agriculture easement could potentially require approximately 30 to 40 afy depending on the specific agriculture use proposed.

As part of the preliminary design of the WTWRF, Valiano will be submitting a detailed recycled water system plan to Rincon MWD and the County for approval. The study will also discuss the interaction between the on-site plant, wet weather storage, and Rincon MWD and Escondido's recycled water system and the required interagency agreements.

The recycled water distribution system will include a backbone system throughout the development. Under the scenarios with an on-site WTWFP, a new recycled water pump station will be required along with approximately 200 linear feet of new pipeline to connect the proposed WTWRF to the existing Rincon MWD system.

A recycled water analysis has been included in the Valiano Water and Recycled Water Study (October 2015), which outlines the recycled water system requirements under Rincon MWD.

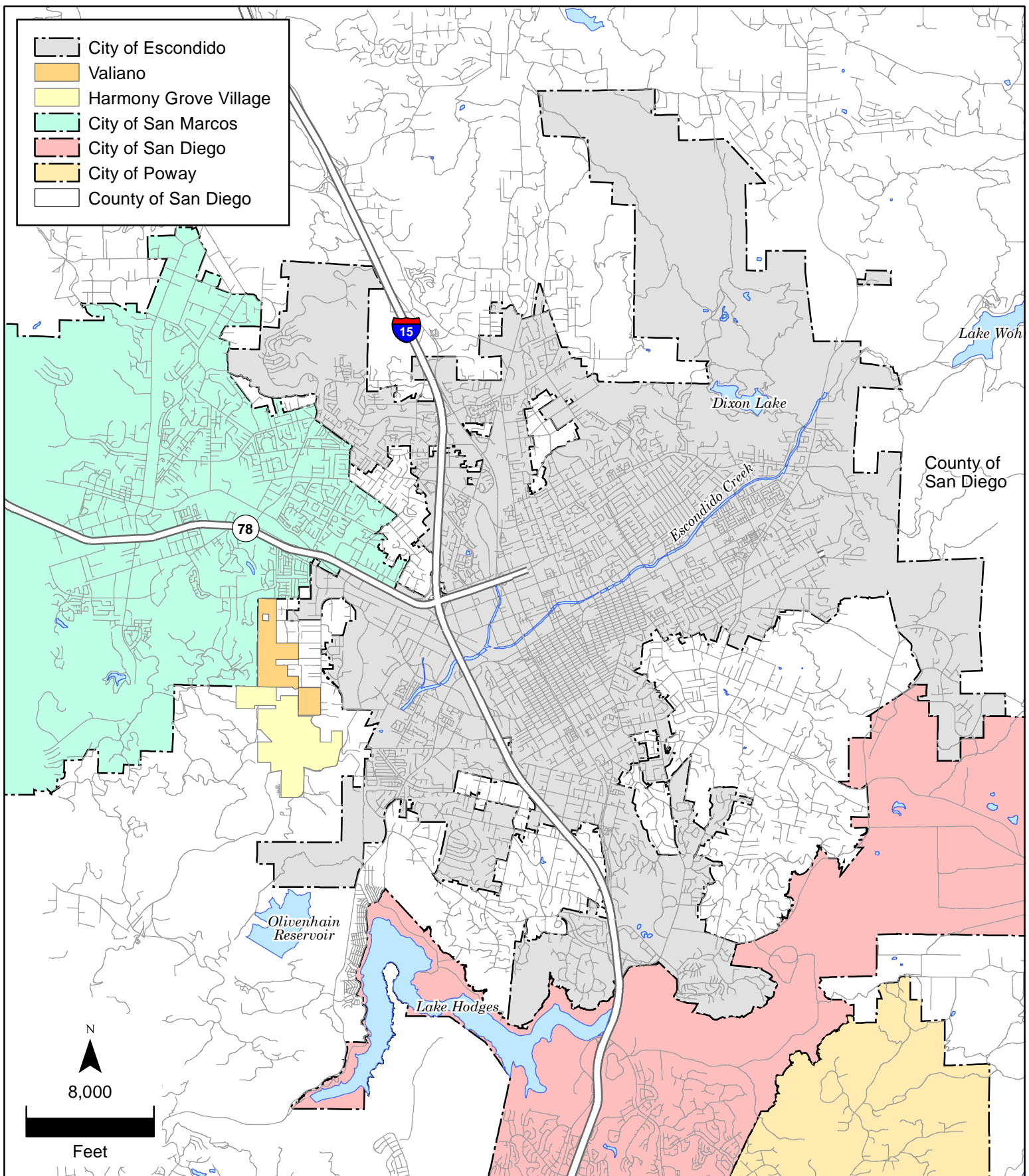
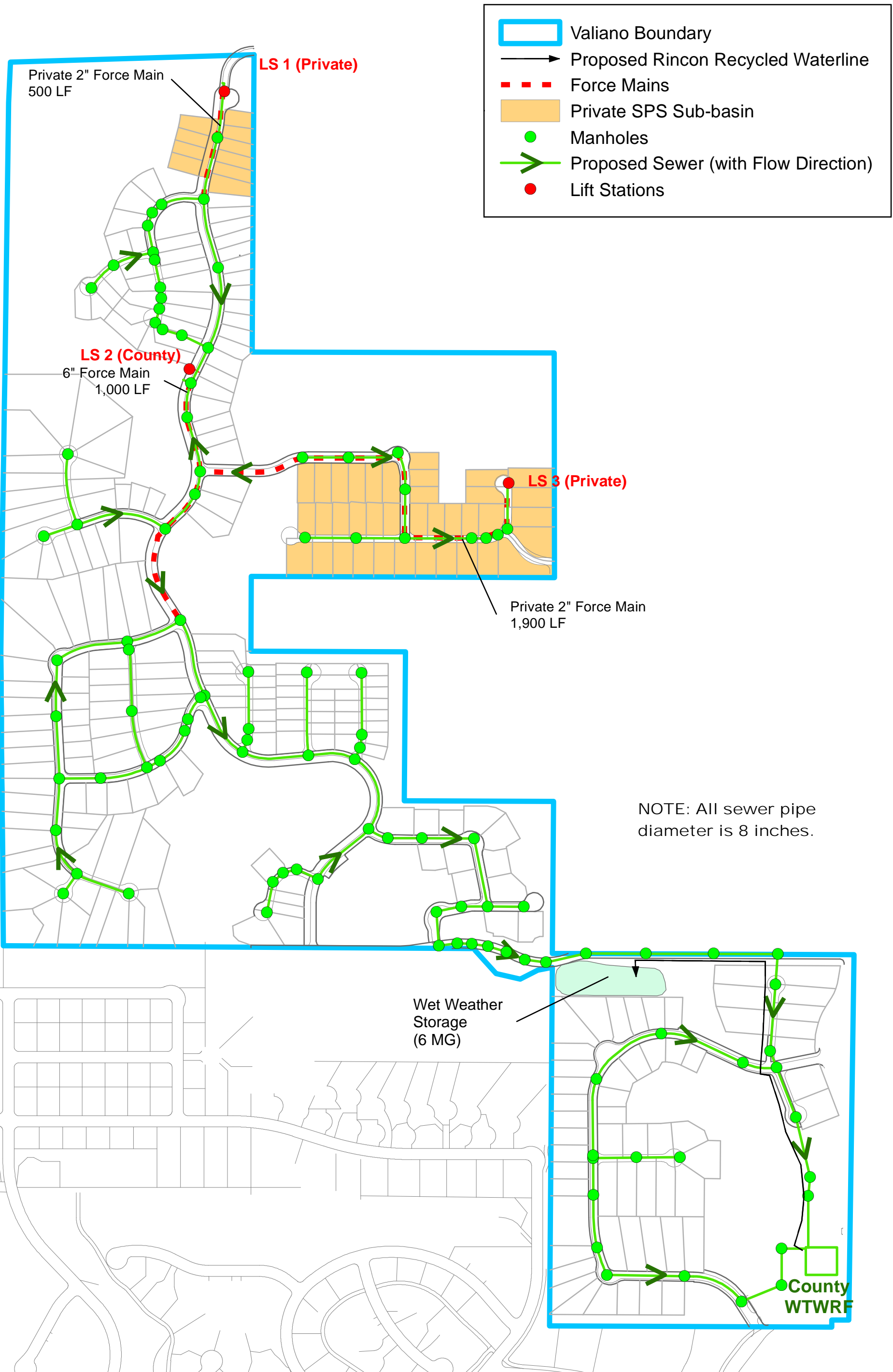
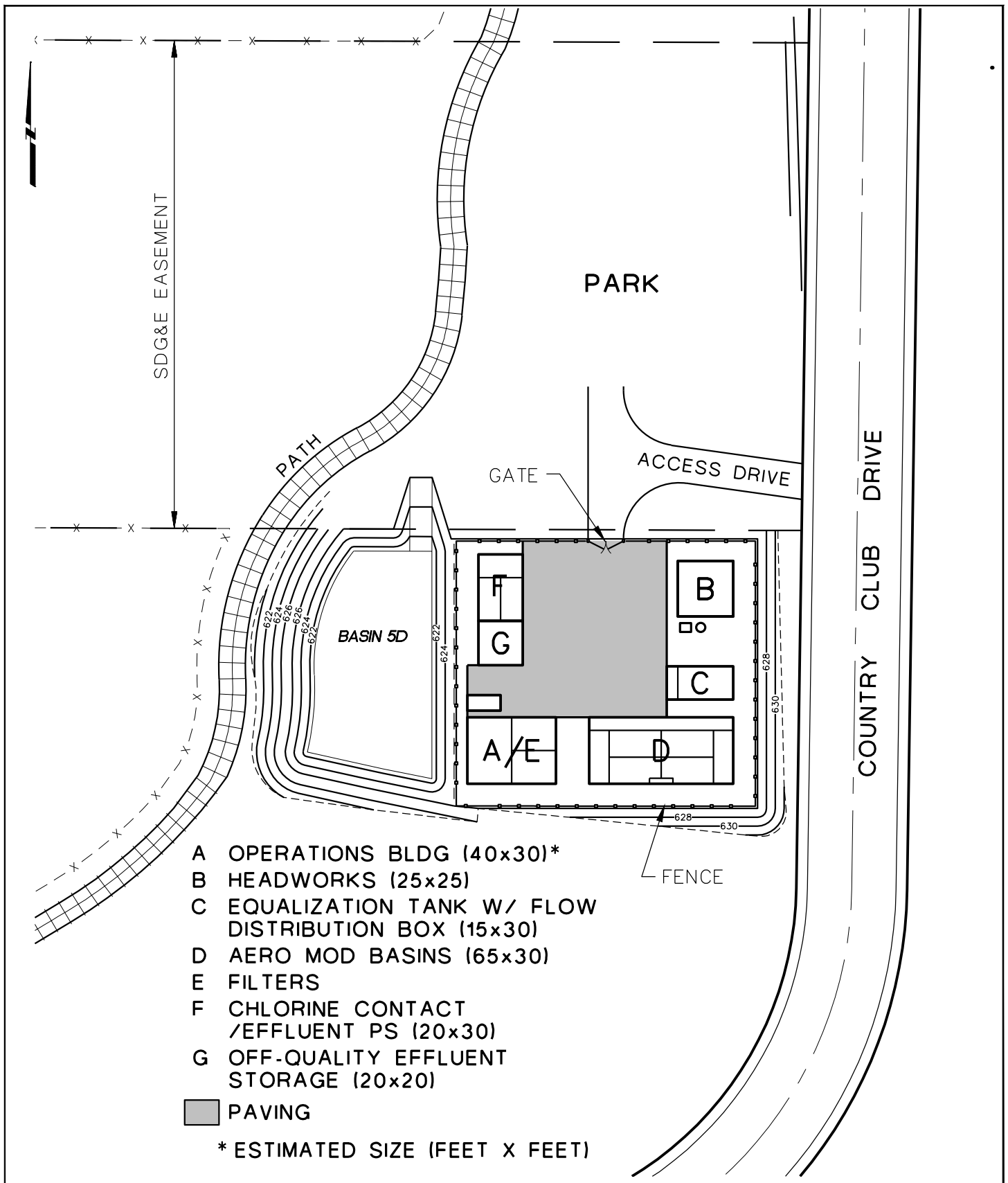


Figure 1 : Vicinity Map



**PROPOSED ON-SITE
COUNTY SEWER SYSTEM**
Figure 2



0 30 60 FEET

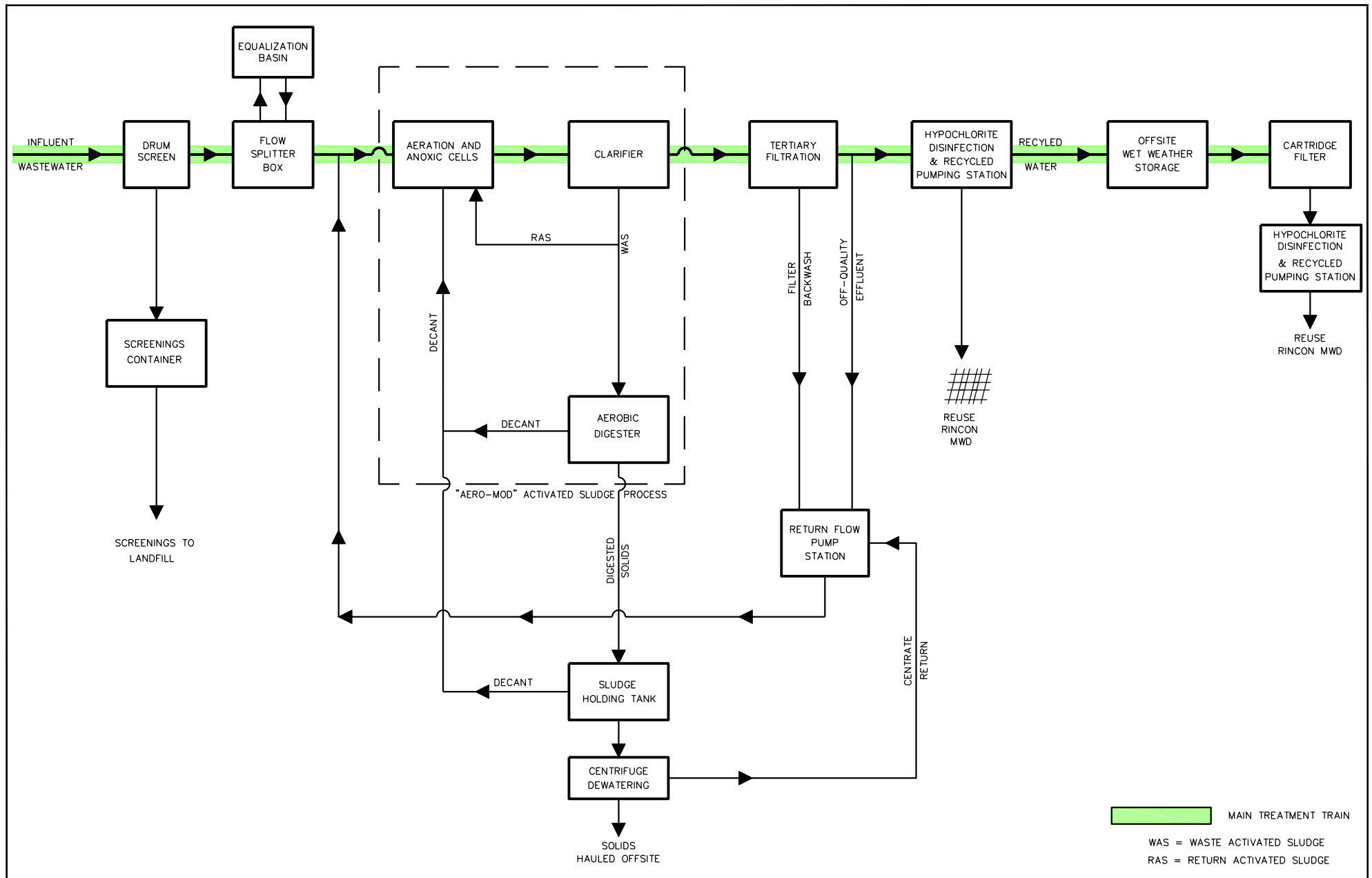
COUNTY WTRWF

Figure 3

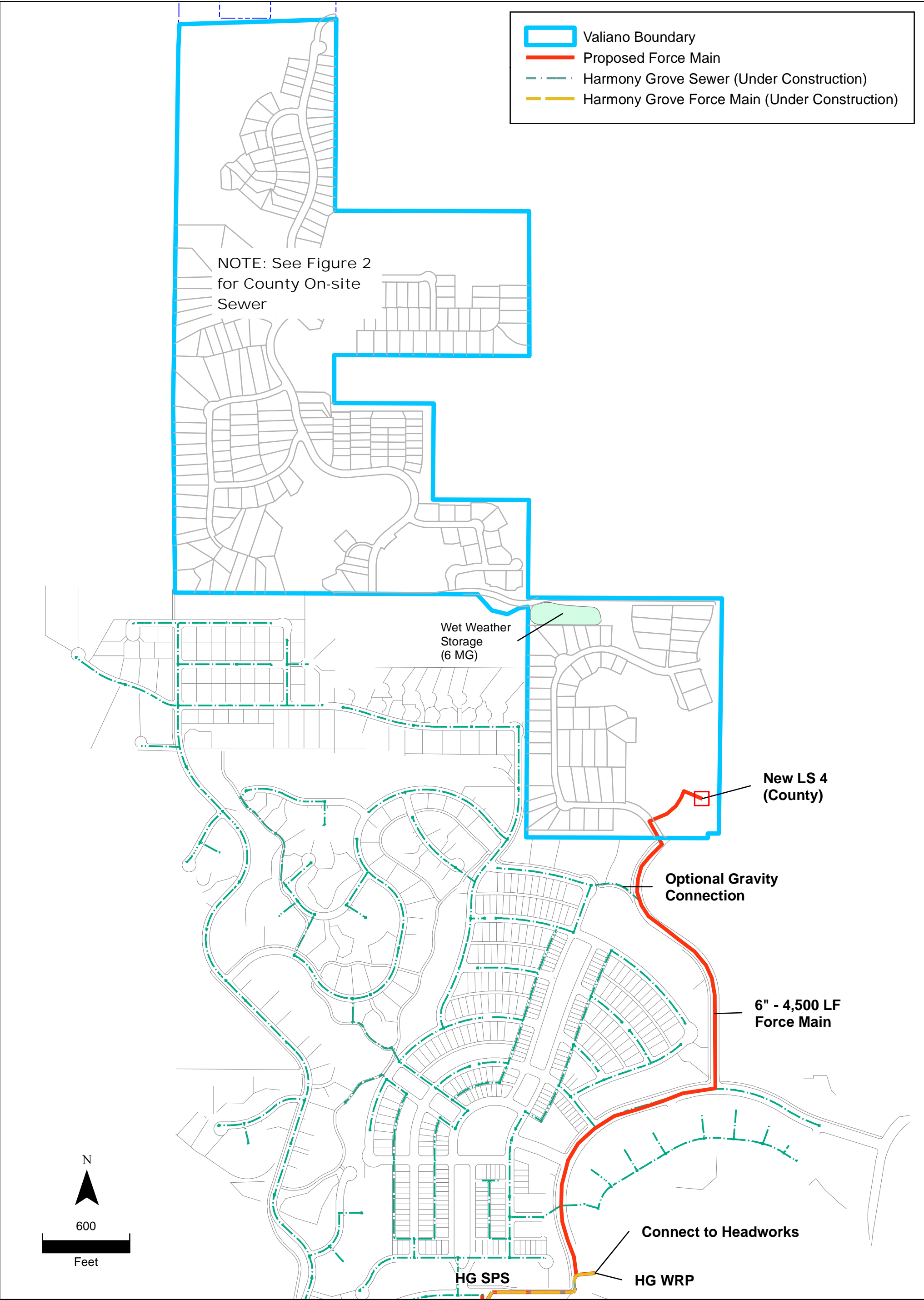
H:\Clients\Integral Communities\100033736 Valiano\Graphics\CADD\ FIGURE 3.dwg 10/05/15 12:28

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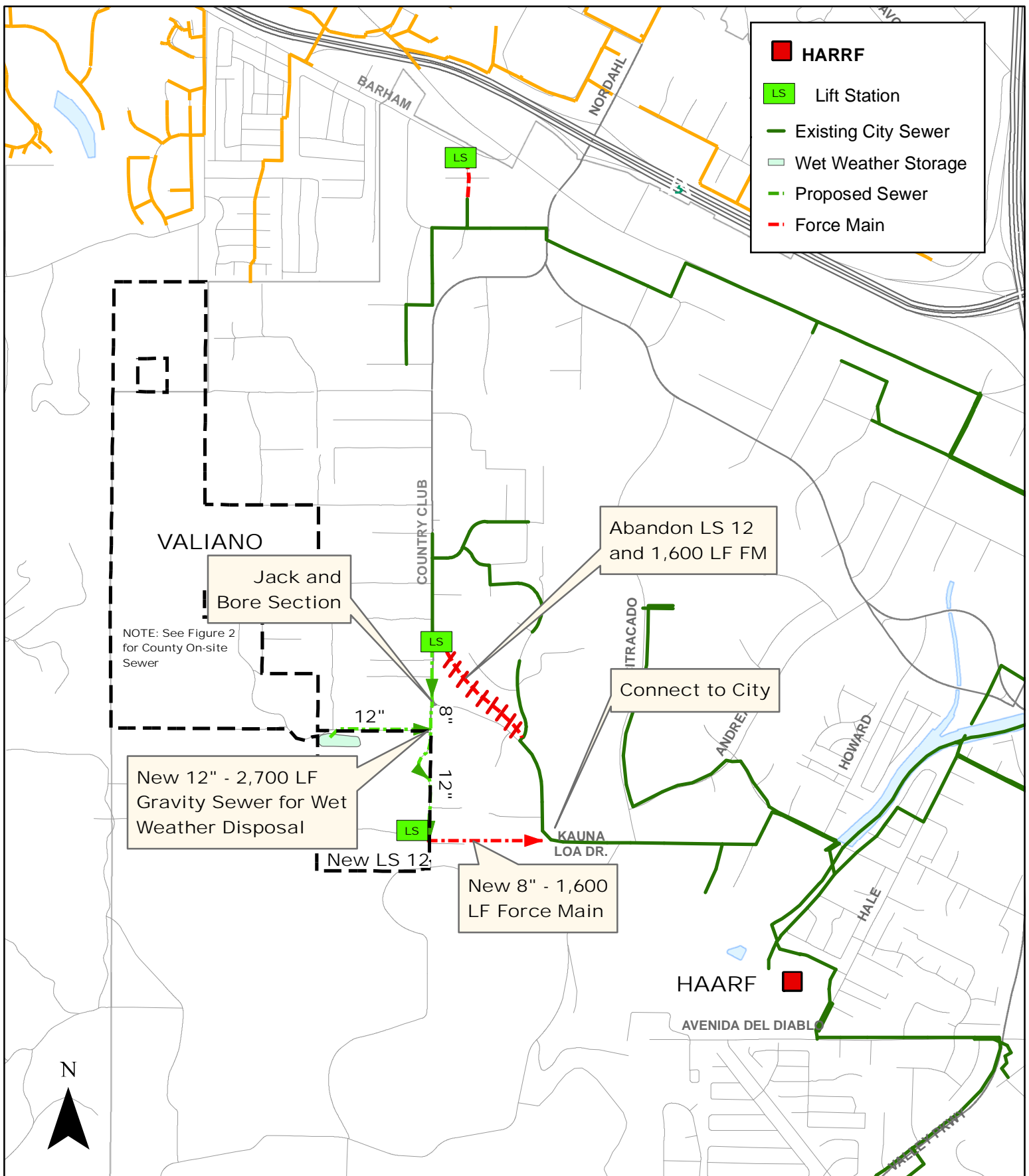
Valiano Sewer Study
December 2015



**COUNTY WTRF
PROCESS SCHEMATIC**
Figure 3A



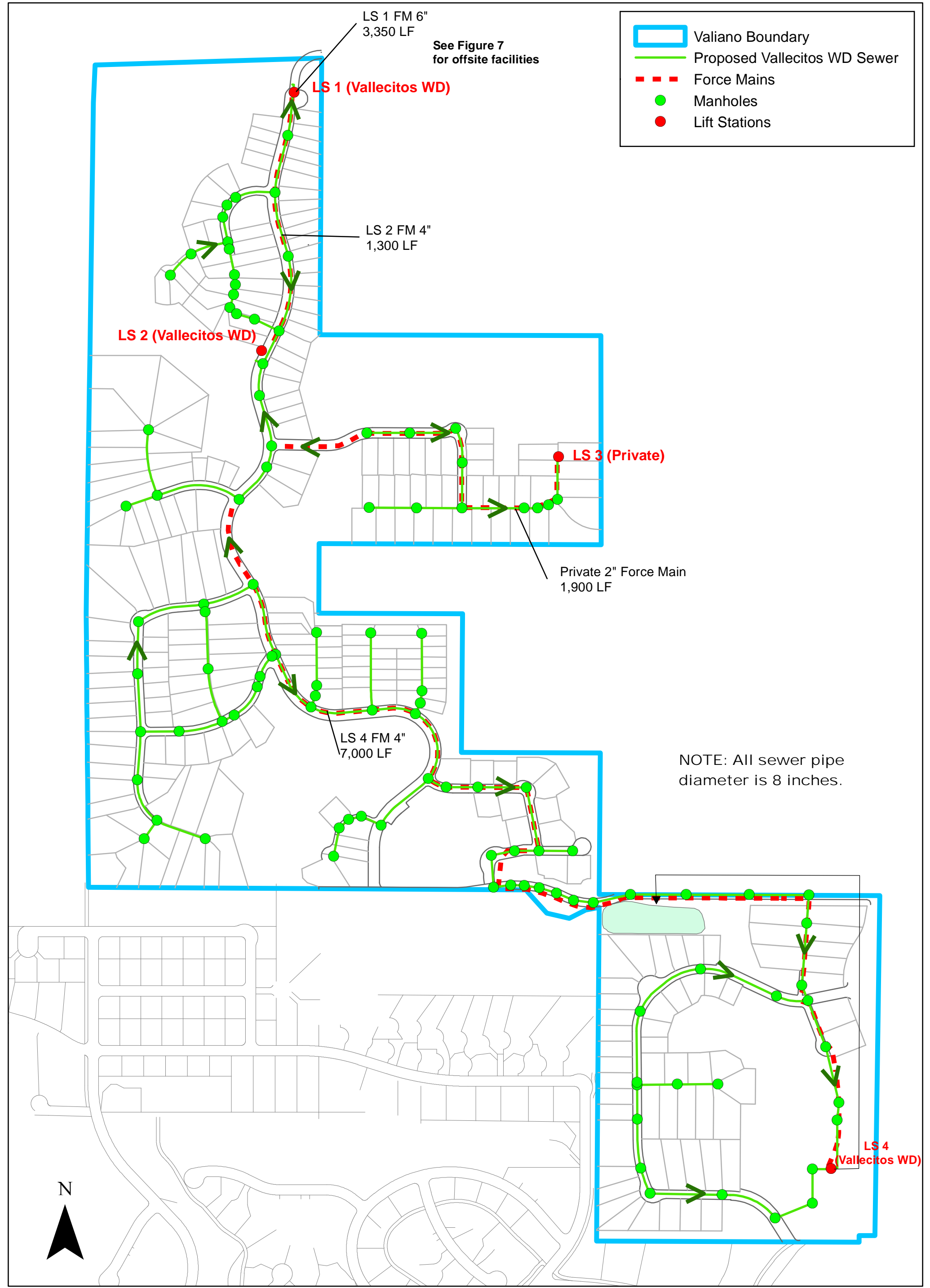
**HARMONY GROVE WTRF
SEWER SERVICE
ALTERNATIVE**
Figure 4



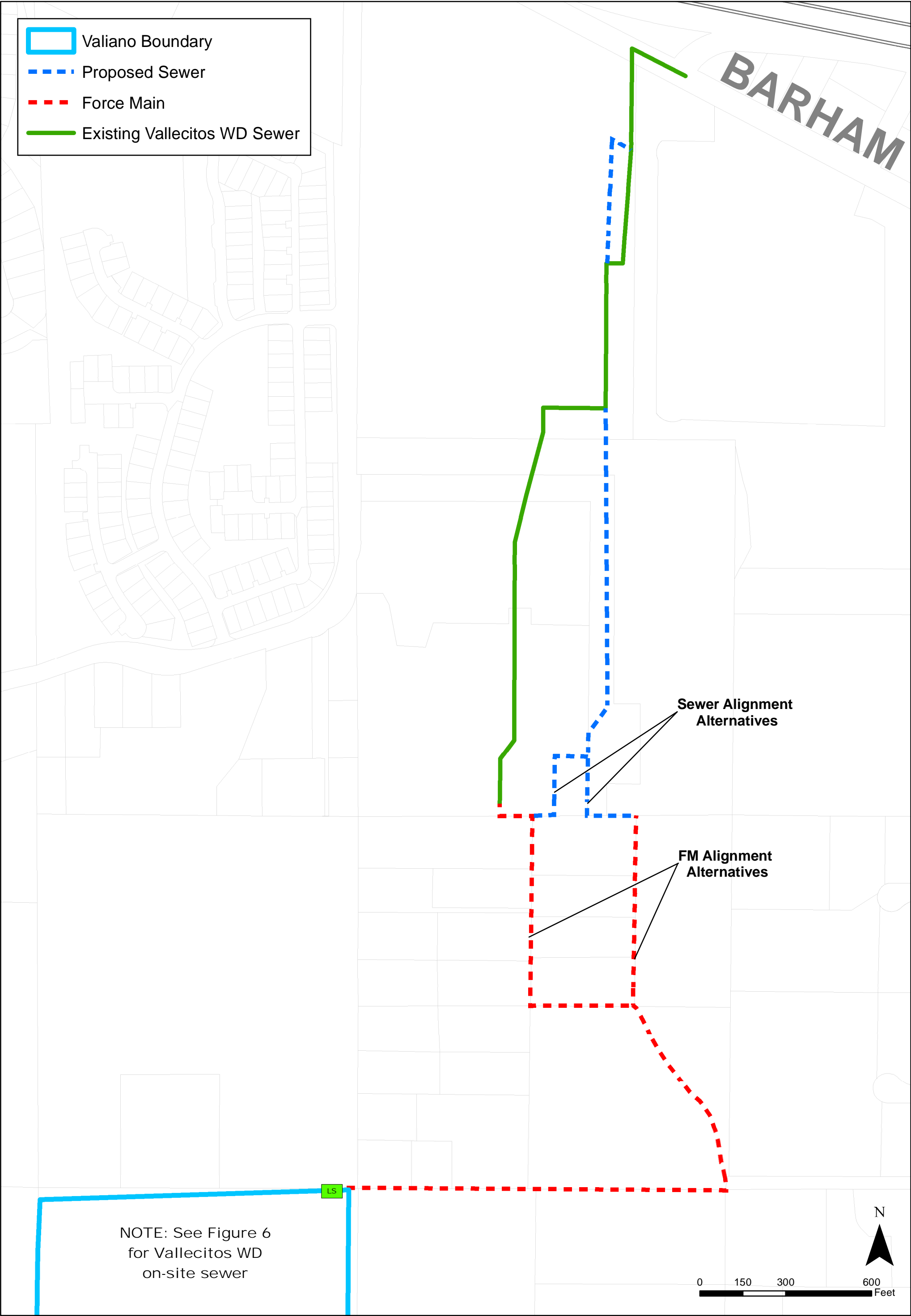
NOTE: On-site sewer system to be owned and operated by the County

ESCONDIDO SEWER SERVICE ALTERNATIVE

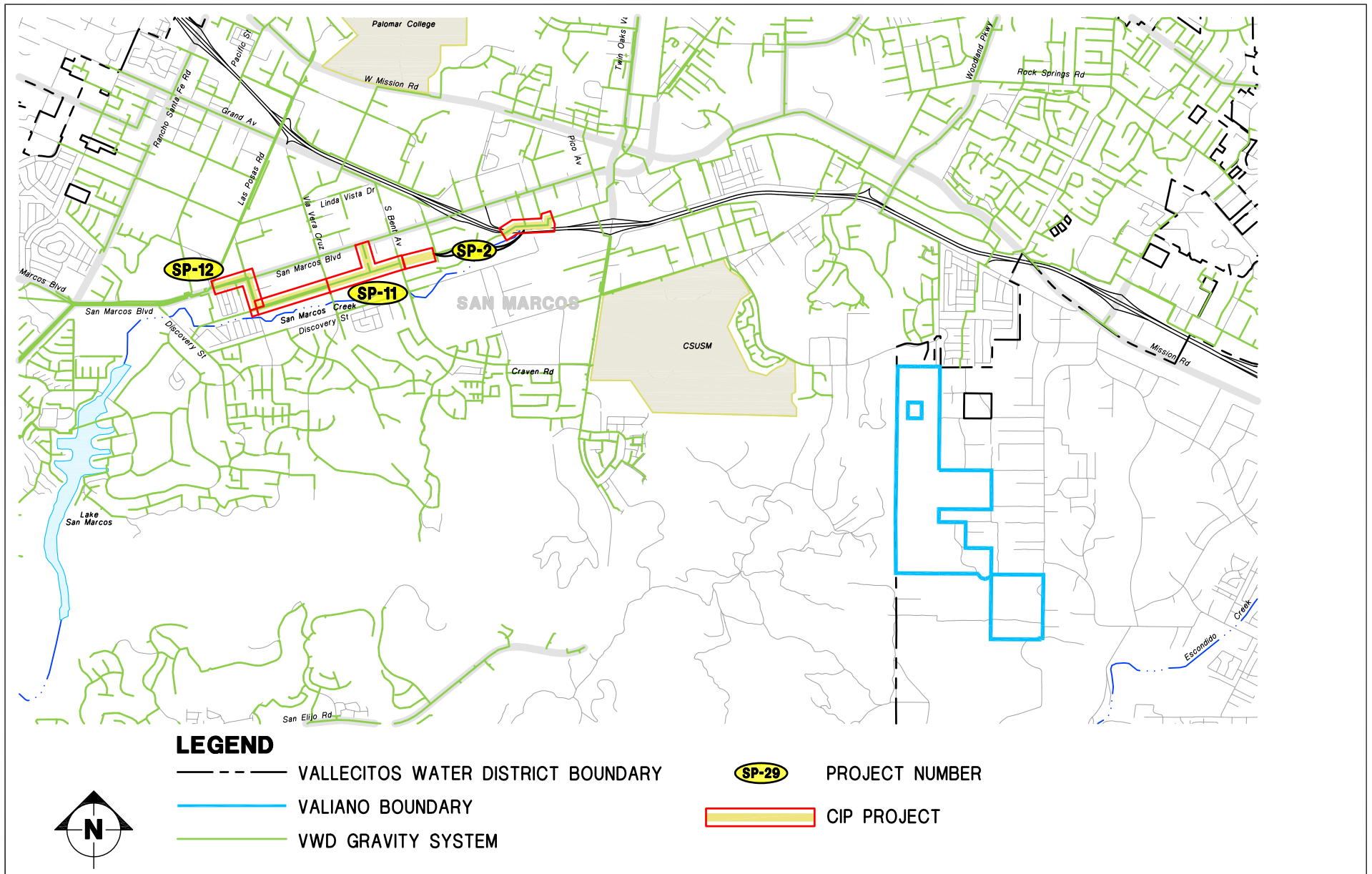
Figure 5



**VALLECITOS WD
ONSITE SEWER SYSTEM
Figure 6**



**VALLECITOS WD
OFFSITE SEWER SYSTEM**
Figure 7



0 3500
SCALE IN FEET

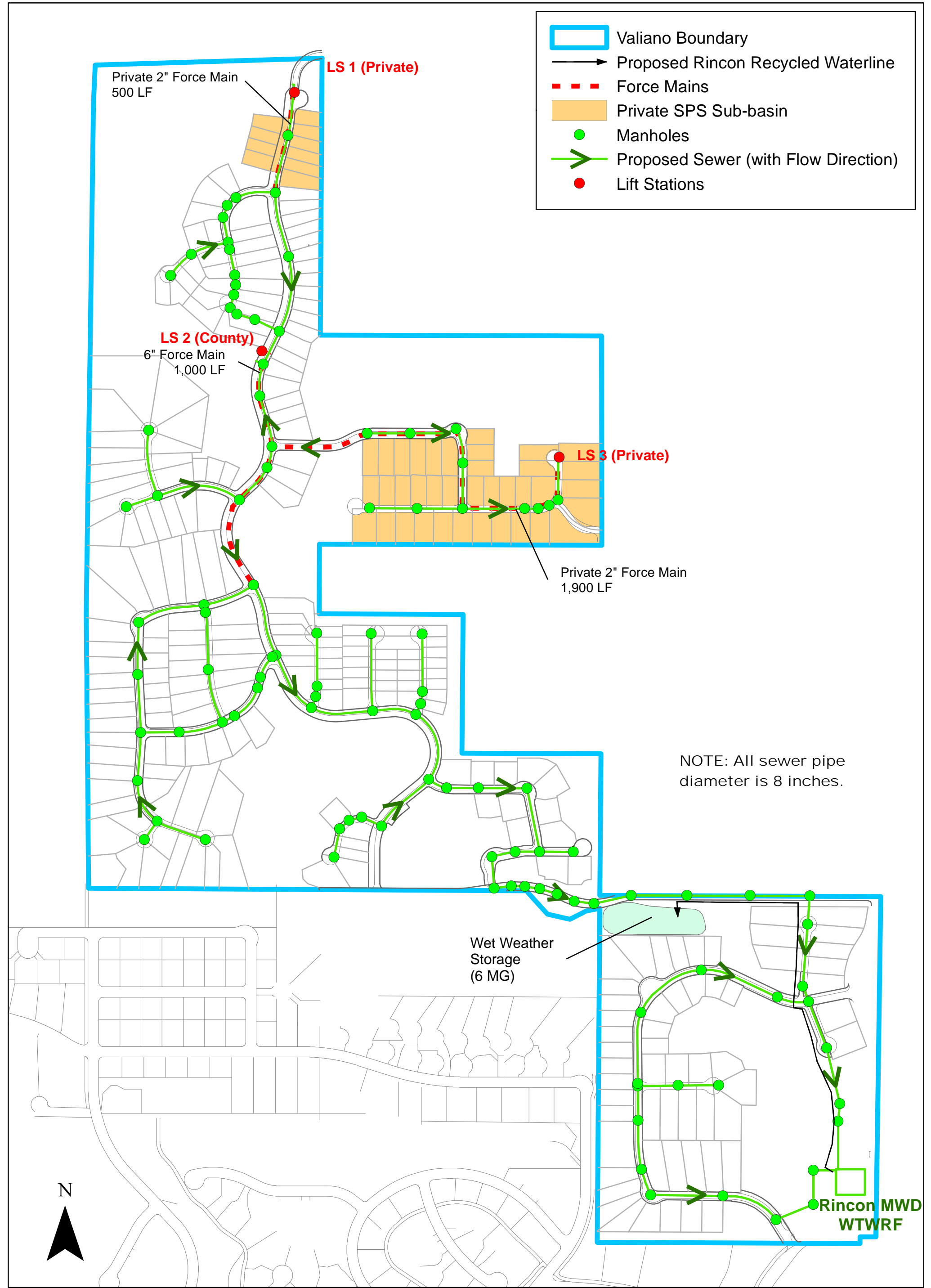
VALLECITOS WD IMPACTED CIP PROJECTS

Figure 8

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Valiano Sewer Study
December 2015



RINCON DEL DIABLO MWD
SEWER SERVICE ALTERNATIVE
Figure 9

Figure 10

LEGEND

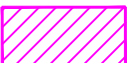
SEWER TREATMENT PLANT



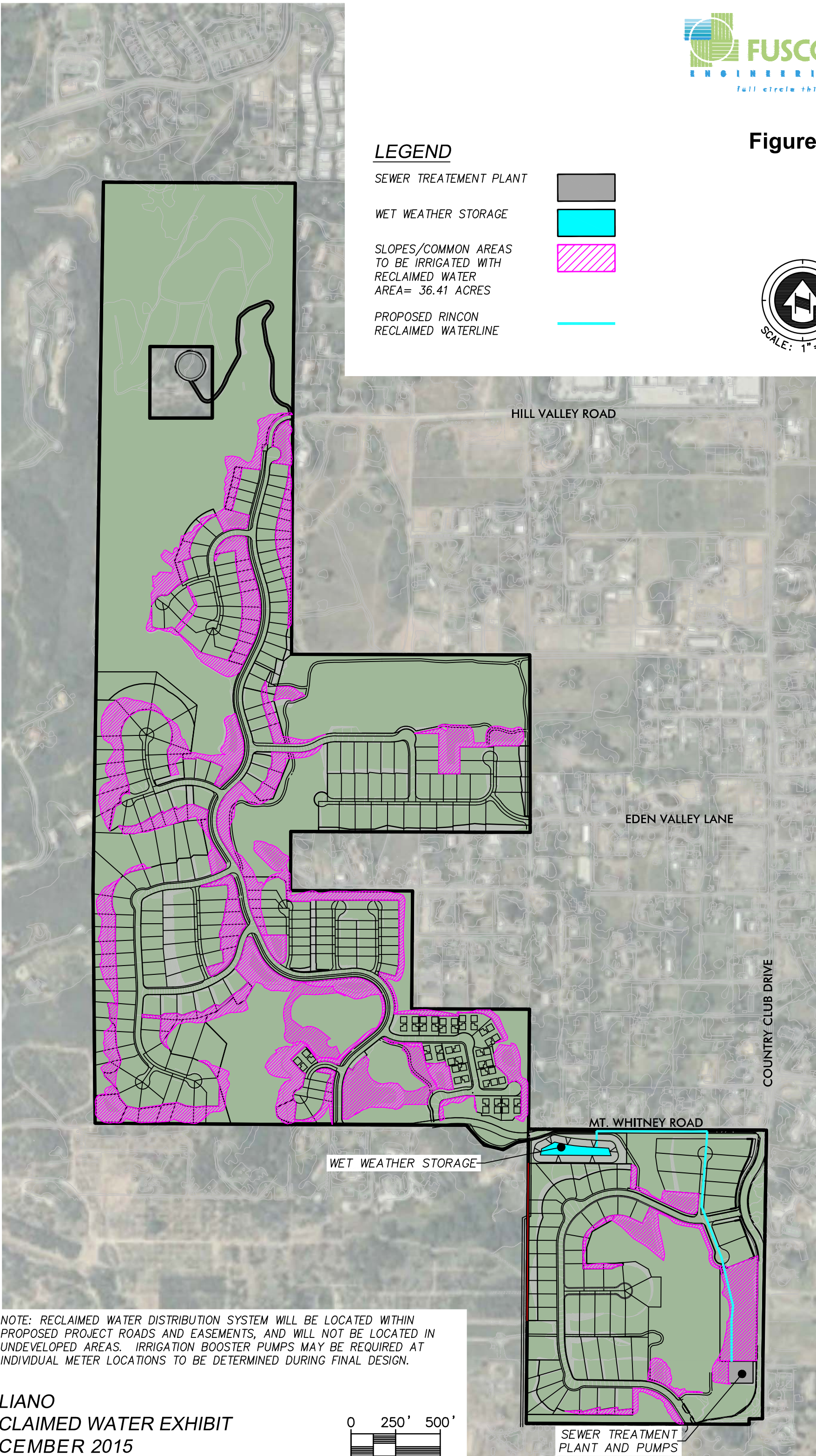
WET WEATHER STORAGE



SLOPES/Common Areas
TO BE IRRIGATED WITH
RECLAIMED WATER
AREA= 36.41 ACRES

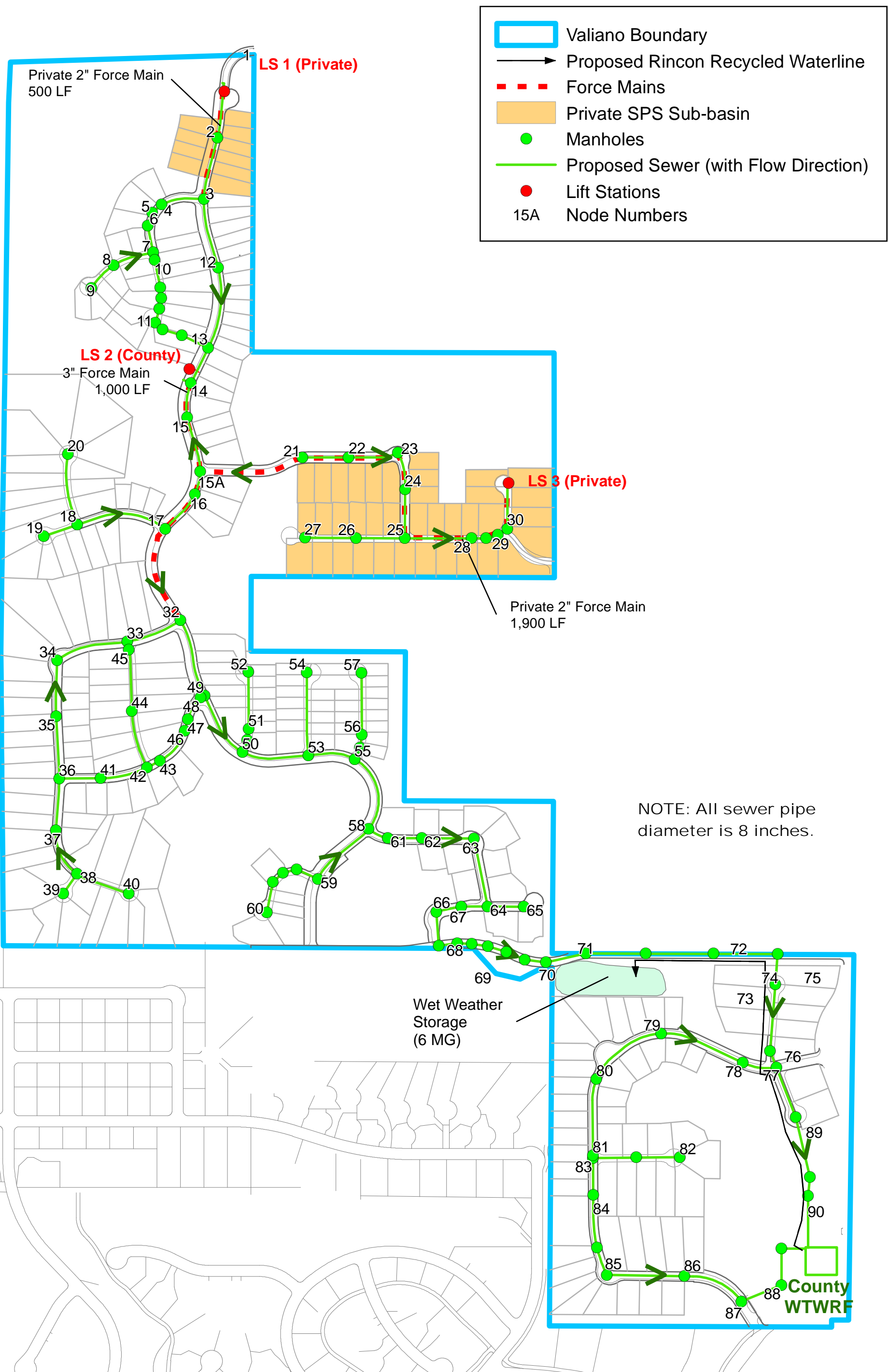


PROPOSED RINCON
RECLAIMED WATERLINE



APPENDIX A

HYDRAULIC CALCULATIONS



**NODE NUMBERS
COUNTY SEWER SYSTEM
Figure A-1**

Valiano Sewer Study

Upstream MH			Downstream MH																	
MH	Rim	Inv	MH	Rim	Inv	Units	Flow (gpd)	Depth	Length	Diameter	Cummulative Average Gravity Flow (gpd)	PSP Flow	Peaking Factor	Cummulative Peak Dry Weather Flow (gpd)	Cummulative Peak Dry Weather Flow (cfs)	Slope (%)	Normal Depth (inches)	d/D	Velocity (fps)	
3	762.30	757.30	2	756.10	751.12	7	1505	5.0	275.7	8	3,870		3.69	14,262	0.02	2.24	0.62	0.08	1.77	
2	756.10	751.10	1	744.00	740.33	3	645	5.0	361.6	8	4,515		3.61	16,298	0.03	2.98	0.62	0.08	2.05	
1	744.00	739.00	SPS1	744.00	736.00	0	0	5.0	30.6	8	4,515		3.61	16,298	0.03	9.80	0.47	0.06	3.09	
SPS1	744.00	736.00	3	762.30	757.32	0	0	8.0	629.0	4		16,298								
10	795.50	790.50	11	783.30	778.30	13	2795	5.0	312.2	8	2,795		3.85	10,760	0.02	3.91	0.35	0.04	1.60	
11	783.30	778.30	13	745.00	740.00	0	0	5.0	364.0	8	2,795		3.85	10,760	0.02	10.52	0.47	0.06	3.20	
20	832.60	827.60	18	820.60	815.60	12	2580	5.0	318.0	8	2,580		3.89	10,040	0.02	3.77	0.47	0.06	1.92	
19	830.10	825.10	18	820.60	815.60	4	860	5.0	155.8	8	860		4.51	3,878	0.01	6.10	0.27	0.03	1.71	
18	820.60	815.60	17	786.90	781.90	6	1290	5.0	413.5	8	4,730		3.59	16,968	0.03	8.15	0.50	0.06	2.93	
17	786.90	781.90	16	770.20	765.20	0	0	5.0	204.5	8	4,730		3.59	16,968	0.03	8.17	0.50	0.06	2.94	
16	770.20	765.20	15A	760.00	755.00	3	645	5.0	350.2	8	5,375		3.53	18,954	0.03	2.91	0.67	0.08	2.11	
15A	760.00	755.00	15	748.00	743.00	0	0	5.0	350.2	8	11,395		3.19	36,329	0.06	3.43	0.88	0.11	2.73	
15	748.00	743.00	14	744.80	739.82	5	1075	5.0	350.0	8	12,470		3.15	39,278	0.06	0.91	1.25	0.16	1.75	
21	718.00	713.00	22	703.00	698.00	1	215	5.0	260.0	8	215		5.43	1,168	0.00	5.77	0.16	0.02	1.19	
22	703.00	698.00	23	700.00	695.00	3	645	5.0	220.0	8	860		4.51	3,878	0.01	1.36	0.39	0.05	1.02	
23	700.00	695.00	24	690.00	685.00	2	430	5.0	150.0	8	1,290		4.27	5,509	0.01	6.67	0.32	0.04	1.97	
24	702.00	697.00	25	707.50	702.54	5	1075	5.0	250.0	8	2,365									
25	707.50	702.54	28	708.00	699.59	3	645	5.0	294.5	8	3,010		3.81	11,473	0.02	1.00	0.68	0.09	1.25	
28	708.00	699.57	29	703.60	698.62	5	1075	8.4	95.1	8	4,085		3.66	14,946	0.02	1.00	0.78	0.10	1.37	
29	703.60	698.60	30	700.00	695.02	3	645	5.0	71.2	8	4,730		3.59	16,968	0.03	5.03	0.56	0.07	2.48	
30	700.00	695.00	31	690.00	685.00	6	1290	5.0	200.7	8	6,020		3.47	20,908	0.03	4.98	0.62	0.08	2.64	
31	690.00	685.00	SPS3	690.00	683.00	0	0	5.0	20	8	6,020		3.47	20,908	0.03	4.98	0.54	0.07	0.00	
SPS3	690.00	683.00	15A	760.00	755.00	0	0	7.0	1,900.0	2	6,020	20,908			0.00					
27	721.90	716.90	26	716.00	711.02	5	1075	5.0	226.0	8	1,075		4.38	4,705	0.01	2.60	0.36	0.04	1.34	
26	716.00	711.00	25	707.50	702.52	4	860	5.0	216.5	8	1,935		4.04	7,826	0.01	3.92	0.41	0.05	1.80	
9	806.50	801.50	8	801.30	796.32	4	860	5.0	191.0	8	860		4.51	3,878	0.01	2.71	0.32	0.04	1.28	
8	801.30	796.30	7	795.10	790.12	2	430	5.0	185.0	8	1,290		4.27	5,509	0.01	3.34	0.37	0.05	1.54	
7	795.10	790.10	6	786.00	781.02	2	430	5.0	119.5	8	1,720		4.11	7,067	0.01	7.60	0.35	0.04	2.24	
6	786.00	781.00	5	780.00	775.02	1	215	5.0	60.8	8	1,935		4.04	7,826	0.01	9.84	0.33	0.04	2.47	
5	780.00	775.00	4	774.00	769.02	1	215	5.0	55.3	8	2,150		3.99	8,574	0.01	10.81	0.34	0.04	2.62	
4	774.00	769.00	3	762.30	757.32	1	215	5.0	190.0	8	2,365		3.94	9,311	0.01	6.15	0.40	0.05	2.21	
3	762.30	757.30	12	750.00	745.02	7	1505	5.0	314.7	8	3,870	16,298	3.69	30,561	0.05	3.90	0.78	0.10	2.70	
12	750.00	745.02	13	745.00	740.00	0	0	5.0	345.0	8	3,870	16,298	3.69	30,561	0.05	1.46	0.99	0.12	1.91	
13	745.00	740.00	14	744.80	739.82	0	0	5.0	107.0	8	6,665	16,298	3.43	39,133	0.06	0.17	1.89	0.24	0.96	
14	744.80	739.80	SPS2	690.00	685.00	0	0	5.0	279.3	8	19,135	16,298	2.97	73,204	0.11	19.62	0.81	0.10	6.18	
SPS2	690.00	685.00	32	817.90	812.90	0	0	5.0	2,261.1	3	19,135	94,112								
34	870.80	865.80	35	870.00	864.46	7	1505	5.0	248.0	8	1,505		4.18	6,296	0.01	0.54	0.51	0.06	0.77	
35	870.00	864.46	36	866.70	861.72	8	1720	5.5	272.3	8	3,225		3.78	12,180	0.02	1.01	0.70	0.09	1.28	
39	878.00	873.00	38	875.90	870.92	5	1075	5.0	105.3	8	1,075		4.38	4,705	0.01	1.98	0.38	0.05	1.22	

Valiano Sewer Study

Upstream MH			Downstream MH																
MH	Rim	Inv	MH	Rim	Inv	Units	Flow (gpd)	Depth	Length	Diameter	Cummulative Average Gravity Flow (gpd)	PSP Flow	Peaking Factor	Cummulative Peak Dry Weather Flow (gpd)	Cummulative Peak Dry Weather Flow (cfs)	Slope (%)	Normal Depth (inches)	d/D	Velocity (fps)
45	836.10	817.64	44	837.50	814.94	6	1290	18.5	270.0	8	1,290		4.27	5,509	0.01	1.00	0.48	0.06	1.00
44	837.50	814.92	42	817.30	812.32	7	1505	22.6	260.2	8	2,795		3.85	10,760	0.02	1.00	0.66	0.08	1.23
34	870.80	865.80	33	836.60	831.62	4	860	5.0	326.7	8	860		4.51	3,878	0.01	10.46	0.24	0.03	2.04
33	836.60	831.60	32	817.90	812.92	1	215	5.0	254.7	8	1,075		4.38	4,705	0.01	7.33	0.28	0.04	1.91
40	879.50	874.50	38	875.90	870.92	6	1290	5.0	246.0	8	1,290		4.27	5,509	0.01	1.46	0.44	0.06	1.14
38	875.90	870.90	37	872.00	867.02	4	860	5.0	225.6	8	3,225		3.78	12,180	0.02	1.72	0.63	0.08	1.56
37	872.00	867.00	36	866.70	861.72	4	860	5.0	231.8	8	4,085		3.66	14,946	0.02	2.28	0.63	0.08	1.80
36	866.70	861.70	41	858.00	853.02	1	215	5.0	182.8	8	7,525		3.37	25,364	0.04	4.75	0.69	0.09	2.75
41	858.00	853.00	42	817.30	812.32	3	645	5.0	212.9	8	8,170		3.33	27,236	0.04	19.11	0.51	0.06	4.54
42	817.30	812.30	43	807.70	802.72	1	215	5.0	64.2	8	11,180		3.20	35,734	0.06	14.93	0.61	0.08	4.53
43	807.70	802.70	46	791.20	786.22	1	215	5.0	176.8	8	11,395		3.19	36,329	0.06	9.32	0.69	0.09	3.87
46	791.20	786.20	47	790.40	771.46	0	0	5.0	53.3	8	11,395		3.19	36,329	0.06	27.66	0.53	0.07	5.64
47	790.40	771.44	48	791.60	770.32	0	0	19.0	111.7	8	11,395		3.19	36,329	0.06	1.00	1.18	0.15	1.77
48	791.60	770.30	49	792.80	770.10	0	0	21.3	19.8	8	11,395		3.19	36,329	0.06	1.00	1.18	0.15	1.77
52	777.80	772.80	51	775.10	770.12	11	2365	5.0	251.2	8	2,365		3.94	9,311	0.01	1.07	0.62	0.08	1.22
51	775.10	770.10	50	772.00	767.02	2	430	5.0	96.6	8	2,795		3.85	10,760	0.02	3.19	0.50	0.06	1.84
54	759.80	754.80	53	754.00	749.02	12	2580	5.0	365.7	8	2,580		3.89	10,040	0.02	1.58	0.57	0.07	1.41
57	751.80	746.80	56	745.50	740.52	12	2580	5.0	275.5	8	2,580		3.89	10,040	0.02	2.28	0.53	0.07	1.62
56	745.50	740.50	55	742.00	737.02	3	645	5.0	113.2	8	3,225		3.78	12,180	0.02	3.07	0.54	0.07	1.88
60	747.90	742.90	59	723.00	718.02	9	1935	5.0	356.6	8	1,935		4.04	7,826	0.01	6.98	0.35	0.04	2.14
59	723.00	718.00	58	720.00	715.02	0	2610	5.0	318.2	8	4,545		3.61	16,392	0.03	0.94	0.81	0.10	1.36
65	711.50	706.50	64	706.80	701.82	12	2580	5.0	160.4	8	2,580		3.89	10,040	0.02	2.92	0.50	0.06	1.76
80	698.40	693.40	79	671.90	666.90	8	1720	5.0	342.1	8	1,720		4.11	7,067	0.01	7.75	0.34	0.04	2.23
79	671.90	666.90	78	649.30	644.30	10	2150	5.0	366.3	8	3,870		3.69	14,262	0.02	6.17	0.49	0.06	2.52
78	649.30	644.30	77	636.50	633.48	0	0	5.0	388.1	8	3,870		3.69	14,262	0.02	2.79	0.60	0.08	1.93
77	636.50	633.48	76	642.20	631.55	0	0	3.0	312.5	8	3,870		3.69	14,262	0.02	0.62	0.85	0.11	1.14
82	685.70	672.51	81	698.40	668.65	6	1290	13.2	384.0	8	1,290		4.27	5,509	0.01	1.01	0.48	0.06	1.00
81	698.40	668.65	83	671.00	666.00	4	860	29.7	263.3	8	2,150		3.99	8,574	0.01	1.01	0.60	0.08	1.16
83	671.00	666.00	84	658.80	653.80	10	2150	5.0	249.2	8	4,300		3.63	15,624	0.02	4.90	0.54	0.07	2.39
84	658.80	653.80	85	630.80	625.80	2	430	5.0	350.0	8	4,730		3.59	16,968	0.03	8.00	0.50	0.06	2.91
85	630.80	625.80	86	627.60	622.60	13	2795	5.0	306.6	8	7,525		3.37	25,364	0.04	1.04	0.98	0.12	1.61
86	627.60	622.60	87	624.00	619.00	0	0	5.0	199.0	8	7,525		3.37	25,364	0.04	1.81	0.86	0.11	1.96
87	624.00	619.00	88	624.50	617.00	0	0	5.0	115.0	8	7,525		3.37	25,364	0.04	5.22	0.67	0.08	2.83
88	624.50	617.00	WWTP	618.00	614.00	0	0	7.5	120.0	8	7,525		3.37	25,364	0.04	514.17	0.23	0.03	14.04

Valiano Sewer Study

Upstream MH			Downstream MH																
MH	Rim	Inv	MH	Rim	Inv	Units	Flow (gpd)	Depth	Length	Diameter	Cummulative Average Gravity Flow (gpd)	PSP Flow	Peaking Factor	Cummulative Peak Dry Weather Flow (gpd)	Cummulative Peak Dry Weather Flow (cfs)	Slope (%)	Normal Depth (inches)	d/D	Velocity (fps)
32	817.90	812.90	49	792.80	770.10	0	0	5.0	353.3	8	1,075	94,112	4.38	98,817	0.15	12.11	1.04	0.13	5.71
49	792.80	770.08	50	772.00	767.02	0	0	22.7	306.4	8	1,075	94,112	4.38	98,817	0.15	1.00	1.92	0.24	2.37
50	772.00	767.00	53	754.00	749.02	0	0	5.0	297.8	8	3,870	94,112	3.69	108,374	0.17	6.04	1.29	0.16	4.60
53	754.00	749.00	55	742.00	737.02	0	0	5.0	206.1	8	6,450	94,112	3.44	116,307	0.18	5.81	1.35	0.17	4.63
55	742.00	737.00	58	720.00	715.02	0	0	5.0	357.8	8	9,675	94,112	3.26	125,642	0.19	6.14	1.38	0.17	4.83
58	720.00	715.00	61	719.00	714.02	0	0	5.0	95.0	8	14,220	94,112	3.09	138,119	0.21	1.03	2.26	0.28	2.64
61	719.00	714.00	62	713.60	708.62	4	860	5.0	149.7	8	15,080	94,112	3.07	140,415	0.22	3.59	1.67	0.21	4.14
62	713.60	708.60	63	710.10	705.12	16	3440	5.0	232.1	8	18,520	94,112	2.99	149,430	0.23	1.50	2.14	0.27	3.09
63	710.10	705.10	64	706.80	701.82	12	2580	5.0	307.0	8	21,100	94,112	2.94	156,043	0.24	1.07	2.39	0.30	2.77
64	706.80	701.80	67	696.00	691.02	4	860	5.0	149.9	8	24,540	94,112	2.88	164,695	0.25	7.19	1.52	0.19	5.54
67	696.00	691.02	66	680.00	675.02	0	0	5.0	142.0	8	24,540	94,112	2.88	164,695	0.25	11.27	1.36	0.17	6.49
66	680.00	675.02	68	673.70	668.70	0	0	5.0	215.0	8	24,540	94,112	2.88	164,695	0.25	2.94	1.90	0.24	4.03
68	673.70	668.70	69	670.00	663.00	0	0	5.0	294.0	8	24,540	94,112	2.88	164,695	0.25	1.94	2.11	0.26	3.48
69	670.00	663.00	70	660.00	655.00	0	0	7.0	205.0	8	24,540	94,112	2.88	164,695	0.25	3.90	1.77	0.22	4.46
70	660.00	655.00	71	658.00	653.00	0	0	5.0	286.0	8	24,540	94,112	2.88	164,695	0.25	0.70	2.74	0.34	2.41
71	658.00	653.00	72	651.00	648.00	0	0	5.0	286.0	8	24,540	94,112	2.88	164,695	0.25	1.75	2.16	0.27	3.35
72	651.00	648.00	73	645.70	636.63	0	0	3.0	272.0	8	24,540	94,112	2.88	164,695	0.25	4.18	1.74	0.22	4.57
73	645.70	636.63	74	643.80	635.14	0	0	9.1	145.6	8	24,540	94,112	2.88	164,695	0.25	1.03	2.48	0.31	2.77
74	643.80	635.14	75	640.00	633.00	0	0	8.7	28.0	8	24,540	94,112	2.88	164,695	0.25	7.63	1.50	0.19	5.65
75	640.00	633.00	76	642.20	631.55	8	1720	7.0	75.0	8	26,260	94,112	2.85	168,958	0.26	1.94	2.13	0.27	3.50
76	642.20	631.55	89	643.00	628.00	2	430	10.7	350.7	8	30,560	94,112	2.79	179,459	0.28	1.01	2.60	0.33	2.82
89	643.00	628.00	90	637.50	621.00	0	1080	15.0	351.3	8	31,640	94,112	2.78	182,065	0.28	1.99	2.20	0.28	3.61
91	637.50	621.00	90	633.00	615.00	0	0	16.5	231.0	8	31,640	94,112	2.78	182,065	0.28	2.60	2.06	0.26	3.97
90	632.00	614.00	WWTP	626.00	613.00	0	0	18.0	66.0	8	39,165	94,112	2.70	199,910	0.31	1.52	2.47	0.31	3.36

USAGE 215
 total units 326
 total population 978
 peaking factor 6.2945*(pop)^{-0.134};for County of San Diego

APPENDIX B

MEMBRANE BIO-REACTOR PLANT

Membrane Bio-reactor (MBR) Plant

In the Rincon del Diablo MWD (Rincon MWD) alternative, MBR is the preferred treatment plant process. The section below describes the MBR plant that will serve the project and is provided for informational purposes only.

The Valiano development will only generate an average wastewater flow of approximately 71,500 gpd and the flows may be lower if lower generation rates per capita are seen. Peak flows may increase to approximately 150,630 gpd (or about 104 gpm) based on a peaking factor of 2.11 (e-mail communication from County). Given this relatively low flow range, Rincon MWD is considering an MBR treatment plant for the purpose of providing a more compact and contained treatment system that is less operator-intensive. The advantages to Rincon MWD include:

- Smaller site footprint, less visual impact
- Fewer treatment process units to operate and maintain
- Reduced odor control requirements and costs due to smaller structures resulting in reduced volumes of air requiring odor control
- Very high-quality effluent
- Modular for simpler expansion
- Somewhat higher operating costs would be borne by users

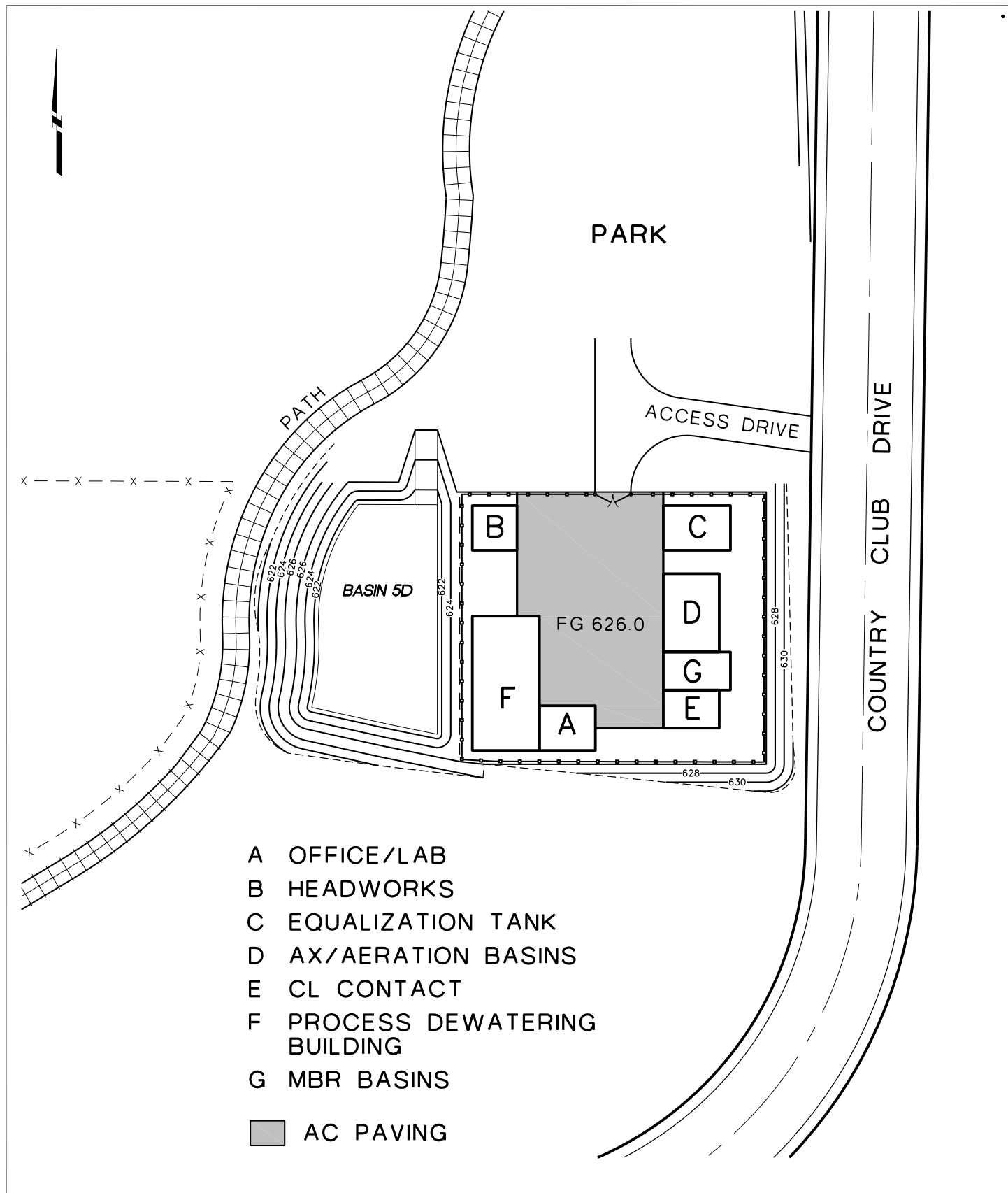
Figure B-1 includes a preliminary site lay-out of an MBR WRP on the dedicated approximately 0.7 acre site. Residual solids digestion and/or dewatering could be accomplished with on-site treatment at the Valiano WRP; however, given the small quantity of sludge that will be produced, it may be more efficient for the County to handle the sludge at the HG WRP site.

A summary of major plant components include:

- **Headworks** providing fine screening of the influent wastewater. The type of fine screen proposed for the Harmony Grove WRP would be sufficient for an MBR plant as well.
- **Equalization basin** to balance out variations in flow by storing a portion of the peak flows received for treatment in the plant during low-flow periods. This basin could also be integrated into the membrane basin design.
- **Bioreactor basins** consisting of anoxic and aerated zones for biological treatment of the organic content of the wastewater, as well as denitrification to convert ammonia from the wastewater ultimately to nitrogen gas which returns to the atmosphere.
- **Membrane basins** which use microfiltration media (either in the form of bundled individual fibers or else flat sheets) to separate water from the solids contained in the wastewater.

The membrane basins take place of, and are much more compact than, the clarifier basins and filters required for the Aero-Mod process and other conventional style wastewater treatment processes.

- **Chlorine contact basins** for disinfection of the reclaimed water by chlorine solution.
- **Residual solids processing**, could include dewatering and digestion, might be limited to thickening only, with further processing at the HG WRP. It would probably be inefficient to construct and operate an entire solids processing operation at a WRP as small as the Valiano facility would be, when another larger facility is available nearby.
- An **operations/laboratory building** providing space for employees to store their personal items, restrooms and showers for employees, some desk space and a small laboratory for use in operational control of the plant, although given the proximity to the HG WRP, the requirements for this building may be minimal.



0 30 60 FEET

RINCON MWD WTRF
Figure B-1