Appendix UIS

Project Utilities Impact Study

1155 and 1185 Terra Bella Ave
Utility Impact Study

Prepared for
Rincon Consultants Inc.

and

City of Mountain View
500 Castro Street
Mountain View, CA 94041

DRAFT

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Executive Summary

Schaaf & Wheeler has been retained by Rincon Consultants Inc. to determine impacts from the 1155 and 1185 Terra Bella Avenue Project (Project) on the City of Mountain View's (City) water and sanitary sewer systems. The Project site is currently vacant, and encompasses two parcels, APN 153-16-011 and 156-16-012. The Project proposes a lot line adjustment to combine both parcels into a single 'L' shaped parcel, and a three-story office building with approximately 20,000 square foot office building .

Project impacts are analyzed for both Existing (2010) and Future Cumulative (2030) Conditions for the water system. Hydraulic models simulating pre- and post-Project development scenarios are performed to examine hydraulic deficiencies. The Existing Condition is based on the *2010 Water Master Plan* (WMP) and the Future Cumulative Condition model is created from the *2030 General Plan – Updated Water System Modeling Alternative 1* (GP-UWSM Alt 1; Schaaf & Wheeler, November 2014) model. The Existing Condition model includes recent City approved projects and projects under construction near the Project site. The Future Cumulative Condition model includes CIPs from the NBPPII UIS and recent City approved projects not accounted for or in exceedance of the 2030 GPUUIS projections. The Future Cumulative Condition model also includes other projects under review near the Project site.

Project impacts to the sewer system are analyzed for Existing (2010) and Future Cumulative (2030) hydraulic models simulating pre- and post-Project development scenarios are performed to examine hydraulic deficiencies. The Existing Condition is based on the *2010 Sewer Master Plan* (SMP). The Existing Condition model includes recent City approved projects and projects under construction near the Project site. The Future Cumulative Condition sewer model is created from the *General Plan Update Utility Impact Study* (GPUUIS; IEC, October 2013) model and includes all sewer system CIPs recommended in the GPUUIS. The Future Cumulative Condition model also includes other projects under review near the Project site.

Water System Project Impacts

The Project development does not significantly impact the water system under peak hour demand (PHD) at Existing Condition. Under the Future Cumulative Condition assuming all of the recommended CIPs in the GPUUIS have been constructed, the system generally meets performance criteria under PHD. Pressures near Shoreline Golf Links fall just under PHD performance criteria of 40 psi; however no additional nodes outside of the Golf Links area fall below the PHD performance criteria. There are no new deficiencies resulting from the additional demands associated with the Project.

The Project specific fire flow requirement is based on the California Fire Code, 2019; the Project-specific fire flow of 1,875 gpm is met during Existing Condition and during Future Cumulative Condition. There are some deficient fire nodes within Pressure Zone 1; however they are far from the Project site. No new deficiencies are created as a result of adding the incremental Project specific water demands.

The actual fire flow requirement may change as the planning process continues and Project specific requirements are determined by the City Fire Marshal. If Project conditions require higher fire flow than what is analyzed, revised modeling should be conducted.

Sewer System Project Impacts

The sewer system has existing deficiencies for both pre- and post-Project flows in the Existing Condition. The Project does not create any new deficiencies in the Existing Condition system. In the Future Cumulative Condition, the sewer system does have sufficient capacity for pre- or post-Project flows assuming all CIPs in the GPUUIS have been constructed.

Three recommended CIPs or portions thereof in the 2030 GPUUIS are downstream of the Project: CIPs # P-97, P-100 and P-108. The CIPP-97 proposed to upsize a portion of the existing sewer main under Terra Bella Avenue from 15-inch diameter pipe to 18-inch diameter pipe, under current conditions, the existing pipe is well below the d/D performance criteria and does not need to be upsized. For this analysis, CIP #100 conforms to City-provided plans from January 2018 for crossing State Highway 101. No new CIPs are required to accommodate the Project incremental sewer flows. The Project contribution to the recommended CIPs are all below 1%.

Chapter 1. Introduction

1.1. Project Description

The 1155 and 1185 Terra Bella Avenue Project (Project) is located on a 1.3 acre site on Terra Bella Avenue, between N. Shoreline Blvd and Linda Vista Ave as shown on Figure B-1. The Project proposes to construct a new 3-story office building with 20,000 square feet of office space.

1.2. Water System Analysis Approach

Project impacts are analyzed using the City's water models for two conditions: Existing (2010) and Future Cumulative (2030). As a baseline for system performance, each condition is evaluated pre-Project for existing hydraulic deficiencies. The estimated incremental water demand resulting from Project development is added to the model and post-Project deficiencies are examined. In total, four model simulations of the water system are performed, as shown in Figure 1.

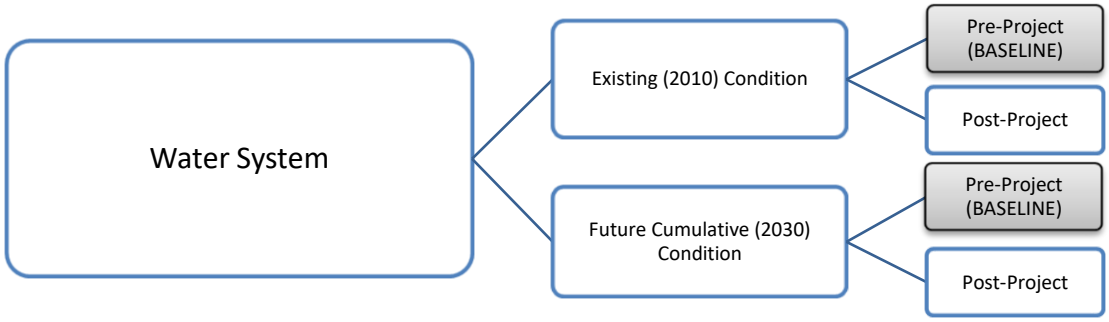


Figure 1. Water System Model Simulations

The Existing Condition model consists of the existing distribution system and operating parameters along with water demands based on existing land use from the *2010 Water Master Plan* (WMP) and has since been revised to include recent City approved projects and projects currently under construction near the Project site. The Future Cumulative Condition water demand is based on the 2030 General Plan Update (GPU) land use and has since been revised to include recent City approved projects not accounted for or in exceedance of the 2030 GPU projections. The Future Cumulative Condition demands also include projects under review near the Project site. Table A-1 in Appendix A provides a list of all of the considered development projects. The Future Cumulative Condition model is based on the *2030 General Plan – Updated Water System Modeling Alternative 1* (GP-UWSM Alt 1) model and assumes all of the recommended CIPs in the *North Bayshore Precise Plan Phase II Utility Impact Study* (NBPPII UIS; Schaaf & Wheeler, October 2016) have been constructed. The GP-UWSM Alt 1 updates the *General Plan Update Utility Impact Study* (GPUUIS; IEC, October 2011) with revisions to demands, network components, boundary conditions, fire flow requirements, and recommended CIPs. The

NBPPII UIS updates some CIPs recommended in the GP-UWSM Alt 1 based on revised demand and fire flow requirements within the North Bayshore Precise Plan boundary.

1.3. Sewer System Analysis Approach

Project impacts to the sewer system are analyzed using the City's sewer models for two conditions: Existing (2010) and Future Cumulative (2030). As a baseline for system performance, each condition is evaluated pre-Project for existing hydraulic deficiencies. The estimated sewer flow resulting from Project development is added to the model and post-Project deficiencies are examined. In total, four model simulations of the sewer system are performed, as shown in Figure 2.

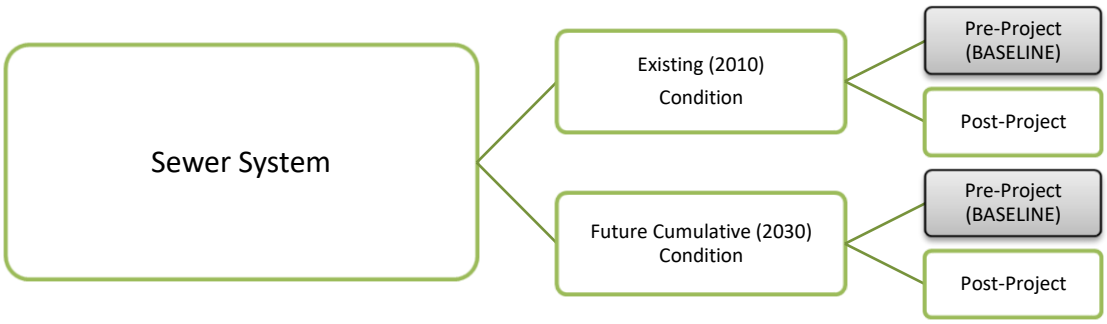


Figure 2. Sewer System Model Simulations

The Existing Condition model consists of the existing collection system and operating parameters along with sewer flow based on existing land use from the *2010 Sewer Master Plan* (SMP) and has since been revised to include recent City approved projects and projects under construction near the Project site. The Future Cumulative Condition sewer flows are based on the 2030 General Plan Update (GPU) land use and have since been revised to include recent City approved projects not accounted for or in exceedance of the 2030 GPU projections. The Future Cumulative Condition sewer flows also include projects under review near the Project site. Table A-1 in Appendix A provides a list of all of the considered development projects.

1.4. Report Organization

This report is organized into four following sections. Chapter 2 discusses the water demand estimates for the Project and Chapter 3 covers the impacts and capital improvement recommendations for the water system. Chapter 4 discusses the sewer flow estimates and Chapter 5 covers the capital improvements recommendations for the sewer system.

Chapter 2. Water Demand Projections

This chapter discusses the estimated water demand and required fire flow for the Project development. Water demand in this section represents Average Daily Demand (ADD). The ADD is an estimated daily average of water use patterns that varies by season and customer type.

Project impact is evaluated by adding the incremental increase in water demand at the Project site post-Project and comparing to the pre-Project baseline demand. The pre-Project baseline demand in the Existing and Future Cumulative Condition follows the methodology described in the 2010 WMP and 2030 GPUUIS. The water unit duty factor for estimating total Project demand is taken from previous technical studies to remain consistent with the City-wide demand projections used in the hydraulic models.

2.1. Project Water Demand

Project water demand is estimated from square footage of proposed office in the Project Plans dated August 26, 2021, and water unit duty factors developed for the City. Water unit duty factors used in this report were developed as part of the North Bayshore Precise Plan Phase II (Table 2-2, NBSPPII) from water meter records of recent developments throughout the City. The duty factors applied are representative of office demands for the proposed office building. Table 2-1 provides the Project specific demand.

Table 2-1: Project Estimated Water Demand

Building	Proposed Area (square feet)	Land Use Type	Water Duty Factor (gpd/DU or gpd/1000 sf)	Water Demand (gpd)
New Building	20,000	Office	90	1,800
Total	***20,000***	-	-	***1,800***

2.1.1. Project Required Fire Flow

The anticipated Project-specific fire flow requirement at the site is based on the 2019 California Fire Code (CFC) Appendix B, which gives the minimum fire flow requirement based on fire-flow area and building construction type. Construction type and estimated floor area for the Project and existing buildings are taken from the Project Plan Set dated August 26, 2021. The proposed building is identified as Construction Type V-B, resulting in a fire flow of 3,750 gpm for the 20,000 square foot office building.

Building-specific fire flow requirements based on the CFC are presented in Table 2-2. Because the proposed buildings will have fire sprinklers, a 50 percent reduction is applied to the required fire flow rates from the CFC. This is a conservative assumption since a 75 percent reduction is allowed upon approval on an approved automatic sprinkler system according to CFC Section B105.2.

Table 2-2 – Anticipated New Building Project Fire Flow (FF) Requirement

Building	FF Calculation Area (sq ft)	Construction Type	CFC Required FF (gpm)	FF with 50% Reduction (gpm)	FF with 75% Reduction (gpm)
Proposed Office Building	20,000	V-B	3,750	1,875	1,500*

**Based on 2019 CFC minimum reduced Fire Flow requirement*

2.2. Existing Condition (2010)

2.2.1. Pre-Project (Baseline) Land Use and Demand

The pre-Project (baseline) condition includes parcel-level demand adopted from the City's InfoWater model, developed as part of the 2010 WMP. The demand in the model is calibrated against water billing records from 2005 and 2006, as further explained in the 2010 WMP. For some non-Project parcels, these WMP demands have since been updated to include recent City approved projects and projects under construction near the Project site outlined in Table A-1 in Appendix A. Table 2-3 details the model demand at the parcels, which were designated as Commercial/Retail.

Table 2-3: Baseline Demand for Existing Condition (Based on Model)

Address	APN	2010 Master Plan Existing Land Use Designation	Acreage	Water Demand (gpd)
1155 and 1185 Terra Bella	153-16-011/ 156-16-012	Commercial/Retail	1.3	907*

**Water Demand allocated to the specific parcels in the Existing Condition hydraulic model*

2.2.2. Post-Project Incremental Demand

For the Project impact analysis in the Existing Condition, total post-Project demand is added to the Existing Condition model as an incremental increase in water flow to the pre-Project demand. The incremental increase in demand in the Existing Condition is given in Table 2-4.

Table 2-4: Incremental Project Demand for Existing Condition

	Water Demand (gpd)
Pre-Project (Baseline) Demand	907
Total Post-Project Demand	1,800
Incremental Increase in Demand	***+893***

2.3. Future Cumulative Condition (2030)

2.3.1. Pre-Project (Baseline) Land Use and Demand

Future Cumulative (baseline) demand for the Project is adopted from the City's InfoWater model developed as part of the 2030 GPUUIS. In the 2030 GPUUIS model, water demands are based on the 2030 General Plan Update (GPU) land use; these demands have since been updated to include recent City approved projects and projects under review as outlined in Table A-1 in Appendix A. Table 2-5 presents the parcel level pre-project demand from the model. Whereas the Existing Condition model was populated with demand based on billing records, the Future Cumulative Condition model has a higher projected future demand for the parcel based on the water duty factors developed as part of the 2010 WMP.

Table 2-5 – Baseline Demand for Future Cumulative Condition (Based on Model)

Address	APN	GPUUIS Land Use Designation	Acreage	Water Demand (gpd)
1155 and 1185 Terra Bella	153-16-011/ 156-16-012	Commercial/Retail	1.3	1,440

**Water Demand allocated to the specific parcel in the Future Cumulative hydraulic model*

2.3.2. Post-Project Incremental Demand

Total post-Project demand is added to the model as an additional increase in water demand to the pre-Project demand. The incremental increase in demand in the Future Cumulative Condition is given in Table 2-6.

Table 2-6: Incremental Project Demand for Future Cumulative Condition

	Water Demand (gpd)
Pre-Project (Baseline) Demand	1,440
Total Post-Project Demand	1,800
Incremental Increase in Demand	***+360***

Chapter 3. Water System Impact

Project impacts to water supply, water storage, hydraulic conveyance, and fire flow requirements are evaluated in this chapter to ensure the Project demand can be adequately met. Hydraulic conveyance and available fire flow are assessed for both Existing (2010) and Future Cumulative (2030) Condition. Water supply and water storage are evaluated for the Future Cumulative Condition.

3.1. Demand Scenarios and Performance Criteria

Hydraulic performance within the water system are evaluated under two demand scenarios: Peak Hour Demand (PHD) and Maximum Day Demand with Fire Flow (MDD + FF). The MDD and PHD peaking factors from the 2010 Water Mater Plan (WMP) are used for this analysis. As detailed in the 2010 WMP, MDD and PHD peaking factors are developed using SCADA data from peak usage months in 2006 and 2007. The peak hour occurred on the day with the largest daily demand, which was observed to be August 8, 2007. The calculated peaking factors, presented in Table 3-1, are applied to Average Day Demand (ADD). Established design criteria used to evaluate the Project impact for all scenarios are summarized in Table 3-2.

Table 3-1: Peaking Factors

Category	Peaking Factor
Maximum Day	1.71
Peak Hour	2.79

Table 3-2: Water System Performance Criteria

Criteria	PHD	MDD + FF
Minimum Allowable Pressure (psi)	40	20

3.2. Water Supply Analysis

The increased water demand from Project development in the Future Cumulative Condition is compared with the City's supply turnouts and groundwater well capacities to ensure demand can be met. The Mountain View water system is divided into three pressure zones to maintain reasonable pressures throughout the City's rising topography moving south, further from the Bay. The Project site is located in Pressure Zone 1, which is, at this time, supplied by only one San Francisco Public Utilities Commission (SFPUC) turnout (Turnout #5).

Water demand versus supply capacity by Pressure Zone is given in Table 3-3. Total capacity for Pressure Zone 1 includes peak hour turnout capacity from SFPUC Turnout #5 and additional supply supplemented from Wells #22 and #23. Demand in Pressure Zone 1 cannot be sufficiently supplied by the current supply operation; however, as discussed in the *2030 General Plan Update Utility Impact Study* (IEC, 2011), surplus supply in Pressure Zone 2 could be routed to Pressure Zone 1 to make-up the supply deficiency in the Pressure Zone 1. A pressure reducing valve (PRV) moving water from Pressure Zone 2 to Pressure Zone 1 at North Whisman Road, between Walker Drive and Whisman Court, is included in the *North Bayshore Precise Plan II Utility Impact Study* (NBPPII UIS; Schaaf & Wheeler, October 2016). The ability of the system to meet Project demand and the fire

flow requirement at Future Cumulative Condition assumes this CIP has been constructed. The additional Project demand does not impact the City's ability to meet total system demand.

Table 3-3: Future Cumulative Condition Demand Versus Supply

Pressure Zone	2030 Future Cumulative Demand			Total Capacity (mgd)*
	Pre-Pro`ject		Post-Project	
	ADD (mgd)	PHD (mgd)	PHD (mgd)	
1	7.98	22.26	22.26	16.56
2	8.41	23.46	23.46	30.53
3	1.62	4.52	4.52	5.1
Total	**18.01**	**50.25**	**50.25**	**52.19**

** Total Capacity from Table 3-8 in the General Plan Update Utility Impact Study (IEC, 2011)*

3.3. Water Storage Analysis

Project impact to water storage volume requirements is evaluated according to the State Water Resources Control Board Division of Drinking Water (DDW). DDW requires storage equal to 8 hours of Maximum Day Demand (MDD) plus fire flow storage in each pressure zone. The required storage versus active storage in the City is detailed in Table 3-4 pre- and post-Project. The maximum active storage in the City is 17 MG. However, the City currently operates with only the operational active storage of 14.3 MG.

The fire flow volume in Table 3-4 revises the requirement in the 2010 WMP and is estimated from the largest fire flow requirement in each pressure zone. Based on CFC requirements the fire flow volume is calculated as 5,000 gpm for 4 hours. Pressure Zone 3 has the potential for a reduction in required fire flow volume since the controlling fire flow requirement is the hospital along Grant Road, which has a planning-level fire flow requirement of 3,500 for 4 hours.

Since the City has the storage volume available to meet DDW requirements in the Future Cumulative Condition pre- and post-Project, no additional storage improvements are recommended. In the future, when City demand and storage requirements exceed the current operating storage, the City may need to alter reservoir operation schemes.

Table 3-4: DDW Storage Requirements

Pressure Zone	Maximum Active Storage* (MG)	Operational Active Storage (MG)	Fire Flow (MG)	Future Cumulative Condition Demand					
				Pre-Project			Post-Project		
				ADD (mgd)	8 Hours of MDD (MG)	DDW Requirement (MG)	ADD (mgd)	8 Hours of MDD (MG)	DDW Requirement (MG)
1	6.00	5.1	1.2	7.98	4.55	5.25	7.98	4.55	5.25
2	8.00	6.5	1.2	8.41	4.79	6.30	8.41	4.79	6.30
3	3.00	2.7	1.2	1.62	0.92	2.12	1.62	0.92	2.12
Total	**17.00**	**14.3**	**3.6**	**18.01**	**10.27**	**13.67**	**18.01**	**10.27**	**13.67**

** Maximum Active Storage from Table 4-2 in the General Plan Update Utility Impact Study (IEC, 2011)*

3.4. Existing Condition (2010) Results

3.4.1. Hydraulic Model Information

Existing water system performance is analyzed with the demands and land use type in the City's InfoWater model developed for the City's 2010 WMP. Domestic and fire services for the Project will connect to the existing 12-inch water mains in Terra Bella Avenue. For this analysis, only City-owned utilities are modeled; interior site piping is not evaluated.

The Existing Condition pre-Project fire flow requirement is based on the planning level fire flow of 1,500 gpm. The proposed fire flow requirements for new buildings are identified in Table 2-2, and is 1,875 gpm with a 50% reduction assumed with the fire sprinklers as discussed in Section 2.1.1.

3.4.2. Peak Hour Demand (PHD) – Pre and Post Project

System pressures are evaluated under Peak Hour Demand (PHD) pre-Project (Figure B-2) and post-Project (Figure B-3). At Existing Condition the system meets performance criteria system-wide. The Project development does not impact the system hydraulic performance under PHD.

3.4.3. Maximum Day Demand with Fire Flow (MDD+FF) – Pre and Post Project

The pre-Project planning-level required fire flow of 1,500 gpm is met at the existing hydrant locations at the proposed Project site (Figure B-4).

After Project development, the anticipated project-specific fire flow requirement of 1,875 gpm is met at the site as illustrated in Figure B-5 and detailed in Table 3-5. The other existing deficiencies in Pressure Zone 1 shown on Figures B-4 and B-5 are not near the Project site and are independent of the Project.

Table 3-5: Existing Condition Evaluated Project Fire Flow Nodes

Node ID	Location	Required Fire Flow Rate (gpm)	Available Flow Pre-Project (gpm)	Available Flow Post-Project (gpm)
J-2837	Project Location – Terra Bella Avenue	Pre-Project: 1,500 Post-Project: 1,875	8,287	8,287

3.4.4. Deficiencies – Pre and Post Project

With Existing Condition demand, the water system meets system design criteria at PHD and is able to adequately supply the increased Project demand.

Existing fire flow nodes are evaluated within the Project Pressure Zone (Zone 1) for Project impact. There are several deficient fire nodes within Pressure Zone 1; however, none of the deficient nodes are near the Project site. The increase in water demand results in less than a 1% decrease in available fire flow at the nearest deficient nodes; therefore, the impact is not considered significant.

Table 3-6: Selected Existing Condition Fire Flow Deficient Nodes Pre- and Post-Project

Node ID	Location	Required Fire Flow Rate (gpm)	Available Flow Pre-Project (gpm)	Available Flow Post-Project (gpm)
J-1201	Laura Lane	1,500	893	893
J-2624	Jackson Street	2,500	2,375	2,375
J-4185	San Leandro St, north of San Pablo	3,500	3,396	3,396

Note: Red font indicates available fire flow that does not meet the required fire flow rate.

3.5. Future Cumulative Condition (2030) Results

3.5.1. Hydraulic Model Information

Outside of the North Bayshore Precise Plan boundary, the Future Cumulative Condition model is created using water demand based on the 2030 General Plan Update (GPU) land use and includes the additional projects listed in Table A-1 in Appendix A. Within the North Bayshore Precise Plan Boundary, demands in the Future Cumulative Condition model are based on demands developed as part of the *North Bayshore Precise Plan Phase II Utility Impact Study* (NBPPII UIS; Schaaf & Wheeler, October 2016). System performance is analyzed under the assumption that all recommended CIPs in the NBPPII UIS have been constructed. Domestic and fire services for the Project will connect to the existing 12-inch water main in Terra Bella Avenue.

The Future Cumulative Condition pre-Project fire flow requirement is not changed from the updated Existing Condition pre-Project fire flow requirement. The pre-Project fire flow requirement of 3,500 gpm, based on planning level fire flow requirements. After Project development, the Project specific required fire flow at the site is anticipated to be a fire flow of 1,875 gpm, utilizing a 50% reduction in fire flow as discussed in Section 2.1.1.

3.5.2. Peak Hour Demand (PHD) – Pre and Post Project

The system has adequate pressures pre-Project (Figure B-6). Pressures pre and post-Project near Shoreline Golf Links are just under the performance criteria of 40 psi, however, none fall below 37 psi.

3.5.3. Maximum Day Demand with Fire Flow (MDD+FF) – Pre and Post Project

The pre-Project planning-level required fire flow of 3,500 gpm is met at the existing hydrant locations at the proposed Project site (Figure B-4).

In the Future Cumulative Condition, the system is able to meet the fire flow requirements at the site pre-Project as shown on Figure B-8. Available Fire Flow pre and post Project are provided on Table 3-7 for three closest deficient nodes within Pressure Zone 1 for comparison of pre- and post-Project available flow.

Table 3-7: Selected Future Condition Fire Flow Deficient Nodes Pre- and Post-Project

Node ID	Location	Required Fire Flow Rate (gpm)	Available Flow Pre-Project (gpm)	Available Flow Post-Project (gpm)
J-2837	Project Location – Terra Bella Avenue	Pre-Project: 3,500 Post-Project: 1,875	8,287	8,287

3.5.4. Deficiencies – Pre and Post Project

With Future Cumulative Condition demand, all nodes within Pressure Zone 1, excluding the Golf Links golf course, meet the performance criteria of 40 psi during PHD.

The fire flow deficient nodes within Pressure Zone 1 are evaluated for Project impact. There are several deficient fire nodes within Pressure Zone 1; however, none of the deficient nodes are near the Project site. The increase in water demand results in less than a 1% decrease in available fire flow at the nearest deficient nodes; therefore, the impact is not considered significant. Fire flows pre- and post-Project are provided on Table 3-8 for three closest deficient nodes within Pressure Zone 1 for comparison of pre- and post-Project available flow.

Table 3-8: Selected Future Condition Fire Flow Deficient Nodes Pre- and Post-Project

Node ID	Location	Required Fire Flow Rate (gpm)	Available Flow Pre-Project (gpm)	Available Flow Post-Project (gpm)
J-2873	Linda Vista Avenue	3,500	3,330	3,330
J-4187	San Leandro St, south of Terra Bella Ave	3,500	3,439	3,439
J-4185	San Leandro St, north of San Pablo	3,500	3,018	3,018

Note: Red font indicates available fire flow that does not meet the required fire flow rate.

Chapter 4. Sewer Flow Projections

This chapter discusses the sewer flow estimate for Project development and provides a comparison to pre-Project baseline condition. The incremental Project flow is determined for both Existing (2010) and Future Cumulative (2030) Condition, as discussed in the following sections. The sewer generation factor for estimating Project sewer flow is taken from previous technical studies (2010 SMP, 2030 GPUUIS, and NBPPII) to remain consistent with the City-wide flow projections used in the hydraulic models.

Three types of sewer flow loading are used to model the sewer system: base wastewater flow, groundwater infiltration (GWI), and rainfall-dependent infiltration/inflow (RDI/I). GWI includes base infiltration (BI) and pumped groundwater discharged to the sewer system. RDI/I is stormwater that enters the sewer system. GWI and RDI/I values are modeled as constant flows.

Base wastewater flow (BWF) is from residential, commercial, institutional, office, and industrial sources. As described in the 2010 Sewer Master Plan (SMP), BWF is developed on an individual parcel level using the 2005 and 2006 water billing records and applying a return-to-sewer (RTS) ratio calculated for land use type. Change in BWF throughout the day due to daily use patterns is known as diurnal variation and is accounted for by applying residential and non-residential diurnal curves. BWF and diurnal curves used in this analysis are taken from the 2010 SMP to remain consistent with previous City-wide modeling. The sewer flows discussed in this section are the BWF values representing average flows and are not peaked.

4.1. Project Sewer Flow

Project generated sewer flow is estimated from the square footage of office space provided in the Project Plan Set dated August 26, 2021. A return-to-sewer (RTS) ratio is applied to the water duty factor from Table 2-1 to estimate sewer flow. An RTS ratio of 0.7 was used for office square footage based on the 2010 SMP RTS ratio for commercial office land use (SMP Table 3-2). Table 4-1 provides the sewer flow estimation for each building.

Table 4-1: Project Estimated Sewer Flow

Building	Number of Dwelling Units	Land Use Type	Sewer Duty Factor (gpd/DU)	Sewer Flow (gpd)
New Building	20,000	Office	70	1,400
Total	***20,000***	-	-	***1,400***

4.2. Existing Condition (2010)

4.2.1. Pre-Project (Baseline)

The pre-Project (baseline) condition includes parcel-level sewer flow adopted from the City's InfoSWMM model, developed as part of the 2010 SMP. For some non-Project parcels, these SMP flows have since been updated to include recent City approved projects and projects under construction near the Project site outlined in Table A-1 in Appendix A. Table 4-2 details the parcel-level sewer flow in the model; the model sewer flows are based on

the sewer generation rates used in the 2010 SMP. The parcel specific demand is based on the weighted contribution to a specific model node and may be lower than the actual parcel sewer generation rate.

Table 4-2: Baseline Flow for Existing Condition (Based on Model)

Address	APN	2010 Master Plan Existing Land Use Designation	Acreage	Sewer Flow (gpd)
1155 and 1185 Terra Bella	153-16-011/ 156-16-012	Commercial/Retail	1.3	271*

**Flow allocated to specific parcel within the Existing Condition hydraulic model*

4.2.2. Post-Project Incremental Demand

For the Project impact analysis in the Existing Condition, total post-Project sewer flow is added to the Existing model pre-Project flow as an additional increase in sewer flow. The incremental increase in flow is given in Table 4-3.

Table 4-3: Incremental Project Flow for Existing Condition

	Sewer Flow (gpd)
Pre-Project (Baseline) Flow	271
Total Post-Project Flow	1,400
Incremental Increase in Flow	***+1,129***

4.3. Future Cumulative Condition (2030)

4.3.1. Pre-Project (Baseline)

Future Cumulative (baseline) flow for the Project is adopted from the City's InfoSWMM model developed as part of the 2030 GPUUIS. In the 2030 GPUUIS model, sewer flows are based on the 2030 General Plan Update (GPU) land use; these flows have since been updated to include recent City approved projects and projects under review as outlined in Table A-1 in Appendix A.

Table 4-4 presents the parcel-level pre-project flow from the Future Cumulative hydraulic model. The Future Cumulative Condition model has a higher projected future sewer flow based on the 2010 SMP generation factors. The specific parcel demand is based on the weighted contribution to a specific model node in the hydraulic model.

Table 4-4: Baseline Flow for Future Cumulative Condition (Based on Model)

Address	APN	GPUUIS Land Use Designation	Acreage	Sewer Flow (gpd)
1155 and 1185 Terra Bella	153-16-011/ 156-16-012	Commercial/Retail	1.3	873*

**Flow allocated to specific parcel within the Future Cumulative hydraulic model*

4.3.2. Post-Project Incremental Demand

Total post-Project flow is added to the Future Cumulative Condition model as an additional increase in sewer flow from pre-Project flow. The incremental post-Project flow is given in Table 4-5.

Table 4-5: Incremental Project Flow for Future Cumulative Condition

	Sewer Flow (gpd)
Pre-Project (Baseline) Flow	873
Total Post-Project Flow	1,400
Incremental Increase in Flow	***+527***

Chapter 5. Sewer System Impact

The impact of Project development on the sewer system is analyzed under Existing (2010) and Future Cumulative (2030) conditions. The specific affected area of the gravity system evaluated for Project impact begins at the Project site on Terra Bella Avenue and flows west, then turns north into North Shoreline Blvd and continues north across Hwy 101. Sewer flows continue to the north to the Shoreline Sewer Pump Station via the Central Trunk.

5.1. Scenarios and Performance Criteria

Sewer capacity is analyzed under Peak Wet Weather Flow (PWWF) and Average Dry Weather Flow (ADWF). PWWF is used to determine hydraulic deficiencies according to the performance criteria in Table 5-1. ADWF is used to determine adequacy of treatment capacity.

The ADWF scenario is developed in the model by adding BWF and GWI. Since the ADWF scenario models average daily flows, BWF is not peaked. The PWWF scenario applies the diurnal peaking curves for residential and non-residential flows and simulates system response to rainfall dependent inflow and infiltration. The diurnal peaking curves are adopted from the City's 2010 SMP. Groundwater Infiltration (GWI) and rainfall-dependent infiltration/inflow (RDI/I) are included, but are not peaked.

Table 5-1: Sewer System Performance Criteria

Criteria	Pipe Diameter ≤ 12 inch	Pipe Diameter > 12 inch
Maximum Flow Depth/Pipe Diameter (d/D)	0.50	0.75

5.2. Sewer Treatment, Joint Interceptor, and San Antonio Interceptor Capacity

Sewage generated within the City is treated at the Regional Water Quality Control Plant (RWQCP) in Palo Alto. The sewer collection system is a gravity system with the majority of flow discharging into three main trunk lines that convey flow from the south to the north and terminate at the SPS located within the City's Shoreline Park. Flow is then pumped to the gravity Joint Interceptor Sewer that conveys flow to the RWQCP. The remaining flow not received at the SPS is discharged to the Los Altos' San Antonio Interceptor that also conveys flow into the Joint Interceptor.

The City entered into a joint agreement, referred to as the Basic Agreement, with the cities of Palo Alto and Los Altos in 1968 for the construction and maintenance of the joint sewer system addressing the need for conveyance, treatment, and disposal of wastewater to meet Regional Board requirements. In accordance with the Basic Agreement, Palo Alto owns the RWQCP and administers the Basic Agreement with the partnering agencies purchasing individual capacity rights in terms of an average annual flow that can be discharged to the RWQCP. Capacity rights of the three cities can be rented or purchased from other neighboring agencies and each partnering agency can sell their capacity to others. Contractual capacity is based upon the 1985 Addendum No. 3 of the 1968 Joint Sewer System agreement that revised capacity rates in relationship to facility expansion and is based upon Average Annual Flow (defined as 1.05 times Average Dry Weather Flow). Separate service

agreements with the RWQCP have since reallocated current capacity rights to include six partnering agencies. Table 5-2 presents the current capacity rights for each agency.

Table 5-2: RWQCP Joint Facilities Capacity Rights

Partner Agency	Treatment Capacity	72-inch Joint Interceptor Capacity
	Average Annual Flow (MGD)	Peak Wet Weather Flow (MGD)
Palo Alto	15.3	14.59
East Palo Alto Sanitary District	3.06	0
Los Altos Hills	0.63	3.41
Stanford University	2.11	0
Mountain View	15.1	50
Los Altos	3.8	12
Total	***40***	***80***

Source: Long Range Facilities Plan for the Regional Water Quality Control Plant (City of Palo Alto, May 2012)

The City's total capacity rights include flow leaving the City through the SPS and the amount of flow that the City discharges into the Los Altos' San Antonio Interceptor, per the 1970 Los Altos San Antonio Trunk Sewer Capacity Agreement between the two cities. The total system-wide contractual capacity for Mountain View is evaluated in the Existing and Future Cumulative Conditions with increased Project flow. Table 5-3 shows the City's projected flows compared to the RWQCP Joint Facilities capacity rights.

Per the Basic Agreement, the partnering agencies agree to conduct an engineering study when their respective service area reaches 80% of their contractual capacity rights. The Future Cumulative Condition estimates that the projected demand pre-Project and post-Project will exceed the 80% capacity threshold. The required engineering study when the City reaches 80% of their capacity shall redefine the anticipated future needs of the treatment plant.

Table 5-3: Capacity Rights Comparison

RWQCP Joint Facility	Mountain View Contractual Capacity (MGD)	Pre-Project		Post-Project	
		2010 Existing (MGD)	2030 Future Cumulative (MGD)	2010 Existing (MGD)	2030 Future Cumulative (MGD)
Treatment	15.1	10.16	14.15	10.16	14.15
Joint	50	16.98	21.91	16.98	21.91

** Treatment = Average Annual Flow (AAF), Joint Interceptor = PWWF*

5.3. Existing Condition (2010) Results

5.3.1. Hydraulic Model Information

The Existing Condition sewer system is modeled using the City's InfoSWMM model developed as part of the *2010 Sewer Master Plan* (SMP). The Project connects to an existing 15-inch VCP pipe within Terra Bella Avenue, the pipe drains west to North Shoreline Blvd. The MH at the intersection of Terra Bella and Linda Vista Avenue is the nearest upstream MH to the Project site, and sewer flows are assumed to discharge into that existing manhole in the hydraulic models.

5.3.2. Peak Wet Weather Flow (PWWF) Scenario – Pre and Post Project

The sewer system meets the City's d/D performance criteria along the Project flow path. There are no pipes along the flow path that are at risk of surcharging. Both pre-Project and post-Project pipes along the flow path in the for the Existing Condition are shown in Figures B-10a, B-10b, B-11a, and B-11b.

5.3.3. Deficiencies – Pre and Post Project

Existing Condition model results comparing pre- and post-Project d/D are presented in Table 5-4. The system meets d/D performance criteria in all pipes downstream of the Project.

5.4. Future Cumulative Condition (2030) Results

5.4.1. Hydraulic Model Information

The Future Cumulative Condition model is created using sewer flows based on the 2030 General Plan Update (GPU) land use and includes additional projects listed in Table A-1 in Appendix A. System performance is analyzed under the assumption that all recommended CIPs in the 2030 GPUUIS have been constructed. Project sewer flow is assumed to discharge into the existing 15-inch diameter public main along Terra Bella Avenue

Three recommended CIPs or portions thereof in the 2030 GPUUIS are downstream of the Project: CIPs #P-97, P-100 and P-108. In the 2030 GPUUIS, CIP # P-97 includes upsizing several pipes, one of which is the 545-ft pipe segment adjacent to the Project site on Terra Bella Avenue. The pipe segment extends from Linda Vista Avenue to N. Shoreline Blvd, along Terra Bella Avenue, this pipe is recommended to be upsized from 15-inch to 18-inch diameter, approximately 360-feet are downstream of the Project connection point to N. Shoreline Blvd. The existing 15-inch pipe within Terra Bella Avenue has adequate capacity and is below the d/D performance criteria for pipes over 12-inches in diameter.

CIP #P-100 includes upsizing 4,419 feet of existing 18-inch diameter pipe to a 21-inch diameter pipe along North Shoreline Boulevard between Terra Bella Avenue and Charleston Road. However, for this analysis, CIP #100 conforms to City-provided plans from January 2018 for crossing State Highway 101 such that approximately 5,792 feet of pipe is upsized to 21-inch diameter pipe. CIP #108 recommends upsizing 241 feet of existing 21-inch diameter pipe to 24-inch diameter pipe along North Shoreline Boulevard north of Crittenden Lane.

5.4.2. Peak Wet Weather Flow (PWWF) Scenario – Pre and Post Project

The system meets d/D performance criteria downstream of the Project in the Future Cumulative Condition pre-Project and post-Project as shown in Figures B-12a and B-12b, assuming recommended CIPs are constructed.

5.4.3. Deficiencies – Pre and Post Project

There are no new deficiencies due to the Project incremental increase in sewer flow under the Future Cumulative Condition. Results comparing the pre- and post-Project d/D and flows are presented in Table 5-5, the pipes downstream of the Project are shown on Figures B-12a through B-13b. Recommended CIP diameters from the 2030 GPUUIS are indicated by green font in Table 5-5.

5.5. Project Contribution to Deficient Sewer Pipes

Several projects are identified downstream of the Project site, including pipes recommended to be upsized as part of the 2030 GPUUIS. The UIS has determined the percentage of project contribution to the recommended CIPs, typically this is used to determine the development impact fees for fair share impact to the sewer system. Based on the results of this UIS, none of the pipes had a contribution of greater than 1%. The City has determined contributions of less than 1% fall within the City's error of margin for variability within the model and therefore the project does not have a significant contribution to the recommended CIPs.

Table 5-4: Existing Condition Model Results – Pre and Post Project

Sewer Main Model ID	Upstream MH ID	Downstream MH ID	Existing Diameter (in)	Length (ft)	Slope (%)	ADWF				PWWF				
						Pre-Project		Post-Project		Pre-Project		Post-Project		
						Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Pipe Capacity Remaining (% of Allowed d/D)
611	F4-128	F4-016	15	267	0.260	0.310	0.3548	0.311	0.3550	0.463	0.4607	0.464	0.4608	39
607	F4-016	E4-003	18	190	0.396	1.296	0.4947	1.297	0.4949	2.239	0.6614	2.240	0.6615	12
525	E4-003	E4-008	18	243	0.014	1.296	0.5094	1.297	0.5097	2.240	0.6851	2.241	0.6853	9
501	E4-008	E4-007	18	217	0.304	1.297	0.4136	1.298	0.4138	2.241	0.5667	2.242	0.5669	24
492	E4-007	E4-001	18	212	0.304	1.297	0.3711	1.298	0.3713	2.243	0.5022	2.244	0.5024	33
478	E4-001	E4-006	18	240	0.724	1.298	0.3223	1.299	0.3224	2.244	0.4328	2.245	0.4329	42
457	E4-006	E4-005	18	250	0.724	1.298	0.3223	1.299	0.3225	2.245	0.4330	2.246	0.4331	42
446	E4-005	E4-004	18	109	0.724	1.299	0.3224	1.300	0.3225	2.247	0.4331	2.248	0.4332	42
434	E4-004	E4-003	18	129	0.724	1.299	0.3224	1.300	0.3226	2.248	0.4332	2.249	0.4333	42
424	E4-003	E4-062	18	162	0.724	1.300	0.3381	1.301	0.3383	2.249	0.4561	2.250	0.4563	39
420	E4-062	E4-002	18	111	0.510	1.300	0.3538	1.301	0.3539	2.251	0.4791	2.252	0.4792	36
389	E4-002	E4-001	18	397	0.510	1.301	0.3538	1.302	0.3540	2.252	0.4955	2.253	0.4957	34
377	E4-001	E4-060	18	36	0.510	1.301	0.3952	1.302	0.3954	2.253	0.5557	2.254	0.5559	26
373	E4-060	E4-012	18	9	0.265	1.302	0.4030	1.303	0.4031	2.255	0.5509	2.256	0.5511	27
349	E4-012	E4-002	18	294	0.437	1.306	0.3854	1.307	0.3864	2.261	0.5256	2.262	0.5270	30
331	E4-002	D4-035	18	375	0.377	1.405	0.3982	1.406	0.3965	2.417	0.5441	2.418	0.5412	28
306	D4-035	D4-033	18	166	0.423	1.419	0.3806	1.420	0.3903	2.439	0.5143	2.440	0.5313	29
290	D4-033	SW-1	21	296	0.422	1.421	0.3344	1.422	0.4189	2.443	0.4469	2.444	0.5701	24
CDT-13	SW-1	D4-021	21	24	0.277	1.436	0.3451	1.437	0.4192	2.456	0.4649	2.457	0.5698	24

Table 5-4 (Continued): Existing Condition Model Results – Pre and Post Project

Sewer Main Model ID	Upstream MH ID	Downstream MH ID	Existing Diameter (in)	Length (ft)	Slope (%)	ADWF				PWWF				
						Pre-Project		Post-Project		Pre-Project		Post-Project		
						Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Pipe Capacity Remaining (% of Allowed d/D)
260	D4-021	D4-050	18	341	0.429	1.438	0.3909	1.439	0.3911	2.460	0.5309	2.461	0.5311	29
241	D4-050	D4-068	18	364	0.434	1.442	0.3901	1.443	0.3903	2.466	0.5296	2.467	0.5298	29
209	D4-068	SW-2	18	509	0.440	1.445	0.4130	1.446	0.4132	2.471	0.5519	2.472	0.5520	26
CDT-17	SW-2	SW-3	18	39	0.083	1.445	0.4063	1.446	0.4065	2.471	0.5366	2.472	0.5367	28
CDT-19	SW-3	D4-006	21	15	0.650	1.625	0.3873	1.626	0.3874	2.747	0.5201	2.748	0.5202	31
177	D4-006	C4-021	30	420	0.100	1.944	0.3173	1.945	0.3174	3.134	0.4072	3.135	0.4073	46
156	C4-021	C4-017	30	396	0.135	1.944	0.3103	1.945	0.3104	3.135	0.4024	3.136	0.4024	46
144	C4-017	C4-016	30	244	0.113	1.945	0.3201	1.946	0.3202	3.136	0.4221	3.137	0.4222	44
118	C4-016	C4-012	30	160	0.182	2.123	0.3621	2.124	0.3622	3.390	0.4687	3.391	0.4688	37
113	C4-012	C4-010	30	323	0.031	2.123	0.3567	2.124	0.3568	3.391	0.4662	3.392	0.4663	38
103	C4-010	C4-008	30	59	0.340	2.124	0.3493	2.125	0.3494	3.392	0.4618	3.393	0.4619	38
96	C4-008	C4-004	30	213	0.098	2.142	0.4198	2.143	0.4199	3.424	0.5274	3.424	0.5275	30
88	C4-004	B4-019	30	276	0.029	2.142	0.3660	2.143	0.3661	3.425	0.4600	3.425	0.4601	39
83	B4-019	B4-017	21	582	0.438	2.150	0.3674	2.151	0.3675	3.437	0.4769	3.438	0.4770	36
72	B4-017	B4-007	21	125	0.760	2.164	0.3345	2.166	0.3346	3.460	0.4312	3.460	0.4312	43
64	B4-007	B4-005	21	464	0.782	2.166	0.4409	2.167	0.4410	3.466	0.5618	3.467	0.5619	25
60	B4-005	B4-003	21	70	0.001	2.166	0.4094	2.167	0.4095	3.470	0.5182	3.470	0.5183	31
58	B4-003	B4-001	27	108	1.256	2.166	0.3089	2.167	0.3090	3.473	0.3908	3.474	0.3908	48
56	B4-001	B4-024	27	300	0.115	2.166	0.3140	2.167	0.3141	3.477	0.3976	3.478	0.3977	47
50	B4-024	B4-022	27	292	1.036	2.166	0.2671	2.167	0.2672	3.480	0.3472	3.481	0.3473	54
45	B4-022	B4-016	21	274	0.398	2.166	0.3918	2.167	0.3919	3.487	0.5104	3.488	0.5105	32

Table 5-4 (Continued): Existing Condition Model Results – Pre and Post Project

Sewer Main Model ID	Upstream MH ID	Downstream MH ID	Existing Diameter (in)	Length (ft)	Slope (%)	ADWF				PWWF				
						Pre-Project		Post-Project		Pre-Project		Post-Project		
						Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Pipe Capacity Remaining (% of Allowed d/D)
19	B4-016	B4-014	42	556	0.189	4.885	0.2726	4.886	0.2727	8.478	0.3624	8.479	0.3624	52
21	B4-014	B4-012	42	368	0.272	4.885	0.2720	4.886	0.2720	8.481	0.3616	8.482	0.3616	52
22	B4-012	B4-010	42	450	0.222	4.885	0.2293	4.886	0.2293	8.485	0.3035	8.486	0.3035	60
20	B4-010	B4-003	42	86	1.388	4.885	0.1956	4.886	0.1956	8.488	0.2579	8.490	0.2579	66
24	B4-003	B4-001	42	200	0.500	4.885	0.2310	4.886	0.2310	8.492	0.3017	8.493	0.3017	60
25	B4-001	B4-006	42	338	0.444	4.885	0.2090	4.886	0.2090	8.496	0.2867	8.497	0.2867	62

Table 5-5: Future Cumulative Condition Model Results – Pre and Post Project

Sewer Main Model ID	CIP ID	Model Diameter (in)	Length (ft)	Slope (%)	ADWF				PWWF				
					Pre-Project		Post-Project		Pre-Project		Post-Project		
					Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Pipe Capacity Remaining (% of Allowed d/D)
611	P-97	15/18	267	0.26	0.4977	0.435	0.4991	0.435	0.7201	0.565	0.7211	0.565	25
SR_CIP-1	P-100	18/21	389	0.30	1.8013	0.391	1.8027	0.391	3.0269	0.525	3.0279	0.525	30
SR_CIP-2	P-100	18/21	322	0.29	1.8013	0.395	1.8027	0.395	3.0263	0.531	3.0273	0.531	29
CDT-29	P-100	18/21	353	0.28	1.8013	0.396	1.8027	0.397	3.0260	0.533	3.0270	0.534	29
CDT-31	P-100	18/21	53	0.28	1.8013	0.397	1.8027	0.397	3.0257	0.534	3.0267	0.534	29
CDT-33	P-100	18/21	915	0.28	1.8013	0.396	1.8027	0.396	3.0258	0.533	3.0268	0.533	29
CDT-35	P-100	18/21	140	0.28	1.8013	0.396	1.8027	0.396	3.0250	0.533	3.0260	0.533	29
CDT-23	P-100	18/21	105	0.28	1.8013	0.397	1.8027	0.397	3.0250	0.534	3.0260	0.534	29
363	P-100	18/21	139	0.28	1.8106	0.398	1.8120	0.398	3.0341	0.534	3.0351	0.534	29
SR_CIP-3	P-100	18/21	763	0.28	1.8106	0.398	1.8120	0.398	3.0336	0.535	3.0346	0.535	29
311	P-100	18/21	53	0.28	1.8106	0.400	1.8120	0.400	3.0332	0.537	3.0342	0.537	28
309	P-100	18/21	26	0.28	1.8322	0.402	1.8336	0.402	3.0597	0.538	3.0607	0.539	28
310	P-100	18/21	325	0.28	1.8510	0.405	1.8524	0.405	3.0773	0.543	3.0783	0.543	28
CDT-37	P-100	18/21	265	0.28	1.8515	0.397	1.8529	0.397	3.0785	0.526	3.0795	0.526	30
306	P-100	18/21	166	0.42	2.1130	0.407	2.1144	0.407	3.3861	0.534	3.3871	0.534	29
290	P-100	18/21	418	0.30	2.1306	0.435	2.1320	0.435	3.4026	0.569	3.4036	0.569	24
CDT-13	P-100	18/21	121	0.28	2.1306	0.414	2.1320	0.415	3.4025	0.540	3.4035	0.540	28
260	P-100	18/21	341	0.43	2.1311	0.390	2.1325	0.391	3.4036	0.509	3.4046	0.509	32
241	P-100	18/21	364	0.43	2.2080	0.413	2.2094	0.413	3.5200	0.541	3.5210	0.541	28

Note: Model Diameter in green text represents a 2030 GPUUIS CIP pipe diameter.

Table 5-5 (Continued): Future Cumulative Condition Model Results – Pre and Post Project

Sewer Main Model ID	CIP ID	Model Diameter (in)	Length (ft)	Slope (%)	ADWF				PWWF				
					Pre-Project		Post-Project		Pre-Project		Post-Project		
					Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Pipe Capacity Remaining (% of Allowed d/D)
209	P-100	18/21	509	0.34	2.2117	0.408	2.2131	0.408	3.5009	0.529	3.5019	0.529	29
CDT-17	P-100	18/21	39	0.25	2.2117	0.409	2.2131	0.409	3.5009	0.521	3.5019	0.521	31
CDT-19	P-100	18/21	15	0.65	2.6089	0.405	2.6103	0.405	4.3212	0.559	4.3217	0.559	25
177		30	420	0.10	3.1203	0.406	3.1217	0.406	4.9471	0.526	4.9480	0.526	30
156		30	396	0.14	3.1208	0.403	3.1222	0.403	4.7877	0.518	4.7887	0.518	31
144		30	244	0.10	3.1213	0.417	3.1227	0.417	4.7777	0.541	4.7787	0.541	28
118		30	160	0.18	3.3242	0.464	3.3256	0.464	4.9735	0.591	4.9745	0.591	21
113		30	323	0.03	3.3247	0.462	3.3261	0.462	4.9736	0.589	4.9746	0.589	22
103		30	59	0.34	3.3252	0.458	3.3266	0.458	4.9741	0.585	4.9750	0.585	22
96		30	213	0.10	3.3787	0.524	3.3801	0.524	5.0273	0.644	5.0283	0.644	14
88		30	276	0.03	3.3792	0.456	3.3806	0.456	5.0282	0.566	5.0292	0.566	25
83		21	582	0.44	3.3949	0.478	3.3963	0.478	5.0526	0.614	5.0536	0.614	18
72		21	125	0.76	3.4706	0.424	3.4720	0.424	5.1692	0.533	5.1701	0.533	29
64	P-108	21/24	464	0.78	3.4722	0.463	3.4736	0.463	5.1763	0.571	5.1773	0.571	24
60	P-108	21/24	70	0.00	3.4722	0.436	3.4736	0.436	5.1800	0.534	5.1809	0.534	29
58		27	108	1.26	3.4722	0.391	3.4736	0.391	5.1836	0.482	5.1846	0.482	36
56		27	300	0.11	3.4722	0.397	3.4736	0.397	5.1872	0.491	5.1882	0.491	35
50		27	292	1.04	3.4722	0.320	3.4736	0.320	5.1908	0.397	5.1918	0.397	47
45		27	274	0.40	3.4722	0.355	3.4736	0.355	5.1979	0.442	5.1988	0.442	41
19		42	556	0.19	7.4602	0.339	7.4616	0.339	11.6665	0.430	11.6675	0.430	43
21		42	368	0.27	7.460	0.338	7.4616	0.338	11.6697	0.429	11.6707	0.429	43

Note: Model Diameter in green text represents a 2030 GPUUIS CIP pipe diameter.

Table 5-5 (Continued): Future Cumulative Condition Model Results – Pre and Post Project

Sewer Main Model ID	CIP ID	Model Diameter (in)	Length (ft)	Slope (%)	ADWF				PWWF				
					Pre-Project		Post-Project		Pre-Project		Post-Project		
					Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Pipe Capacity Remaining (% of Allowed d/D)
22		42	450	0.22	7.4602	0.284	7.4616	0.284	11.6729	0.359	11.6740	0.359	52
20		42	86	1.39	7.4602	0.242	7.4616	0.242	11.6765	0.304	11.6776	0.304	60
24		42	200	0.50	7.4602	0.283	7.4616	0.283	11.6802	0.353	11.6812	0.353	53
25		42	338	0.44	7.4602	0.266	7.4616	0.266	11.6838	0.345	11.6848	0.345	54

*Note: Model Diameter in **green** text represents a 2030 GPUUIS CIP pipe diameter.*

APPENDIX A:

Additional Considered Projects

Table A-1: Additional Considered Projects

	Project	Change Area/Planning Area	Address	Status*
1	Mountain View Co-Housing Community	Central Neighborhood	445 Calderon Ave	Completed
2	Hope Street Investors	Downtown/Evelyn Corridor	231-235 Hope St	Under Construction
3	Downtown Mixed Use Building	Downtown/Evelyn Corridor	605 Castro St	Completed
4	Residential Condominium Project	Downtown/Evelyn Corridor	325, 333, 339 Franklin St	Approved
5	St Joseph's Church	Downtown/Evelyn Corridor	599 Castro St	Completed
6	Bryant/Dana Office	Downtown/Evelyn Corridor	250 Bryant St	Completed
7	Quad/Lovewell	East Whisman	369 N Whisman Rd	Approved but Inactive
8	Renault & Handley	East Whisman	625-685 Clyde Ave	Completed
9	LinkedIn	East Whisman	700 E Middlefield Rd	Under Construction
10	National Avenue Partners	East Whisman	600 National Ave	Completed
11	2700 West El Camino Real	El Camino Real	2700 El Camino Real W	Completed
12	SummerHill Apt	El Camino Real	2650 El Camino Real W	Completed
13	Alta Housing	El Camino Real	950 West El Camino Real	Completed
14	Lennar Multi-Family Communities	El Camino Real	2268 El Camino Real W	Completed
15	UDR	El Camino Real	1984 El Camino Real W	Completed
16	Residence Inn Gatehouse	El Camino Real	1854 El Camino Real W	Completed
17	Residence Inn	El Camino Real	1740 El Camino Real W	Completed
18	Tropicana Lodge - Prometheus	El Camino Real	1720 El Camino Real W	Completed
19	Austin's - Prometheus	El Camino Real	1616 El Camino Real W	Completed
20	1701 W El Camino Real	El Camino Real	1701 El Camino Real W	Completed
21	First Community Housing	El Camino Real	1585 El Camino Real W	Completed
22	Harv's Car Wash - Regis House	El Camino Real	1101 El Camino Real W	Completed
23	Greystar	El Camino Real	801 El Camino Real W	Completed
24	Medical Building	El Camino Real	412 El Camino Real W	Completed
25	Lennar Apartments	El Camino Real	865 El Camino Real E	Completed

**Source: City of Mountain View Planning Division Current Project List (City of Mountain View, February 2022)*

Table A-1: Additional Considered Projects (Continued)

	Project	Change Area/Planning Area	Address	Status*
26	Wonder Years Preschool	El Camino Real	86 El Camino Real	Completed
27	Evelyn Family Apartments	Grant/Sylvan	779 East Evelyn Ave	Completed
28	344 Bryant Ave	Grant/Sylvan	344 Bryant Ave	Under Construction
29	Adachi Project	Grant/Sylvan	1991 Sun Mor Ave	Completed
30	840 E El Camino Real	Grant/Sylvan	840 El Camino Real E	Approved
31	Loop Convenience Store	Grant/Sylvan	790 El Camino Real E	Completed
32	El Camino Real Hospital Campus	Miramonte/Springer	2500 Grant Ave	Completed
33	City Sports	Miramonte/Springer	1040 Grant Ave	Completed
34	Prometheus	Moffett/Whisman	100 Moffett Blvd	Completed
35	Hampton Inn Addition	Moffett/Whisman	390 Moffett Blvd	Completed
36	Calvano Development	Moffett/Whisman	1075 Terra Bella Avenue	Completed
37	Moffett Gateway	Moffett/Whisman	750 Moffett Blvd	Completed
38	Holiday Inn Express	Moffett/Whisman	870 Leong Dr	Approved
39	Warmington Residential	Moffett/Whisman	660 Tyrella Avenue	Completed
40	Dividend Homes	Moffett/Whisman	111 and 123 Fairchild Dr	Completed
41	133-149 Fairchild Dr	Moffett/Whisman	133-149 Fairchild Dr	Completed
42	Warmington Residential	Moffett/Whisman	277 Fairchild Dr	Completed
43	Hetch-Hetchy Property	Moffett/Whisman	450 N Whisman Dr	Completed
44	DeNardi Homes	Moffett/Whisman	186 East Middlefield Road	Under Construction
45	Tripointe Homes	Moffett/Whisman	135 Ada Ave	Completed
46	Tripointe Homes	Moffett/Whisman	129 Ada Ave	Completed
47	Robson Homes	Moffett/Whisman	137 Easy St	Completed
48	167 N Whisman Rd	Moffett/Whisman	167 N Whisman Rd	Completed
49	Antenna Farm (Pacific Dr)	Moffett/Whisman	Pacific Dr	Completed
50	Pulte Homes	Moffett/Whisman	100, 420-430 Ferguson Dr	Completed
51	EFL Development	Moffett/Whisman	500 Ferguson Dr	Completed
52	Shenandoah Square Precise Plan	Moffett/Whisman	500 Moffett Blvd	On Hold

**Source: City of Mountain View Planning Division Current Project List (City of Mountain View, February 2022)*

Table A-1: Additional Considered Projects (Continued)

	Project	Change Area/Planning Area	Address	Status*
53	1185 Terra Bella Ave	Moffett/Whisman	1185 Terra Bella Ave	Under Review
54	Linde Hydrogen Fueling Station	Moffett/Whisman	830 Leong Dr	Completed
55	Windsor Academy	Monta Loma/Farley/Rock	908 N Rengstorff Ave	Completed
56	D.R. Horton	Monta Loma/Farley/Rock	827 N Rengstorff Ave	Completed
57	ROEM/Eden	Monta Loma/Farley/Rock	819 N Rengstorff Ave	Completed
58	Paul Ryan	Monta Loma/Farley/Rock	858 Sierra Vista Ave	Completed
59	William Lyon Homes	Monta Loma/Farley/Rock	1951 Colony St	Completed
60	Dividend Homes	Monta Loma/Farley/Rock	1958 Rock St	Completed
61	Paul Ryan	Monta Loma/Farley/Rock	2392 Rock St	Completed
62	San Antonio Station	Monta Loma/Farley/Rock	100 & 250 Mayfield Ave	Completed
63	Northpark Apartments	Monta Loma/Farley/Rock	111 N Rengstorff Ave	Completed
64	333 N Rengstorff Ave	Monta Loma/Farley/Rock	333 N Rengstorff Ave	Completed
65	Classic Communities	Monta Loma/Farley/Rock	1946 San Luis Ave	Completed
66	1998-2024 Montecitio Ave	Monta Loma/Farley/Rock	1998-2024 Montecito Ave	Under Construction
67	Classic Communities	Monta Loma/Farley/Rock	647 Sierra Vista Ave	Completed
68	Dividend Homes	Monta Loma/Farley/Rock	1968 Hackett Ave & 208-210 Sierra Vista Ave	Completed
69	California Communities	Monta Loma/Farley/Rock	2025 & 2065 San Luis Ave	Completed
70	2044 and 2054 Montecito Ave	Monta Loma/Farley/Rock	2044 & 2054 Montecito Ave	Under Construction
71	Shorebreeze Apartments	Monta Loma/Farley/Rock	460 North Shoreline Blvd	Completed
72	Intuit	North Bayshore	2600 Marine Way	Completed
73	Sobrato Organization	North Bayshore	1255 Pear Ave	Approved
74	Charleston East	North Bayshore	2000 North Shoreline Blvd	Under Construction
75	Google and Sywest	North Bayshore	1400 North Shoreline Blvd	On Hold
76	Broadreach	North Bayshore	1625 Plymouth Street	Completed
77	Microsoft	North Bayshore	1045-1085 La Avenida St	Completed
78	Shashi Hotel	North Bayshore	1625 North Shoreline Blvd	Completed

**Source: City of Mountain View Planning Division Current Project List (City of Mountain View, February 2022)*

Table A-1: Additional Considered Projects (Continued)

	Project	Change Area/Planning Area	Address	Status*
79	Community School of Music and Art	San Antonio	250 San Antonio Circle	Completed
80	Prometheus	San Antonio	400 San Antonio Rd	Completed
81	Octane Fayette	San Antonio	2645 & 2655 Fayette Dr	Approved
82	SA Center Phase III	San Antonio	405 San Antonio Rd	Completed
83	Anton Calega	San Antonio/Rengstorff/ Del Medio	394 Ortega Ave	Completed
84	Barry Swenson Builder	San Antonio/Rengstorff/ Del Medio	1958 Latham St	Approved
85	2296 Mora Drive	San Antonio/Rengstorff/ Del Medio	2296 Mora Dr	Completed
86	St Francis High School	Miramonte/Springer	1885 Miramonte Ave	Approved
87	Franklin	Central/Downtown	325 Franklin Street	Approved
88	756 California St	Central/Downtown	756 California Street	Under Review
89	North Shoreline	Moffett/Whisman	1001 North Shorelin Boulevard	Under Construction
90	555 West Middlefield Road	Moffett/Whisman	555 West Middlefield Road	Under Review
91	DeNardini	San Antonio	1919-1933 Gamel Way, 574 Escuela Ave	Approved
92	Tyrella	Moffett/Whisman	294-296 Tyrella Avenue	Approved
93	Logue	Moffett/Whisman	400 Logue Avenue	Approved
94	Google Landings	North Bayshore	1860-2159 Landings Dr., 1014-1058 Huff Ave, 900 Alta Avenue, 2000 North Shoreline	Approved
95	Phan	Moffett/Whisman	198 Easy Street	Approved

**Source: City of Mountain View Planning Division Current Project List (City of Mountain View, February 2022)*

Table A-1: Additional Considered Projects (Continued)

	Project	Change Area/Planning Area	Address	Status*
96	Dana Street	Downtown	676 West Dana Street	Approved
97	Summer Hill	Monta Loma/Farley/Rock	1555 West Middlefield Road	Approved
98	Ambrosio	El Camino Real	855-1023 West El Camino Real	Approved
99	BPR	El Camino Real	2300 West El Camino Real	Approved
100	Dutchints	San Antonio	570 South Rengstorff Avenue	Approved
101	Ambra	Monta Loma/Farley/Rock	901-987 N. Rengstorff Avenue	Under Review
102	Hylan	Monta Loma/Farley/Rock	410-414 Sierra Vista Avenue	Under Construction
103	Maston	Miramonte/Springer	982 Bonita Avenue	Under Construction
104	McKim	Monta Loma/Farley/Rock	2019 Leghorn Street	Approved
105	Sand Hill	Moffett/Whisman	189 North Bernardo Avenue	Under Review
106	Maston	El Camino Real	1313 and 1347 West El Camino Real	Approved
107	Anderson	El Camino Real	601 Escuela Ave and 1873 Latham Street	Under Review
108	SummerHill	Moffett/Whisman	355-418 E Middlefield Road	Approved
109	Prometheus	Monta Loma/Farley/Rock	1950 Montecito Avenue	Under Construction
110	Dividend Homes	Monta Loma/Farley/Rock	2310 Rock Street	Under Construction
111	Insight Realty	Downtown	701 W. Evelyn Avenue	Approved
112	Prometheus	Downtown	1720 Villa Street	Under Construction
113	Fortbay	Moffett/Whisman	777 West Middlefield Road	Approved

**Source: City of Mountain View Planning Division Current Project List (City of Mountain View, February 2022)*

Table A-1: Additional Considered Projects (Continued)

	Project	Change Area/Planning Area	Address	Status*
114	Prometheus Real estate	Moffett/Whisman	759 W. Middlefield Road	Under Construction
115	Green Company	Downtown	Hope Street Lots 4 & 8	Approved
116	Dividend Homes	Monta Loma/Farley/Rock	2005 Rock Street	Under Construction
117	Classic Communities	Monta Loma/Farley/Rock	315 & 319 Sierra Vista	Completed
118	SummerHill	Downtown	257-279 Calderon Ave	Completed
119	SummerHill	Moffett/Whisman	535 and 555 Walker Drive	Under Construction
120	Google	-	Nasa Research Park	Under Construction
121	Renault & Handly	Moffett/Whisman	580-620 Clyde Avenue	Completed
122	Flower Mart	Grant Sylvan Park	525 East Evelyn Ave	Under Construction
123	Greystar	San Antonio	2580 and 2590 California St / 201 San Antonia Circle	Under Construction
124	Eden Housing	North Bayshore	1100 La Avenida St	Approved
125	DeNardi	Miramonte/Springer	773 Cuesta Dr	Approved
126	Legend Colony	Monta Loma/ Farley/Rock	828 & 836 Sierra Vista Avenue	Approved
127	Jason Kim Lee	San Antonio	1958 Latham St	Approved
128	Colony Sierra Homes	Moffett/Whisman	851-853 Sierra Vista Ave	Under Construction
129	Lux Largo	El Camino Real	1411-1495 West El Camino	Approved
130	Sobrato	Moffett/Whisman	600 Ellis St	Approved
131	Zachary Trailer	Moffett/Whisman	730 Central Ave	Under Review
132	870 E El Camino Real	El Camino Real	870 E El Camino Real	Under Review
133	590 Castro St	Central/Downtown	590 Castro Street	Under Review
134	301 E Evelyn Ave	Grant/Sylvan Park	301 E Evelyn Ave	Under Review
135	730 Central Ave	Moffett/Whisman	730 Central Ave	Under Review
136	1155 Terra Bella Ave	Moffett/Whisman	1155-1185 Terra Bella Ave	Under Review
137	334 San Antonio Road	San Antonio	334 San Antonio Road	Under Review

**Source: City of Mountain View Planning Division Current Project List (City of Mountain View, February 2022)*

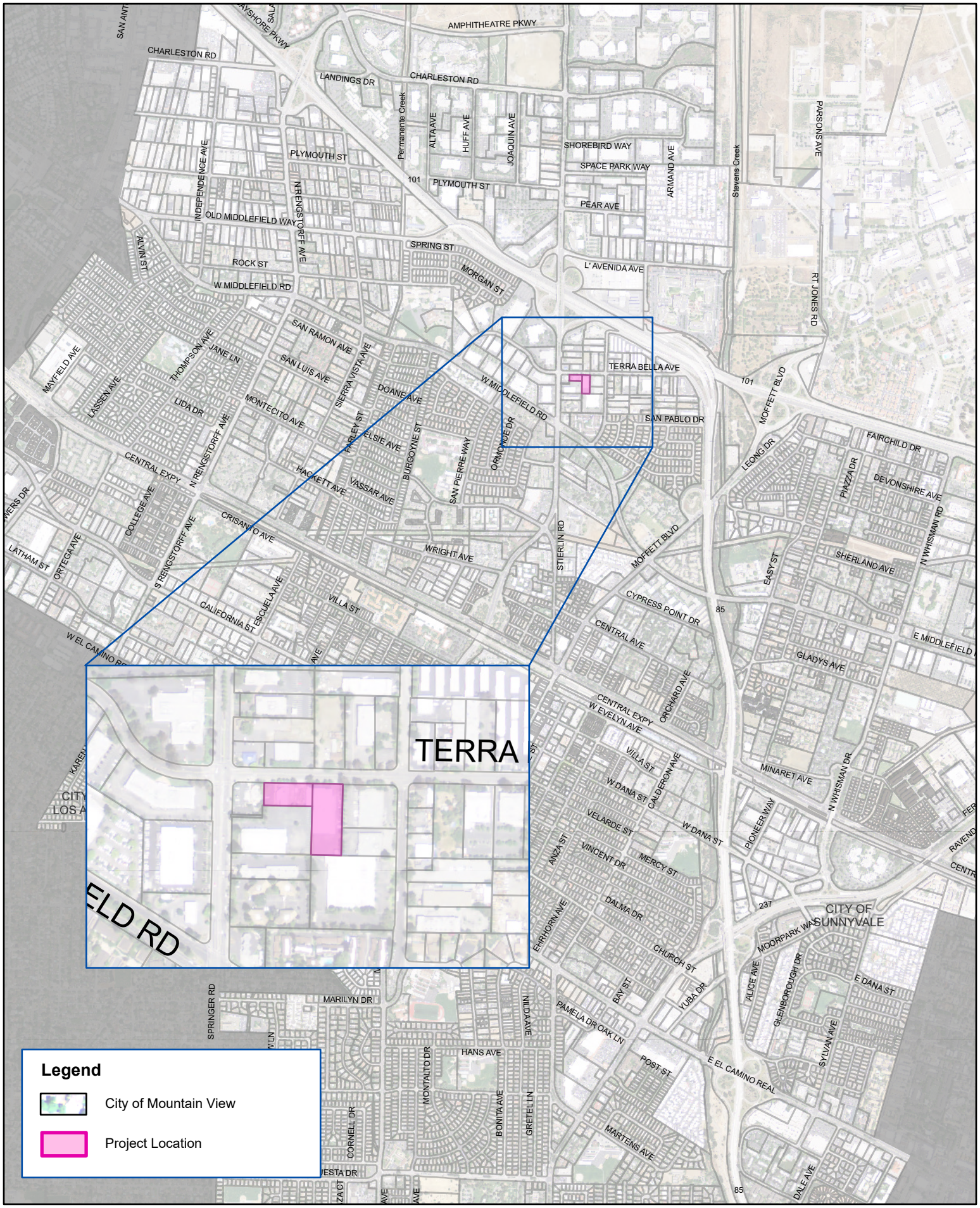
Table A-1: Additional Considered Projects (Continued)

	Project	Change Area/Planning Area	Address	Status*
138	1265 Montecito Ave	Monta Loma	1265 Montecito Ave	Under Review
139	Middlefield Park Master Plan	East Whisman	500 E Middlefield Rd	Under Review
140	North Bayshore Master Plan	North Bayshore	1393 Shorebird Way	Under Review
141	1265 Montecito Ave	Monta Loma/ Farley/Rock	1265 Montecito Ave	Under Review
142	747 West Dana Street	Central/Downtown	747 West Dana Street	Approved

**Source: City of Mountain View Planning Division Current Project List (City of Mountain View, February 2022)*

APPENDIX B:

Figures



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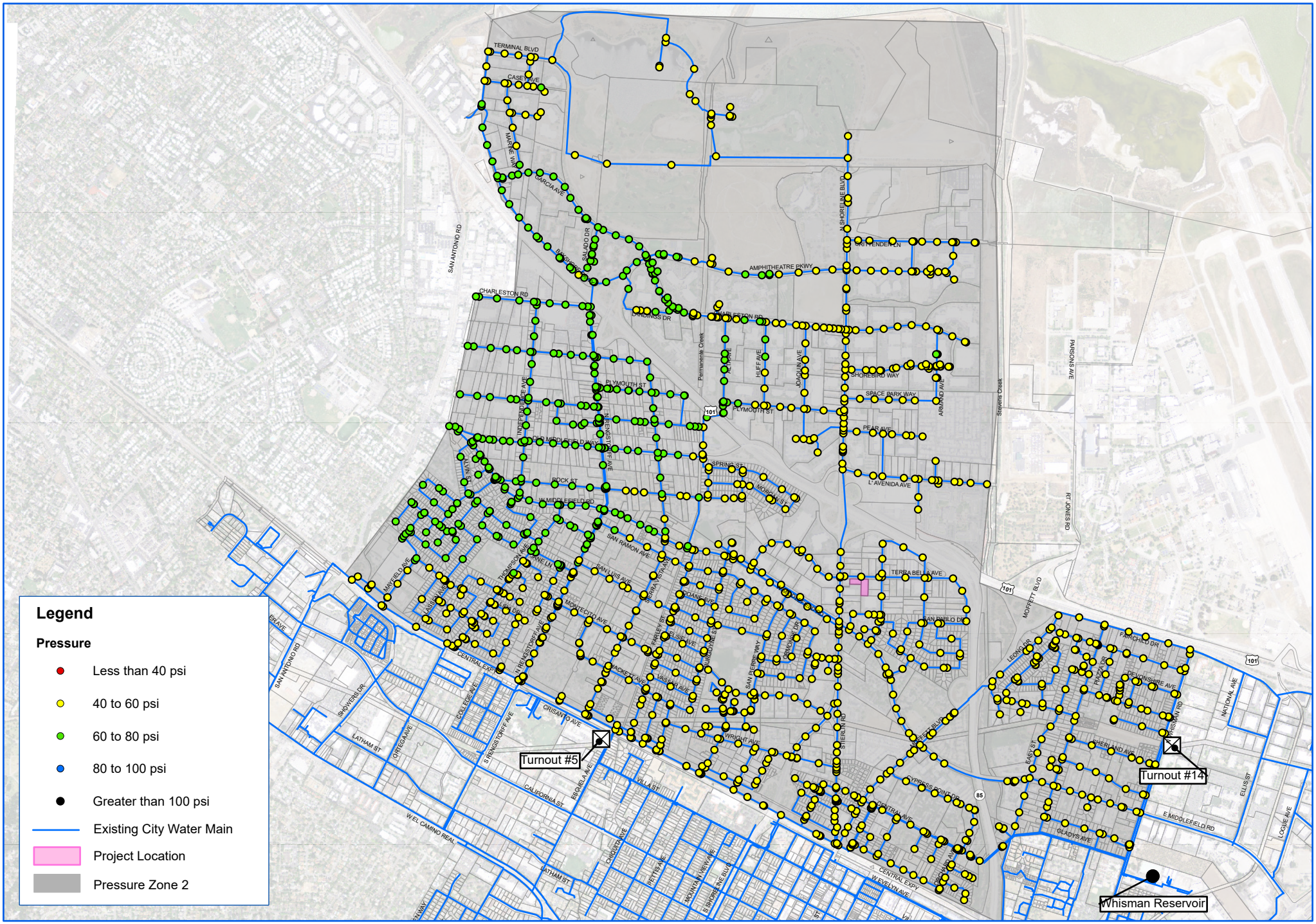
0 1,000 2,000 Feet

FIGURE B-1: **Project Location**



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0 1,000 2,000 Feet

N

FIGURE B-2: **Peak Hour Demand (PHD) - Without Project**

Water System Model - Existing Condition

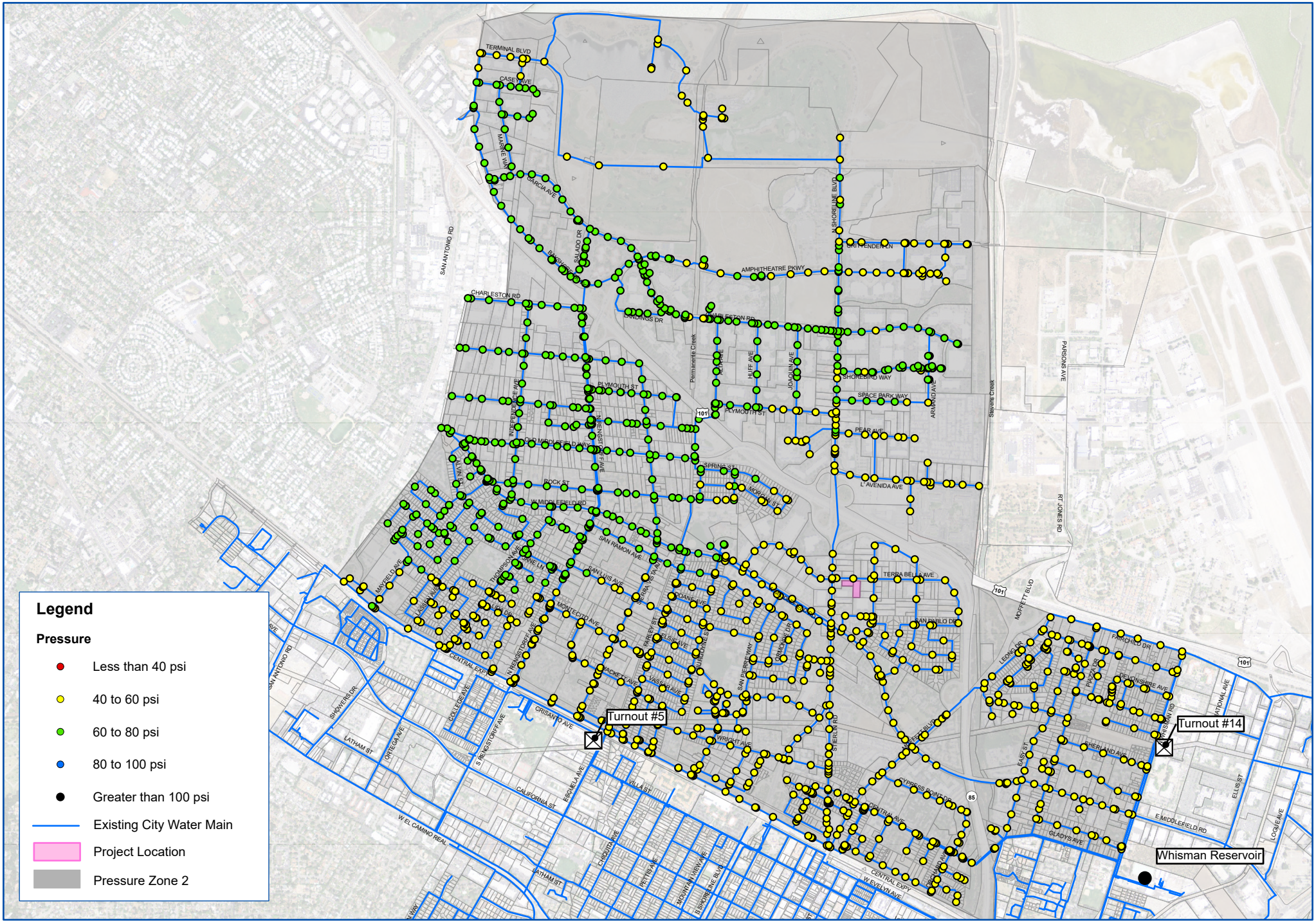

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FIGURE B-3:

Peak Hour Demand (PHD) - With Project

Water System Model - Existing Condition

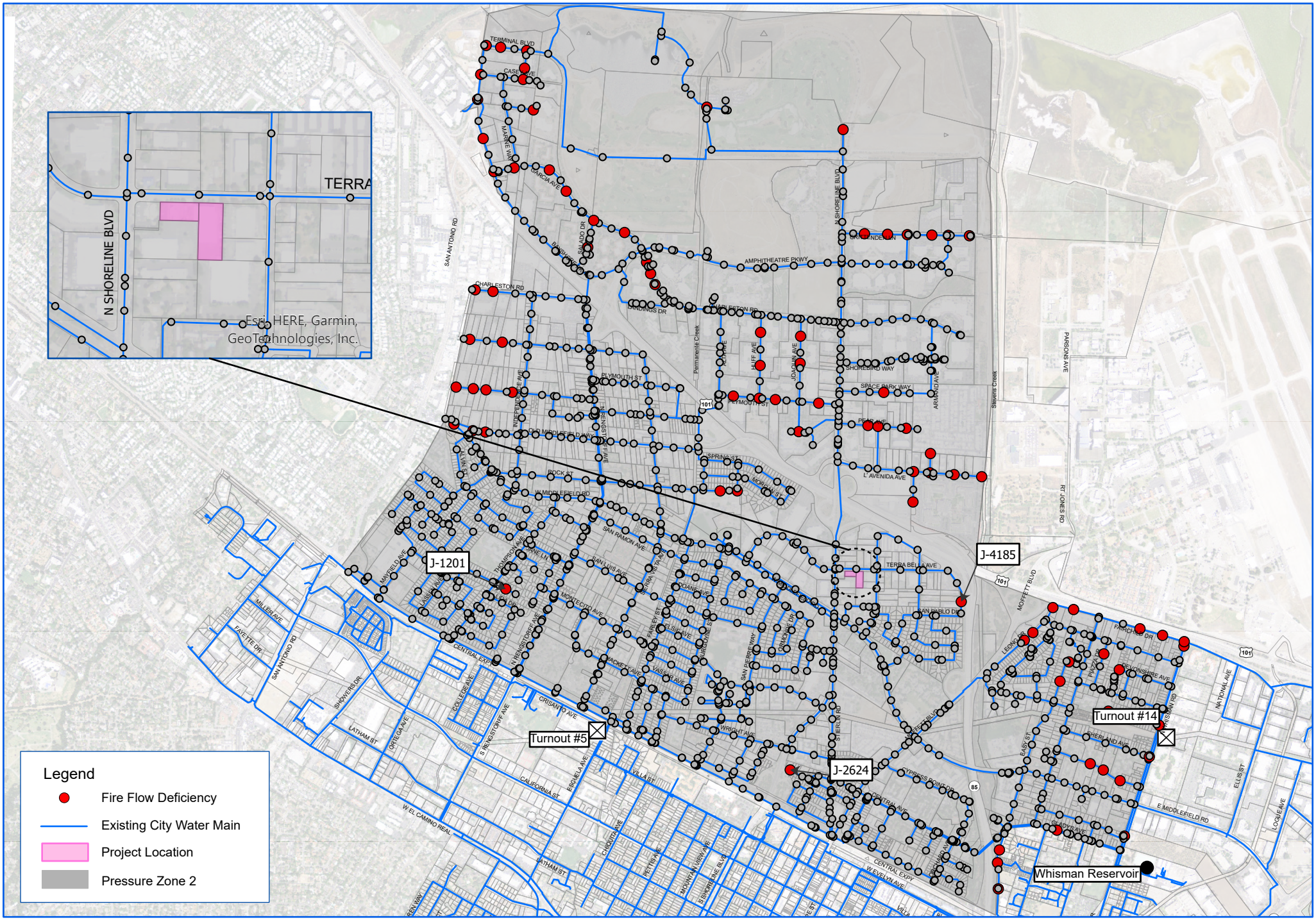

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FIGURE B-4:

Fire Flow Analysis - Without Project
Water System Model - Existing Condition

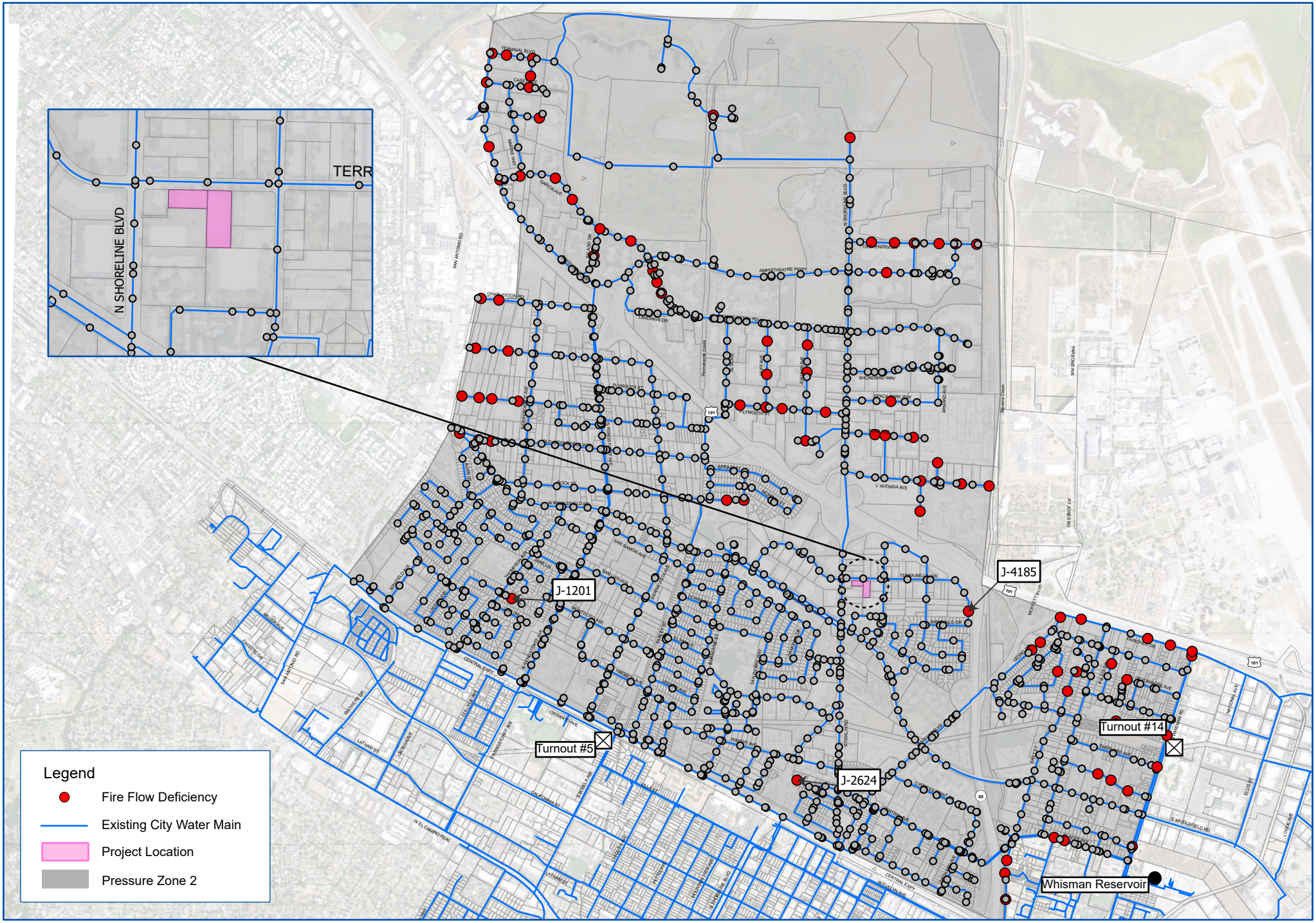

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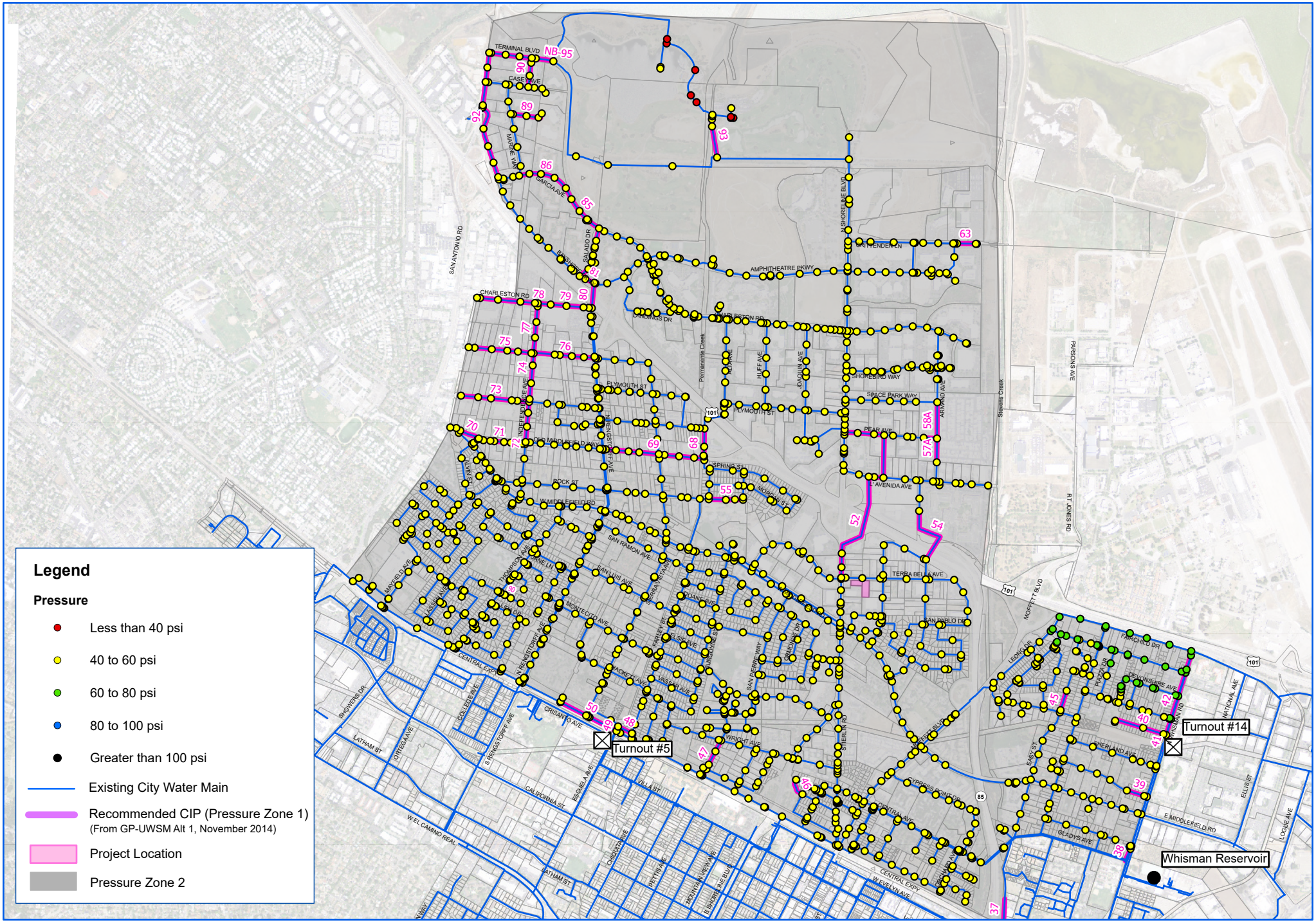
FIGURE B-5:

Fire Flow Analysis - With Project
Water System Model - Existing Condition



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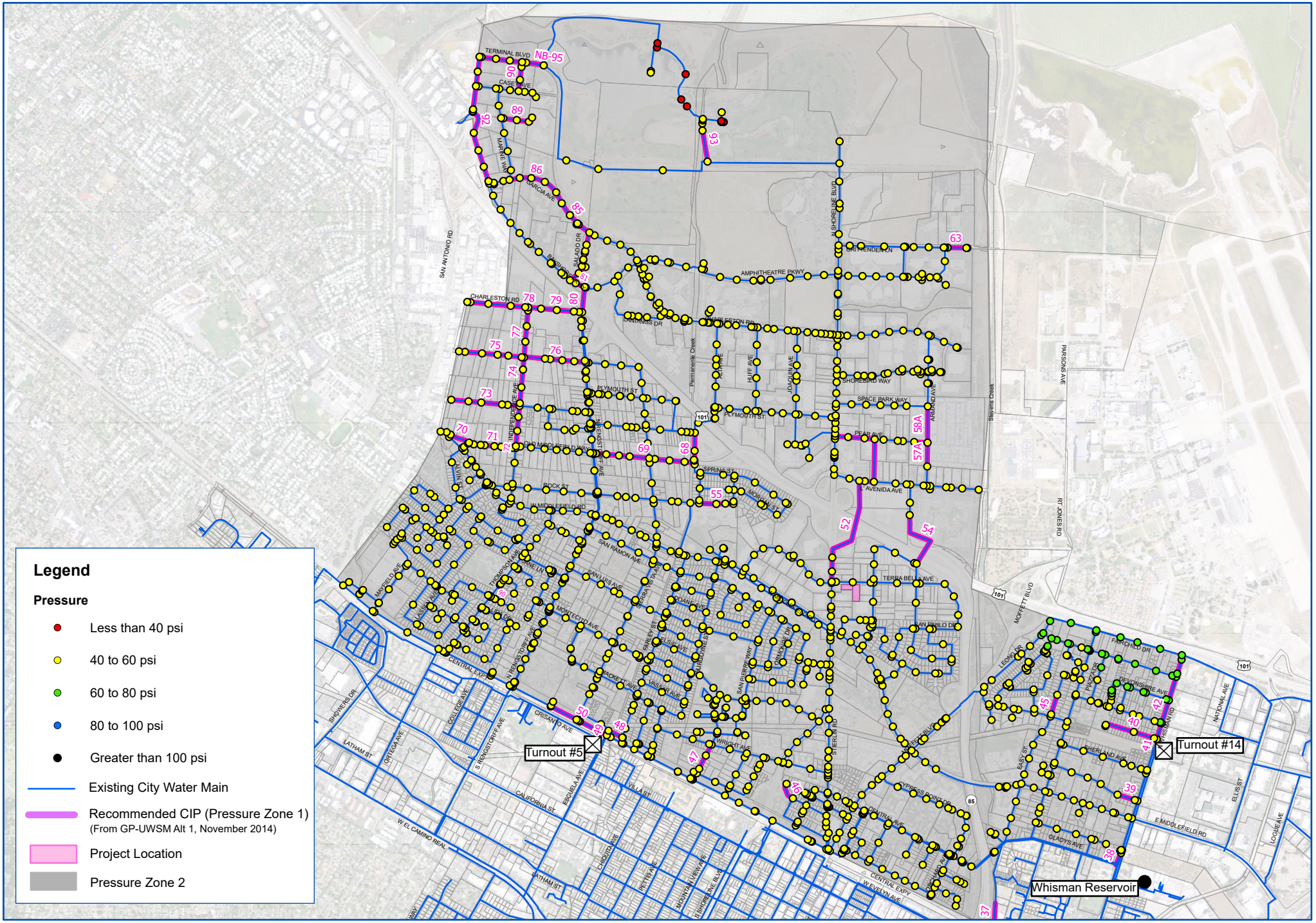
0 1,000 2,000 Feet

N

FIGURE B-6:

Peak Hour Demand (PHD) - Without Project

Water System Model - Future Cumulative Condition



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0 1,000 2,000 Feet

N

FIGURE B-7:

Peak Hour Demand (PHD) - With Project

Water System Model - Future Cumulative Condition

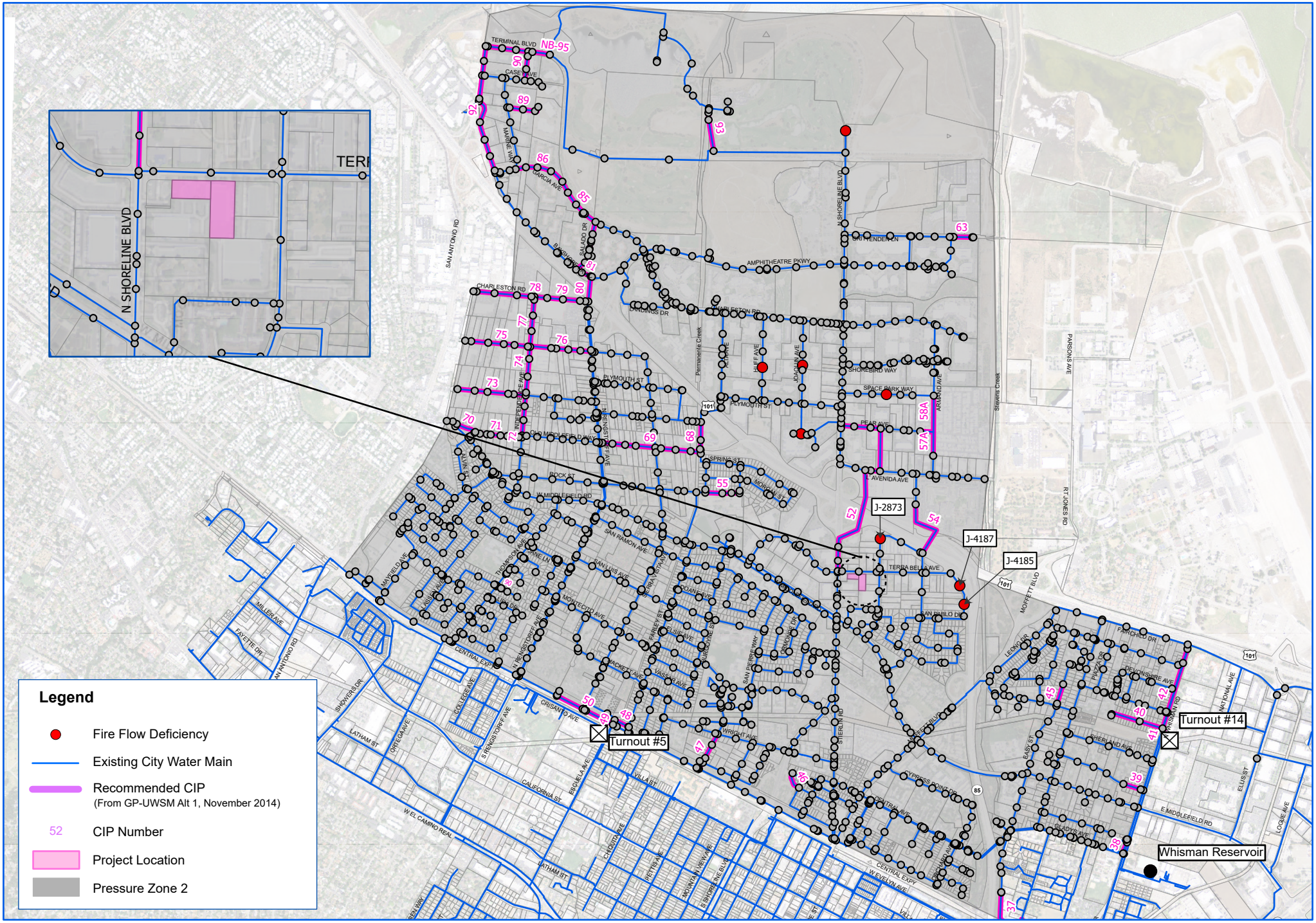

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FIGURE B-8:

Fire Flow Analysis - Without Project
Water System Model - Future Cumulative Condition

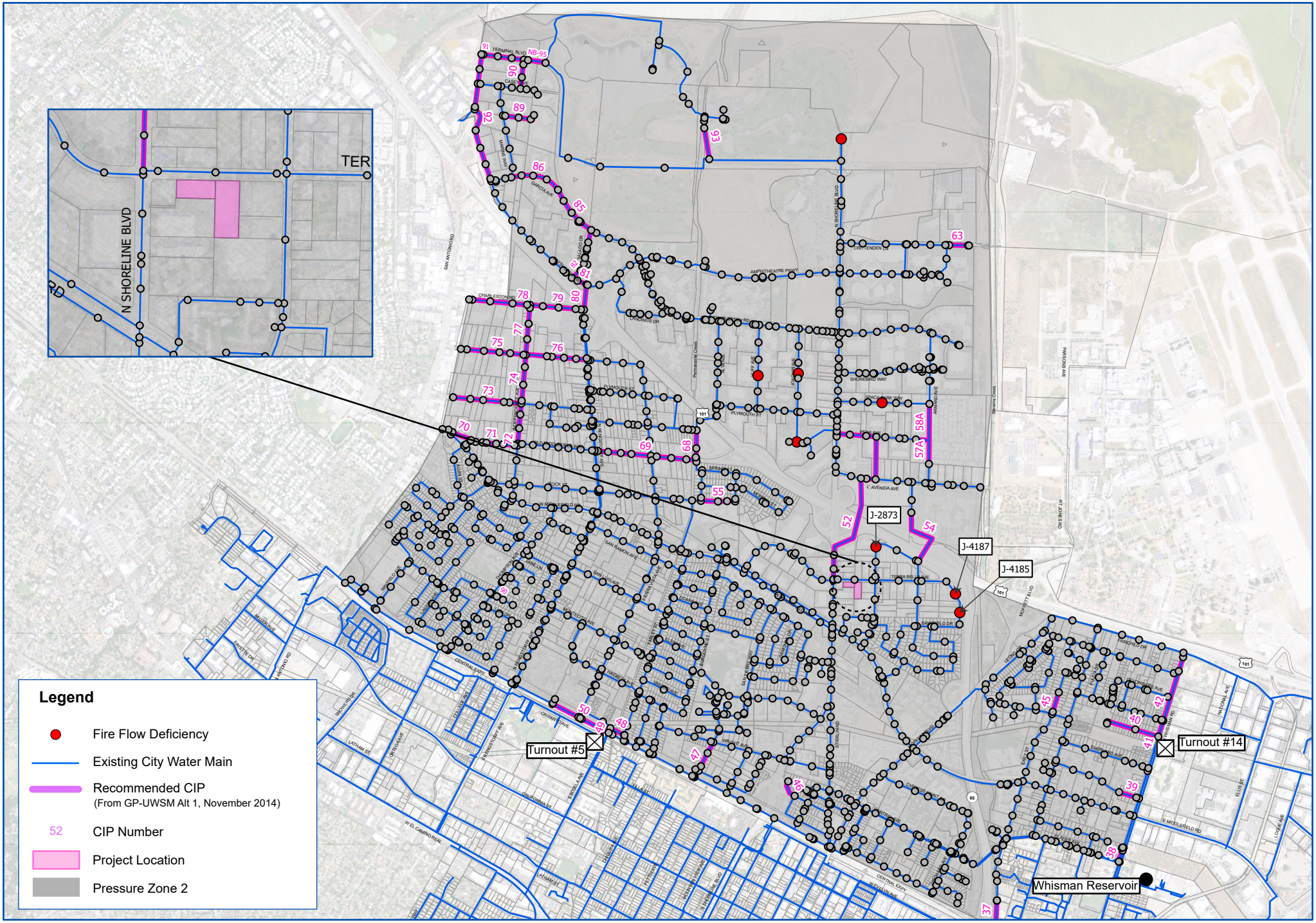

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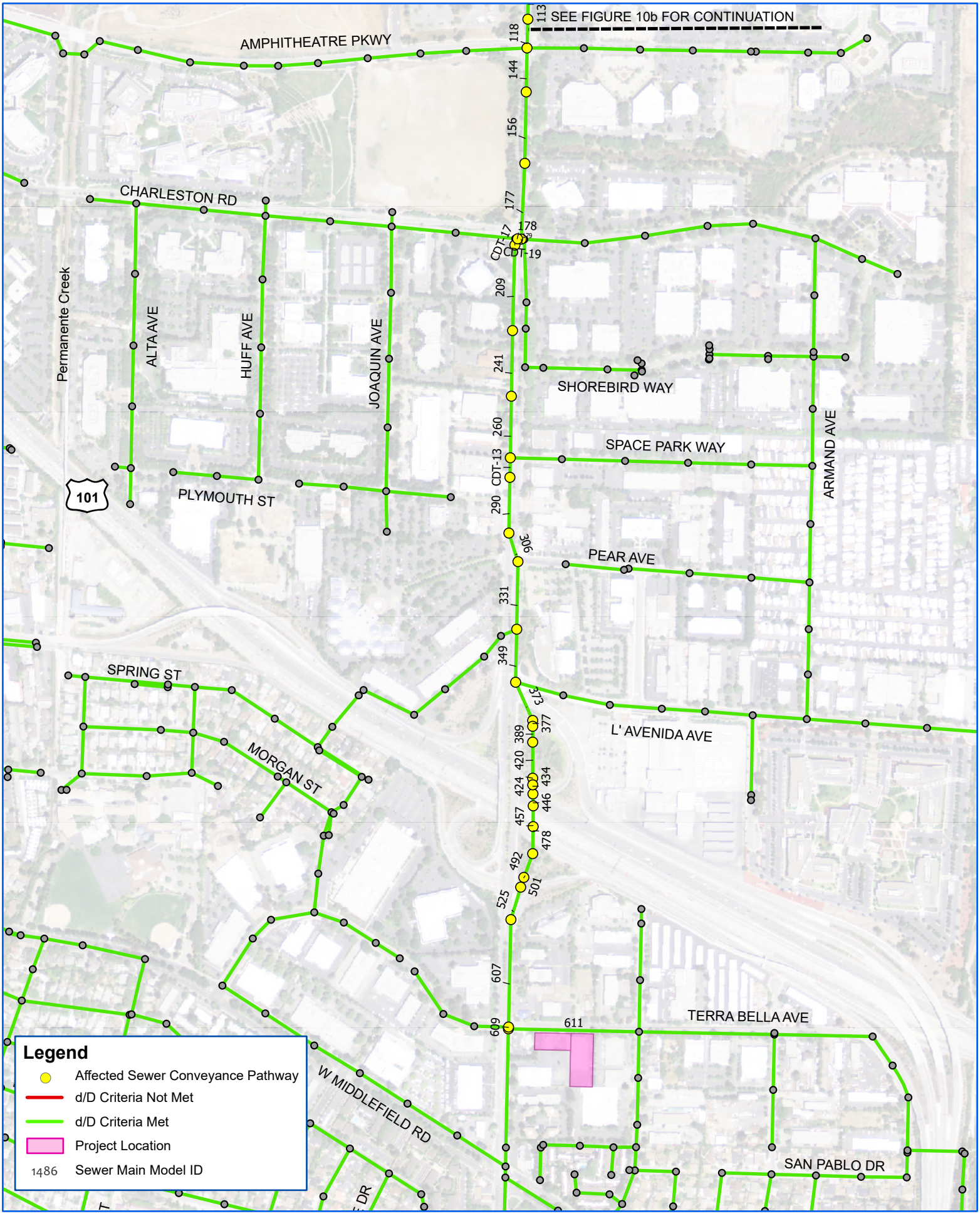
FIGURE B-9:

Fire Flow Analysis - With Project
Water System Model - Future Cumulative Condition



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0 330 660 Feet

FIGURE B-10a:

PWWF - Without Project

Sewer System Model - Existing Condition

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FIGURE B-10b:

PWWF - Without Project

Sewer System Model - Existing Condition

1155 and 1185 Terra Bella Ave Utility Impact Study | April 2022

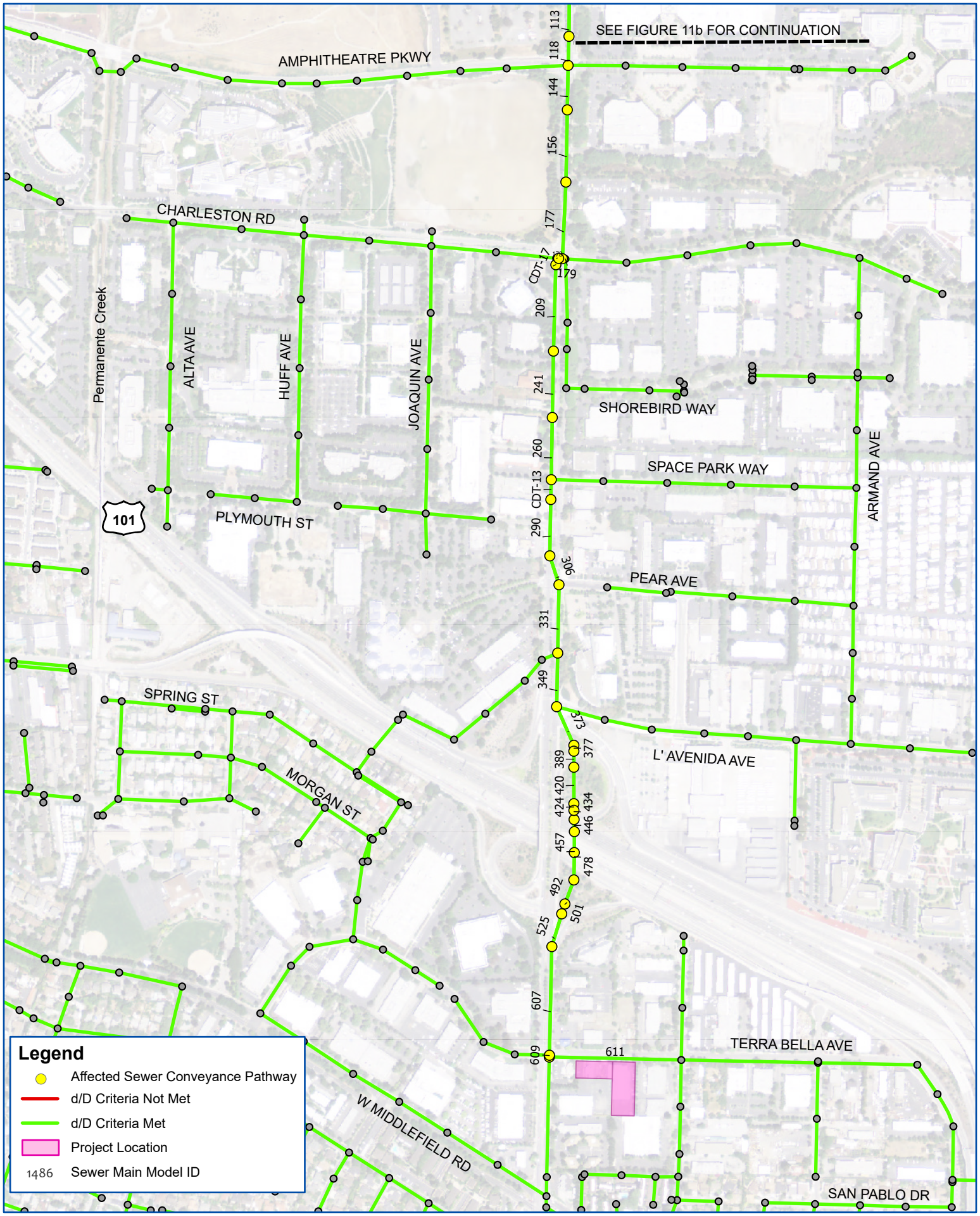

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FIGURE B-11a:

PWWF - With Project

Sewer System Model - Existing Condition

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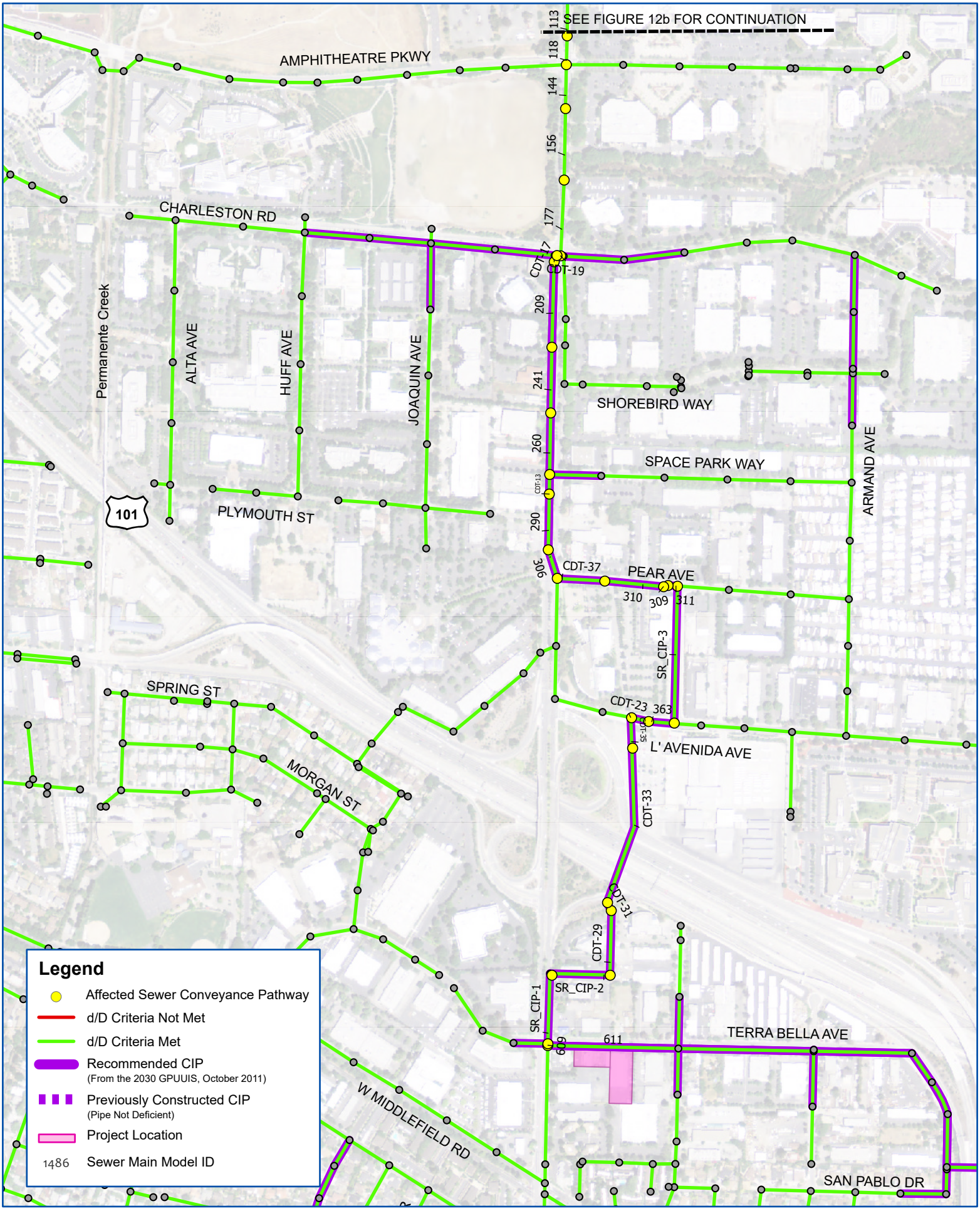
FIGURE B-11b:

PWWF - With Project

Sewer System Model - Existing Condition



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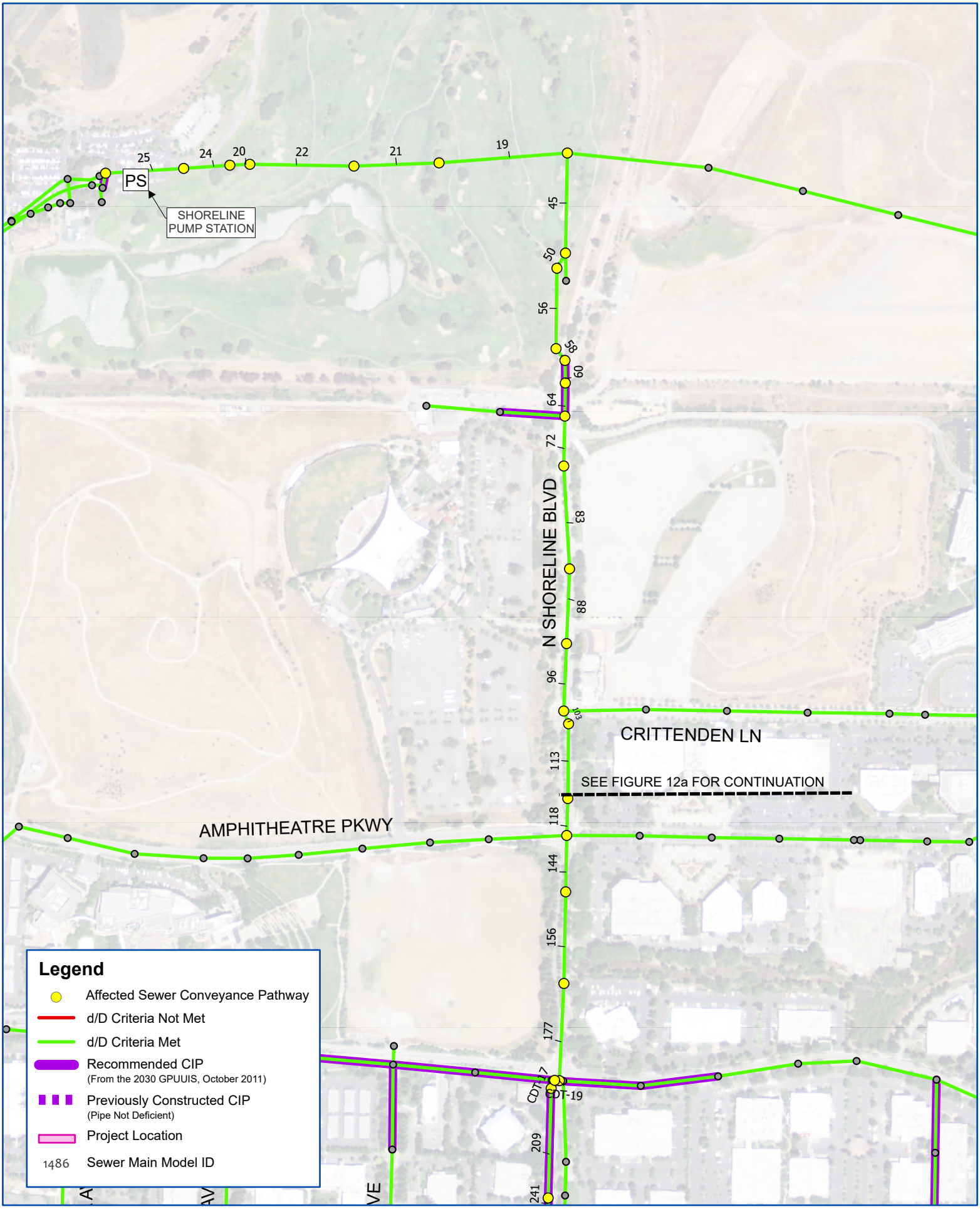
0 330 660 Feet

FIGURE B-12a:

PWWF - Without Project

Sewer System Model - Future Cumulative Condition



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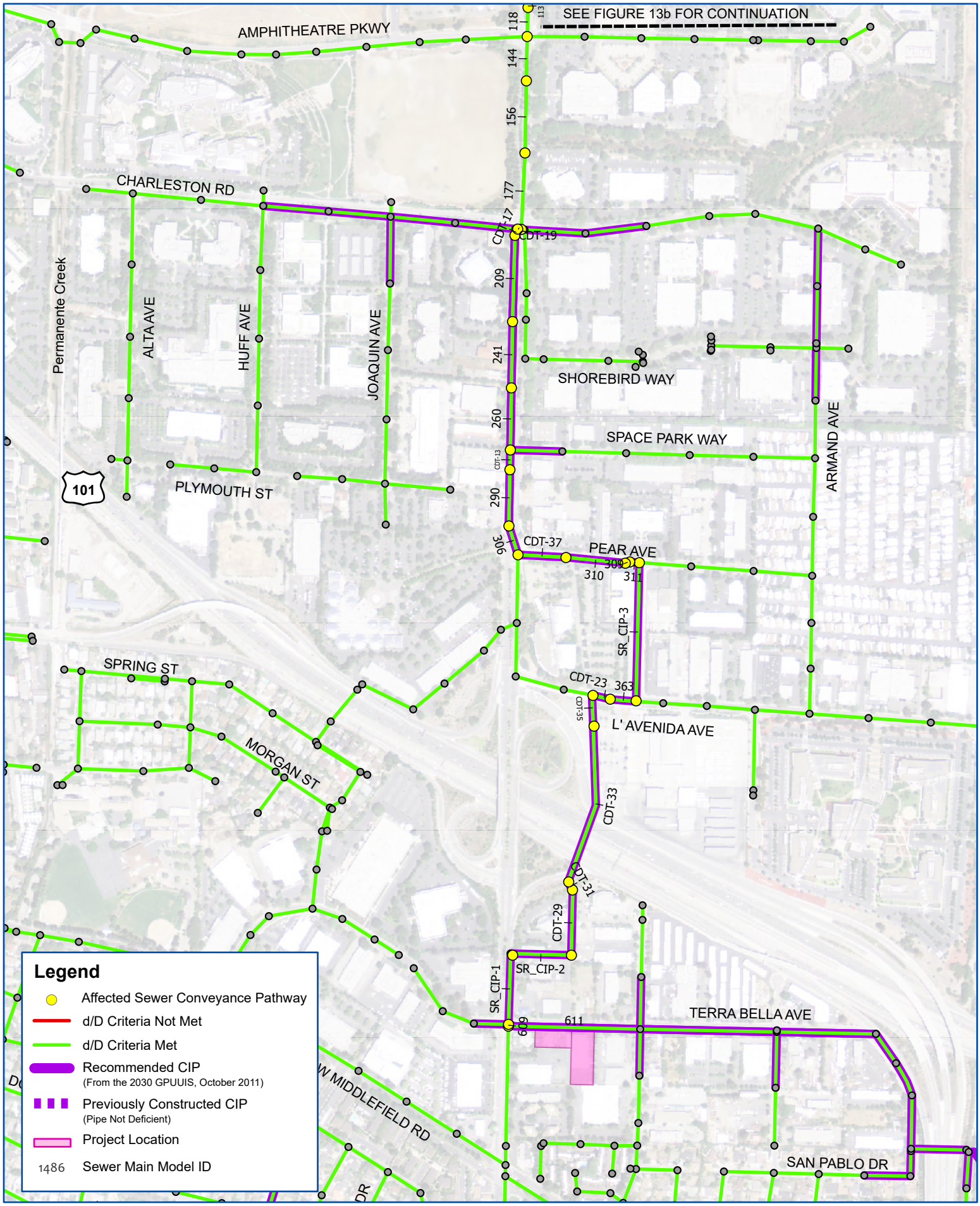
0 250 500 Feet

FIGURE B-12b:

PWWF - Without Project

Sewer System Model - Future Cumulative Condition



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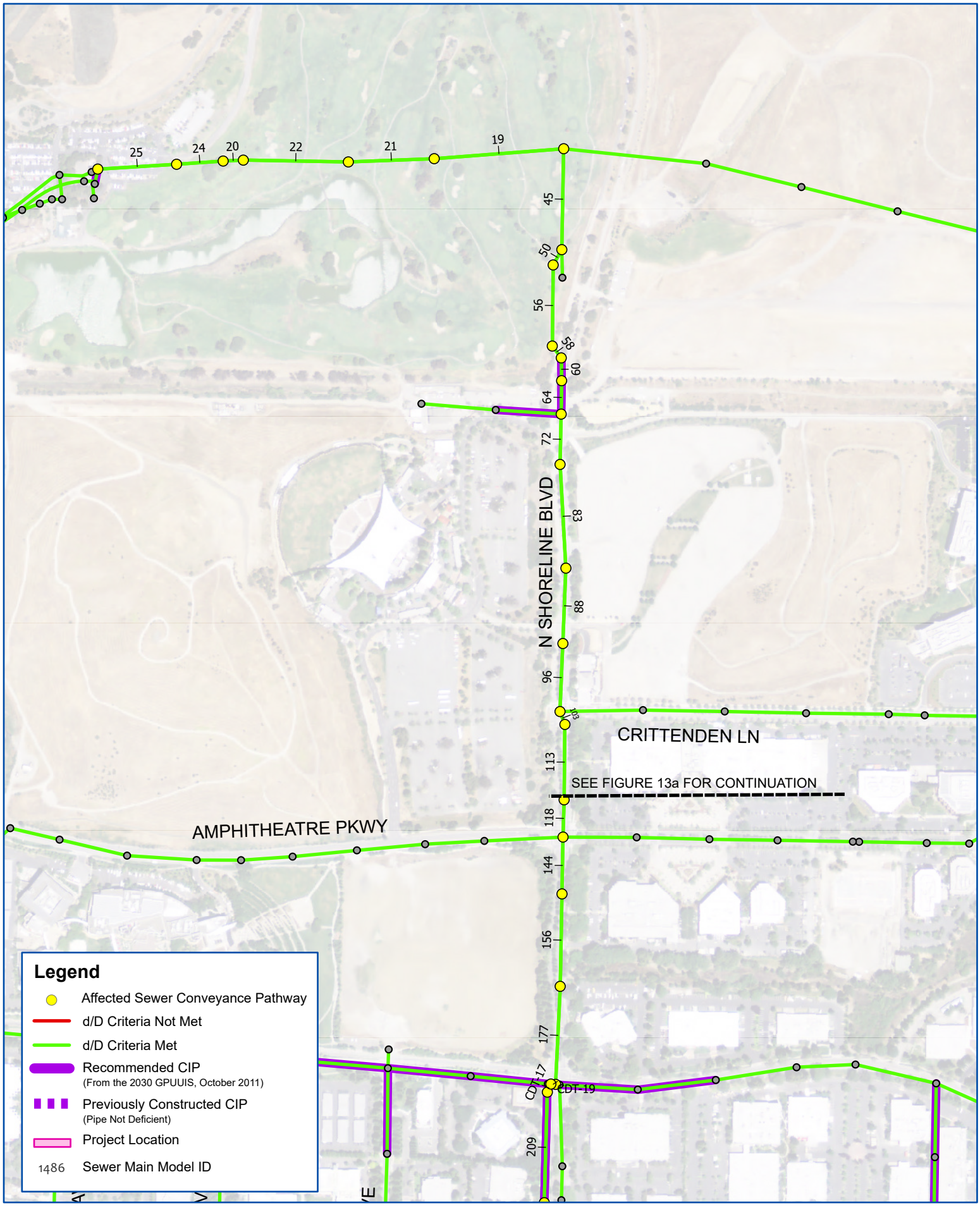
0 330 660 Feet

FIGURE B-13a:

PWWF - With Project

Sewer System Model - Future Cumulative Condition



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0 250 500 Feet

FIGURE B-13b:

PWWF - With Project

Sewer System Model - Future Cumulative Condition