North Bayshore Master Plan
Utility Impact Study

Prepared for
David J. Powers & Associates

and

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

City of
Mountain View

Leif M. Coponen, California RCE No. 70139

December 16, 2022

Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

4699 Old Ironsides Dr., Suite 350
Santa Clara, CA 95054
(408) 246-4848
lcoponen@swsv.com

Table of Contents

List of Figures

List of Tables

Executive Summary

Schaaf & Wheeler has been retained by David J. Powers & Associates to determine impacts from the North Bayshore Master Plan Project (Project) on the City of Mountain View's (City) potable water, sanitary sewer, and recycled water systems. The Project is located within the North Bayshore Precise Plan (NBPP) area on the northern side of the City (Figure B-1). The Project proposes to remove several existing light industrial and office buildings across 42 existing parcels and construct several new office buildings totaling 3,145,897 square feet, new residential buildings with 7,000 dwelling units, 244,000 square feet of retail/restaurant, 55,000 square feet of community space, two hotels with a total of 525 rooms and six parking garages.

The project proposes to connect to the City's utility system and as an option the Project may include private district utility systems with a District Central Plant (DCP) that would collect and treat onsite sewage generated by the Project and create non-potable recycled water for indoor and outdoor use throughout the project. Portions of the City's existing utility corridors will be modified due to the Project to accommodate the new construction and proposed private utilities as shown in Figure B-2. The DCP would provide up to 900,000 gallons per day of non-potable water to the proposed development. Three utility configuration scenarios are studied to determine potential impacts to the City's wet utility systems. Scenario 1 assumes the private district utility systems and DCP are not constructed (No DCP). Scenario 2 considers the DCP and all supporting private utilities, sewer and recycled water lines, are constructed but the DCP is offline and all sewer flows are diverted to the City's system at the DCP and all non-potable water demands are loaded at the DCP (DCP Offline). Scenario 3 considers the DCP and all supporting private utilities are constructed and the DCP is online operating with full efficiency, reducing sewer flows and water demands on the City's system (DCP Online). The water and sewer demands and loading locations are modified for each scenario accordingly.

Project impacts (at full project buildout) to the potable water and sanitary sewer systems are analyzed for both Existing and Future Cumulative Conditions. Hydraulic models simulating pre- and post-Project development scenarios are performed to examine hydraulic deficiencies. The Existing Condition and Future Cumulative Condition models are created from the models developed for the *North Bayshore Precise Plan II Utility Impact Study* (NBPPII UIS; Schaaf & Wheeler, October 2016). The models are further revised to include recent City approved and constructed projects not accounted for or in exceedance of the previous modeled land use. For this analysis, the Future Cumulative Condition model includes the CIPs from the NBPPII UIS and the Gateway Master Plan UIS. The Water Master Plan and Sewer Master Plan Updates are currently in development and the reports are currently in DRAFT status. This UIS was underway prior to the final versions of the Water and Sewer Master Plans and therefore will utilize the 2010 Water Master plan and 2010 Sewer Master Plan and all correlated specific plan model updates until the new models are available for use.

Project impacts (at full project buildout) to the recycled water system are analyzed for both Existing and Future Cumulative Conditions. Hydraulic models simulating pre- and post-Project development scenarios are performed to examine hydraulic deficiencies. The Existing Condition and Future Cumulative Condition models are created from the models developed for the *Recycled Water Feasibility Study Update* (Carollo, March 2022).

Water System Project Impacts

The Project development does not significantly impact the water system during Existing Condition for all the project scenarios. It also does not significantly impact the water system in the Future Cumulative Condition assuming all the recommended CIPs in the General Plan Update UIS (GPUUIS), NBPPII UIS, and Gateway Master Plan UIS, in addition to new Project-dependent water mains have been constructed. The anticipated maximum Project-specific fire flow requirement of 4,000 gpm is met during Existing Condition and Future Cumulative Condition, except for one location on Huff Avenue. The Project fire flow requirement used in this analysis assumes that a 50% reduction of the required fire flow will be approved by the City Fire Marshal based on the installation of an approved automatic sprinkler system.

Sewer System Project Impacts

The sewer system has sufficient capacity in the Existing Condition without the estimated increase in incremental Project flow, other than one conduit, Pipe ID 287. The sewer system does not have sufficient capacity in the Existing Condition with the estimated increase in incremental Project flow in all scenarios. Each scenario has many existing pipes that exceed the maximum allowable depth over diameter (d/D) design criteria, many of the pipes are identified for upsizing as a part of the 2030 GPUUIS and the NBPPII UIS.

The sewer system has sufficient capacity in the Future Cumulative Condition without the estimated increase in incremental Project flow, other than two conduits, Pipe ID 172 and 249, assuming all the recommended CIPs in the GPUUIS, NBPPII UIS, and Gateway Master Plan UIS have been constructed. The sewer system does not have sufficient capacity in the Future Cumulative Condition with the estimated increase in incremental Project flow in all scenarios. Each Scenario has many pipes that exceed the maximum allowable depth over diameter (d/D) design criteria. Five CIP projects from the GPUUIS are identified downstream of the project, three CIPs from the NBPPII UIS are also located downstream of the project, and one CIP from the Gateway Master Plan UIS is located within the project area and downstream of the project. In addition to CIPs outlined in the referenced studies, six (6) Project-specific CIPs are outlined between the different scenarios. Project contributions to the recommended CIPs are determined and may be used to estimate development impacts for fair share cost analysis.

Recycled Water Impacts

The City anticipates expansion of the existing recycled water system into NASA/Moffett Field, North Bayshore area, and East Whisman as outlined in the Recycled Water Feasibility Study Update - Alternative 3 (RWFS; Carollo, March 2022).

The Project's proposed private wastewater treatment plant and recycled water production has the potential to impact the City's planned expansion of the municipal recycled water system. The Project's non-potable demands make up a considerable amount of the RWFS's anticipated recycled water demand in the North Bayshore area. The Project does not significantly impact the hydraulics of the recycled water system in both the Existing Condition and Future Cumulative Condition. In the Existing Conditions, the Palo Alto Regional Water Quality Control Plant supply allocation is not sufficient to support peak existing demands nor the peak post-project demands without construction of in-system storage facilities (and corresponding booster pump station). The City is currently conducting a recycled water tank siting study to determine feasibile in-system storage facility locations.

Chapter 1. Introduction

1.1. Project Description

The proposed North Bayshore Master Plan Project (Project) encompasses 42 existing parcels (Assessor's Parcel Numbers [APNs]: 116-10-108, 116-10-107, 116-10-105, 116-10-104, 116-10-102, 116-10-101, 116-10-097, 116-10-095, 116-10-089, 116-10-088, 116-10-109, 116-10-084, 116-10-080, 116-02-088, 116-10-111, 116-10-078, 116-10-077, 116-14-072, 116-02-084, 116-02-083, 116-02-054, 116-14-070, 116-02-081, 116-14-066, 116-14-058, 116-13-038, 116-11-039, 116-13-037, 116-11-038, 116-13-034, 116-11-030, 116-13-027, 116-11-028, 116-02-037, 116-11-025, 116-11-024, 116-11-022, 116-11-021, 116-11-012, 116-14-028, 116-14-095, and 116-20-043) comprising approximately 151 acres. This analysis is based on the City's planning departments and the CEQA project description which outline the Project components and proposed development information. The Project is bounded by the Stevens Creek Trail on the east, Huff Avenue on the west, Charleston Road to the north, and US-101 to the south and is located within the North Bayshore Precise Plan area (Figure B-1). Additionally, there are six (6) parcels in the northwest of the City that are proposed for parking garages. The Project proposes removing several office and light industrial/office buildings on site and constructing new office buildings totaling 3,145,987 square feet, new residential buildings with 7,000 dwelling units, 244,000 square feet of retail/restaurant, 55,000 square feet of community space, new hotels with a total of 525 rooms, six parking garages, and approximately 30 acres of park/open space. The Project also includes a 2,000 square foot police substation; however, given the small size and negligible impact on City utilities, it was not included in the hydraulic modeling.

The Project is located within the North Bayshore Precise Plan area and is proposing a denser development than was originally assumed for the Project parcels in the *North Bayshore Precise Plan II Utility Impact Study* (NBPPII UIS; Schaaf & Wheeler, October 2016). The development densities are higher for the Project parcels than what was previously studied but are within the allowed land use densities outlined in the NBPP. The demands previously allocated within the NBPP area, but outside of the Project area are reduced to accommodate the redistribution of land use densities. Aspects of the Project land use types and densities result in exceedances of development levels previously studied as part of the adopted NBPPII and SEIR.

The project proposes to connect to the City's utility system and as an option the Project may include private district utility systems with a District Central Plant (DCP) that would collect and treat onsite sewage generated by the Project and create non-potable recycled water for indoor and outdoor use throughout the project. The DCP would provide up to 900,000 gallons per day of non-potable water to the proposed development. Portions of the City's existing utility corridors will be modified due to the Project to accommodate the new construction and proposed private utilities as shown in Figure B-2. Three utility configuration scenarios are studied to determine potential impacts to the City's wet utility systems. All scenarios assume that potable water is served by the City's potable water system. Scenario 1 assumes the DCP is not constructed, and the development is served by City utilities on a parcel by parcel basis (No DCP). Scenario 2 considers the DCP and private sewer and recycled water lines are constructed but the DCP is offline and sewer flows are diverted to the City's sewer system at the DCP and non-potable demands are supplied by the City's recycled water system at the DCP (DCP Offline). Scenario 3 considers the DCP and all supporting utilities are constructed and the DCP is online operating with full efficiency (DCP Online). The sewer generation and loading locations are modified for each scenario accordingly and are discussed further in each systems' analysis section. The City has a recycled water system in the project area that was studied for Scenario 1 (No DCP) and Scenario 2 (DCP Offline) to compare the worst case impact alternatives. None of the Project's non-potable demands are applied to the City's potable water system and therefore the potable water demands do not differ between scenarios. Table 1-1 provides a summary of the scenarios.

Table 1-1: Summary of Scenario Loading

Scenario	Potable Water	Recycled Water	Sewer
1 (No DCP)	Loaded at Near Adjacent Public Main to Each Building	Loaded at Near Adjacent Public Main to Each Building	Loaded at Near Adjacent Public Main to Each Building
2 (DCP Offline)	Loaded at Near Adjacent Public Main to Each Building	Private Recycled Water System Supplied by City at DCP	Private Sanitary Sewer System Flows to City System at DCP
3 (DCP Online)	Loaded at Near Adjacent Public Main to Each Building	Private Recycled Water System Supplied DCP and Supplied by City at DCP	Private Sanitary Sewer System Served by DCP – No Flow to City System

1.2. Comparison to North Bayshore Precise Plan II

The proposed North Bayshore Master Plan is in general conformance with the NBPPII. The Project does increase the proposed land use for hotel use, retail and restaurant use, and Institutional and recreational use. Table 1-2 summarizes the previously approved land use compared to the Project land use.

Table 1-2: Net Development Comparison of NBMP and NBPPII

Land Use	Net New Development Evaluated in the NBPPII	Net New Approved/ Developed Projects Since NBPPII*	Remaining Development Capacity	Net New Development by NBMP	Remaining Development Capacity
Office/ R&D/ Industrial/ Services	3,505,042	1,964,608	1,540,434	1,303,250	237,184
Restaurant/ Retail	129,238	95,500	33,738	232,944	-199,206
Institutional/ Recreational	86,500	98,457	-11,957	55,000	-66,957
Multi-Family Units	9,850	2,517	7,333	7,000	333
Hotel Rooms	400	200	200	525	-325

Note: Net development amounts reflects deductions in square footage for existing uses that would be demolished as a result of redevelopment.

** The amount of net new approved/developed projects do not include the amount of approved development on property within the proposed Master Plan.*

As shown in Table 1-2 above, the Project increases land use for Retail, Restaurant, Institutional, Recreational, and Hotel land uses above what was studied in the NBPPII and SEIR. This study accounts for the additional development quantities above and beyond those studied in the NBPPII. Additionally, as a portion of this study, previously allocated NBPPII development quantities have been redistributed within the NBPP boundary to better analyze the impacts to the City Utilities.

This study assumes the Project will use both potable water and recycled water; however, the NBPPII assumed all development projects would only use potable water. In the NBPPII, recycled water was only considered for the open spaces and parks. This study analyzes potable and non-potable water demands separately on a parcel level within the NBMP boundaries. This approach uses the latest information regarding recycled water, and therefore, varies from the NBPPII and other previous studies' methodology.

1.3. Utility Alignments

The proposed North Bayshore Master Plan Project (Project) includes new utility mains, utility main alignments, and additional capital improvement projects (CIPs) to serve the new Project. Many of the new utility alignments are required to meet the Project's new street and building configurations. Figure B-2 provides an overview of affected utility corridors.

The Southwest block of the Project, south of Plymouth Street and west of North Shoreline Boulevard, is currently developed as a movie theatre. The block is owned by two entities and the planned utilities are coordinated to serve both sites' planned redevelopment. The area is referred to as the Gateway. The Gateway Master Plan was studied in February 2021. For the purposes of this study, it is assumed the wet utility realignment in this area are installed for all post-Project scenarios and all scenarios in the Future Cumulative Condition. The water realignment includes looping in the Gateway Master Plan area. The sewer realignment includes rerouting upstream sewer flows to the west into Plymouth Street and away from North Shoreline Boulevard. The Realignment includes new pipe along C Street and upsizing pipe along Plymouth Street and Joaquin Road.

The Project also includes installing new public water mains around the Project to increase system connectivity. For the purposes of this study, it is assumed new pipes will be installed in Monarch Street, Inigo Way, the southern segment of Manzanita Street, and in the loop between Monarch Street and Shorebird Way. Additionally, it is assumed new pipes will be installed in the new Inigo Way extension from Space Park Way to Pear Avenue and on the east end of Pear Avenue connecting to La Avenida Street.

The Project requires an additional sewer realignment to avoid conflicts with Project buildings and private utility alignments. The existing sewer flows through the project parcels in an easement that will no longer be available. The realignment includes routing the eastern sewer flowing directly north on Armand Avenue to the west in Shorebird Way and north in Inigo Way. For the purposes of this study, it is assumed the sewer realignment in this area is installed for all post-Project scenarios.

The recycled water system requires a significant number of additional public recycled water mains to serve the complete Project. The pre-Project scenario in the Existing Condition assumes only the existing pipes are constructed; the Future Cumulative Condition it is assumed the Alternative 3 in the RWFS is constructed. For post-Project scenarios it is assumed that new public recycled water lines are constructed throughout the Project site in the public roads similar to the water system.

The additional pipeline realignments, CIPs, and new pipes discussed above are assumed to be in all post-Project scenarios. Additional scenario-specific CIPs are discussed in the individual utility impact chapters.

1.4. Water System Analysis Approach

Project impacts are analyzed using the City's water model for two conditions: Existing and Future Cumulative. 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 for each scenario does not differ and is therefore added to the model for one post-Project condition to examine deficiencies. In total, four model simulations of the water system are performed, as shown in Figure 1.

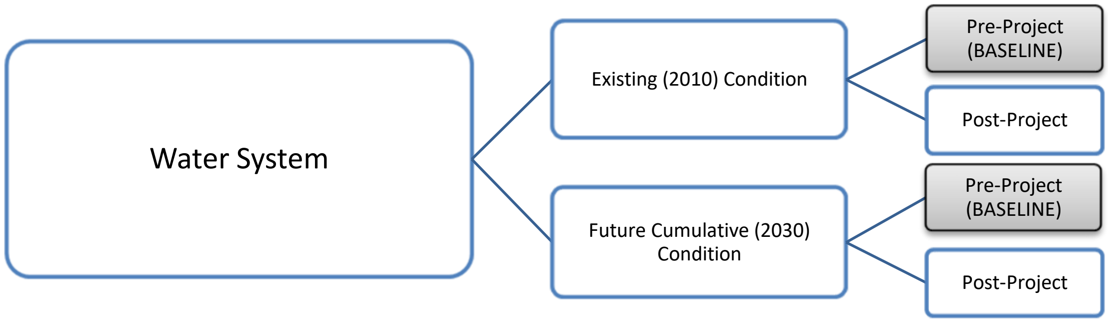


Figure 1. Water Model Simulations

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). Water demands within the North Bayshore Precise Plan area have been updated to reflect current land use as part of the NBPPII UIS. 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. Water demands in the Future Cumulative Condition have also been updated to reflect demands associated with the North Bayshore Precise Plan per the NBPPII UIS. The Future Cumulative Condition model includes the operating parameters from the *2030 General Plan Update (GPU) – Updated Water System Modeling* (GP-USWM; Schaaf & Wheeler, June 2014) model and assumes all of the recommended CIPs in the GP-UWSM have been constructed and the Gateway Master Plan CIPs have been constructed. Table A-1 in Appendix A provides a list of the considered development projects for the Future Cumulative Condition in addition to the North Bayshore Precise Plan.

1.5. Sewer System Analysis Approach

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

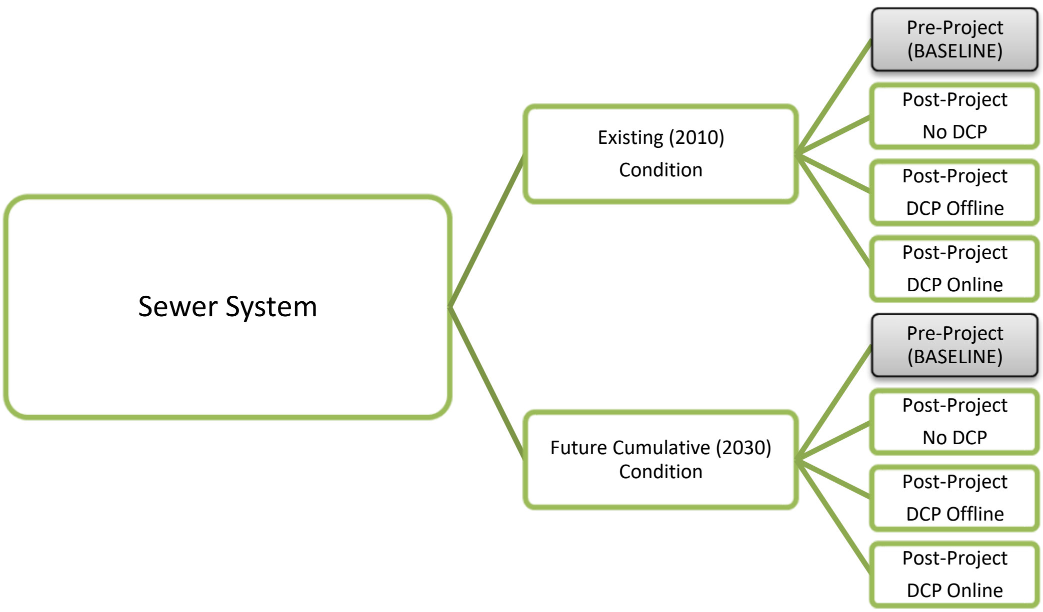


Figure 2. Sewer Model Simulations

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). Sewer flows within the North Bayshore Precise Plan area have been updated to reflect current land use as part of the NBPPII UIS. The Future Cumulative Condition sewer flow 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. Table A-1 in Appendix A provides a list of the considered development projects for the Future Cumulative Condition. In addition to the projects in Table A-1, sewer flows have also been updated to reflect development densities associated with the North Bayshore Precise Plan. The Future Cumulative Condition model includes the operating parameters in the *2030 General Plan Update Utility Impact Study* (GPUUIS) model and assumes that all sewer system CIPs recommended in the 2030 GPUUIS and NBPPII UIS have been constructed. In addition, the sewer realignment outlined in the Gateway Master Plan is assumed to be constructed in the Future Cumulative Condition and in the post-Project Existing Condition.

1.6. Recycled Water System Analysis Approach

Project impacts are analyzed using the City's water model for two conditions: Existing and Future Cumulative. As a baseline for system performance, each condition is evaluated pre-Project for existing hydraulic deficiencies. The estimated incremental recycled water demand resulting from Project development for each scenario is added to the model post-Project condition to examine deficiencies. In total, six model simulations of the recycled water system are performed, as shown in Figure 3.

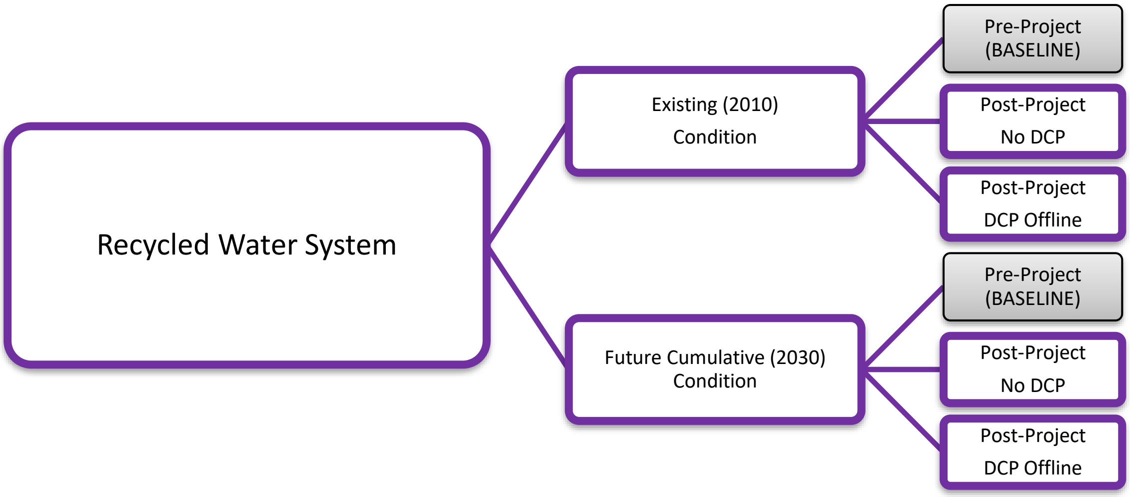


Figure 3. Recycled Water Model Simulations

The Existing Condition model consists of the existing distribution system and operating parameters along with recycled water demand based on existing land use from the *2022 Recycled Water Feasibility Study* (RWFS). Water demands within the North Bayshore Precise Plan area have been updated to reflect current land use as part of the NBPPII UIS. The Future Cumulative Condition recycled water demand is based on the *GPU* land use, and includes demands outlined in Alternative 3 of the *RWFS*. The Future Cumulative Condition model includes the operating parameters in the *RWFS* model and assumes that all infrastructure recommended in the *RWFS* for Alternative 3 has been constructed. It also includes recommended CIPs from the NBMP required to serve the Project sites.

1.7. Report Organization

This report is organized into five following sections. Chapter 2 discusses the water demand estimates for the Project. 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 6 discusses the recycled water demand estimates for the Project. Chapter 7 cover the impacts and capital improvement recommendations for the recycled water system.

Chapter 2. Water Demand Projections

This chapter discusses the estimated water demand and required fire flow for the Project development. Water demand from the existing buildings and proposed Project are estimated with water unit duty factors taken from previous technical studies to remain consistent with the City-wide demand projections used in the hydraulic models and is further refined to differentiate individual building/parcel water demand as potable versus non-potable. The incremental difference in estimated demand between the proposed Project and the existing demand at the site is evaluated to determine Project impact on the system.

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. Domestic potable water and firefighting water services for the Project will connect to the existing 8-inch and 12-inch diameter water mains in Charleston Road, N Shoreline Boulevard, Space Park Way, Pear Avenue, L'Avenida Avenue, Armanda Avenue, Plymouth Street, Joaquin Avenue and Huff Avenue according to the Project Plan figures. Dedicated fire service lines are proposed to connect to the 12-inch water mains to feed on-site fire hydrant within the project area. The domestic potable water demands, and fire flow analysis is conducted at the locations where the Project connects to the public water mains. On-site private domestic water and fire water mains are not evaluated as part of this analysis. Potable domestic water serving each building are loaded into the model at the adjacent main.

Non-potable water service and demands are removed from the water model. Potable water demands do not change between the various scenarios analyzed since potable water will be supplied by the City's water system for all scenarios.

2.1. Project Water Demand

Water demand from proposed buildings is estimated from the proposed number of residential dwelling units and non-residential building square footages provided in the Project Description, and water unit duty factors developed for the City. Water unit duty factors used in this report were developed from water meter records of recent developments throughout the City (and developed as part of North Bayshore Precise Plan Phase II). The duty factors applied are representative of high-density, multi-family residential buildings, of high intensity office (HIO) building, of retail/restaurant (R&R), of hotel, and civic/community uses for the proposed mix use buildings. Table 2-1 provides the demand estimation for each building by use type and also differentiates potable and non-potable demands. The Project utilizes recycled water and the split is considered in this study; therefore, this study will differ from methodologies used in previous studies. The potable and recycled water demands are discussed below and outlined further in Chapter 6.

The project proposes to utilize recycled water onsite including outdoor irrigation and non-potable water indoors. It is assumed that 80% of water is for indoor use and 20% of water is for outdoor use for all land use types. 100% of water for outdoor use will be recycled water. For non-residential buildings it is assumed 50%

indoor water use will be non-potable water and 50% will be potable water. For residential buildings, it is assumed 25% of indoor water use will be non-potable water and 75% will be potable water.

Table 2-1: Proposed Building Estimated Water Demand

Subarea	Land Use Type	Dwelling Units (DU)	Building Area (sf)	Water Duty Factor (gpd/DU) / (gpd/1,000 sf)	Water Demand (gpd)	Demand Type	
						Potable	Non-Potable
SB-PO-1[1]	HIO / R&R	-	HIO: 511,259 R&R: 33,711	130 665	88,881	35,552	53,329
SB-PO-2[1]	HIO	-	HIO: 738,156	130	95,960	38,384	57,576
SB-PO-3[1]	HIO	-	HIO: 390,179	130	50,723	20,289	30,434
SB-PH[1]	Hotel / R&R	245	R&R: 16,731	100 665	35,626	19,150	16,476
SB-PR-1[1]	MFR – Mixed Use	366	R&R: 27,192	100 665	54,683	29,193	25,490
SB-PR-2[1]	MFR – Mixed Use	503	R&R: 39,707	100 665	76,705	40,742	35,963
SB-PR-3[1]	MFR – Mixed Use	211	R&R: 18,552	100 665	33,437	17,595	15,842
SB-PR-4[1]	MFR – Mixed Use	297	R&R: 12,825	100 665	38,229	21,231	16,997
SB-PR-5[1]	MFR – Mixed Use	176	R&R: 16,732	100 665	28,727	15,011	13,716
SB-PR-6[1]	MFR – Affordable	220	-	100	22,000	13,200	8,800
SB-PR-7[1]	MFR – Affordable	172	-	100	17,200	10,320	6,880
SB-PR-8[1]	MFR – Affordable	215	-	100	21,500	12,900	8,600
SB-FLEX	Community	-	55,000	165	9,075	3,630	5,445
SB-PP[1]	R&R / Parking	-	R&R: 4,550	165	3,026	1,210	1,815
JS-PO-1	HIO / R&R	-	HIO: 250,000 R&R: 3,990	130 665	35,153	14,061	21,092
JS-PR-1	MFR – Affordable	413	-	100	41,300	24,780	16,520
JS-PR-2	MFR – Mixed Use	283	R&R: 10,010	100 665	34,957	19,643	15,314

Table 2-1 (Cont'd): Proposed Building Estimated Water Demand

Subarea	Land Use Type	Dwelling Units (DU)	Building Area (sf)	Water Duty Factor (gpd/DU) / (gpd/1,000 sf)	Water Demand (gpd)	Demand Type	
						Potable	Non-Potable
JS-PR-3	MFR – Mixed Use	318	R&R: 7,000	100 665	36,455	20,942	15,513
JS-FLEX	Hotel / R&R	280	R&R: 4,000	100 665	30,660	17,864	12,796
JN-PO-1[1]	HIO	-	HIO: 770,023	130	100,103	40,041	60,062
JN-PO-2[1]	HIO	-	HIO: 486,280	130	63,216	25,287	37,930
JN-PR-1[1]	MFR – Affordable	159	-	100	15,900	9,540	6,360
JN-PR-2[1]	MFR – Affordable	748	-	100	74,800	44,880	29,920
JN-PR-3[1]	MFR – Affordable	881	-	100	88,100	52,860	35,240
JN-PR-4[1]	MFR – Mixed Use	375	R&R: 7,748	100 665	42,652	24,561	18,091
JN-PR-5[1]	MFR – Mixed Use	142	R&R: 4,000	100 665	16,860	9,584	7,276
JN-PR-6[1]	MFR – Mixed Use	230	R&R: 20,655	100 665	36,736	19,294	17,442
JN-PR-7[1]	MFR – Mixed Use	781	R&R: 6,597	100 665	82,487	48,615	33,872
PE-PR-1	MFR – Mixed Use	285	R&R: 10,000	100 665	35,150	19,760	15,390
PE-PR-2	MFR – Affordable	225	-	100	22,500	13,500	9,000
Total	-	**MFR: 7,000** **Hotel: 525**	**R&R: 244,000** **HIO: 3,145,897** **Civic: 55,000**	-	**1,332,801**	**683,620**	**649,181**

[1]Buildings are connected to the Private Utility District proposed by the developer and recycled water is provided from the DCP as outlined in Scenarios 2 & 3.

2.1.1. Project Required Fire Flow

The anticipated project-specific fire flow requirement at each building 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. Building specific fire flow requirements based on the CFC are presented in Table 2-2.

Schaaf and Wheeler used fire-flow calculation data provided by the applicant and confirmed the calculations based on the California Fire Code. The Project plans and calculations indicate building construction types vary from III-A to V-A. The required fire flow based on construction type varies between 5,500 and 8,000 gpm.

A 50 percent reduction of the fire flow rate is used as the project-specific fire flow requirement in this evaluation. This is a conservative reduction estimate as up to a 75 percent reduction is allowed upon approval of an automatic sprinkler system according to CFC Section B105; the resulting fire flow requirement is between 2,750 gpm and 4,000 gpm. The actual fire flow requirement may change as the planning process continues and Project specific requirements are determined by the City Fire Marshal.

Table 2-2: Anticipated Project Fire Flow (FF) Requirement

Subarea	Occupancy Use	Fire-Flow Calculation Area (Square Feet)	Building Construction Type	CFC Required FF (gpm)	FF with 50% Reduction (gpm)	FF with 75% Reduction (gpm)
SB-PO-1	HIO / R&R	250,886	IV	8,000	4,000	2,000
SB-PO-2	HIO	221,090	IV	8,000	4,000	2,000
SB-PO-3	HIO	177,501	IV	7,500	3,750	1,875
SB-PH	Hotel / R&R	176,731	IV	7,500	3,750	1,875
SB-PR-1	MFR – Mixed Use	339,835	IV	8,000	4,000	2,000
SB-PR-2	MFR – Mixed Use	410,197	IV	8,000	4,000	2,000
SB-PR-3	MFR – Mixed Use	220,552	IV	8,000	4,000	2,000
SB-PR-4	MFR – Mixed Use	385,825	IV	8,000	4,000	2,000
SB-PR-5	MFR – Mixed Use	267,732	III-A	6,000	3,000	1,500
SB-PR-6	MFR – Affordable	178,000	III-A	6,000	3,000	1,500
SB-PR-7	MFR – Affordable	176,000	IV	7,500	3,750	1,875
SB-PR-8	MFR – Affordable	358,000	V-A	8,000	4,000	2,000
SB-FLEX	Community	90,000	IV	5,500	2,750	1,375
SB-PP	R&R / Parking	155,550	IV	7,000	3,500	1,750
JS-PO-1	HIO / R&R	278,990	IV	8,000	4,000	2,000
JS-PR-1	MFR – Affordable	281,000	IV	8,000	4,000	2,000
JS-PR-2	MFR – Mixed Use	273,186	IV	8,000	4,000	2,000

Table 2-2 (Cont'd): Anticipated Project Fire Flow (FF) Requirement

Subarea	Occupancy Use	Fire-Flow Calculation Area (Square Feet)	Building Construction Type	CFC Required FF (gpm)	FF with 50% Reduction (gpm)	FF with 75% Reduction (gpm)
JS-PR-3	MFR – Mixed Use	336,579	IV	8,000	4,000	2,000
JS-FLEX	Hotel / R&R	184,000	IV	8,000	4,000	2,000
JN-PO-1	HIO	770,023	IV	8,000	4,000	2,000
JN-PO-2	HIO	486,280	IV	8,000	4,000	2,000
JN-PR-1	MFR – Affordable	163,000	IV	8,000	4,000	2,000
JN-PR-2	MFR – Affordable	807,000	IV	8,000	4,000	2,000
JN-PR-3	MFR – Affordable	953,000	IV	8,000	4,000	2,000
JN-PR-4	MFR – Mixed Use	374,748	IV	8,000	4,000	2,000
JN-PR-5	MFR – Mixed Use	148,558	IV	7,000	3,500	1,750
JN-PR-6	MFR – Mixed Use	252,097	IV	8,000	4,000	2,000
JN-PR-7	MFR – Mixed Use	815,597	IV	8,000	4,000	2,000
PE-PR-1	MFR – Mixed Use	297,000	IV	8,000	4,000	2,000
PE-PR-2	MFR – Affordable	232,000	IV	8,000	4,000	2,000

2.2. Existing Condition

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, and further developed as part of the NBPPII UIS. Outside of the North Bayshore Precise Plan, the demand in the model is calibrated against water billings records from 2005 and 2006, as further explained in the 2010 WMP (the City is currently updating the Water Master Plan and is not available for use). Within the North Bayshore Precise Plan area, demand is calculated using the water demand unit duty factors developed from the *North Bayshore Precise Plan Phase II Utility Impact Study* (NBPPII UIS; Schaaf & Wheeler, October 2016) and current land use densities analyzed as part of the NBPPII UIS for the Existing Condition pre-project scenario. Table 2-3 presents the pre-Project demand from the model for the whole Project area.

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

	Water Demand (gpd)
NBMP Parcels	***238,904****

**Water demands allocated in the Existing Condition Water Model*

2.2.2. Post-Project Incremental Demand

Project demand is added to the model as an incremental difference from the pre-Project demand. Table 2-3 and Table 2-4 only consider the project specific parcels for comparison purposes in the hydraulic models. Total Project potable water demand is added to the hydraulic model as an incremental difference from the pre-Project estimated demand, as shown in Table 2-4.

Table 2-4: Incremental Project Demand for Existing Condition

	Potable Water Demand (gpd)
Pre-Project Demand	238,904
Project Demand	682,316
Incremental Project Demand	***+ 443,412***

2.3. Future Cumulative Condition

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 NBPPII UIS. In the NBPPII UIS model, water demands are based on the 2030 General Plan Update (GPU) land use for areas outside of the North Bayshore Precise Plan; these demands have since been updated to include recent City approved projects outlined in Table A-1 in Appendix A, which were not accounted for or were in exceedance of the 2030 GPU projections. Within the North Bayshore Precise Plan, demands are based on future land use densities analyzed as part of the NBPP UIS. Table 2-5 presents the pre-Project demand from the model for the whole Project area.

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

	Water Demand (gpd)
NBMP Parcels	***615,219****

***Water demands allocated in the Future Cumulative Condition Water Model*

2.3.2. Post-Project Incremental Demand

Project demand is added to the model as an incremental difference from the pre-Project demand. Table 2-5 and Table 2-6 only consider the project specific parcels for comparison purposes in the hydraulic models. Additional adjustments are made to land use and demands within the NBPPII boundaries, but outside of the NBMP Project area, to stay consistent with the overall NBPPII land use quantities as discussed in Chapter 1.

Table 2-6 represents a less significant differential change in estimated Project water demand because a large portion of the Project's overall water demand is anticipated to be non-potable water. This differs from what was modeled in the General Plan and NBPPII that assumed 100% of water demand was potable. Master Plan parcel demands were adjusted to reflect potable demands associated with this analysis. The incremental Project demand in the Future Cumulative Condition is given in Table 2-6.

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

	Potable Water Demand (gpd)
Pre-Project Demand	615,219
Project Demand	682,316
Incremental Project Demand	***+ 67,097***

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. Water supply and water storage are evaluated for the Future Cumulative Condition. Hydraulic conveyance and available fire flow are assessed for both Existing and Future Cumulative Condition for each scenario.

3.1. Demand Scenarios and Performance Criteria

Hydraulic deficiencies within the water system are evaluated under two demand scenarios: Peak Hour Demand (PHD) and Maximum Day Demand with Fire Flow (MDD + FF). PHD simulations analyze the pressures in the system to ensure the water system performance criteria of a minimum of 40 psi is maintained throughout the system. MDD + FF simulations analyze the available fire flows at each node while meeting the performance criteria of a minimum of 20 psi is maintained in the system. 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 City's 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 is located in Pressure Zone 1, which is supplied by one San Francisco Public Utilities Commission (SFPUC) turnout.

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 #10 and #21. 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-Project		Post-Project*	
	ADD (mgd)	PHD (mgd)	PHD (mgd)	
1	7.98	22.18	22.67	16.56
2	8.41	23.58	23.58	30.53
3	1.62	4.56	4.56	5.10
Total	**18.01**	**50.32**	**50.81**	**52.19**

** Increase in Project Demand on the City's system assumes all water use is potable. Considering 100% potable water uses is conservative to ensure the City has sufficient capacity. There is a potential for reduction using recycled water. Recycled water capacity impacts are discussed in Chapter 7.*

*** 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 El Camino Hospital at 2500 Grant Road, which has a planning-level fire flow requirement of 3,500 gpm for 4 hours.

The City has the ability to transfer water between pressure zones via pump stations and control valves, therefore deficient storage in one zone may be supplemented by excess storage in another zone. 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	5.75	8.16	4.65	5.85
2	8.00	6.5	1.2	8.41	4.79	5.99	8.41	4.79	5.99
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**	**13.87**	**18.19**	**10.37**	**13.97**

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

*** Increase in Project Demand on the City's system assumes all water use is potable. Considering 100% potable water uses is conservative to ensure the City has sufficient capacity. There is a potential for reduction using recycled water. Recycled water capacity impacts are discussed in Chapter 7.*

3.4. Existing Condition Results

3.4.1. Hydraulic Model Information

Hydraulic deficiencies within the water system are evaluated under two demand scenarios: Peak Hour Demand (PHD) and Maximum Day Demand with Fire Flow (MDD + FF).

The Existing Condition pre-Project fire flow requirements are taken from the NBPPII UIS model and are 3,500 gpm as outlined in Table 3-5. After Project development, the Project-specific required fire flow at the site is anticipated to be between 2,750 and 4,000 gpm with an applied 50% reduction for the assumed approval of an automatic sprinkler system.

The Existing Conditions model post-Project assumes multiple additional water mains have been installed in the Gateway Master Plan area, along Monarch Street between North Shoreline Boulevard and Huff Avenue, and in the southeastern area of the Project area. The additional pipes will need to be installed with the Project to serve the new construction in the Gateway Master Plan area and the remainder of the Project area. It is assumed the new pipes are 8-inch diameter except for the pipe along the new Pear Avenue which is assumed to be 12-inch and the piping in Monarch Street is assumed to be 12-inch.

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

System pressures are evaluated under Peak Hour Demand (PHD) pre-Project (Figure B-3) and post-Project (Figure B-4). 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 required fire flows vary between 1,500 and 3,500 gpm is met at most of the existing hydrant locations other than J-4210 and J-1636 within the Project area. After Project development, the anticipated project-specific fire flow requirement ranges, between 2,750 to 4,000 gpm, can still be met at the connecting nodes other than J-2912, J-2987, and J-1636. The evaluated fire flow is detailed in Table 3-5. The existing deficiencies in Pressure Zone 1 shown on Figures B-5 and B-6 are independent of the Project.

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

Model Node ID	Location	Required Fire Flow Rate (gpm)	Available Flow Pre-Project (gpm)	Available Flow Post-Project (gpm)
J-2912	Project Location – Main St (New Road)	Pre-Project: N/A Post-Project: 4,000	N/A	3,177
J-2944	Project Location – N Shoreline Blvd	Pre-Project: 3,500 Post-Project: 4,000	6,800	6,726
J-2952	Project Location – Plymouth St	Pre-Project: 3,500 Post-Project: 4,000	4,259	4,964
J-2964	Project Location – Space Park Way	Pre-Project: 3,500 Post-Project: 4,000	3,962	4,671
J-2968	Project Location – Joaquin Ave	Pre-Project: N/A Post-Project: 4,000	N/A	5,249
J-2969	Project Location – Huff Ave	Pre-Project: N/A Post-Project: 4,000	N/A	6,040
J-2982	Project Location – N Shoreline Blvd	Pre-Project: 3,500 Post-Project: 4,000	6,676	6,767
J-2987	Project Location – Huff Ave	Pre-Project: N/A Post-Project: 4,000	N/A	3,961
J-2988	Project Location – N Shoreline Blvd	Pre-Project: 3,500 Post-Project: 4,000	6,592	6,630
J-2992	Project Location – Joaquin Ave	Pre-Project: 3,500 Post-Project: 4,000	4,175	4,310
J-3003	Project Location – Charleston Rd	Pre-Project: 3,500 Post-Project: 4,000	5,514	5,968
J-4210	Project Location – Pear Ave	Pre-Project: 3,500 Post-Project: 4,000	2,300	4,128
J-4234	Project Location – Shorebird Way	Pre-Project: 3,500 Post-Project: 4,000	5,388	6,119
J-4243	Project Location – Charleston Rd	Pre-Project: 3,500 Post-Project: 2,750	4,205	5,260
J-4250	Project Location – Charleston Rd	Pre-Project: 3,500 Post-Project: 3,750	5,127	5,859

Table 3-5 (Cont'd): Existing Condition Evaluated Project Fire Flow Nodes

Model Node ID	Location	Required Fire Flow Rate (gpm)	Available Flow Pre-Project (gpm)	Available Flow Post-Project (gpm)
J-3048	Parking – Amphitheatre Pkwy	Pre-Project: N/A Post-Project: 4,000	N/A	5,523
J-1636	Parking – Bayshore Pkwy	Pre-Project: 3,500 Post-Project: 4,000	3,051	2,981
J-1648	Parking – Marine Way	Pre-Project: N/A Post-Project: 4,000	N/A	4,001

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 deficient nodes are evaluated within the Project Pressure Zone (Zone 1) for Project impact. Available fire flow pre- and post-Project at selected deficient nodes is presented in Table 3-6, showing minimal impact (<2%) due to Project development for each scenario. Multiple new fire flow deficiencies occur as a result of the project flows in the existing conditions. These deficiencies are corrected by CIPs recommended in the 2030 GPUUIS as discussed in the following sections. GPUUIS CIP 52, the US-101 crossing at N Shoreline Boulevard, is sufficient in mitigating the deficiencies that occur due to Project demands.

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	Lidia Dr.	1,500	893	885
J-2624	Jackson St.	2,500	2,375	2,363
J-4185	San Leandro St.	3,500	3,395	3,337
J-1519	Leghorn St.	3,500	1,772	1,743

3.4.5. CIP Phasing

The phasing of CIPs in conjunction with the Project construction is discussed broadly based on the general development of NBMP blocks. Generally, CIPs shall be constructed in conjunction with the development of each area. As roads and corridors are being modified, CIPs within the corridors shall be installed.

Internal, project-specific CIPs shall be built corresponding with NBMP building construction in each utility corridor. Project-specific CIPs are required to be installed prior to buildings being completed.

GPUUIS CIP #52 is a known CIP that is required to be installed in conjunction with the start of construction of the NBMP to mitigate fire flow deficiencies within the core Project area.

The northwestern portion of the Project site has additional deficiencies due to the fire flow requirements of the Parking Garage. A combination of GPUUIS CIP #80, 81, 82, and 92 should be constructed to help mitigate fire flow issues in the northwest project area prior to building construction.

Additional City identified CIPs (from 2030 GPU and NBPP II) that serve the North Bayshore area are dependent on land development growth in the North Bayshore area as well as land development growth in other portions of the City. Therefore, as the NBMP phasing progresses, additional CIPs may need to be constructed depending on the relative timing of overall growth within the City's Pressure Zone 1 service area.

3.5. Future Cumulative Condition Results

3.5.1. Hydraulic Model Information

Hydraulic deficiencies within the water system are evaluated under two demand scenarios: Peak Hour Demand (PHD) and Maximum Day Demand with Fire Flow (MDD + FF).

The Future Cumulative Condition pre-Project fire flow requirement is taken from the NBPPII UIS model and are 3,500 gpm as outlined in Table 3-7. After Project development, the Project-specific required fire flow at the site is anticipated to be between 2,750 and 4,000 gpm with an applied 50% reduction for the assumed approval of an automatic sprinkler system.

The Future Cumulative Conditions model post-Project assumes multiple additional water mains have been installed in the Gateway Master Plan area, along Monarch Street between North Shoreline Boulevard and Huff Avenue, and in the southeastern area of the Project area. The additional pipes will need to be installed with the Project to serve the new construction in the Gateway Master Plan area and the remainder of the Project area. It is assumed the new pipes are 8-inch diameter except for the pipe along the new Pear Avenue which is assumed to be 12-inch and the piping in Monarch Street is assumed to be 12-inch.

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

The system has adequate pressures pre-Project except for the area within Shoreline Golf Links, which drops below 40 psi (Figure B-7). The system does not experience additional deficiencies due to post-Project demands (Figure B-8) under peak-hour conditions.

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

In the Future Cumulative Condition, the system is able to meet the fire flow requirements at the site pre- and post-Project, except at J-2987 in Huff Avenue, as shown on Figures B-9 and B-10 assuming all GP-UWSM recommended CIPs are constructed. Within Pressure Zone 1, there are several deficient nodes, but they are far from and independent of the Project. Multiple model junctions, show an apparent increase in available fire flow in the different scenarios; this is a result of re-allocating demand from the North Bayshore Precise Plan proposed development densities based on the proposed Project design. The fire-flow deficiency in Huff Avenue can be addressed by replacing the northern section of pipe from Charleston Avenue to the deficient node with 12-inch main, however the junction is very close to the required fire-flow rate and may not warrant additional improvements once the project progresses to the detailed building design phase.

Table 3-7: Future Cumulative Condition Evaluated Project Fire Flow (FF) Nodes

Model Node ID	Location	Required Fire Flow Rate (gpm)	Available Flow Pre-Project (gpm)	Available Flow Post-Project (gpm)
J-2912	Project Location – Main St (New Road)	Pre-Project: N/A Post-Project: 4,000	N/A	4,119
J-2944	Project Location – N Shoreline Blvd	Pre-Project: 3,500 Post-Project: 4,000	6,605	7,028
J-2952	Project Location – Plymouth St	Pre-Project: 3,500 Post-Project: 4,000	4,852	5,312
J-2964	Project Location – Space Park Way	Pre-Project: 3,500 Post-Project: 4,000	3,860	4,764
J-2968	Project Location – Joaquin Ave	Pre-Project: N/A Post-Project: 4,000	N/A	5,324
J-2969	Project Location – Huff Ave	Pre-Project: N/A Post-Project: 4,000	N/A	6,192
J-2982	Project Location – N Shoreline Blvd	Pre-Project: 3,500 Post-Project: 4,000	6,536	7,248
J-2987	Project Location – Huff Ave	Pre-Project: N/A Post-Project: 4,000	N/A	3,936
J-2988	Project Location – N Shoreline Blvd	Pre-Project: 3,500 Post-Project: 4,000	6,446	7,071
J-2992	Project Location – Joaquin Ave	Pre-Project: 3,500 Post-Project: 4,000	3,923	4,304
J-3003	Project Location – Charleston Rd	Pre-Project: 5,000 Post-Project: 4,000	5,282	6,275
J-4210	Project Location – Pear Ave	Pre-Project: 3,500 Post-Project: 4,000	3,765	5,177
J-4234	Project Location – Shorebird Way	Pre-Project: 3,500 Post-Project: 4,000	5,319	6,572
J-4243	Project Location – Charleston Rd	Pre-Project: 3,500 Post-Project: 2,750	3,977	5,333
J-4250	Project Location – Charleston Rd	Pre-Project: 3,500 Post-Project: 3,750	4,900	6,184
J-3048	Parking – Amphitheatre Pkwy	Pre-Project: N/A Post-Project: 4,000	N/A	5,737
J-1636	Parking – Bayshore Pkwy	Pre-Project: 3,500 Post-Project: 4,000	5,110	5,214
J-1648	Parking – Marine Way	Pre-Project: N/A Post-Project: 4,000	N/A	4,880

3.5.4. Deficiencies – Pre and Post Project

The fire flow deficient nodes within Pressure Zone 1 are evaluated for Project impact. Table 3-8 compares the available fire flow before and after Project development showing no impact to the fire flow deficiencies in Pressure Zone 1.

Table 3-8: Future Cumulative 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 Ave.	3,500	3,254	3,307
J-3066	N Shoreline Blvd.	2,500	2,258	2,306
J-4185	San Leandro St.	3,500	2,950	2,995

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 and Future Cumulative 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 for parcels outside of the North Bayshore Precise Plan Area. Within the North Bayshore Precise Plan area, BWF is developed based on current land use and applicable water duty factors and RTS ratios from the *North Bayshore Precise Plan Utility Impact Study* (NBPPII UIS; Schaaf & Wheeler, October 2016). 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 number of residential dwelling units and building square footages of the different land uses provided in the Project Description. A Return-to-Sewer (RTS) ratio is applied to water duty factor from Table 2-1 to estimate sewer flow. An RTS ratio of approximately 0.75 is used based on the 2010 SMP RTS ratio for the different land uses. Table 4-1 provides the estimated Project sewer flow.

The Project scenarios have different sewer generation and loading locations. Scenario 1 (No DCP) has loading at the closest adjacent public sewer main to each building in Charleston Road, Shorebird Way, Space Park Way, Pear Avenue, N Shoreline Boulevard, Joaquin Road, Huff Ave, and Plymouth Street. Scenario 2 (DCP Offline) and Scenario 3 (DCP Online) loads all buildings with sewer generation collected and conveyed by private district sewer mains to the DCP at the adjacent public sewer main in Charleston Road. In Scenario 2 & 3, all buildings not served by private district sewer mains will load their sewer generation at the nearest adjacent public main in Pear Ave, N Shoreline Blvd, Joaquin Rd, Huff Ave, and Plymouth St. Scenario 3 generation considers the full DCP treatment capacity of 900,000 gallons per day and therefore, total sewer generation is reduced by the capacity of the DCP or by the total sewer collected and conveyed by private sewer mains to the DCP, whichever is smaller. Private district piping is not studied in this analysis.

Table 4-1: Project Estimated Sewer Flow

Building	Land Use Type	Dwelling Units (DU)	Building Area (sf)	Sewer Duty Factor (gpd/DU) / (gpd/1,000 sf)	Sewer Demand (gpd)
SB-PO-1[1]	HIO / R&R	-	HIO: 511,259 R&R: 33,711	100 500	67,981
SB-PO-2[1]	HIO	-	HIO: 738,156	100	73,816
SB-PO-3[1]	HIO	-	HIO: 390,179	100	39,018
SB-PH[1]	Hotel / R&R	245	R&R: 16,731	75 500	26,741
SB-PR-1[1]	MFR – Mixed Use	366	R&R: 27,192	75 500	41,046
SB-PR-2[1]	MFR – Mixed Use	503	R&R: 39,707	75 500	57,579
SB-PR-3[1]	MFR – Mixed Use	211	R&R: 18,552	75 500	25,101
SB-PR-4[1]	MFR – Mixed Use	297	R&R: 12,825	75 500	28,688
SB-PR-5[1]	MFR – Mixed Use	176	R&R: 16,732	75 500	21,566
SB-PR-6[1]	MFR – Affordable	220	-	75	16,500
SB-PR-7[1]	MFR – Affordable	172	-	75	12,900
SB-PR-8[1]	MFR – Affordable	215	-	75	16,125
SB-FLEX[1]	Community	-	55,000	125	6,875
SB-PP[1]	R&R / Parking	-	R&R: 4,550	500	2,275
JS-PO-1	HIO / R&R	-	HIO: 250,000 R&R: 3,990	100 500	26,995
JS-PR-1	MFR – Affordable	413	-	75	30,975
JS-PR-2	MFR – Mixed Use	283	R&R: 10,010	75 500	26,230
JS-PR-3	MFR – Mixed Use	318	R&R: 7,000	75 500	27,350
JS-FLEX	Hotel / R&R	280	R&R: 4,000	75 500	23,00

Table 4-1 (Cont'd): Project Estimated Sewer Flow

Building	Land Use Type	Dwelling Units (DU)	Building Area (sf)	Sewer Duty Factor (gpd/DU) / (gpd/1,000 sf)	Sewer Demand (gpd)
JN-PO-1	HIO	-	HIO: 770,023	100	77,002
JN-PO-2	HIO	-	HIO: 486,280	100	48,628
JN-PR-1	MFR – Affordable	159	-	75	11,925
JN-PR-2	MFR – Affordable	748	-	75	56,100
JN-PR-3	MFR – Affordable	881	-	75	66,075
JN-PR-4	MFR – Mixed Use	375	R&R: 7,748	75 500	31,999
JN-PR-5	MFR – Mixed Use	142	R&R: 4,000	75 500	12,650
JN-PR-6	MFR – Mixed Use	230	R&R: 20,655	75 500	27,578
JN-PR-7	MFR – Mixed Use	781	R&R: 6,597	75 500	61,874
PE-PR-1	MFR – Mixed Use	285	R&R: 10,000	75 500	26,375
PE-PR-2	MFR – Affordable	225	-	75	16,875
Total	-	**MFR: 7,000** **Hotel: 525**	**R&R: 244,000** **HIO: 3,145,897** **Civic: 55,000**	-	**1,007,839**

[1]Buildings are connected to the Private Utility District proposed by the developer and flow to the DCP for treatment and reuse as outlined in Scenarios 2 & 3.

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 NBPPII UIS. Table 4-2 details the Master Plan-level sewer flow in the model, which was calculated based on current land use densities and sewer duty factors.

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

	Sewer Demand (gpd)
NBMP Parcels	***156,906****

** Sewer Flow generation in the Existing Condition Model*

4.2.2. Post-Project Incremental Flow

For the Project impact analysis in the Existing Condition, Project sewer flow is added to the Existing Condition model as an incremental difference from pre-Project demand. The Project incremental sewer flow is given in Table 4-3. For Scenario 1 and 2, the incremental demand assumes all sewer generation is collected by the City sewer system. For the Project private district option that includes installing the DCP, while the DCP is operational (as modeled in Scenario 3), 435,748 gallons per day are anticipated to be treated and recycled at the DCP, and therefore the net incremental demand while the DCP is operational is 409,722 gpd.

Table 4-3: Incremental Project Flow for Existing Condition

	Sewer Flow (gpd)	
	Scenarios 1 & 2	Scenario 3
Pre-Project (Baseline) Flow	156,906	156,906
Project Flow	1,005,376	569,628
Incremental Project Flow	***+ 848,470***	***+ 409,722***

4.3. Future Cumulative Condition

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 NBPPII UIS. In the NBPPII UIS model, sewer flows outside of the North Bayshore Precise Plan area are based on the 2030 General Plan Update (GPU) land use; these flows have been updated to include recent City approved projects outlined in Table A-1 in Appendix A, which were not accounted for or were in exceedance of the 2030 GPU projections. Sewer flows within the North Bayshore Precise Plan area have been further revised to reflect future development densities as analyzed in the NBPPII UIS. Table 4-4 presents Master Plan-level pre-Project demand from the model.

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

	Sewer Demand (gpd)
NBMP Parcel	***723,589****

** Sewer Flow generation allocated in the Future Cumulative Condition Water Model from the NBPP*

4.3.2. Post-Project Incremental Flow

Project flow is added to the Future Cumulative Condition model as an incremental difference from pre-Project flow. Table 4-4 and Table 4-5 only consider the project specific parcels for comparison purposes in the hydraulic models. Additional adjustments are made to land use and sewer flows within the NBPPII boundaries, but outside of the NBMP Project area, to stay consistent with the overall NBPPII land use quantities as discussed in Chapter 1. The incremental Project flow is given in Table 4-5. For Scenario 1 and 2, the incremental demand assumes all sewer generation is collected by the City sewer system. For the project alternative that includes installing the DCP, while the DCP is operational (as modeled in Scenario 3), 435,748 gpd are anticipated to be treated and recycled at the DCP, and therefore the net incremental demand while the DCP is operational is -153,961 gallons per day. Negative demand indicates there would be less total sewer flow to the City's system than was previously projected in the Future Cumulative Condition.

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

	Sewer Flow (gpd)	
	Scenarios 1 & 2	**Scenario 3**
Pre-Project (Baseline) Flow	723,589	723,589
Project Flow	1,005,376	569,628
Incremental Project Flow	***+ 281,787***	***-153,961***

Chapter 5. Sewer System Impact

The impact of Project development on the sewer system is analyzed under both Existing and Future Cumulative Conditions. The specific affected area of the gravity system evaluated for Project impact begins at US-101 and progresses north to the Shoreline Pump Station.

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 base wastewater flow (BWF) and groundwater infiltration (GWI). Since the ADWF scenario models average daily flows, BWF and GWI are 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. 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 Shoreline Pump Station (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 (Carollo, 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.

Increase in future demands is offset by removing future allocated demands assumed as part of the NBPPII. The net increase in future demand is 0.13 MGD. Capacity rights comparison assumes all project sewer generation flows to the City's system.

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	10.39	14.28
Joint Interceptor	50.0	16.98	21.91	17.18	22.04

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

5.3. Existing Condition 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 *North Bayshore Precise Plan Utility Impact Study* (NBPPII UIS; Schaaf & Wheeler, October 2016). Hydraulic deficiencies within the sewer system are evaluated under peak wet weather flow conditions and project contributions to the capacity of the sewer are evaluated under average dry weather flow conditions.

Each project scenario was analyzed separately with sewer generation and loading as described in previous sections. In existing conditions pre-Project, it is assumed the existing sewer alignments are installed. There are two new alignments assumed to be installed in the post-Project condition because the existing alignments require relocation to accommodate the new development site layouts. The Lonesome Road CIP proposed in the Gateway Master Plan is proposed to be installed and a realignment through Shorebird Way and the proposed Inigo Way is assumed to be installed. If the pipe relocations are not installed, it will impact downstream conditions that were not included in the analysis.

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

The sewer system has sufficient capacity downstream of the Project with the pre-Project flows in the Existing Condition as shown in Figures B-11a, B-11b. Pre-Project, one conduit, Conduit ID 287, exceeds the maximum d/D. This pipe is recommended for upsizing in the NBPPII UIS. The pipe is flowing slightly over half-full and is not close to surcharging.

Scenario 1

The sewer system does not have sufficient capacity downstream of the Project with the post-Project flows for Scenario 1 in the Existing Condition as shown in Figures B-12a and B-12b. Nine pipes, Conduit ID 287, 267, 181, 217, 188, 193, 172, 173, and 176, exceed the maximum d/D. As discussed in the Future Conditions Section 5.4, many of these pipes are recommended for upsizing in the 2030 GPUUIS and NBPPII UIS.

Scenario 2

The sewer system does not have capacity downstream of the Project with the post-Project flows for Scenario 2 in the Existing Condition as shown in Figures B-13a and B-13b. Eleven pipes, Conduit ID 287, 185, 183, 174, 181, 217, 188, 193, 172, 173, and 176, exceeds the maximum d/D. As discussed in the Future Conditions Section 5.4, many of these pipes are recommended for upsizing in the 2030 GPUUIS and NBPPII UIS.

Scenario 3

The sewer system does not have capacity downstream of the Project with the post-Project flows for Scenario 3 in the Existing Condition as shown in Figures B-14a and B-14b. Seven pipes, Conduit ID 287, 217, 188, 193, 172, 173, and 176, exceed the maximum d/D. As discussed in the Future Conditions Section 5.4, many of these pipes are recommended for upsizing in the 2030 GPUUIS and NBPPII UIS.

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. In the pre-Project, one pipe, Conduit ID 287, did not meet d/D performance criteria. For post-Project Scenario 1, nine pipes did not meet d/D requirements, Conduit ID 287, 267, 181, 217, 188, 193, 172, 173, and 176. For post-Project Scenario 2 eleven pipes did not meet d/D requirements, Conduit ID 287, 185, 183, 174, 181, 217, 188, 193, 172, 173, and 176. For post-Project Scenario 3 seven pipes did not meet d/D requirements, Conduit ID 287, 217, 188, 193, 172, 173, and 176. The majority of pipes are recommended for upsizing in the 2030 GPUUIS as discussed in the following sections. Conduit ID 172, 188, and 217 were not recommended in the 2030 GPUUIS. CIPs shown in Figures 12, 13, and 14 are limited to the Project-generated relocations previously discussed.

5.3.4. CIP Phasing

The phasing of CIPs in conjunction with the Project construction is discussed broadly based on the general development of NBMP blocks. Generally, CIPs shall be constructed in conjunction with the development of each area. As roads and corridors are being modified, CIPs within the corridors shall be installed.

Prior to the southwestern (Gateway) block being constructed, the Lonesome Road CIP is required to be installed along with the corresponding GPUUIS CIP #104 (as modified in this UIS) in Joaquin Road. If the northwestern blocks along Joaquin Road are constructed prior to the Gateway area, it is recommended the CIPs in Joaquin Road are installed. If the Joaquin Road improvements are installed prior to the southern portion of the Lonesome Road CIP, it is recommended that a routing study is conducted to ensure the new downstream sewer accepts the Lonesome Road CIP.

GPUUIS CIP #103 and #100 are known deficiencies and the construction of those CIPs shall correspond with construction within the Charleston Road corridor and the N Shoreline Boulevard corridor, respectively.

The NBMP-specific eastern relocation CIP along the new Inigo Way shall be constructed prior to abandoning the existing sewer alignment and shall occur as part of the construction of the new Inigo Way corridor. The remaining eastern CIPs shall be installed prior to the construction of new buildings in the NBMP within the same corridor.

5.4. Future Cumulative Condition 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, which were not accounted for or were in exceedance of the 2030 GPU projections, as well as the North Bayshore Precise Plan. System performance is analyzed under the assumption that all recommended CIPs in the 2030 GPUUIS and NBPPII UIS have been constructed.

Five CIPs from the 2030 GPUUIS are recommended downstream of the project. The first project, CIP #100 recommends upsizing 2,175 feet of 18-inch diameter pipe to 21-inch diameter pipe. The second project, CIP #103, recommends upsizing 2,114 feet of 8, 12, and 21, and 30-inch diameter pipe to 12, 15, 18, 27, and 30-

inch diameter pipe. The third project, CIP #104, recommends upsizing 367 feet of 8-inch to 15-inch diameter pipe. The fourth project, CIP #105, recommends upsizing 945 feet of 12-inch to 15-inch. CIP #105 is impacted by the project re-route and only one pipe is recommended for update in the post-Project condition. The fifth project, CIP #108, recommends upsizing 241 feet of 21-inch to 24-inch. In conjunction, three CIPs from the NBPPII UIS are recommended downstream of the project. The first project, NB-1, recommends upsizing 274 feet of 21-inch to 27-inch. The second project, NB-2, recommends upsizing 339 feet of 8-inch to 12-inch. The third project, NB-4, recommends upsizing 639 feet of 10 and 12-inch pipe to 15-inch pipe.

In Future Cumulative Condition pre-Project, it is assumed all GPUUIS CIPS are installed and it considers the Lonesome Road CIP proposed by the Gateway Master Plan is installed. The Lonesome Road CIP recommends relocating 1,329 feet of 12-inch pipe and upsizing 1,584 feet of 8-inch pipe to 12-inch pipe. Post-Project it is assumed the conduit re-route in Shorebird Way and the new Inigo Way is installed because the existing pipe alignments require reconfiguration due to Project layout. If these CIPs are not installed, it will impact downstream conditions that were not included in the analysis.

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 under pre-Project conditions as shown in Figures B-15a & B-15b. Pre-Project, two conduits, Conduit ID 172 and 249, exceeds the maximum d/D.

Scenario 1

The system does not meet d/D performance criteria downstream of the Project in the Future Cumulative Condition under post-Project Scenario 1 conditions as shown in Figures B-16a and B-16b. Eight pipes, Conduit ID 232, 231, 208, 172, 249, 188, 217, and 245, exceeds the maximum d/D.

Scenario 2

The system does not meet d/D performance criteria downstream of the Project in the Future Cumulative Condition under post-Project Scenario 2 conditions as shown in Figures B-17a and B-17b. Seven pipes, Conduit ID 172, 249, 188, 217, 245, 185, and 183, exceeds the maximum d/D.

Scenario 3

The system does not meet d/D performance criteria downstream of the Project in the Future Cumulative Condition under post-Project Scenario 3 conditions as shown in Figures B-18a and B-18b. Five pipes, Conduit ID 172, 249, 188, 217, and 245, exceeds the maximum d/D.

5.4.3. Deficiencies – Pre and Post Project

Table 5-5 presents the comparison of d/D results pre- and post-Project for pipes downstream of the Project development. The system meets d/D performance criteria after all recommended CIPs are constructed for pipes downstream of the Project under pre-Project and post-Project conditions. Table 5-5 present the recommended CIP diameters. The NBPPII UIS and Gateway Master Plan recommended diameters are shown in bold blue font, the GPUUIS diameters are shown in bold green font, and NBMP Project-specific diameters are shown in bold purple font. Scenario 2 and 3 result in deficiencies even though the proposed private utility system is collecting Project sewer flows. Scenario 2 concentrates collected flow to the City's system at the DCP location, which results in Scenario-specific deficiencies. Both Scenario 2 and 3 include portions of the NBMP area that are not connected to the private utility system and therefore contribute to localized City system deficiencies.

5.5. Project Contribution to Deficient Sewer Pipes

Approximately 2,175 feet of 18-inch diameter pipe along North Shoreline Boulevard is recommended to be upsized to 21-inch diameter pipe, as well as 2,114 feet of 8, 12, and 21, 30-inch diameter pipe to 12, 15, 18, 27, and 30-inch along Charleston Road, as well as approximately 367 feet of 8-inch to 15-inch diameter, as well as 945 feet of 12-inch to 15-inch, and 241 feet of 21-inch to 24-inch, as part of the 2030 GPUUIS. An additional 274 feet of 21-inch diameter pipe to 27-inch along North Shoreline Boulevard, 339 feet 8-inch to 12-inch along Space Park Way, and 339 feet of 10 and 12-inch to 15-inch along Armand Avenue, are recommended to be upsized as part of the NBPPII UIS. In addition, Lonesome Road CIP recommends relocating 1,329 feet of 12-inch pipe and upsizing 1,584 feet of 8-inch pipe to 12-inch pipe.

All project scenarios require four additional CIPs. The existing sewer alignment crosses through the Project parcels in the eastern portion of the project. The realignment includes relocating approximately 730 feet of 15-inch pipe along the new Inigo Way road and upsizing approximately 312 feet of 8-inch to 15-inch along Shorebird Way. Additionally, 1,097 feet of 8-inch to 12-inch along Huff Avenue, as well as 342 feet of 12-inch to 15-inch diameter pipe along Charleston, and 747 feet of 12-inch to 15-inch along Joaquin Road. The CIP along Joaquin Road was also outlined in the Lonesome Road CIP but the project flows require further upsizing of the CIPs.

Scenario 1 requires one additional CIP in North Shoreline Boulevard that includes upsizing approximately 708 feet of 8-inch to 12-inch diameter pipe. Scenario 2 requires on additional CIP in Charleston near the DCP that includes upsizing approximately 496 feet of 10-inch to 12-inch diameter pipe. Table 5-6 through 5-8 provide a comparison of ADWF in order to determine the Project contribution for the recommended pipe improvement projects based on each scenario's loading and flow path.

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 (%)	PWWF Pre-Project Max Flow (MGD)	PWWF Pre-Project d/D	Scenario 1 Max Flow (MGD)	Scenario 1 d/D	Scenario 1 Pipe Capacity Remaining (% of Allowed d/D)	Scenario 2 Max Flow (MGD)	Scenario 2 d/D	Scenario 2 Pipe Capacity Remaining (% of Allowed d/D)	Scenario 3 Max Flow (MGD)	Scenario 3 d/D	Scenario 3 Pipe Capacity Remaining (% of Allowed d/D)
245	D4-026	D4-024	8	367	0.509	0.052	0.2351	0.234	0.4874	3	0.234	0.4874	3	0.234	0.4874	3
217	D4-024	D4-022	8	377	0.436	0.080	0.2676	0.277	0.6176	0	0.277	0.6176	0	0.277	0.6176	0
188	D4-022	C4-025	8	353	0.436	0.081	0.3229	0.435	0.7002	0	0.435	0.7002	0	0.435	0.7002	0
168	C4-025	C4-027	12	360	0.304	0.175	0.2444	0.511	0.4274	15	0.511	0.4274	15	0.511	0.4274	15
172	C4-027	D4-002	12	342	0.455	0.177	0.3310	0.512	0.6976	0	0.512	0.6976	0	0.512	0.6976	0
277	D4-011	D4-013	8	248	0.260	0.015	0.1374	0.212	0.3100	38	0.212	0.3100	38	0.212	0.3100	38
281	D4-013	D4-015	8	237	0.210	0.016	0.1666	0.214	0.2864	43	0.214	0.2864	43	0.214	0.2864	43
280	D4-015	D4-032	8	354	0.557	0.054	0.2700	0.218	0.3121	38	0.218	0.3121	38	0.218	0.3121	38
249	D4-032	D4-030	8	381	0.258	0.089	0.3170	0.328	0.3495	30	0.328	0.3495	30	0.328	0.3495	30
227	D4-030	D4-028	8	366	0.439	0.099	0.2950	0.329	0.3431	31	0.329	0.3431	31	0.329	0.3431	31
193	D4-028	D4-002	8	367	0.490	0.101	0.4710	0.472	0.6853	0	0.472	0.6853	0	0.472	0.6853	0
173	D4-002	D4-034	12	356	0.100	0.284	0.4879	0.983	1.0000	0	0.983	1.0000	0	0.983	1.0000	0
176	D4-034	D4-004	12	332	0.066	0.290	0.4093	0.984	0.7615	0	0.984	0.7615	0	0.984	0.7615	0
178	D4-004	SW-3	21	12	0.646	0.291	0.4119	0.985	0.5661	25	0.985	0.5798	23	0.985	0.4917	34
312	D4-043	D5-007	8	344	0.378	0.020	0.1417	0.042	0.2006	60	0.042	0.2006	60	0.042	0.2006	60
315	D5-007	D5-009	8	323	0.378	0.021	0.2422	0.043	0.2745	45	0.043	0.2745	45	0.043	0.2745	45
314	D5-009	D5-005	10	324	1.344	0.270	0.4411	0.288	0.4520	10	0.288	0.4572	9	0.288	0.4572	9
287	D5-005	D5-003	10	323	0.089	0.271	0.5267	0.290	0.5618	0	0.290	0.5475	0	0.290	0.5475	0
264	D4-027	D4-031	8	349	0.340	0.008	0.1608	0.062	0.3772	25	0.008	0.1553	69	0.008	0.1553	69
265	D4-031	D5-001	8	350	0.046	0.011	0.1585	0.064	0.3509	30	0.010	0.1524	70	0.010	0.1524	70

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 (%)	PWWF										
						Pre-Project		Scenario 1			Scenario 2			Scenario 3		
						Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Pipe Capacity Remaining (% of Allowed d/D)	Max Flow (MGD)	d/D	Pipe Capacity Remaining (% of Allowed d/D)	Max Flow (MGD)	d/D	Pipe Capacity Remaining (% of Allowed d/D)
267	D5-001	D5-003	8	339	0.975	0.013	0.4478	0.065	0.5282	0	0.012	0.4581	8	0.012	0.4581	8
266	D5-003	D5-018	12	316	0.062	0.285	0.4062	0.339	0.4431	11	0.303	0.4185	16	0.303	0.4185	16
244	D5-018	D5-010	12	289	0.124	0.286	0.4070	0.341	0.3878	22	0.304	0.3648	27	0.304	0.3648	27
221	D4-048	D5-019	8	325	0.567	0.007	0.1035	0.124	0.2541	49	0.007	0.0619	88	0.007	0.0619	88
CDT-29	D5-019	MH-100	12	80	0.239	-	-	0.346	0.4703	6	0.309	0.3899	22	0.309	0.3972	21
CDT-31	MH-100	C5-007	12	700	0.195	-	-	0.455	0.4429	11	0.316	0.3865	23	0.316	0.3628	27
224	D5-019	D5-010	8	252	0.383	0.016	0.1179	0.343	0.3908	22	0.307	0.3581	28	0.307	0.3581	28
223	D5-010	D5-023	12	26	0.574	0.308	0.4720	-	-	-	-	-	-	-	-	-
219	D5-023	D5-020	12	314	0.064	0.309	0.4314	-	-	-	-	-	-	-	-	-
194	D5-020	C5-009	12	316	0.378	0.311	0.3343	-	-	-	-	-	-	-	-	-
185	D5-006	D5-004	10	213	0.369	0.022	0.1090	0.014	0.0884	82	0.774	0.7279	0	0.001	0.0362	93
183	D5-004	C5-009	10	283	0.467	0.023	0.1016	0.015	0.0830	83	0.772	0.6457	0	0.003	0.0347	93
175	C5-009	C5-007	15	355	0.227	0.328	0.2716	0.016	0.2017	73	0.773	0.4611	39	0.004	0.1464	80
170	C5-007	C4-039	15	253	0.279	0.334	0.3308	0.547	0.4421	41	1.064	0.6423	14	0.326	0.3276	56
174	C4-039	D4-012	15	350	0.058	0.335	0.3734	0.551	0.5604	25	1.065	0.7704	0	0.327	0.3621	52
181	D4-012	D4-010	12	337	0.166	0.368	0.4417	0.805	0.6948	0	1.072	0.8700	0	0.332	0.4146	17
182	D4-010	D4-008	15	336	0.128	0.379	0.3337	0.815	0.5094	32	1.082	0.5784	23	0.339	0.3240	57
235	D4-046	D4-044	8	189	0.646	0.012	0.1087	0.148	0.3513	30	0.007	0.0801	84	0.007	0.0801	84
233	D4-044	D4-042	8	356	0.488	0.017	0.1209	0.149	0.3333	33	0.008	0.0818	84	0.008	0.0818	84
232	D4-042	D4-040	8	101	1.041	0.025	0.1447	0.151	0.3559	29	0.009	0.0928	81	0.009	0.0928	81
231	D4-040	D4-038	8	214	0.286	0.026	0.1807	0.152	0.4368	13	0.011	0.1202	76	0.011	0.1202	76

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 (%)	PWWF Pre-Project Max Flow (MGD)	PWWF Pre-Project d/D	Scenario 1 Max Flow (MGD)	Scenario 1 d/D	Scenario 1 Pipe Capacity Remaining (% of Allowed d/D)	Scenario 2 Max Flow (MGD)	Scenario 2 d/D	Scenario 2 Pipe Capacity Remaining (% of Allowed d/D)	Scenario 3 Max Flow (MGD)	Scenario 3 d/D	Scenario 3 Pipe Capacity Remaining (% of Allowed d/D)
208	D4-038	D4-036	8	145	0.286	0.027	0.1614	0.153	0.3787	24	0.012	0.1103	78	0.012	0.1103	78
197	D4-036	D4-008	8	349	1.011	0.029	0.1304	0.155	0.3008	40	0.013	0.0902	82	0.013	0.0902	82
179	D4-008	D4-006	15	22	0.135	0.404	0.2776	0.970	0.4570	39	1.096	0.4796	36	0.354	0.3427	54
331	E4-002	D4-035	18	375	0.377	2.415	0.5409	2.379	0.5360	29	2.379	0.5360	29	2.379	0.5360	29
306	D4-035	D4-033	18	166	0.423	2.438	0.5311	2.402	0.5315	29	2.402	0.5315	29	2.402	0.5315	29
290	D4-033	SW-1	18	296	0.422	2.442	0.5698	2.485	0.5760	23	2.485	0.5760	23	2.485	0.5760	23
CDT-13	SW-1	D4-021	18	24	0.277	2.455	0.5695	2.498	0.5757	23	2.498	0.5757	23	2.498	0.5757	23
260	D4-021	D4-050	18	341	0.429	2.458	0.5308	2.499	0.5357	29	2.499	0.5357	29	2.499	0.5357	29
241	D4-050	D4-068	18	364	0.434	2.465	0.5295	2.501	0.5376	28	2.501	0.5376	28	2.501	0.5376	28
209	D4-068	SW-2	18	509	0.440	2.470	0.5518	2.564	0.5635	25	2.564	0.5635	25	2.564	0.5635	25
CDT-17	SW-2	SW-3	18	39	0.083	2.470	0.5364	2.564	0.5471	27	2.564	0.5471	27	2.564	0.5471	27
CDT-19	SW-3	D4-006	21	15	0.650	2.746	0.5200	3.514	0.6623	12	3.514	0.6753	10	3.514	0.5952	21
177	D4-006	C4-021	30	420	0.100	3.133	0.4071	4.478	0.4962	34	4.609	0.5048	33	3.840	0.4548	39
156	C4-021	C4-017	30	396	0.135	3.134	0.4023	4.476	0.4957	34	4.608	0.5050	33	3.839	0.4520	40
144	C4-017	C4-016	30	244	0.113	3.135	0.4221	4.474	0.5244	30	4.607	0.5343	29	3.839	0.4766	36
118	C4-016	C4-012	30	160	0.182	3.389	0.4687	4.743	0.5724	24	4.874	0.5823	22	4.104	0.5240	30
113	C4-012	C4-010	30	323	0.031	3.390	0.4661	4.742	0.5700	24	4.873	0.5800	23	4.104	0.5217	30
103	C4-010	C4-008	30	59	0.340	3.391	0.4618	4.741	0.5661	25	4.872	0.5760	23	4.104	0.5177	31

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 (%)	PWWF Pre-Project Max Flow (MGD)	PWWF Pre-Project d/D	PWWF Scenario 1 Max Flow (MGD)	PWWF Scenario 1 d/D	PWWF Scenario 1 Pipe Capacity Remaining (% of Allowed d/D)	PWWF Scenario 2 Max Flow (MGD)	PWWF Scenario 2 d/D	PWWF Scenario 2 Pipe Capacity Remaining (% of Allowed d/D)	PWWF Scenario 3 Max Flow (MGD)	PWWF Scenario 3 d/D	PWWF Scenario 3 Pipe Capacity Remaining (% of Allowed d/D)
96	C4-008	C4-004	30	213	0.098	3.423	0.5273	4.772	0.6260	17	4.904	0.6354	15	4.135	0.5803	23
88	C4-004	B4-019	30	276	0.029	3.424	0.4600	4.772	0.5498	27	4.904	0.5586	26	4.136	0.5074	32
83	B4-019	B4-017	21	582	0.438	3.436	0.4768	4.783	0.5836	22	4.915	0.5942	21	4.147	0.5329	29
72	B4-017	B4-007	21	125	0.760	3.458	0.4311	4.805	0.5213	30	4.938	0.5299	29	4.170	0.4795	36
64	B4-007	B4-005	21	464	0.782	3.465	0.5618	4.812	0.6758	10	4.944	0.6869	8	4.177	0.6226	17
60	B4-005	B4-003	21	70	0.001	3.469	0.5182	4.815	0.6188	17	4.948	0.6285	16	4.180	0.5721	24
58	B4-003	B4-001	27	108	1.256	3.472	0.3907	4.819	0.4637	38	4.951	0.4706	37	4.184	0.4302	43
56	B4-001	B4-024	27	300	0.115	3.476	0.3976	4.822	0.4720	37	4.955	0.4789	36	4.187	0.4378	42
50	B4-024	B4-022	27	292	1.036	3.479	0.3471	4.826	0.4238	43	4.958	0.4314	42	4.191	0.3877	48
45	B4-022	B4-016	21	274	0.398	3.486	0.5103	4.831	0.6210	17	4.964	0.6319	16	4.197	0.5692	24
19	B4-016	B4-014	42	556	0.189	8.477	0.3623	9.707	0.3894	48	9.814	0.3917	48	9.142	0.3771	50
21	B4-014	B4-012	42	368	0.272	8.480	0.3616	9.711	0.3885	48	9.818	0.3908	48	9.145	0.3763	50
22	B4-012	B4-010	42	450	0.222	8.484	0.3035	9.714	0.3256	57	9.821	0.3274	56	9.149	0.3156	58
20	B4-010	B4-003	42	86	1.388	8.487	0.2579	9.718	0.2763	63	9.825	0.2779	63	9.153	0.2680	64
24	B4-003	B4-001	42	200	0.500	8.491	0.3017	9.721	0.3225	57	9.828	0.3242	57	9.156	0.3131	58
25	B4-001	B4-006	42	338	0.444	8.494	0.2867	9.725	0.3101	59	9.832	0.3121	58	9.160	0.2995	60

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

Sewer Main Model ID	CIP ID	Model Diameter (in)	Length (ft)	Slope (%)	PWWF										
					Pre-Project		Scenario 1			Scenario 2			Scenario 3		
					Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Pipe Capacity Remaining (% of Allowed d/D)	Max Flow (MGD)	d/D	Pipe Capacity Remaining (% of Allowed d/D)	Max Flow (MGD)	d/D	Pipe Capacity Remaining (% of Allowed d/D)
245		8/12	367	0.509	0.1474	0.362	0.2996	0.538/ 0.296	0/41	0.2996	0.538/ 0.296	0/41	0.2996	0.538/ 0.296	0/41
217	NBMP-CIP	8/12	377	0.436	0.1524	0.373	0.3045	0.662/ 0.341	0/32	0.3045	0.662/ 0.341	0/32	0.3045	0.662/ 0.341	0/32
188		8/12	353	0.436	0.1536	0.447	0.4618	0.723/ 0.443	0/11	0.4618	0.723/ 0.419	0/16	0.4618	0.723/ 0.419	0/16
168	CIP #103	12	360	0.304	0.3039	0.323	0.4924	0.419	16	0.4924	0.419	16	0.4924	0.419	16
172	CIP #103/ NBMP-CIP	12/15	342	0.455	0.3053	0.585	0.4938	0.679/ 0.53	0/29	0.4938	0.679/ 0.53	0/29	0.4938	0.679/ 0.53	0/29
277		12	248	0.260	0.3366	0.378	0.3899	0.414	17	0.3899	0.414	17	0.3899	0.414	17
281		12	237	0.210	0.3382	0.408	0.3915	0.414	17	0.3915	0.414	17	0.3915	0.414	17
280	Lonesome Road CIP/ NBMP-CIP	12	354	0.557	0.6540	0.483	0.5696	0.488	2	0.5696	0.488	2	0.5696	0.488	2
249		12/15	381	0.258	0.6558	0.535	0.6800	0.526/ 0.374	0/50	0.6800	0.526/ 0.374	0/50	0.6800	0.526/ 0.374	0/50
227		12/15	366	0.439	0.7940	0.488	0.6812	0.463/ 0.351	7/53	0.6812	0.463/ 0.351	7/53	0.6812	0.463/ 0.351	7/53
193	CIP #104	15	367	0.490	0.7952	0.526	0.8239	0.570	24	0.8239	0.570	24	0.8239	0.570	24
173	CIP #103	15	356	0.100	1.1023	0.615	1.3194	0.686	9	1.3194	0.686	9	1.3194	0.686	9
176		15	332	0.066	1.1103	0.475	1.3211	0.525	30	1.3211	0.525	30	1.3211	0.525	30
178		21	12	0.646	1.1580	0.669	1.4014	0.746	1	1.4016	0.747	0	1.3716	0.655	13
312		8	344	0.378	0.0020	0.053	0.0313	0.175	65	0.0313	0.175	65	0.0313	0.175	65
315		8	323	0.378	0.0034	0.184	0.0327	0.249	50	0.0327	0.249	50	0.0327	0.249	50

*Note: Model Diameter in **green** text represents a 2030 GPUUIS CIP; model diameter in **blue** font represents a recommended upsized pipe from the NBPP UIS and Gateway Master Plan UIS; model diameter in **purple** font represents a recommended upsized pipe specific to the proposed project.*

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 (%)	PWWF										
					Pre-Project		Scenario 1			Scenario 2			Scenario 3		
					Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Pipe Capacity Remaining (% of Allowed d/D)	Max Flow (MGD)	d/D	Pipe Capacity Remaining (% of Allowed d/D)	Max Flow (MGD)	d/D	Pipe Capacity Remaining (% of Allowed d/D)
314		10	324	1.344	0.2205	0.315	0.2406	0.329	34	0.2406	0.329	34	0.2406	0.329	34
287	NB-4	15	323	0.089	0.2219	0.341	0.2419	0.358	52	0.2419	0.342	54	0.2419	0.342	54
264		8	349	0.340	0.0357	0.438	0.0688	0.474	5	0.0144	0.314	37	0.0144	0.314	37
265		8	350	0.046	0.1157	0.459	0.1152	0.458	8	0.0608	0.338	32	0.0608	0.338	32
267	NB-2	12	339	0.975	0.1171	0.350	0.1165	0.360	28	0.0621	0.320	36	0.0621	0.320	36
266	NB-4	15	316	0.062	0.3272	0.328	0.3564	0.342	54	0.3019	0.316	58	0.3019	0.316	58
244	CIP #105	15	289	0.124	0.3432	0.344	0.3577	0.321	57	0.3033	0.295	61	0.3033	0.295	61
221		8	325	0.567	0.0067	0.142	0.1244	0.254	49	0.0067	0.062	88	0.0067	0.062	88
CDT-47	Project Re-Route	15	60	0.223			0.3630	0.291	42	0.3086	0.267	47	0.3086	0.271	46
CDT-49		15	730	0.235			0.4887	0.322	36	0.3152	0.383	23	0.3152	0.267	47
224		8/15	252	0.383	0.0420	0.191	0.3604	0.286	43	0.3060	0.263	47	0.3060	0.263	47
223	CIP #105	15	26	0.574	0.6905	0.388									
219		15	314	0.064	0.4252	0.370									
194		15	316	0.378	0.3950	0.288									
185	NBMP CIP	8/15	213	0.369	0.0198	0.140	0.0139	0.119	76	0.8104	1.000/ 0.392	0/48	0.0017	0.050	90
183		8/15	283	0.467	0.0211	0.131	0.0151	0.111	78	0.8404	0.907/ 0.351	0/53	0.0030	0.051	90
175		15	355	0.227	0.4038	0.302	0.0164	0.206	73	0.7732	0.465	38	0.0043	0.146	81
170		15	253	0.279	0.4093	0.369	0.5740	0.438	42	1.0888	0.626	17	0.3201	0.330	56
174		15	350	0.058	0.4103	0.401	0.5752	0.492	34	1.0900	0.642	14	0.3214	0.343	54

*Note: Model Diameter in **green** text represents a 2030 GPUUIS CIP; model diameter in **blue** font represents a recommended upsized pipe from the NBPP UIS and Gateway Master Plan UIS; model diameter in **purple** font represents a recommended upsized pipe specific to the proposed project.*

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 (%)	PWWF										
					Pre-Project		Scenario 1			Scenario 2			Scenario 3		
					Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Pipe Capacity Remaining (% of Allowed d/D)	Max Flow (MGD)	d/D	Pipe Capacity Remaining (% of Allowed d/D)	Max Flow (MGD)	d/D	Pipe Capacity Remaining (% of Allowed d/D)
181	CIP #103	18	337	0.166	0.5337	0.315	0.8435	0.392	48	1.1085	0.455	39	0.3394	0.245	67
182		21	336	0.128	0.6462	0.334	0.9472	0.405	46	1.2951	0.433	42	0.3820	0.293	61
235		8	189	0.646	0.0941	0.273	0.2749	0.495	1	0.0068	0.080	84	0.0068	0.080	84
233		8	356	0.488	0.0957	0.284	0.2748	0.467	7	0.0081	0.082	84	0.0081	0.082	84
232		8	101	1.041	0.1406	0.347	0.2762	0.501/ **0.451**	0/**10**	0.0095	0.095	81	0.0095	0.095	81
231		8/**12**	214	0.286	0.1468	0.429	0.2780	0.623/ **0.334**	0/**33**	0.0112	0.123	75	0.0112	0.123	75
208	NBMP CIP	8/**12**	145	0.286	0.1480	0.372	0.2793	0.531/ **0.290**	0/**42**	0.0126	0.113	77	0.0126	0.113	77
197		8/**12**	349	1.011	0.1494	0.295	0.2806	0.413/ **0.235**	17/**53**	0.0140	0.097	81	0.0139	0.092	82
179		21	22	0.135	2.5818	0.407	3.5804	0.472	37	3.6112	0.473	37	2.0227	0.396	47
331		21	375	0.377	0.2137	0.293	0.1796	0.302	60	0.1796	0.302	60	0.1796	0.302	60
306		21	166	0.423	3.1898	0.516	3.2348	0.525	30	3.2348	0.525	30	3.2348	0.525	30
290		21	296	0.422	3.2307	0.551	3.3533	0.564	25	3.3533	0.564	25	3.3533	0.564	25
CDT-13	CIP #100	21	24	0.277	3.2306	0.525	3.3532	0.536	29	3.3532	0.536	29	3.3532	0.536	29
260		21	341	0.429	3.2547	0.497	3.3773	0.503	33	3.3773	0.503	33	3.3773	0.503	33
241		21	364	0.434	3.4043	0.530	3.4116	0.534	29	3.4116	0.534	29	3.4116	0.534	29
209		21	509	0.440	3.3853	0.519	3.4511	0.524	30	3.4511	0.524	30	3.4511	0.524	30
CDT-17		21	39	0.083	3.3853	0.512	3.4511	0.517	31	3.4511	0.517	31	3.4511	0.517	31
CDT-19	CIP #103	27	15	0.650	4.6466	0.589	5.0903	0.645	14	5.0983	0.646	14	4.9539	0.582	22

Note: Model Diameter in ***green*** *text represents a 2030 GPUUIS CIP; model diameter in* ***blue*** *font represents a recommended upsized pipe from the NBPP UIS and Gateway Master Plan UIS; model diameter in* ***purple*** *font represents a recommended upsized pipe specific to the proposed project.*

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 (%)	PWWF									
					Pre-Project		Scenario 1			Scenario 2			Scenario 3		
					Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Pipe Capacity Remaining (% of Allowed d/D)	Max Flow (MGD)	d/D	Pipe Capacity Remaining (% of Allowed d/D)	Max Flow (MGD)	d/D	Pipe Capacity Remaining (% of Allowed d/D)
177		30	420	0.100	5.3248	0.550	6.0738	0.598	20	6.0872	0.599	20	5.2471	0.545	27
156		30	396	0.135	5.1432	0.543	5.8235	0.589	21	5.8341	0.590	21	5.0732	0.537	28
144		30	244	0.113	5.1330	0.568	5.8038	0.615	18	5.8145	0.616	18	5.0604	0.560	25
118		30	160	0.182	5.3289	0.618	5.9569	0.664	11	5.9686	0.665	11	5.2196	0.608	19
113		30	323	0.031	5.3292	0.616	5.9537	0.661	12	5.9651	0.662	12	5.2183	0.605	19
103		30	59	0.340	5.3301	0.612	5.9508	0.657	12	5.9621	0.657	12	5.2176	0.601	20
96		30	213	0.098	5.3835	0.669	5.9709	0.712	5	5.9815	0.712	5	5.2414	0.659	12
88		30	276	0.029	5.3845	0.590	5.9699	0.631	16	5.9800	0.632	16	5.2416	0.580	23
83		21	582	0.438	5.4089	0.644	5.9932	0.695	7	6.0028	0.695	7	5.2657	0.631	16
72		21	125	0.760	5.5255	0.555	6.1096	0.591	21	6.1191	0.592	21	5.3822	0.546	27
64	**CIP #108**	**24**	464	0.782	5.5327	0.592	6.1168	0.626	17	6.1262	0.626	16	5.3893	0.583	22
60		**24**	70	0.001	5.5363	0.554	6.1203	0.584	22	6.1298	0.585	22	5.3930	0.546	27
58		27	108	1.256	5.5399	0.500	6.1240	0.529	29	6.1335	0.529	29	5.3966	0.493	34
56		27	300	0.115	5.5435	0.509	6.1274	0.539	28	6.1368	0.539	28	5.4001	0.502	33
50		27	292	1.036	5.5472	0.412	6.1310	0.436	42	6.1403	0.437	42	5.4037	0.406	46
45	**NB-1**	**27**	274	0.398	5.5542	0.458	6.1372	0.484	35	6.1462	0.485	35	5.4104	0.452	40

*Note: Model Diameter in **green** text represents a 2030 GPUUIS CIP; model diameter in **blue** font represents a recommended upsized pipe from the NBPP UIS and Gateway Master Plan UIS; model diameter in **purple** font represents a recommended upsized pipe specific to the proposed project.*

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 (%)	PWWF									
					Pre-Project		Scenario 1			Scenario 2			Scenario 3		
					Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Pipe Capacity Remaining (% of Allowed d/D)	Max Flow (MGD)	d/D	Pipe Capacity Remaining (% of Allowed d/D)	Max Flow (MGD)	d/D	Pipe Capacity Remaining (% of Allowed d/D)
19		42	556	0.189	12.0202	0.437	12.5346	0.448	40	12.5315	0.448	40	11.8602	0.434	42
21		42	368	0.272	12.0233	0.436	12.5377	0.446	41	12.5346	0.446	41	11.8633	0.433	42
22		42	450	0.222	12.0266	0.364	12.5410	0.372	50	12.5379	0.372	50	11.8666	0.362	52
20		42	86	1.388	12.0302	0.308	12.5446	0.315	58	12.5415	0.315	58	11.8702	0.306	59
24		42	200	0.500	12.0338	0.359	12.5482	0.367	51	12.5451	0.367	51	11.8738	0.356	52
25		42	338	0.444	12.0374	0.351	12.5519	0.360	52	12.5488	0.360	52	11.8775	0.349	54

*Note: Model Diameter in **green** text represents a 2030 GPUUIS CIP; model diameter in **blue** font represents a recommended upsized pipe from the NBPP UIS and Gateway Master Plan UIS; model diameter in **purple** font represents a recommended upsized pipe specific to the proposed project.*

Table 5-6: Pipes Recommended for Upsizing and Percentage of Contributed Flow – Scenario 1

Sewer Main Model ID	CIP #	Existing Diameter (in)	Proposed Diameter (in)	Total Future Cumulative ADWF Flow With Project (MGD)	Project Incremental Contribution		City of Mountain View Contribution	
					ADWF Flow (MGD)	Percentage of Total Flow (%)	ADWF Flow (MGD)	Percentage of Total Flow (%)
245	NBMP-CIP	8	12	0.300	0.152	50.8	0.147	49.2
217		8	12	0.304	0.152	50	0.152	50
188		8	12	0.462	0.308	66.7	0.154	33.3
277	Lonesome Road CIP / NBMP CIP	8	12	0.390	0.053	13.7	0.337	86.3
281		8	12	0.391	0.053	13.6	0.338	86.4
280		8	12	0.570	0.000	0	0.570	100
249		8	12/15	0.680	0.024	3.6	0.656	96.4
227		8	12/15	0.681	0.000	0	0.681	100
193	GPUUIS CIP #104	8	15	0.824	0.029	3.5	0.795	96.5
172	NBMP-CIP	12	15	0.494	0.189	38.2	0.305	61.8
173	GPUUIS CIP #103	12	15	1.319	0.217	16.5	1.102	83.5
176		12	15	1.321	0.211	16	1.110	84
179		15	21	3.580	0.999	27.9	2.582	72.1
181		12	18	0.843	0.310	36.7	0.534	63.3
182		15	21	0.947	0.301	31.8	0.646	68.2
244	GPUUIS CIP #105	12	15	0.358	0.014	4	0.343	96
267	NB-2	8	12	0.117	0.000	0	0.117	100
287	NB-4	10	15	0.242	0.020	8.3	0.222	91.7
266		12	15	0.356	0.029	8.2	0.327	91.8
224	Project Specific CIP	8	15	0.360	0.318	88.4	0.042	11.6
CDT-47		8	15	0.363	0.363	100	0.000	0
CDT-49			15	0.489	0.489	100	0.000	0
306	GPUUIS CIP #100	18	21	3.235	0.045	1.4	3.190	98.6
290		18	21	3.353	0.123	3.7	3.231	96.3
CDT-13		18	21	3.353	0.123	3.7	3.231	96.3
260		18	21	3.377	0.123	3.6	3.255	96.4

Sewer Main Model ID	CIP #	Existing Diameter (in)	Proposed Diameter (in)	Total Future Cumulative ADWF Flow With Project (MGD)	Project Incremental Contribution		City of Mountain View Contribution	
					ADWF Flow (MGD)	Percentage of Total Flow (%)	ADWF Flow (MGD)	Percentage of Total Flow (%)
241	GPUUIS CIP #100	18	21	3.412	0.007	0.2	3.404	99.8
209		18	21	3.451	0.066	1.9	3.385	98.1
CDT-17		18	21	3.451	0.066	1.9	3.385	98.1
64	GPUUIS CIP #108	21	24	6.117	0.584	9.5	5.533	90.5
60		21	24	6.120	0.584	9.5	5.536	90.5
45	NB-1	21	27	6.137	0.583	9.5	5.554	90.5
231	NBMP-CIP	8	12	0.278	0.131	47.2	0.147	52.8
208		8	12	0.279	0.131	47	0.148	53
197		8	12	0.281	0.131	46.8	0.149	53.2

Table 5-7: Pipes Recommended for Upsizing and Percentage of Contributed Flow – Scenario 2

Sewer Main Model ID	CIP #	Existing Diameter (in)	Proposed Diameter (in)	Total Future Cumulative ADWF Flow With Project (MGD)	Project Incremental Contribution		City of Mountain View Contribution	
					ADWF Flow (MGD)	Percentage of Total Flow (%)	ADWF Flow (MGD)	Percentage of Total Flow (%)
245	NBMP-CIP	8	12	0.300	0.152	50.8	0.147	49.2
217		8	12	0.304	0.152	50.0	0.152	50.0
188		8	12	0.462	0.308	66.7	0.154	33.3
277	Lonesome Road CIP / NBMP CIP	8	12	0.390	0.053	13.7	0.337	86.3
281		8	12	0.391	0.053	13.6	0.338	86.4
280		8	12	0.570	0.000	0.0	0.570	100.0
249		8	12/15	0.680	0.024	3.6	0.656	96.4
227		8	12/15	0.681	0.000	0.0	0.681	100.0
193	GPUUIS CIP #104	8	15	0.824	0.029	3.5	0.795	96.5
172	NBMP-CIP	12	15	0.494	0.189	38.2	0.305	61.8
173	GPUUIS CIP #103	12	15	1.319	0.217	16.5	1.102	83.5
176		12	15	1.321	0.211	16.0	1.110	84.0

Sewer Main Model ID	CIP #	Existing Diameter (in)	Proposed Diameter (in)	Total Future Cumulative ADWF Flow With Project (MGD)	Project Incremental Contribution		City of Mountain View Contribution	
					ADWF Flow (MGD)	Percentage of Total Flow (%)	ADWF Flow (MGD)	Percentage of Total Flow (%)
179	GPUUIS CIP #103	15	21	3.611	1.029	28.5	2.582	71.5
181		12	18	1.109	0.575	51.9	0.534	48.1
182		15	21	1.295	0.649	50.1	0.646	49.9
244	GPUUIS CIP #105	12	15	0.303	0.000	0.0	0.303	100.0
287	NB-4	10	15	0.242	0.020	8.3	0.222	91.7
266		12	15	0.302	0.000	0.0	0.302	100.0
224	Project Specific CIP	8	15	0.306	0.264	86.3	0.042	13.7
CDT-47		8	15	0.309	0.309	100.0	0.042	13.6
CDT-49			15	0.315	0.315	100.0	0.000	0.0
306	GPUUIS CIP #100	18	21	3.235	0.045	1.4	3.190	98.6
290		18	21	3.353	0.123	3.7	3.231	96.3
CDT-13		18	21	3.353	0.123	3.7	3.231	96.3
260		18	21	3.412	0.007	0.2	3.404	99.8
241		18	21	3.377	0.123	3.6	3.255	96.4
209		18	21	3.451	0.066	1.9	3.385	98.1
CDT-17		18	21	3.451	0.066	1.9	3.385	98.1
64	GPUUIS CIP #108	21	24	6.126	0.594	9.7	5.533	90.3
60		21	24	6.130	0.594	9.7	5.536	90.3
45	NB-1	21	27	6.146	0.592	9.6	5.554	90.4
185	NBMP-CIP	8	15	0.810	0.791	97.6	0.020	2.4
183		8	15	0.462	0.308	66.7	0.154	33.3

Table 5-8: Pipes Recommended for Upsizing and Percentage of Contributed Flow – Scenario 3

Sewer Main Model ID	CIP #	Existing Diameter (in)	Proposed Diameter (in)	Total Future Cumulative ADWF Flow With Project (MGD)	Project Incremental Contribution		City of Mountain View Contribution	
					ADWF Flow (MGD)	Percentage of Total Flow (%)	ADWF Flow (MGD)	Percentage of Total Flow (%)
245	NBMP-CIP	8	12	0.300	0.152	50.8	0.147	49.2
217	NBMP-CIP	8	12	0.304	0.152	50	0.152	50
188	NBMP-CIP	8	12	0.462	0.308	66.7	0.154	33.3
277	Lonesome Road CIP / NBMP CIP	8	12	0.390	0.053	13.7	0.337	86.3
281	Lonesome Road CIP / NBMP CIP	8	12	0.391	0.053	13.6	0.338	86.4
280	Lonesome Road CIP / NBMP CIP	8	12	0.570	0.000	0	0.570	100
249	Lonesome Road CIP / NBMP CIP	8	12/15	0.680	0.024	3.6	0.656	96.4
227	Lonesome Road CIP / NBMP CIP	8	12/15	0.681	0.000	0	0.681	100
193	GPUUIS CIP #104	8	15	0.824	0.029	3.5	0.795	96.5
172	NBMP-CIP	12	12	0.494	0.189	38.2	0.305	61.8
173	GPUUIS CIP #103	12	15	1.319	0.217	16.5	1.102	83.5
176	GPUUIS CIP #103	12	15	1.321	0.211	16	1.110	84
179	GPUUIS CIP #103	15	21	2.023	0.000	0	2.023	100
181	GPUUIS CIP #103	12	18	0.339	0.000	0	0.339	100
182	GPUUIS CIP #103	15	21	0.382	0.000	0	0.382	100
244	GPUUIS CIP #105	12	15	0.303	0.000	0	0.303	100
287	NB-4	10	15	0.242	0.020	8.3	0.222	91.7
266	NB-4	12	15	0.302	0.000	0	0.302	100
224	Project Specific CIP	8	8	0.306	0.264	86.3	0.042	13.7
CDT-47	Project Specific CIP	8	15	0.309	0.309	100	0.000	0
CDT-49	Project Specific CIP		15	0.315	0.315	100	0.000	0
306	GPUUIS CIP #100	18	21	3.235	0.045	1.4	3.190	98.6
290	GPUUIS CIP #100	18	21	3.353	0.123	3.7	3.231	96.3
CDT-13	GPUUIS CIP #100	18	21	3.353	0.123	3.7	3.231	96.3
260	GPUUIS CIP #100	18	21	3.377	0.123	3.6	3.255	96.4
241	GPUUIS CIP #100	18	21	3.412	0.007	0.2	3.404	99.8

Sewer Main Model ID	CIP #	Existing Diameter (in)	Proposed Diameter (in)	Total Future Cumulative ADWF Flow With Project (MGD)	Project Incremental Contribution		City of Mountain View Contribution	
					ADWF Flow (MGD)	Percentage of Total Flow (%)	ADWF Flow (MGD)	Percentage of Total Flow (%)
209	GPUUIS CIP #100	18	21	3.451	0.066	1.9	3.385	98.1
CDT-17		18	21	3.451	0.066	1.9	3.385	98.1
64	GPUUIS CIP #108	21	24	5.389	0	0	5.389	100
60		21	24	5.393	0	0	5.393	100
45	NB-1	21	27	5.410	0	0	5.410	100

Chapter 6. Recycled Water Demand Projections

This Chapter discusses the estimated recycled water demand for the Project development. Recycled water demands from the existing buildings and proposed Project are estimated with water unit duty factors taken from previous technical studies to remain consistent with the City-wide demand projections used in the hydraulic models. The incremental difference in estimated demand between the proposed Project and the existing demand at the site is evaluated to determine Project impact on the system.

Recycled water demands in this section represents Average Daily Demands (ADD). The ADD is an estimated daily average of water use patterns that varies by season and customer type.

Each scenario is considered in developing the impacts to the City's recycled water system. The construction and status of the DCP changes the demand location and loads as outline herein. Two scenarios are analyzed to determine Project impacts. Scenario 1 (No DCP) will load all non-potable recycled water demands at the closest adjacent public recycled water main to each building. Scenario 2 (DCP Offline) loads the entire non-potable recycled water demand for each building that is served by private recycled water mains at the public recycled water main adjacent to the DCP. In Scenario 2 (DCP Offline) buildings that are not served by private utilities will be served at the closest adjacent public recycled water main to each building. Scenario 3 (DCP Online) provides recycled water to the private recycled water system from the DCP with make-up non potable water from the City loaded at the main adjacent to the DCP. Scenario 3 was considered in this study; however, it was not hydraulically analyzed because the public recycled water system was only hydraulically analyzed under worst case scenarios, Scenario 1 & 2. Each scenario is further explained in the following sections.

The option to install a DCP also includes a network of private utilities. Private recycled mains are proposed to be installed in the north-eastern and north-western block of parcels and buildings, north of Space Park Way and Plymouth Avenue, that are supplied from the DCP. The remaining parcels will be supplied by the nearest adjacent public recycled water main.

Recycled water services for the Project will connect to the existing mains in Huff Avenue, Joaquin Road, Plymouth Street, North Shoreline Boulevard, and Charleston Avenue and the proposed recycled water mains in Charleston, Shorebird Way, Inigo Way, Monarch Way, Space Park Way, Pear Avenue, and the Gateway Master Plan area. The recycled water demand analysis is conducted at the locations where the Project connects to the public recycled water mains. Private recycled water mains are not evaluated as part of this analysis. Recycled water serving each building are loaded into the model at the adjacent main.

6.1. Project Recycled Water Demand

Recycled water demand from proposed buildings and landscaping is estimated from the proposed number of residential dwelling units and non-residential building square footages provided in the Project Description, and water unit duty factors developed for the City. Water unit duty factors used in this report were developed from water meter records of recent developments throughout the City (and developed as part of North Bayshore Precise Plan Phase II). The duty factors applied are representative of high-density, multi-family residential buildings, of high intensity office (HIO) building, of retail/restaurant (R&R), of hotel, and civic/community uses for the proposed mix use buildings. Table 2-1 provides the demand estimation for each building, the Project demand, and the total post-Project demand. The project proposes to utilize recycled water onsite including outdoor irrigation and non-potable water indoors. It is assumed that 80% of water is for indoor use and 20% of water is for outdoor use for all land use types. 100% of water for outdoor use will be recycled water. For non-residential buildings it is assumed 50% indoor water use will be non-potable water and 50% will be potable water. For residential buildings, it is assumed 25% of indoor water use will be non-potable water and 75% will be potable water.

6.2. Existing Condition

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

The pre-Project (baseline) condition includes demands adopted from the City's recycled water model, developed as part of the RWFS Update. The demand in the model is calibrated against water billing records, as further explained in the RWFS. Model demands are not available on a parcel-by-parcel basis so total estimated demands and loading locations were used to develop the basis for pre-Project to post-Project model comparison. There are approximately 15 locations in the Project area with existing connections. Total estimated average day demand is 49 gallons per minute, or approximately 70,550 gallons per day within the Project area.

6.2.2. Post-Project Incremental Demand

Total Project demand is added to the hydraulic model as an incremental difference from the pre-Project estimated demand, as shown in Table 6-1. Scenarios 1 and 2 consider all recycled water is provided by the City's recycled water system at the locations discussed above. Scenario 3 considers the DCP is in operation and produces 435,748 gpd of non-potable water which is equal to the average sewer flow to the DCP. There is greater recycled water demand from the buildings connected to the private utility system than there is private recyceled water supply, therefore, additional recycled water is supplied from the City's recycled water system at the DCP as make-up non-potable water to the private utility system.

Table 6-1: Incremental Project Demand for Existing Condition

	Recycled Water Demand (gpd)	
	Scenarios 1 & 2	Scenario 3
Pre-Project (Baseline) Demand	70,550	70,550
Project Demand	647,224	211,476
Incremental Project Demand	***+ 576,674***	***+ 140,926***

6.3. Future Cumulative Condition

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

The pre-Project (baseline) condition includes demands adopted from the City's recycled water model future development Alternative 3, developed as part of the RWFS Update. The demand in the model includes estimated demands as the recycled water system expands towards East Whisman and NASA, as further explained in the RWFS. Model demands are not available on a parcel-by-parcel basis so total estimated demands and loading locations were used to develop the basis for pre-Project to post-Project model comparison. There are approximately 32 locations in the Project area with existing connections. Total estimated average day demand is 189 gallons per minute, or approximately 272,450 gallons per day within the Project area.

6.3.2. Post-Project Incremental Demand

Total Project demand is added to the hydraulic model as an incremental difference from the pre-Project estimated demand, as shown in Table 6-2. Scenarios 1 and 2 consider all recycled water is provided by the City's recycled water system at the locations discussed above. Scenario 3 considers the DCP is in operation and produces 435,748 gpd of non-potable water which is equal to the average sewer flow to the DCP. There is greater recycled water demand from the buildings connected to the private utility system than there is private recycled water supply, therefore, additional recycled water is supplied from the City's recycled water system at the DCP as make-up non-potable water to the private utility system.

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

	Recycled Water Demand (gpd)	
	Scenarios 1 & 2	Scenario 3
Pre-Project (Baseline) Demand	272,450	272,450
Project Demand	647,224	211,476
Incremental Project Demand	***+ 374,774***	***- 60,974***

Chapter 7. Recycled Water System Impact

Project impacts to recycled water supply, storage, and hydraulic conveyance are evaluated in this chapter to ensure the Project demand can be adequately met. Recycled water supply, storage, and hydraulic conveyance is assessed for both Existing and Future Cumulative Conditions for each scenario.

7.1. Demand Scenarios and Performance Criteria

Hydraulic deficiencies within the water system are evaluated under Peak Hour Demand (PHD). The PHD peaking factors calculated from the 2022 Recycled Water Feasibility Study Update (RWFS) are used for this analysis. The 2022 RWFS provides different peaking factors for different demand types. For simplicity of presentation for this report, peaking factors are presented as aggregated peaking factors and are calculated from Table 3.2 in the 2022 RWFS comparing PHD to Average Day Demand (ADD), as shown in Table 7-1. The Future Cumulative PHD peaking factor reduction compared to the Existing Condition PHD peaking factor is attributed to the additional indoor, non-potable demands for dual-plumbed buildings connections in the Future Condition. Demands for dual-plumbed building peak at a different time of day compared to irrigation demands, therefore reducing the aggregated PHD peaking factors.

Established design criteria used to evaluate the Project impact for all scenarios are summarized in Table 7-2.

Table 7-1: Summarized Peaking Factors

Category	Peaking Factor	
	MDD	PHD
Existing Conditions	2.6	9.6
Future Conditions	2.6	5.9

Table 7-2: Water System Performance Criteria

Criteria	PHD
Minimum Allowable Pressure (psi)	40

The RWFS studied multiple levels of development and system expansion in the Future Cumulative Condition. The City's preferred build-out alternative is outlined in Alternative 3 in the RWFS. Alternative 3 generally includes expansion in North Bayshore including demands for NASA and expansion to East Whisman via Middlefield Road. The Future Cumulative Condition includes the demands included in the North Bayshore expansion, NASA, and a point load to model the pump station that serves East Whisman. The pump station is assumed to operate at a constant 2,500 gallons per minute pumping capacity. Table 7-3 outlines the existing demands and the estimated future demands, from Table 3.2 in the 2022 RWFS.

Table 7-3: Estimated Average Day Demands

Category	Existing (mgd)	Future (mgd)
North Bayshore Demands	0.46	1.44
East Whisman Demands	-	0.95

7.2. Recycled Water Supply Analysis

The increased water demand from Project development in the Existing and Future Cumulative Condition is compared with the City's supply allocation and pumping capacity from the RWQCP. In the Future Condition, there are two pressure zones, North Bayshore and East Whisman. The Project is located within the North Bayshore pressure zone, and that is the zone outlined below.

Water demand versus City contractual peak supply capacity from the RWQCP is given in Table 7-4, while the RWQCP has a total production capacity of 4.5 mgd, the City's peak supply allocation is only 3.0 mgd. The RWQCP supplies water to the City via the Palo Alto Pump Station which has a firm pumping capacity of 5.8 mgd (4,000gpm). Historically, demand in North Bayshore can be supplied by the RWQCP; however, in the Existing Condition, the model shows the pre-Project peak hour demands exceed the City's contract recycled water supply. Post-Project PHD is shown in Table 7-4, where Project Scenarios 1 and 2 simulates the City supplying all recycled water and Scenario 3 accounts for DCP recycled water production.

In the Future Cumulative Condition, the current RWQCP capacity is not sufficient to meet North Bayshore pre-Project max-day demands. The RWFS assumes additional treatment and supply capacity is available to meet pre-Project max-day demands for the preferred Alternative 3, while PHD is met by in-system storage and booster pumping capacity. The FCC modeling for this study follows the RWFS assumptions for future supply capacity. Table 7-5 provides a comparison of MDD and not PHD, to provide a more accurate comparison for supply capacity since the difference between MDD and PHD is typically supplied by in-system storage. Post-Project MDD shown in Table 7-5 for Project Scenarios 1 and 2 simulate the City supplying all recycled water in the North Bayshore Pressure Zone and Scenario 3 accounts for DCP recycled water production in the North Bayshore Pressure Zone.

Table 7-4: Existing Condition Demand Versus Supply

Pressure Zone	Existing Demand				Total Capacity (mgd)
	Pre-Project		Post-Project		
			Scenario 1 & 2	Scenario 3	
	ADD (mgd)	PHD (mgd)	PHD (mgd)	PHD (mgd)	
North Bayshore	0.46	4.4	9.95	5.76	**3.0**

Table 7-5: Future Cumulative Condition Demand Versus Supply

Pressure Zone	Future Cumulative Demand				Total Capacity (mgd)[1]
	Pre-Project		Post-Project		
			Scenario 1 & 2	Scenario 3	
	ADD (mgd)	MDD (mgd)	MDD (mgd)	MDD (mgd)	
North Bayshore	1.44	3.7	4.72	3.59	-
East Whisman	0.95	2.7	2.7	2.7	-
Total	**2.39**	**6.4**	**7.42**	**6.29**	**8.64**

[1]Total Capacity from the RWQCP in the future cumulative condition is assumed to be 8.64 mgd per the model produced as a portion of the RWFS (6,000gpm pumping capacity at the Palo Alto Pump Station, per RWFS Section 4.2.1)

7.3. Recycled Water Storage Analysis

Project impact to recycled water storage volume requirements is evaluated based on the ability for the system to serve customers during peak hour demand conditions. System supply capacities are typically sized to meet MDD with storage tanks and booster pump stations sized to make up the difference between MDD and PHD over an 8-hour period.

The City does not currently have in-system operational storage. In the Future Cumulative Condition, the City estimates a storage tank and booster pump station will be included in each service zone, North Bayshore and East Whisman, with operational storage to meet PHD.

In the Existing Condition post-Project, a storage tank will need to be installed to mitigate the difference in peak hour demand and the available source capacity at the RWQCP. In the Future Cumulative Condition post-Project, the storage volumes and booster pump station capacities need to be increased to accommodate the additional peak hour demands. Table 7-6 outlines the minimum operational storage volumes required to meet the difference between MDD and PHD, the storage volumes assume that source capacity is equal to or greater than the MDD for the system. Actual tank volumes will be larger due to the volume of dead storage in the tank that does not count towards operational storage volumes. Scenario 3 would result in a reduction in demand, and therefore, required storage volumes compared to the RWFS projections. Should the DCP shut down in Scenario 3 for any reason, a smaller system wide storage volume would result in deficient storage across the recycled water system.

Table 7-6: Recycled Water Operational Storage Requirements

Pressure Zone	Future Cumulative Demand					
	Pre-Project			Post-Project (Scenarios 1 & 2)		
	MDD (mgd)	PHD (mgd)	Storage Volume (MG)	MDD (mgd)	PHD (mgd)	Storage Volume (MG)
North Bayshore	3.7	8.5	1.6	4.72	10.71	2.0
East Whisman	2.7	8.4	1.9	2.7	8.4	1.9
Total	**6.4**	**16.9**	**3.5**	**7.42**	**19.1**	**3.9**

7.4. Existing Condition Results

7.4.1. Hydraulic Model Information

Existing recycled water system performance is analyzed with the demands and land use types in the City's InfoWater model developed for the City's 2022 RWFS. Hydraulic deficiencies within the recycled water system are evaluated under Peak Hour Demand (PHD).

Recycled water system pipe alignments in the Existing Condition are modeled based on the existing recycled water system. Post-Project it is assumed several mains are installed in the system as required to extend the recycled water system to serve the Project. Recycled water mains were added to the model within street corridors that are contained within the Master Plan development area in order to serve the Project parcels. Some of the alignments of the new Project mains were also identified as necessary improvements in the RWFS to allow for system expansion. Project-required recycled water mains pipe sizes are shown in Figures B-20 and B-21.

The model assumes the treatment plant and associated pump station have sufficient capacity to supply all peak hour demands. The system was modeled without the use of an in-system storage tank and booster pump station to confirm existing pipe hydraulics are able to meet the performance criteria for the recycled water system. The estimated flows from the treatment plant and pump station are outlined in the following sections and the results are discussed.

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

System pressures are evaluated under Peak Hour Demand (PHD) pre-Project (Figure B-19) and post-Project for each scenario (Figure B-20 & B-21). At Existing Condition pre- and post-Project, the system hydraulics meet performance criteria system-wide.

Pre-project in the Existing Conditions during PHD, the RWQCP supplies approximately 4.4 mgd. Post-project in the Existing Conditions during PHD, Scenario 1 & 2 the RWQCP supplies approximately 9.95 mgd, and in Scenario 3 the RWQCP supplies approximately 5.76 mgd. The additional post-Project demands result in peak hour demands that are significantly higher than the City's supply allocation in the Existing Condition. An in-system storage tank and booster pump station will be required to be installed within North Bayshore to sufficiently serve the additional post-Project demands.

7.4.3. Deficiencies – Pre and Post Project

In the Existing Condition, the conveyance system hydraulics meet system performance criteria. The pre- and post-Project peak hour demands exceed the City's contract supply capacity. It is recommended a storage tank and booster pump station be installed to mitigate peak hour demands with operational storage. In the near-term and as part of improvement phasing the City may consider supplementing the recycled water supply with potable water until operational storage is constructed.

7.5. Future Cumulative Condition Results

7.5.1. Hydraulic Model Information

Recycled water system performance is analyzed with the demands and land use types in the City's InfoWater model developed for the City's 2022 RWFS. Hydraulic deficiencies within the recycled water system are evaluated under Peak Hour Demand (PHD).

Recycled water system pipe alignments in the Future Cumulative Condition are modeled based on the recycled water system outlined in the RWFS Alternative 3. CIPs proposed in Alternative 3 of the RWFS include new pipes looping the North Bayshore piping ranging from sizes 6-inch through 12-inch and include upsizing multiple of the main trunk pipes. It is also assumed a recycled water storage tank and associated pump station are located at the Charleston Park (North) location as outlined in the RWFS. The East Whisman demands are estimated as a point load near the future pump station along Middlefield Road with an assumed pumping capacity of 1,900 gpm which corresponds to the East Whisman MDD. Post-Project it is assumed several mains are installed in the system as required to extend the recycled water system to serve the Project. Pipe sizes of the CIPs are shown in Figures B-22 through B-24.

The RWQCP supply allocation in the future is assumed to be 6,000 gpm, or approximately 8.64 MGD to be consistent with the RWFS. Operational storage in North Bayshore is assumed to make up the difference between the source supply and the PHD.

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

System pressures are evaluated under Peak Hour Demand (PHD) pre-Project (Figure B-22) and post-Project for each scenario (Figure B-23 & B-24). At Future Cumulative Condition pre- and post-Project, the system meets hydraulic performance criteria system-wide.

In the Future Cumulative Conditions, the RWQCP supplies approximately 6,000 gpm, or 8.64 MGD (per RWFS Section 4.2.1), which is greater than both pre- and post-Project MDD for the Alternative 3 system. The pumps at the North Bayshore recycled water storage tank (Charleston Park) vary capacity between the different scenarios in order to meet PHD. In the pre-Project condition, the pump station operates at approximately 1,500 gpm. In post-Project Scenario 1 and 2, the pump station operates at approximately 2,300 gpm and in Scenario 3 it operates at approximately 1,000 gpm. The required operational storage volumes are discussed in Section 7.3 above.

7.5.3. Deficiencies – Pre and Post Project

In the Future Cumulative Condition, the conveyance system hydraulics meet system performance criteria. Supply capacity will need to be increased to meet future MDDs. Post-Project storage volume requirements increase above RWFS pre-Project storage volumes for Project Scenarios 1 & 2. Scenario 3 demands are lower and therefore the proposed system and storage volumes outlined in the RWFS are sufficient to meet the design criteria.

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, April 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, April 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, April 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, April 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, April 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, April 2022)*

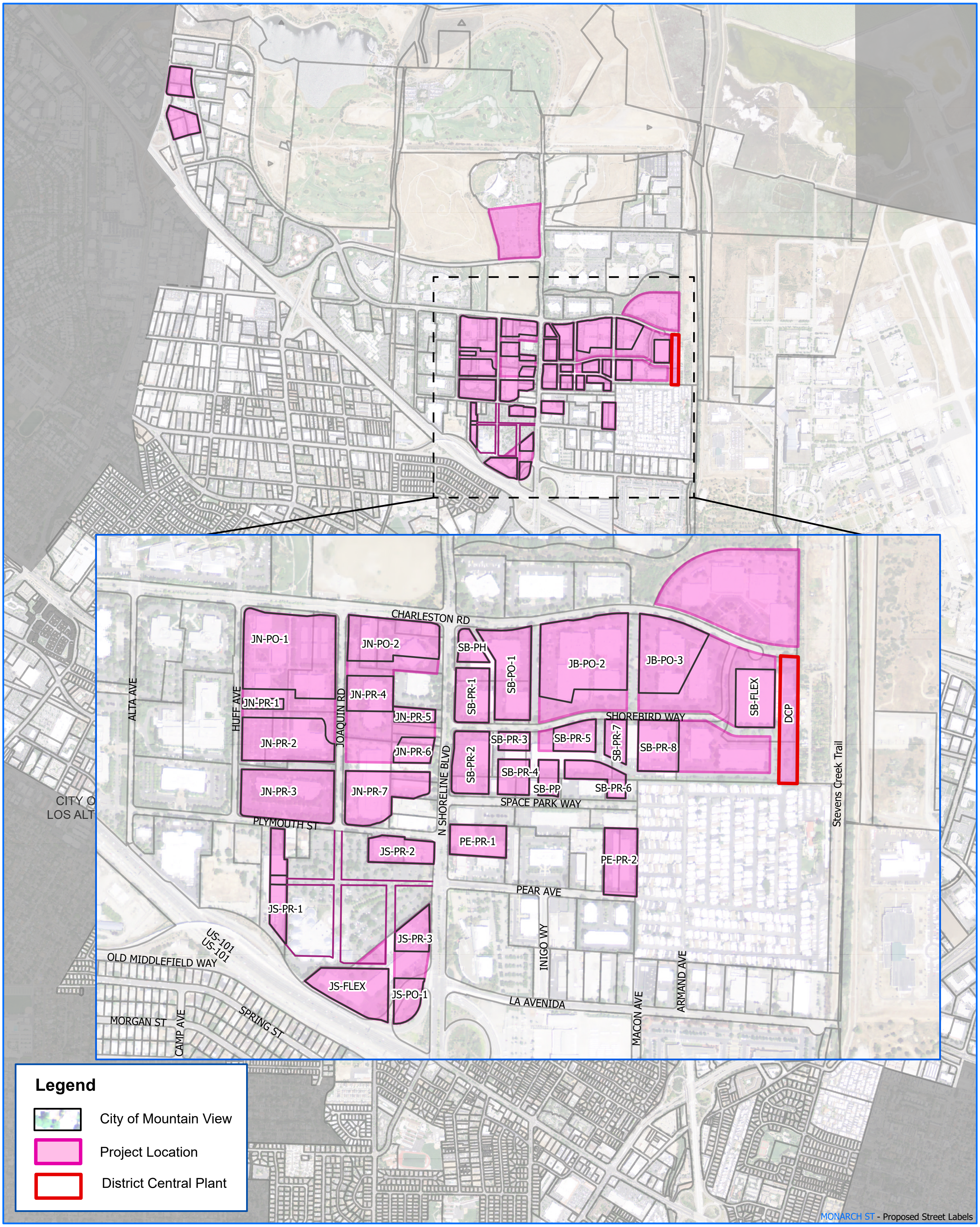
Table A-1: Additional Considered Projects (Continued)

	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, April 2022)*

APPENDIX B:

Figures

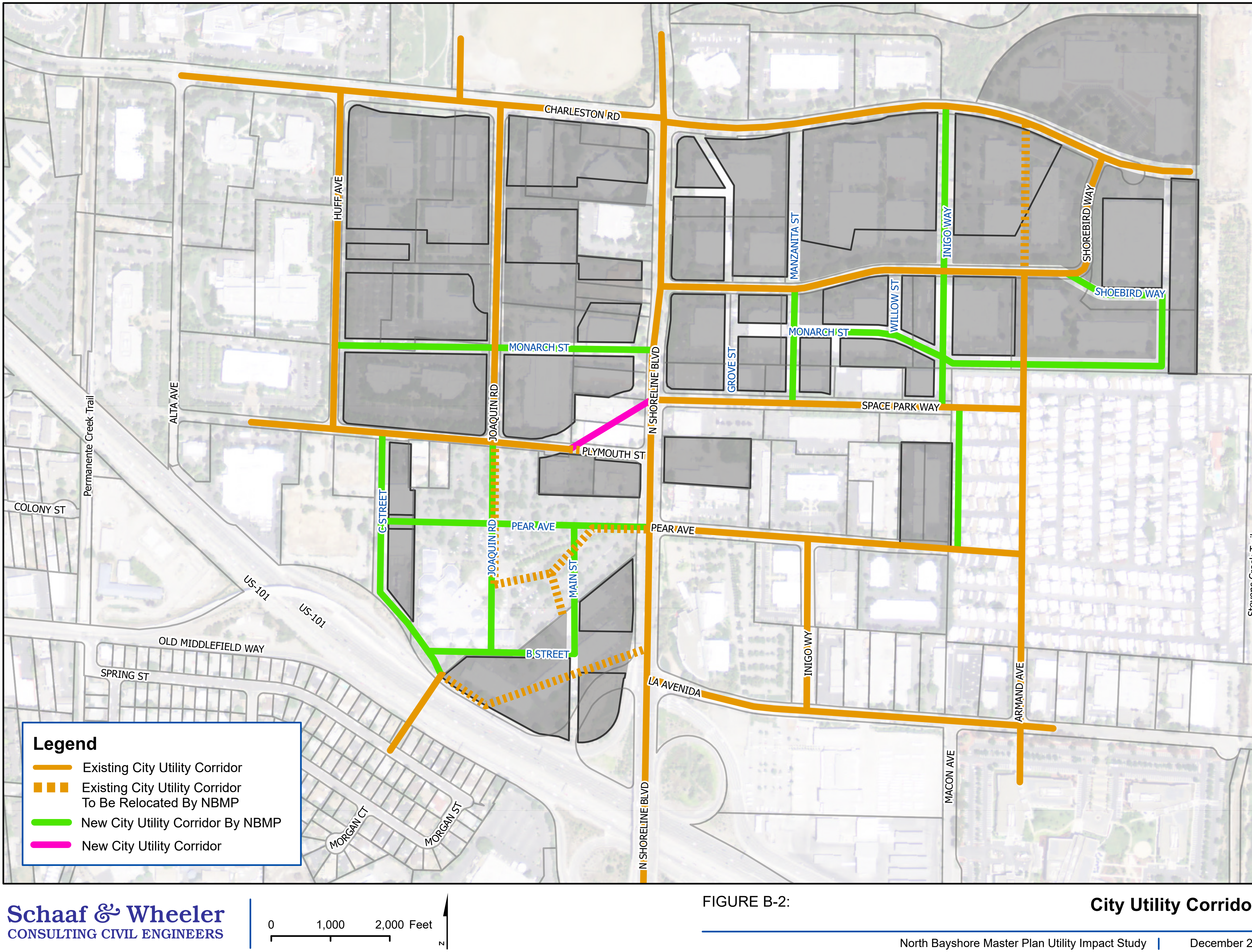


Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

0 1,000 2,000 Feet
N

FIGURE B-1: **Project Location**

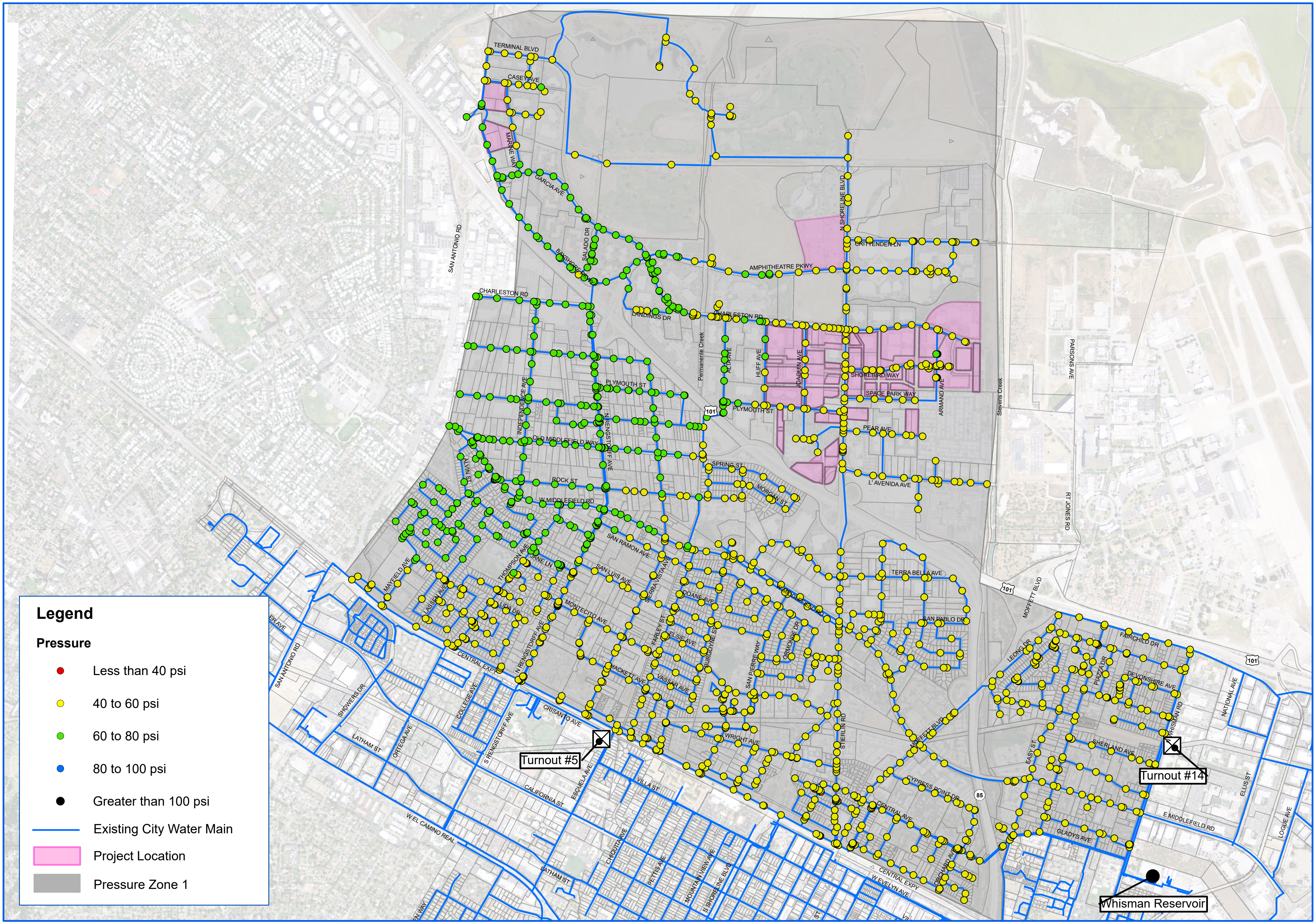
North Bayshore Master Plan Utility Impact Study December 2022



Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

FIGURE B-2:

City Utility Corridor



Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

0 1,000 2,000 Feet

FIGURE B-3:

Peak Hour Demand (PHD) - Without Project

Water System Model - Existing Condition

North Bayshore Master Plan Utility Impact Study | December 2022

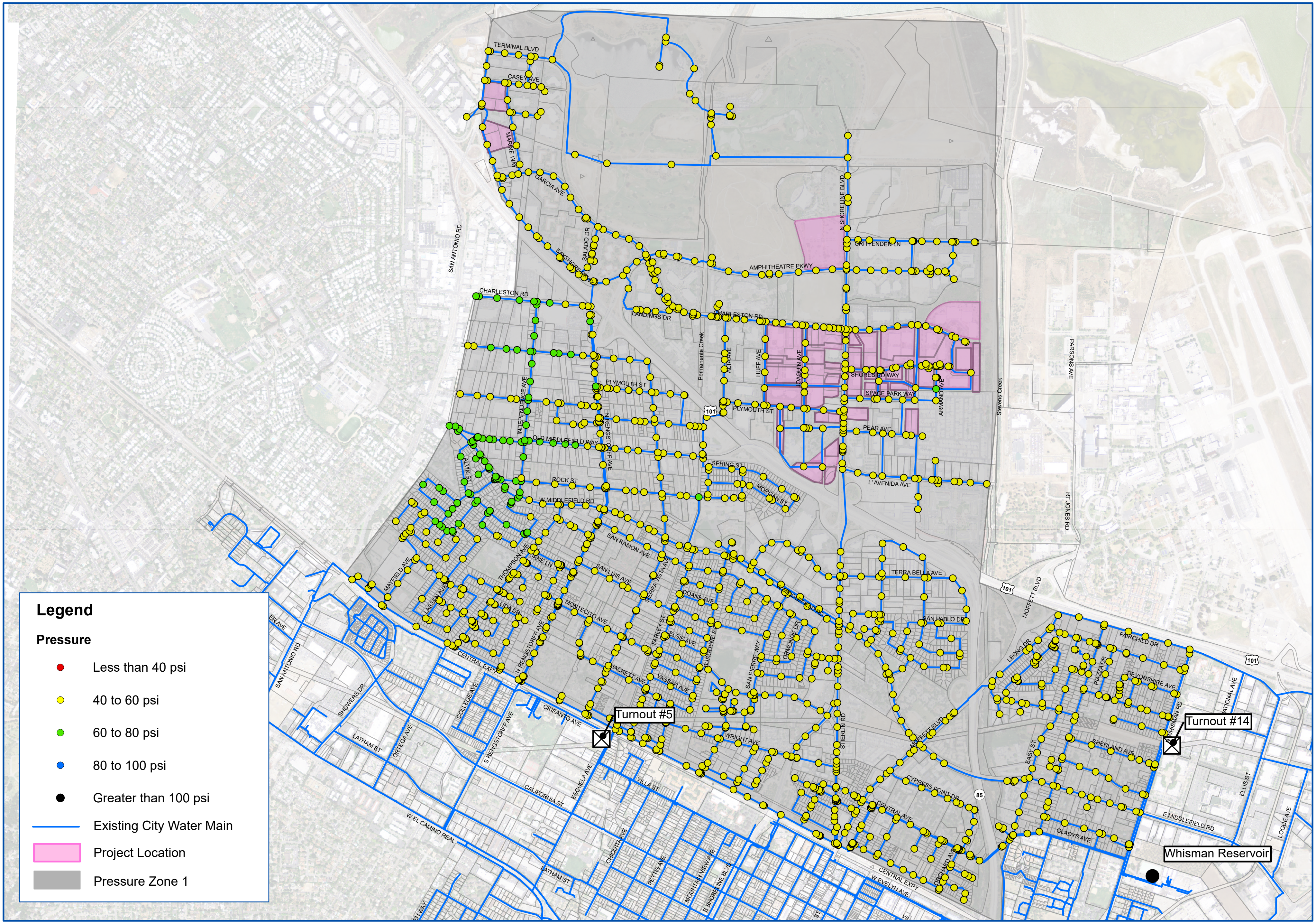
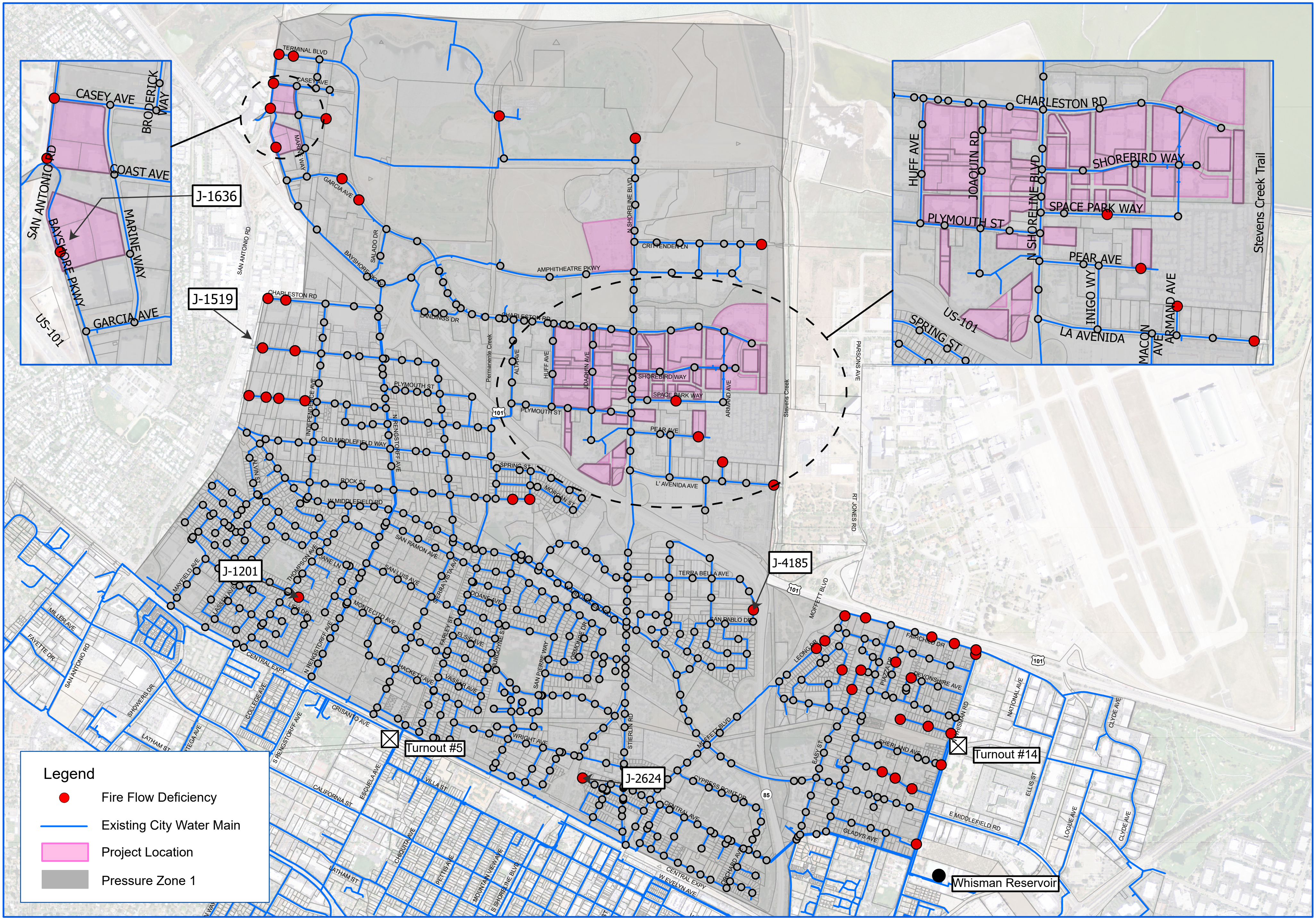


FIGURE B-4:

Peak Hour Demand (PHD) - With Project

Water System Model - Existing Condition

Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS



Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

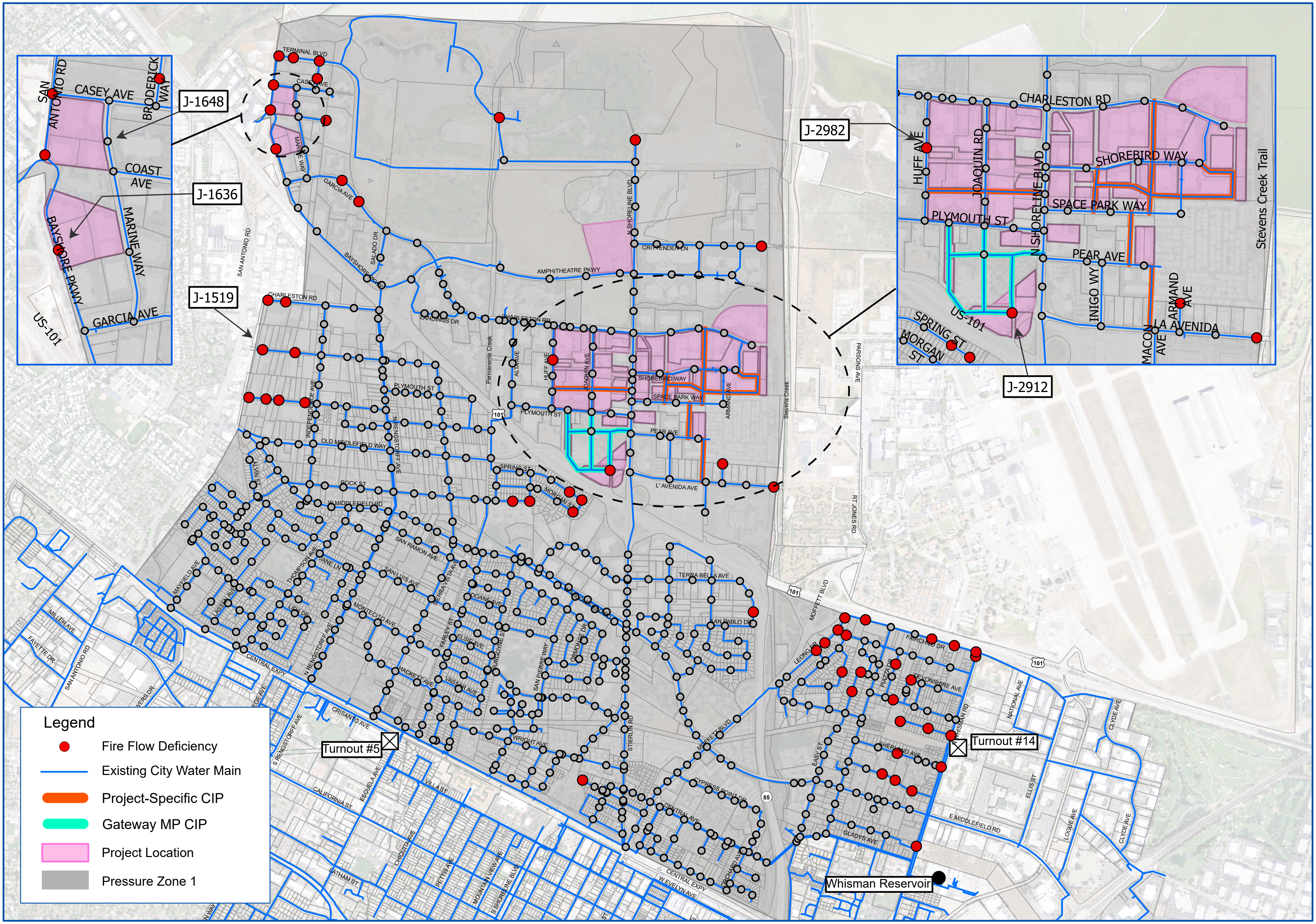
0 1,000 2,000 Feet

FIGURE B-5:

Fire Flow Analysis - Without Project

Water System Model - Existing Condition

North Bayshore Master Plan Utility Impact Study | December 2022



Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

0 1,000 2,000 Feet

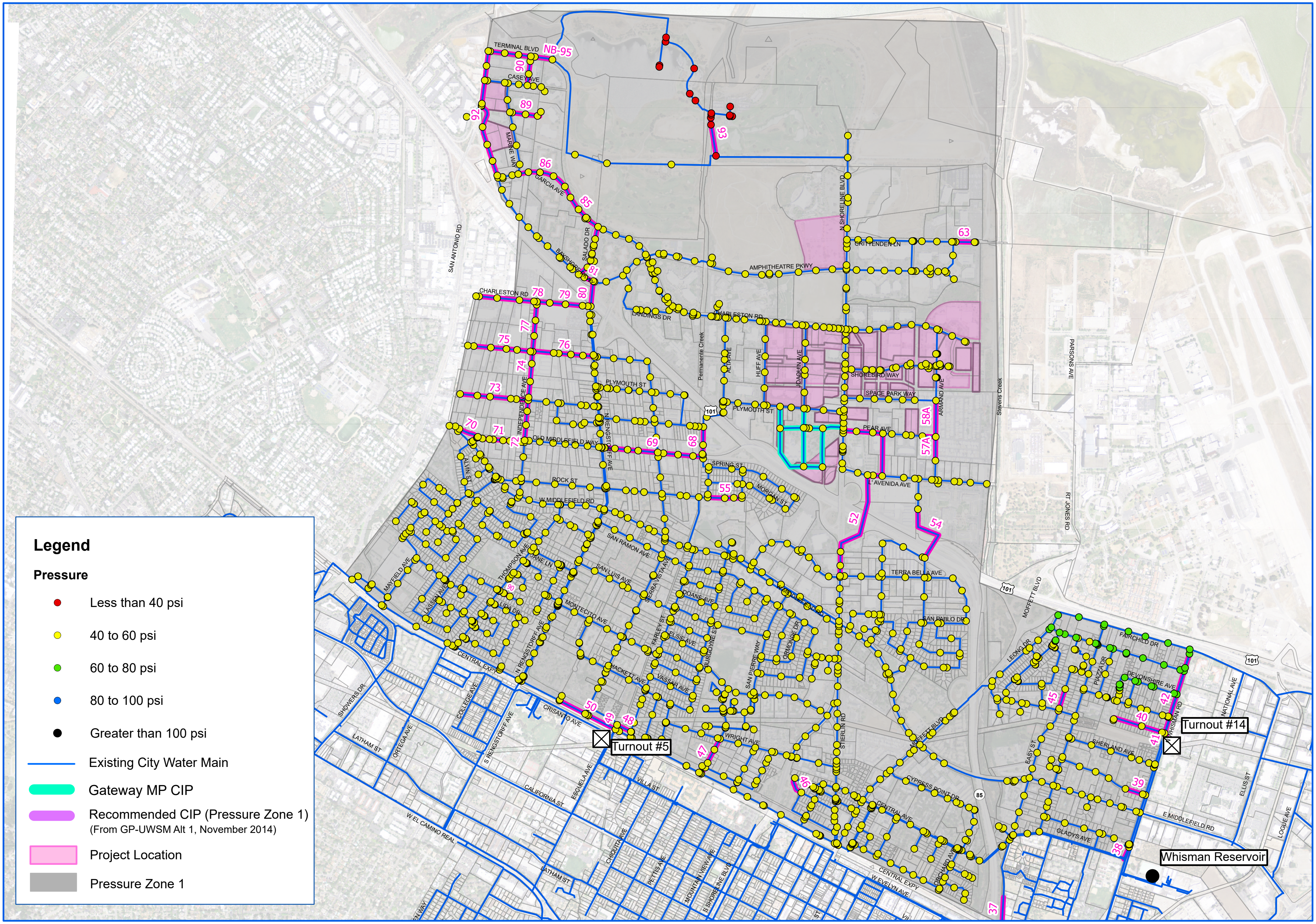
N

FIGURE B-6:

Fire Flow Analysis - With Project

Water System Model - Existing Condition

North Bayshore Master Plan Utility Impact Study | December 2022



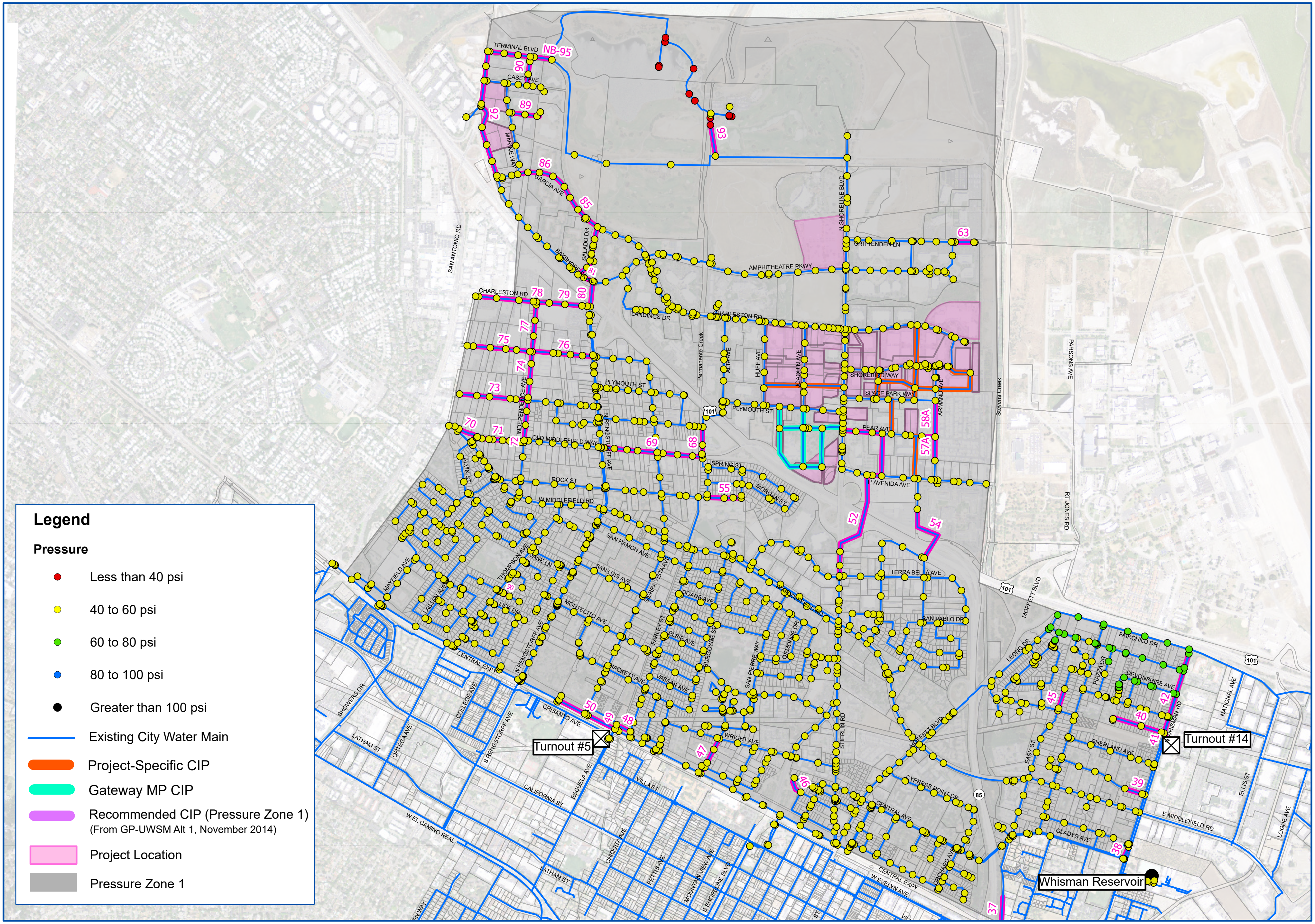
Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

FIGURE B-7:

Peak Hour Demand (PHD) - Without Project

Water System Model - Future Cumulative Condition

North Bayshore Master Plan Utility Impact Study | December 2022



Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

0 1,000 2,000 Feet

FIGURE B-8:

Peak Hour Demand (PHD) - With Project

Water System Model - Future Cumulative Condition

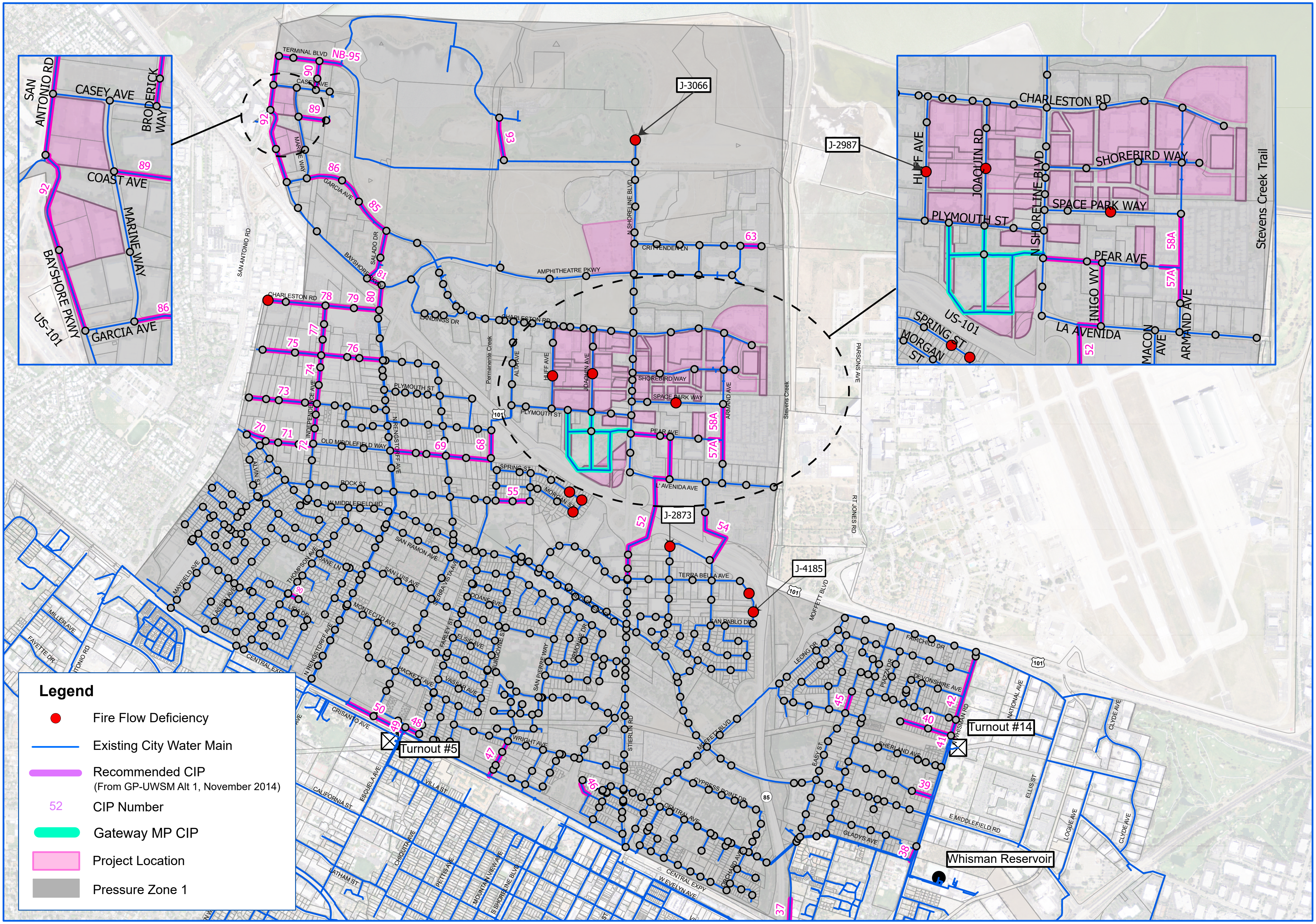


FIGURE B-9:

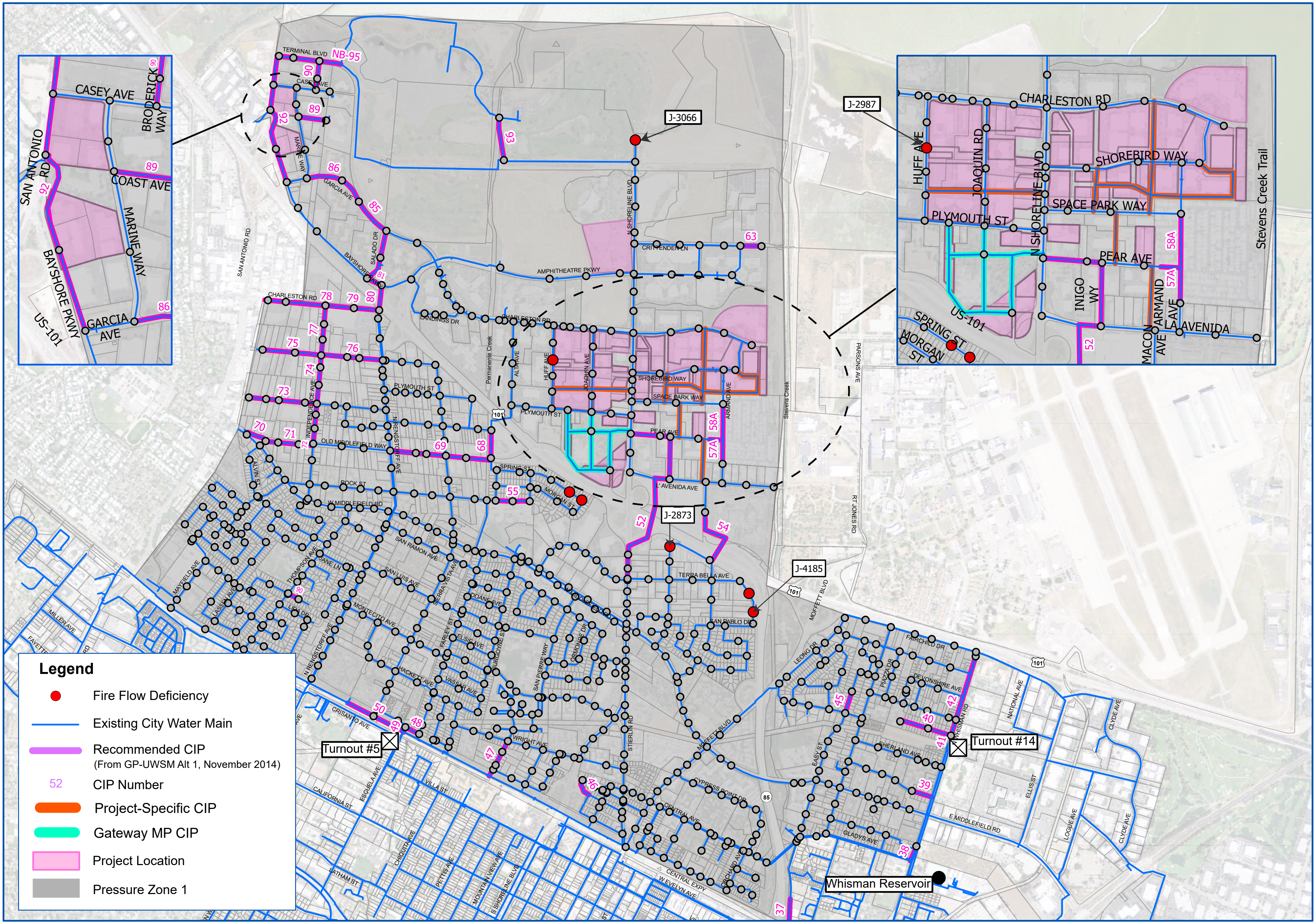
Fire Flow Analysis - Without Project

Water System Model - Future Cumulative Condition

North Bayshore Master Plan Utility Impact Study | December 2022

Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

0 1,000 2,000 Feet



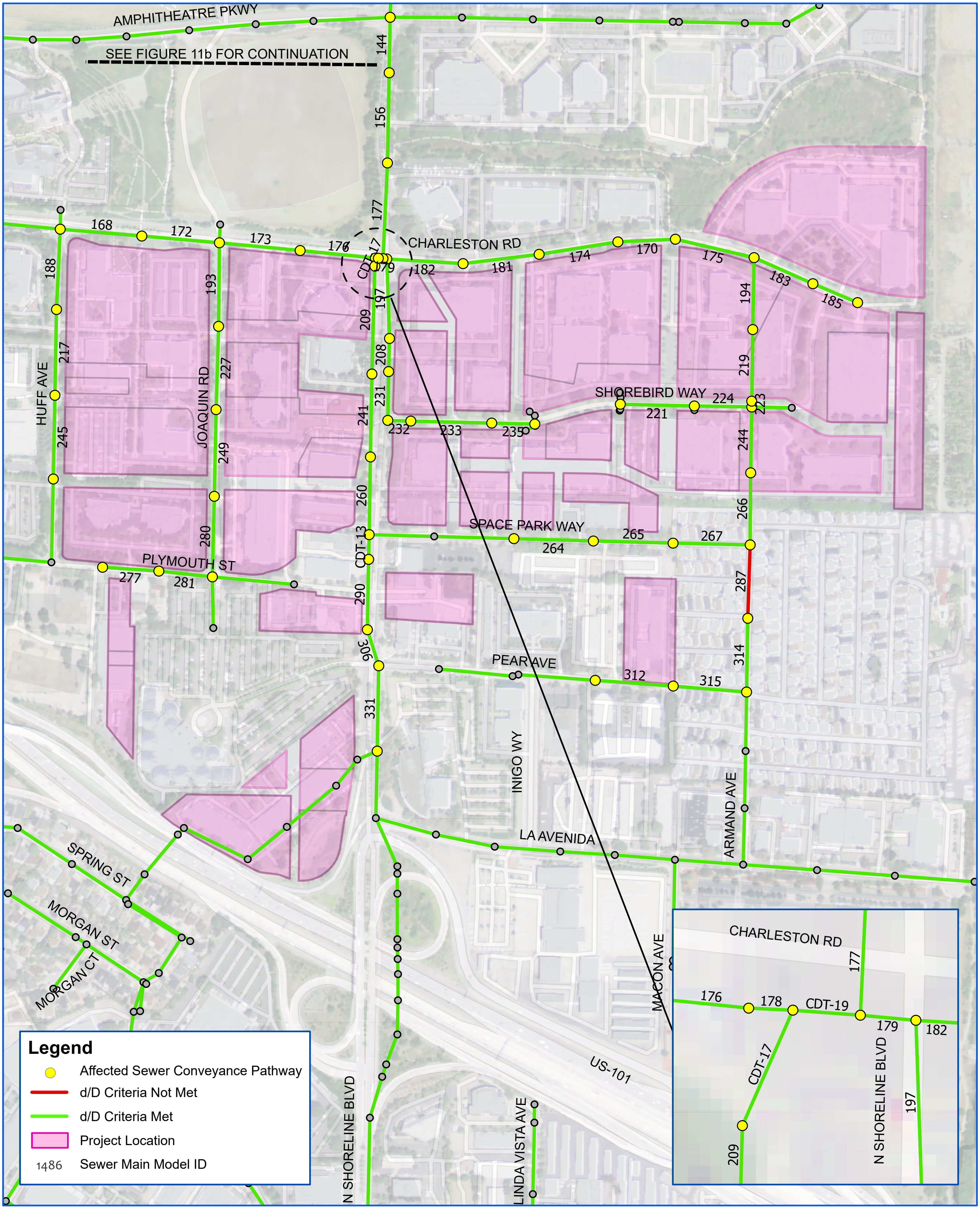
Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

FIGURE B-10:

Fire Flow Analysis - With Project

Water System Model - Future Cumulative Condition

North Bayshore Master Plan Utility Impact Study | December 2022



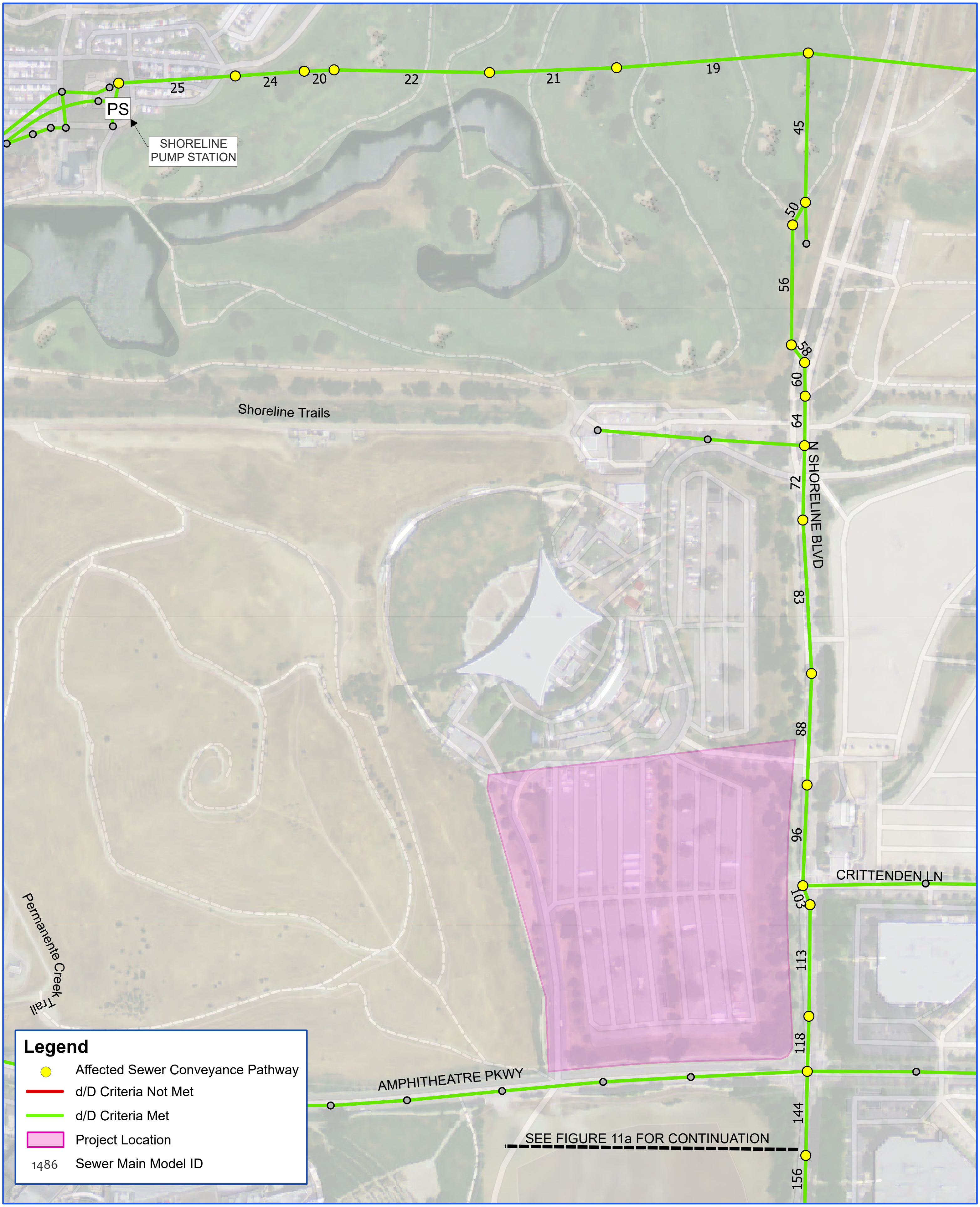
Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

FIGURE B-11a:

PWWF - Without Project

Sewer System Model - Existing Condition

North Bayshore Master Plan Utility Impact Study | December 2022



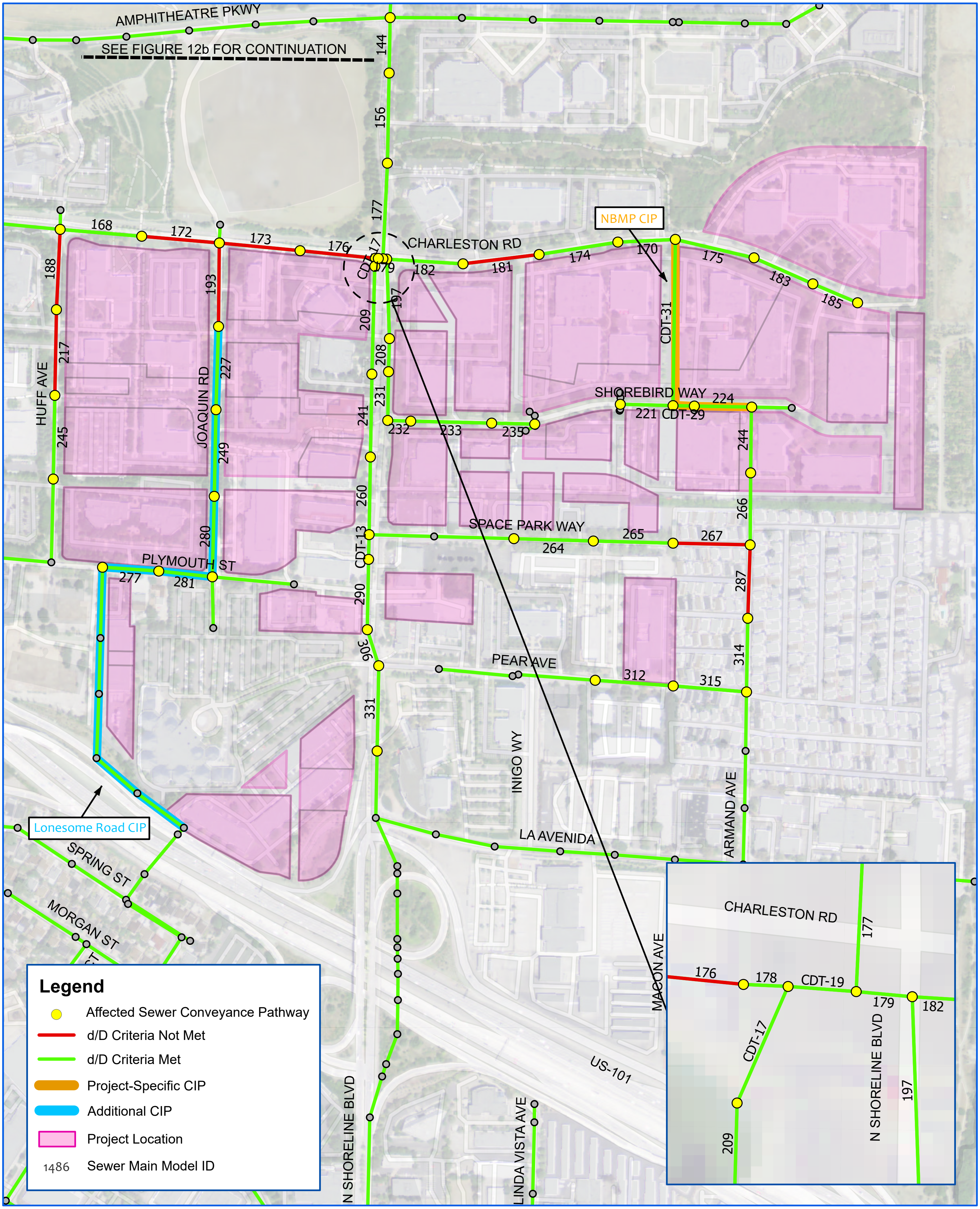
SEE FIGURE 11a FOR CONTINUATION

Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

FIGURE B-11b: **PWWF - Without Project**

Sewer System Model - Existing Condition

North Bayshore Master Plan Utility Impact Study | December 2022



Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

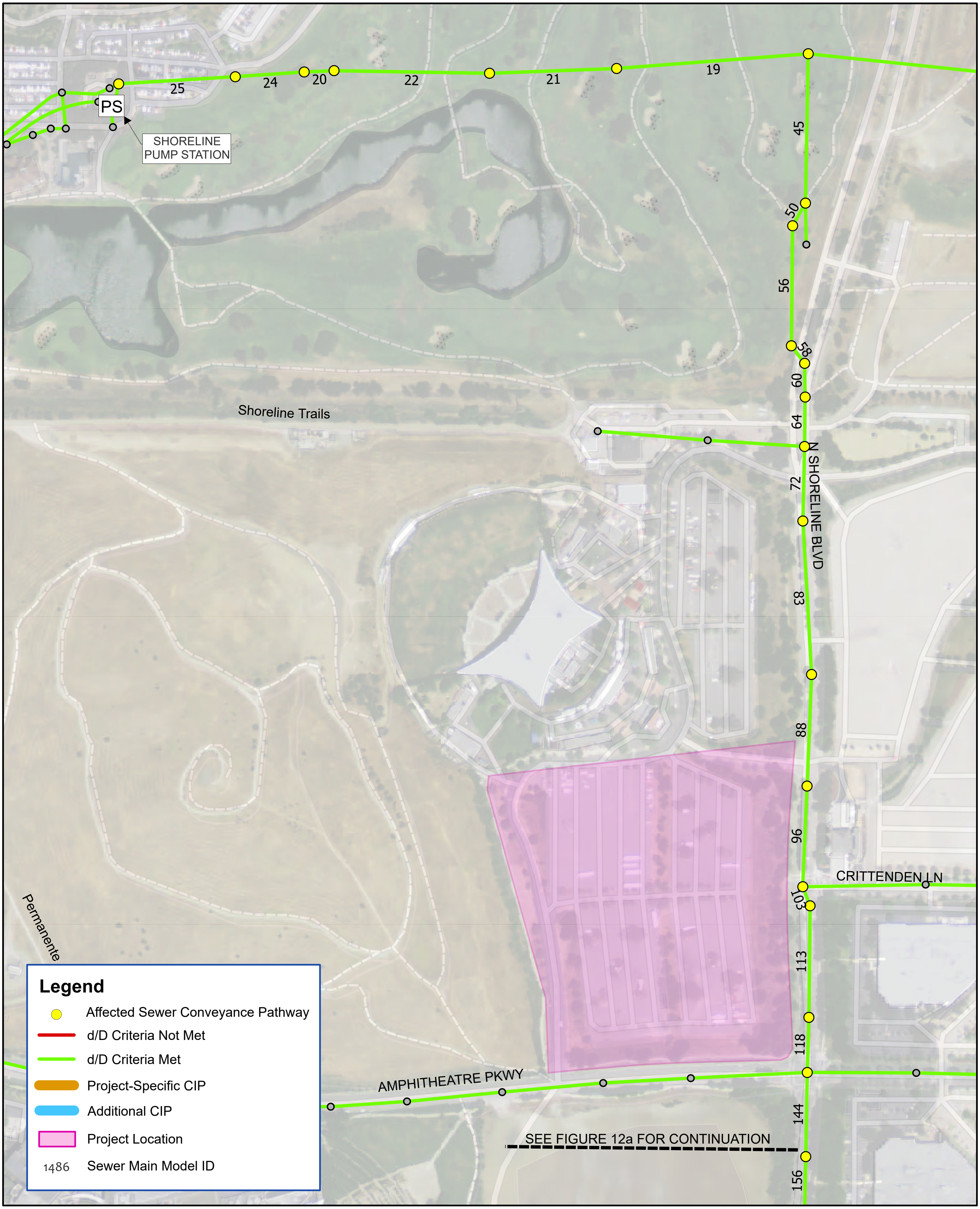
0 260 520 Feet

FIGURE B-12a:

PWWF - With Project - Scenario 1

Sewer System Model - Existing Condition

North Bayshore Master Plan Utility Impact Study | December 2022

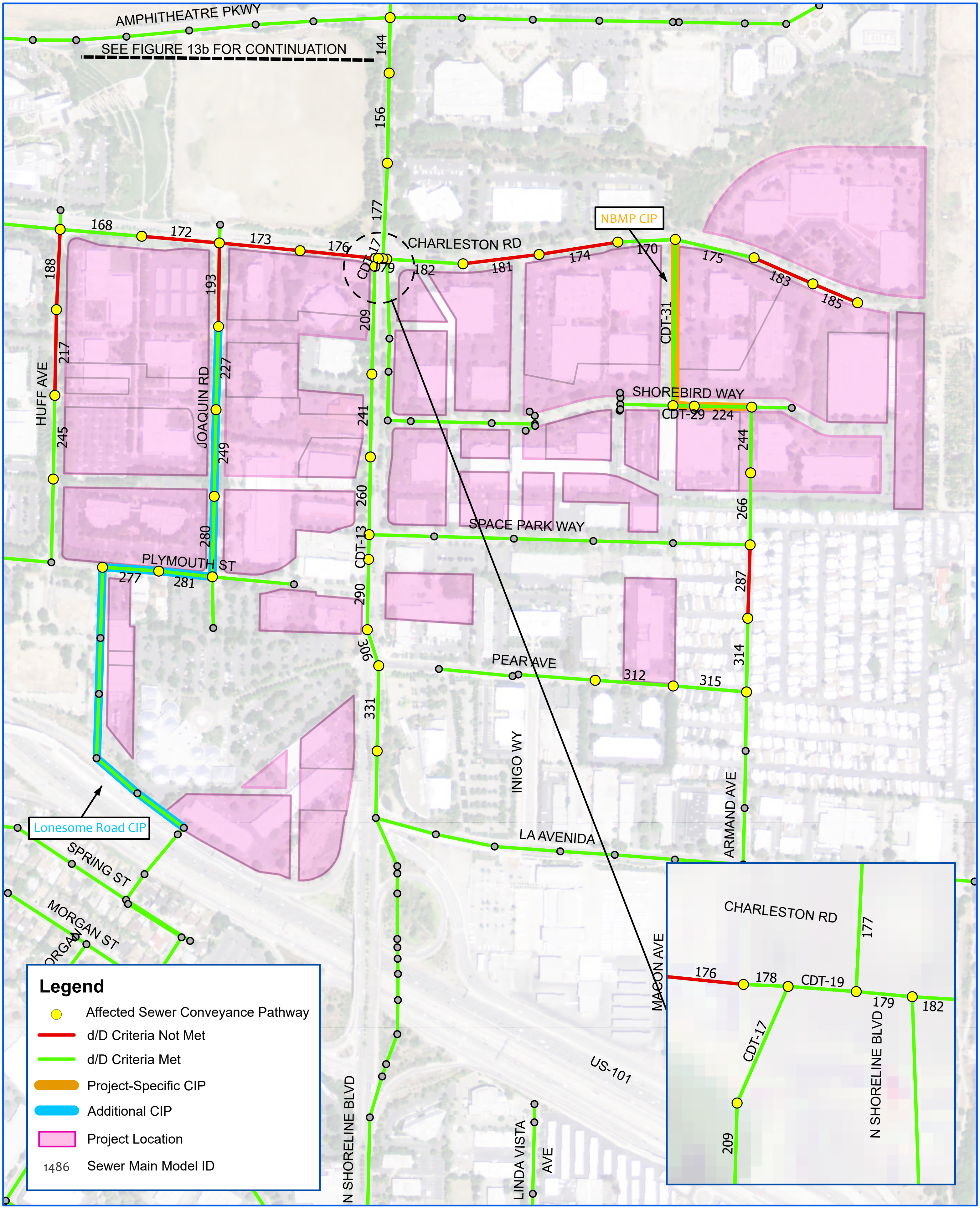


Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

FIGURE B-12b: **PWWF - With Project - Scenario 1**

Sewer System Model - Existing Condition

North Bayshore Master Plan Utility Impact Study | December 2022



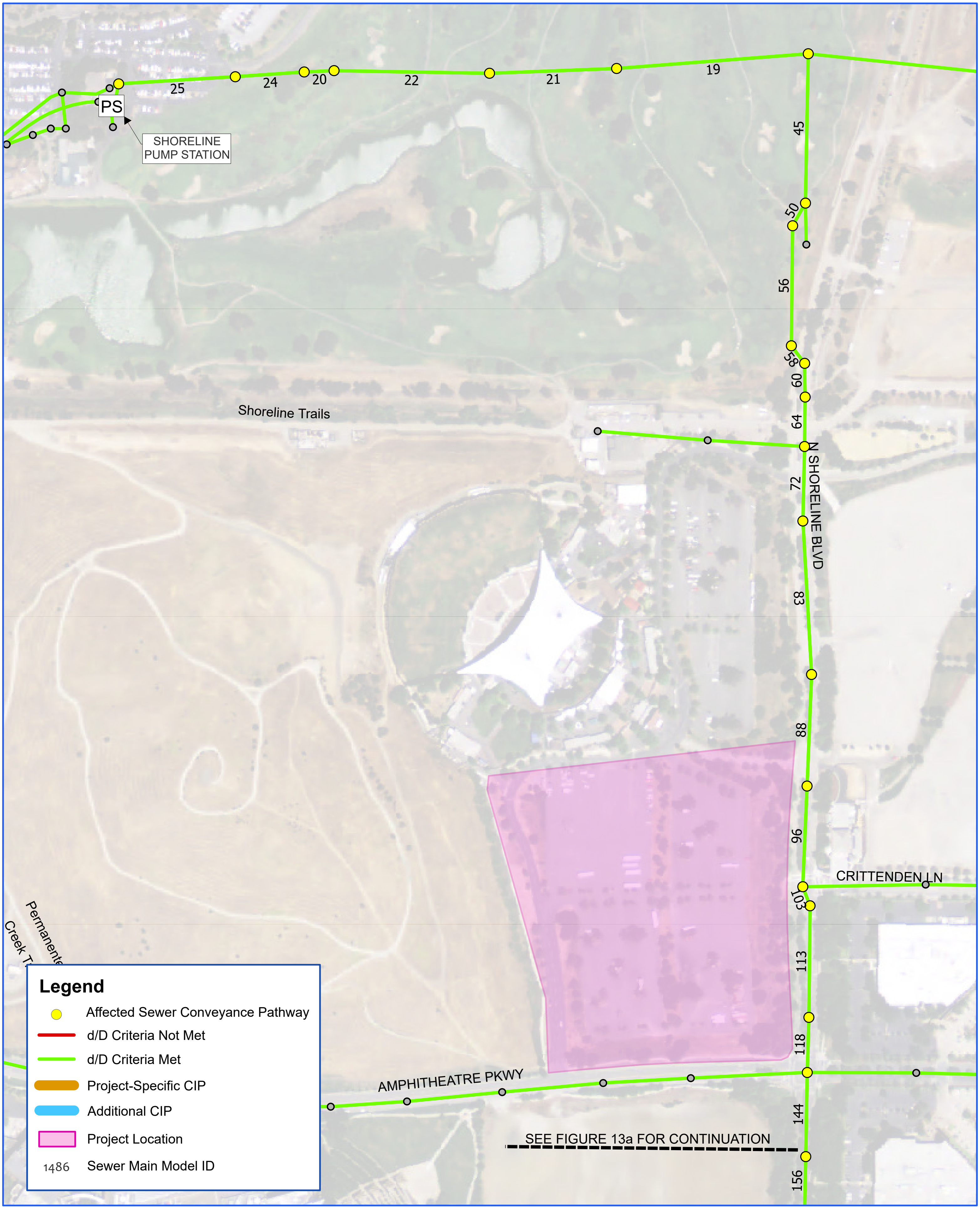
Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

FIGURE B-13a:

PWWF - With Project - Scenario 2

Sewer System Model - Existing Condition

North Bayshore Master Plan Utility Impact Study | December 2022



SEE FIGURE 13a FOR CONTINUATION

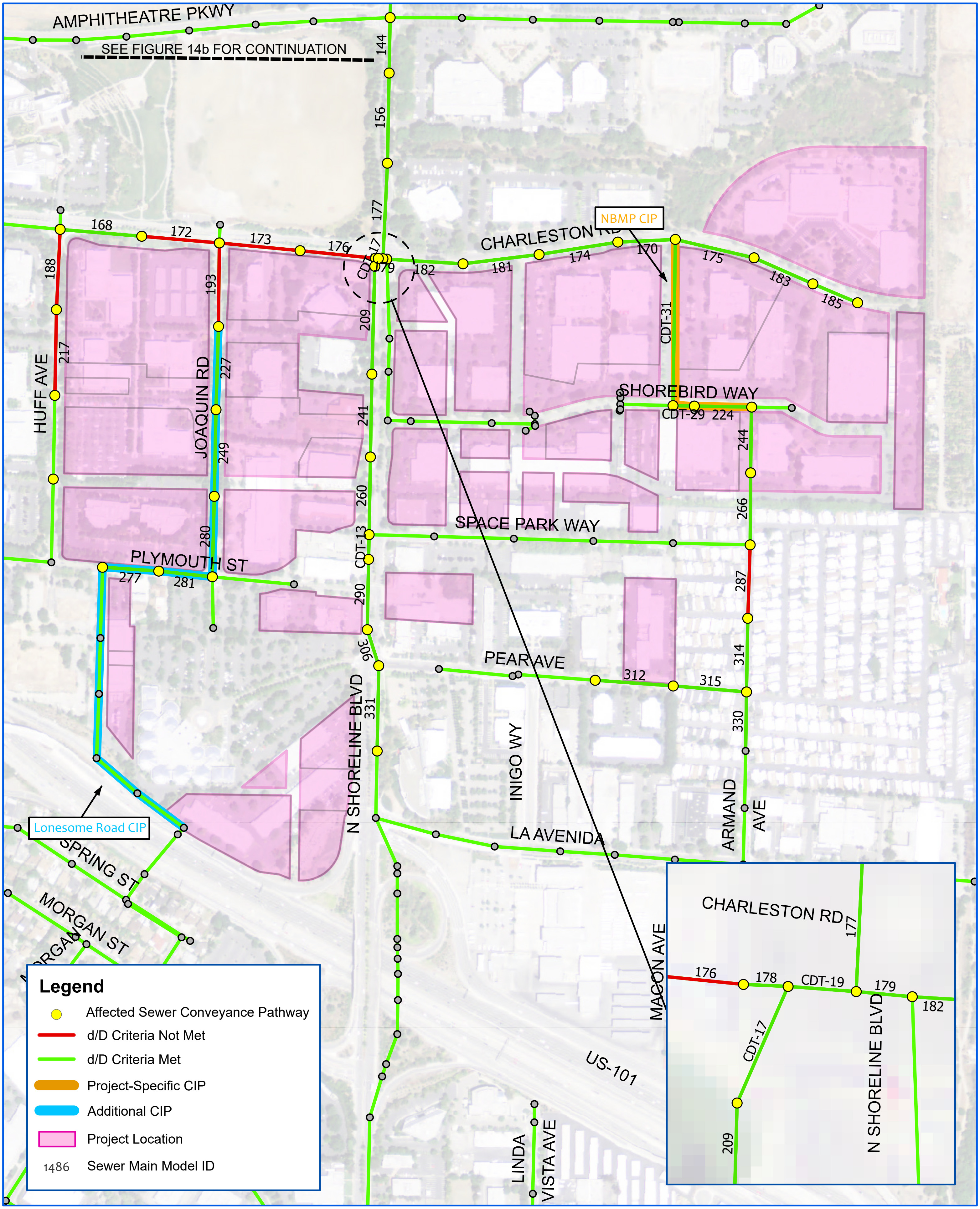
Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

0 170 340 Feet

FIGURE B-13b: **PWWF - With Project - Scenario 2**

Sewer System Model - Existing Condition

North Bayshore Master Plan Utility Impact Study | December 2022



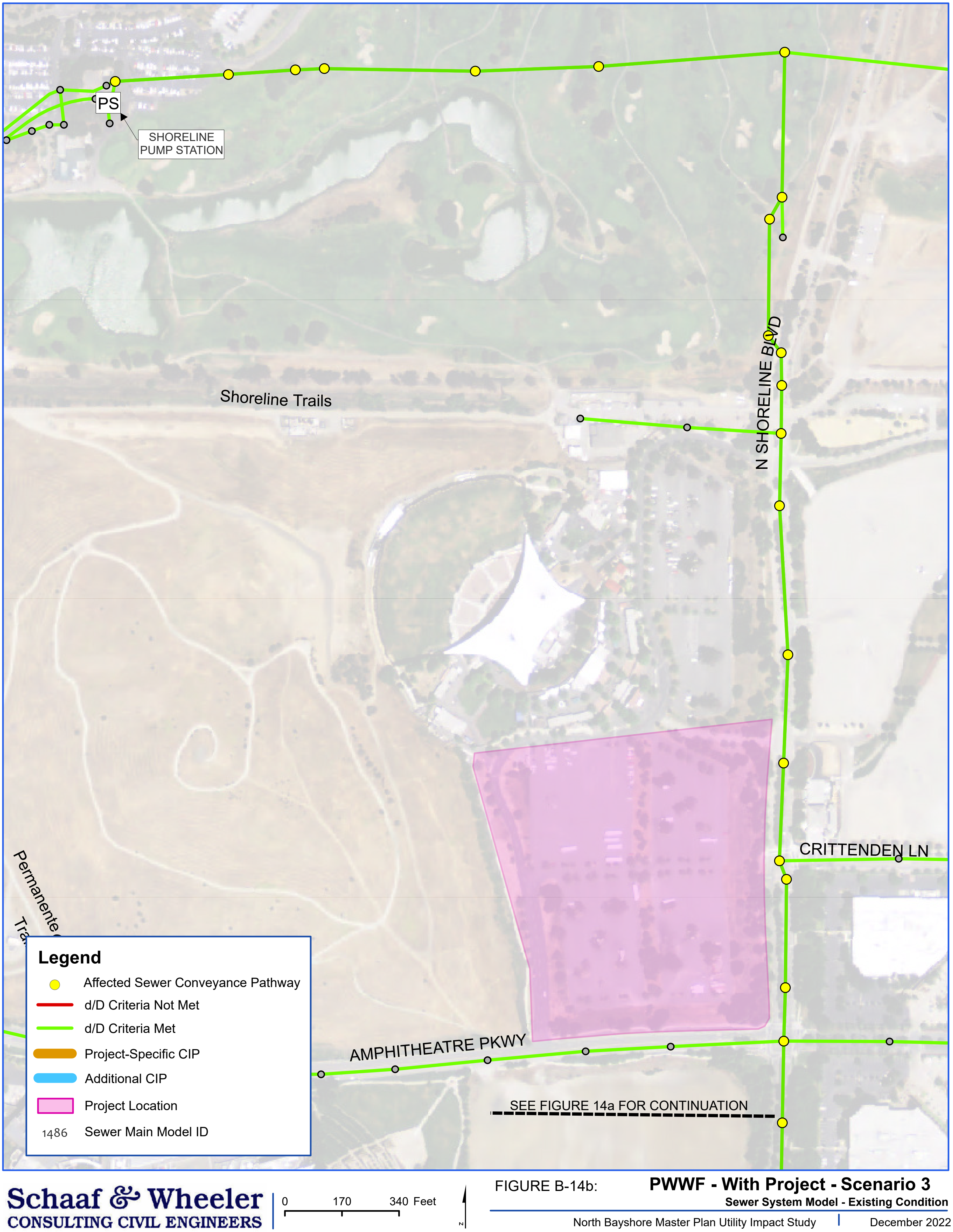
Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

0 260 520 Feet

FIGURE B-14a: **PWWF - With Project - Scenario 3**

Sewer System Model - Existing Condition

North Bayshore Master Plan Utility Impact Study | December 2022

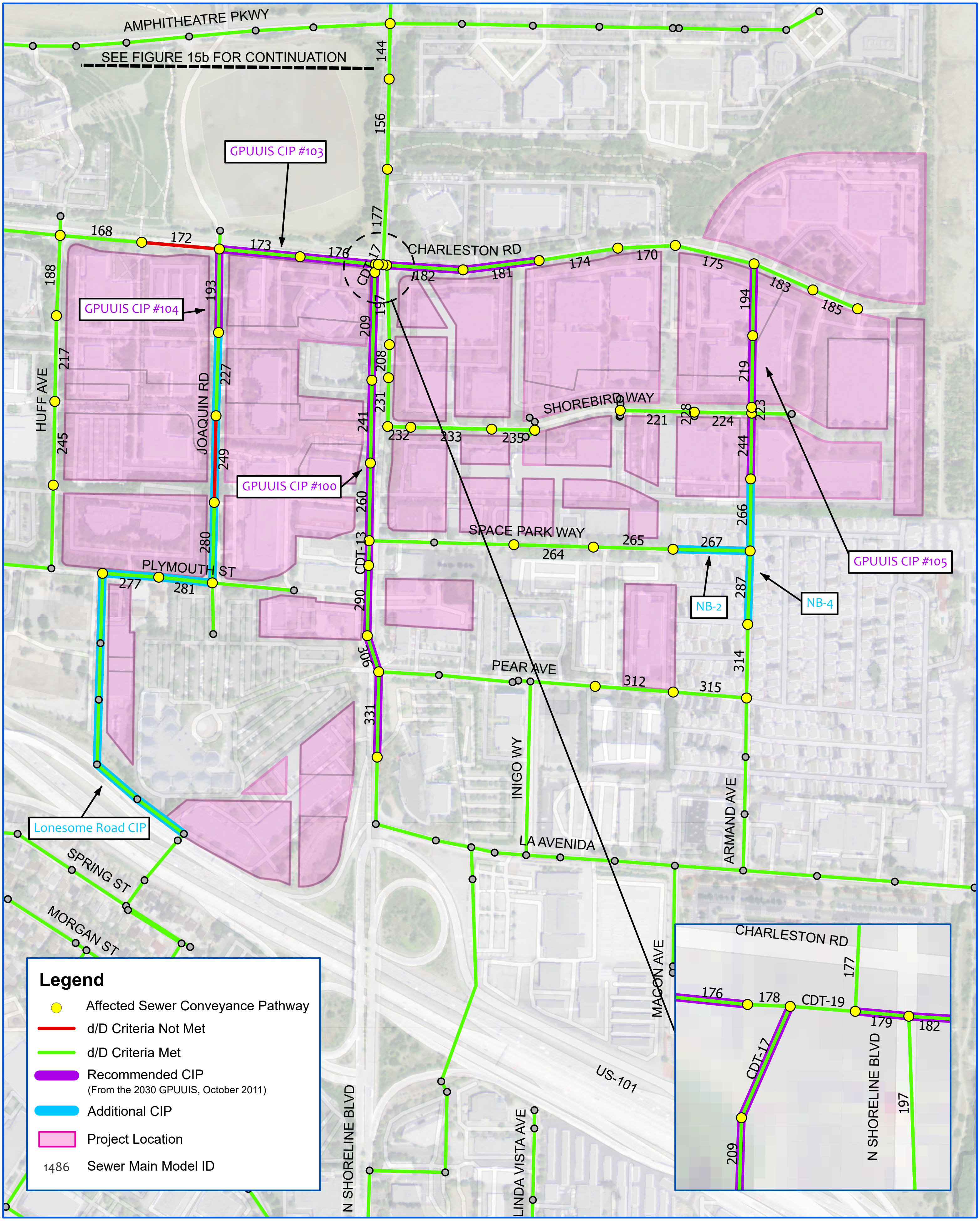


Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

FIGURE B-14b: **PWWF - With Project - Scenario 3**

Sewer System Model - Existing Condition

North Bayshore Master Plan Utility Impact Study | December 2022



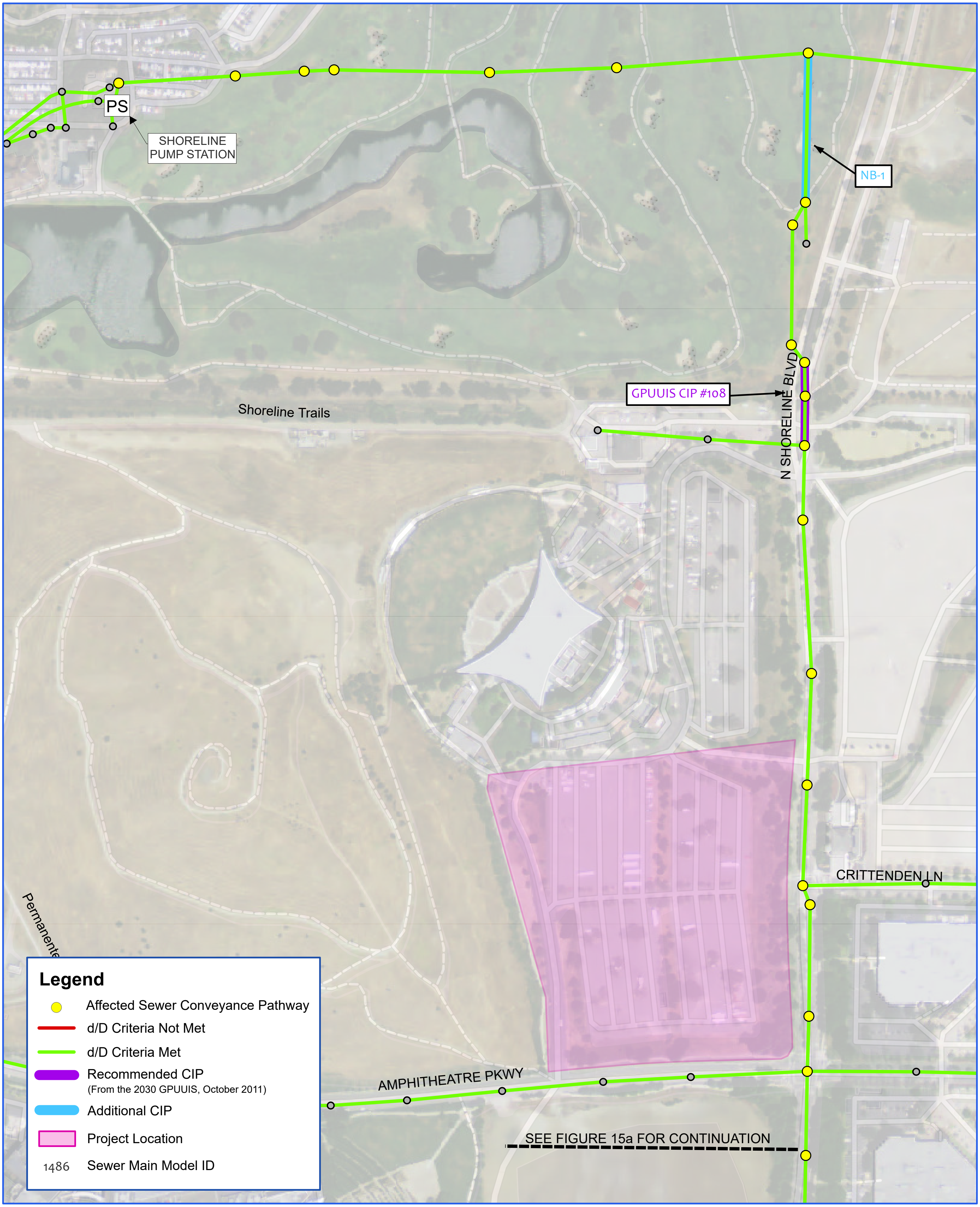
Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

0 260 520 Feet

FIGURE B-15a: **PWWF - Without Project**

Sewer System Model - Future Cumulative Condition

North Bayshore Master Plan Utility Impact Study | December 2022



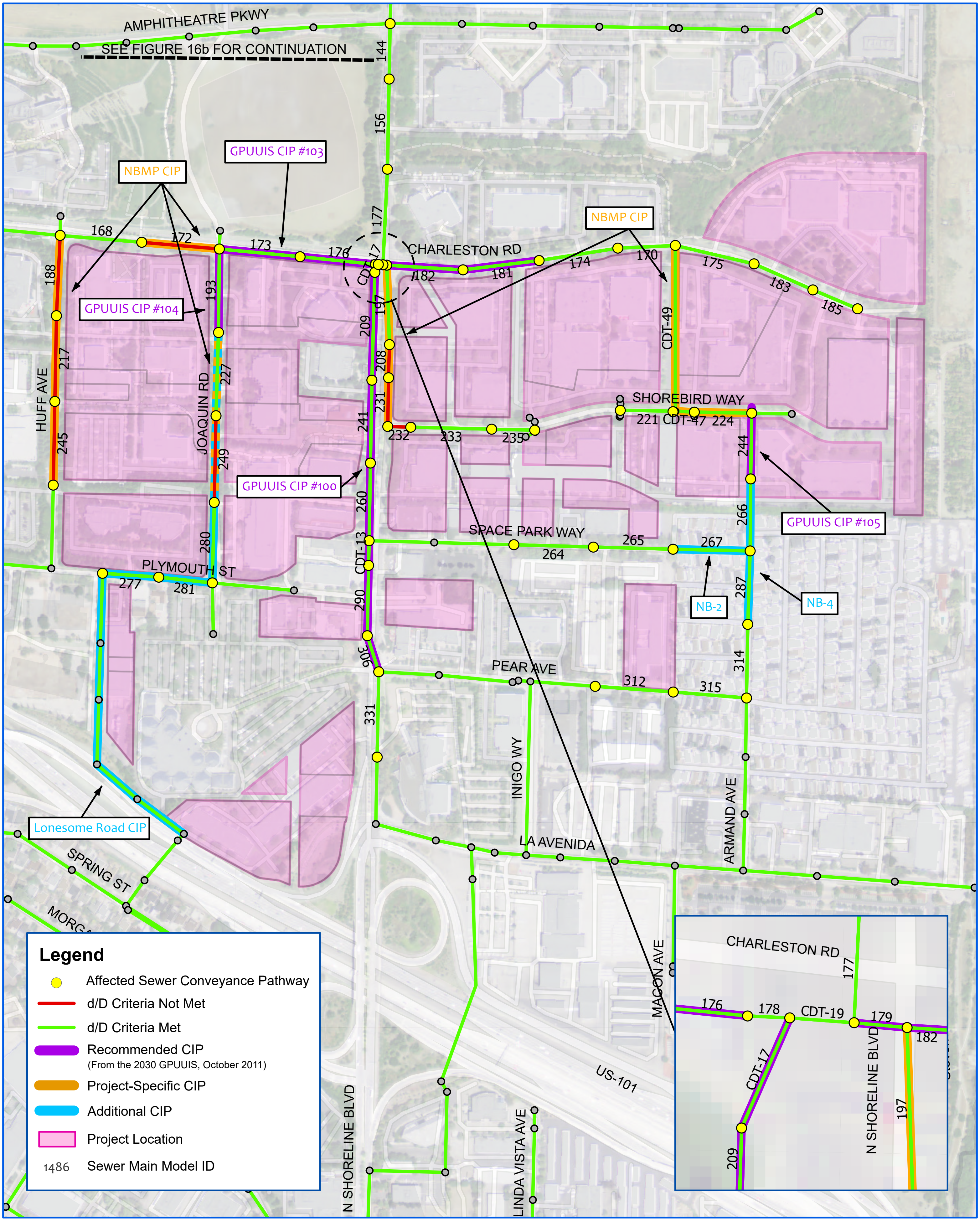
Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

FIGURE B-15b:

PWWF - Without Project

Sewer System Model - Future Cumulative Condition

North Bayshore Master Plan Utility Impact Study | December 2022



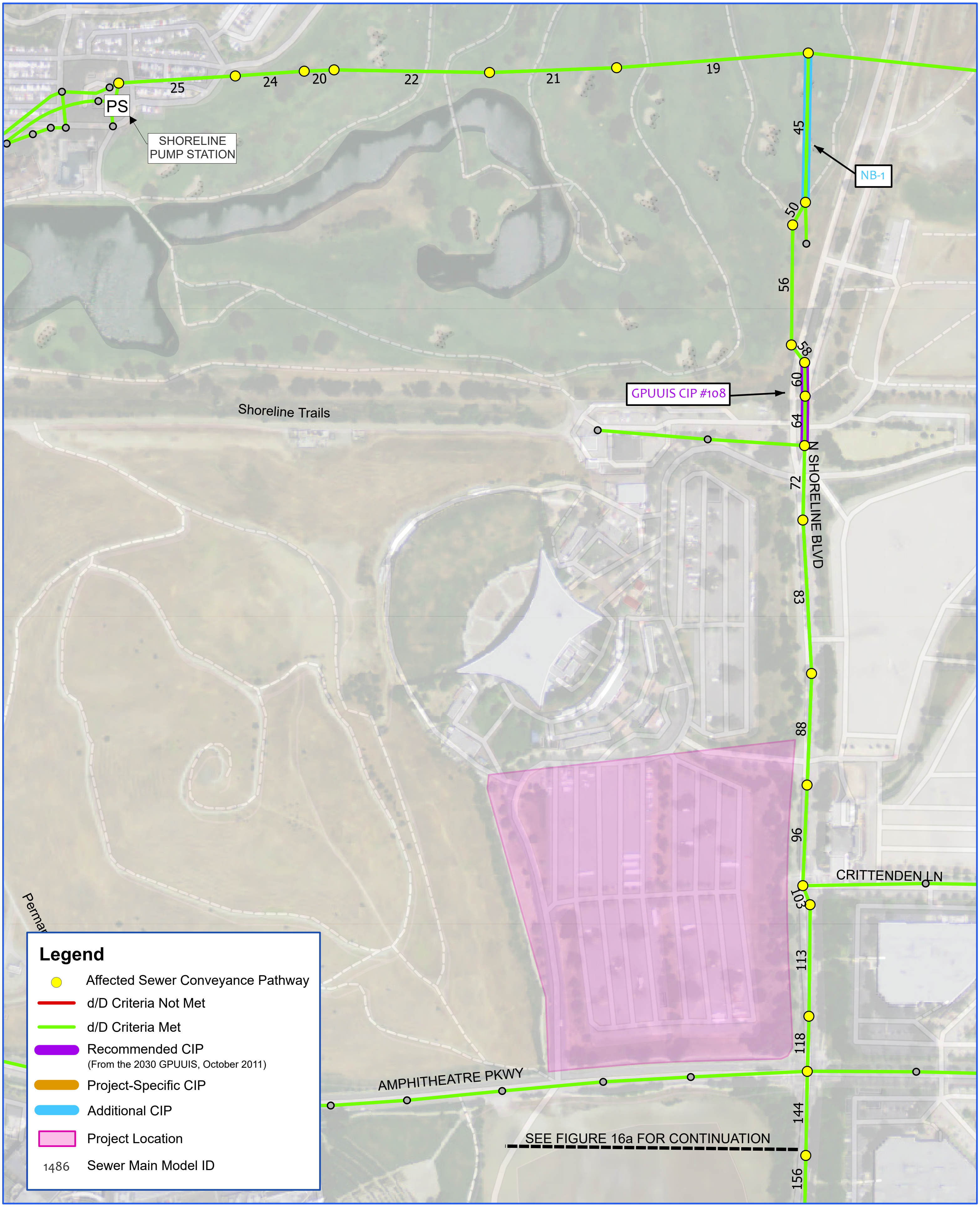
Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

0 260 520 Feet

FIGURE B-16a: **PWWF - With Project - Scenario 1**

Sewer System Model - Future Cumulative Condition

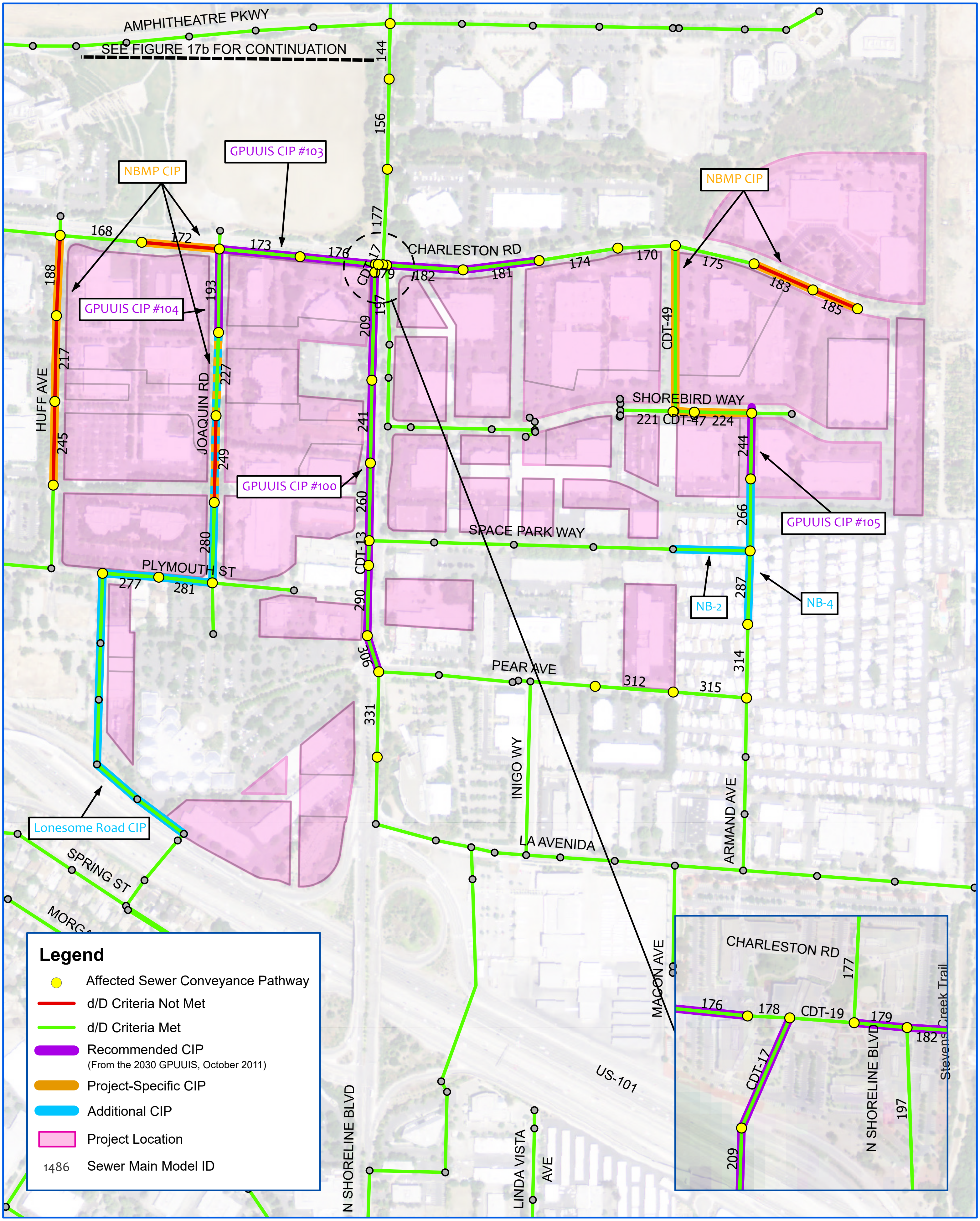
North Bayshore Master Plan Utility Impact Study | December 2022



Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

FIGURE B-16b: **PWWF - With Project - Scenario 1**

Sewer System Model - Future Cumulative Condition

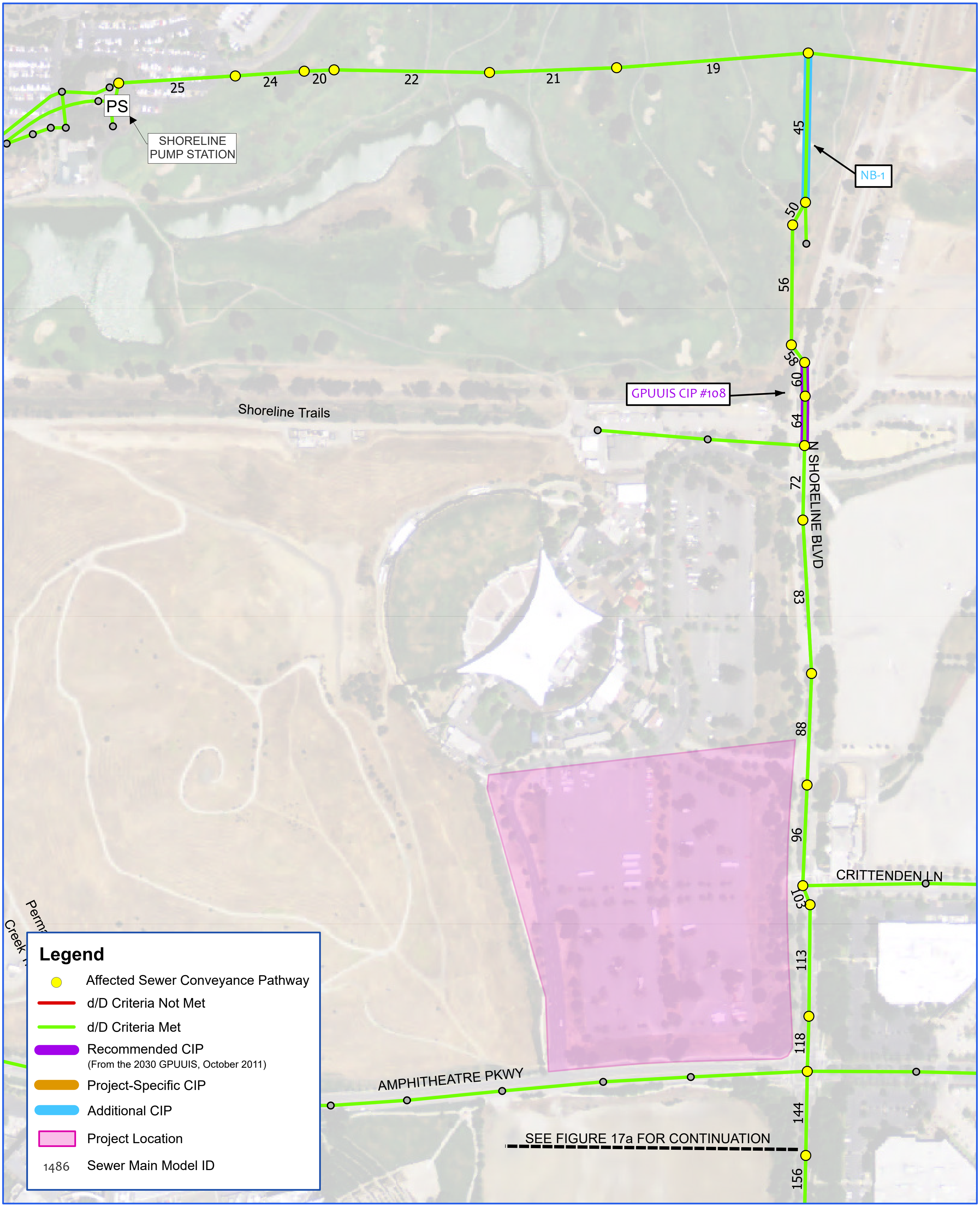


Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

FIGURE B-17a: **PWWF - With Project - Scenario 2**

Sewer System Model - Future Cumulative Condition

North Bayshore Master Plan Utility Impact Study | December 2022

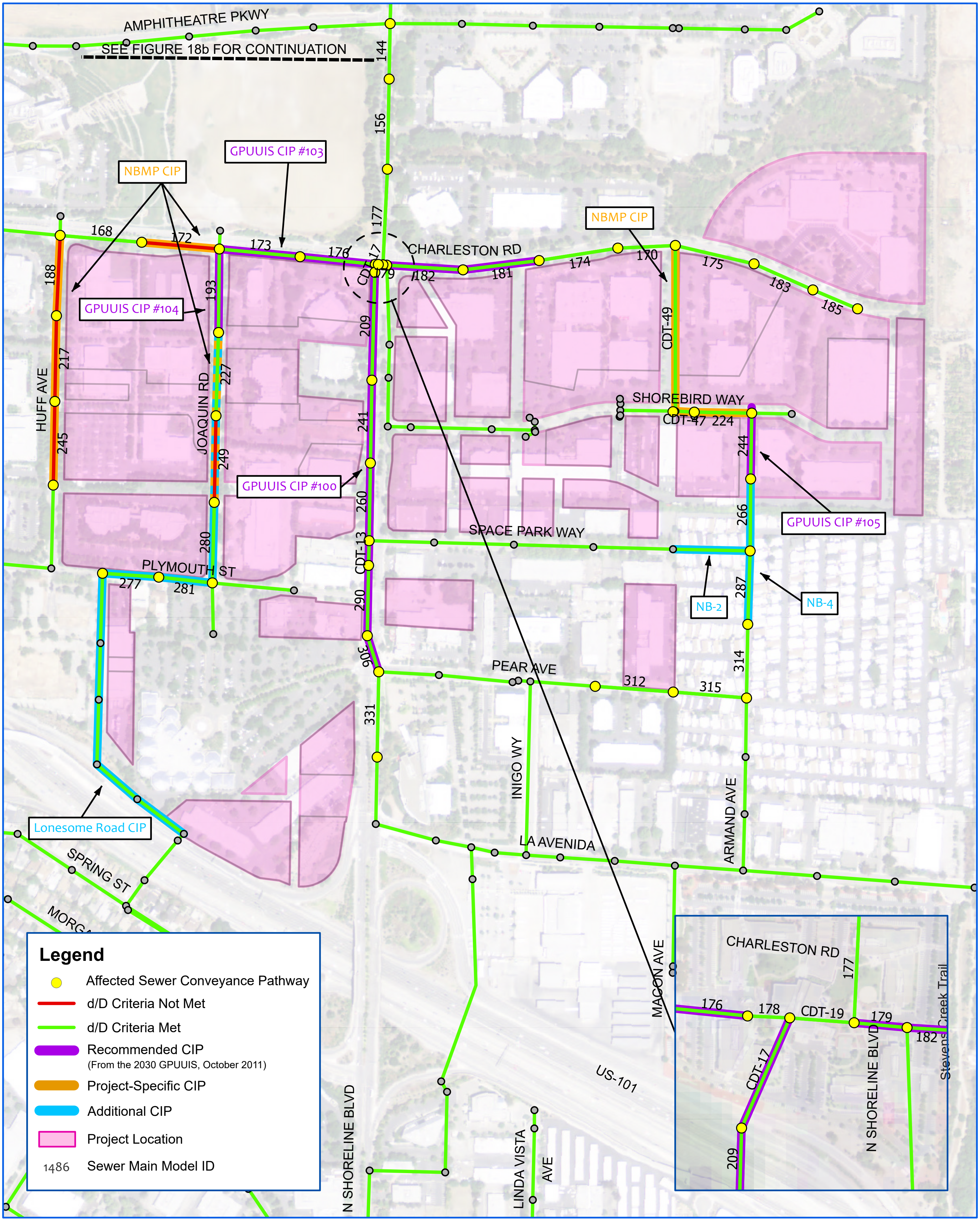


Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

FIGURE B-17b: **PWWF - With Project - Scenario 2**

Sewer System Model - Future Cumulative Condition

North Bayshore Master Plan Utility Impact Study | December 2022



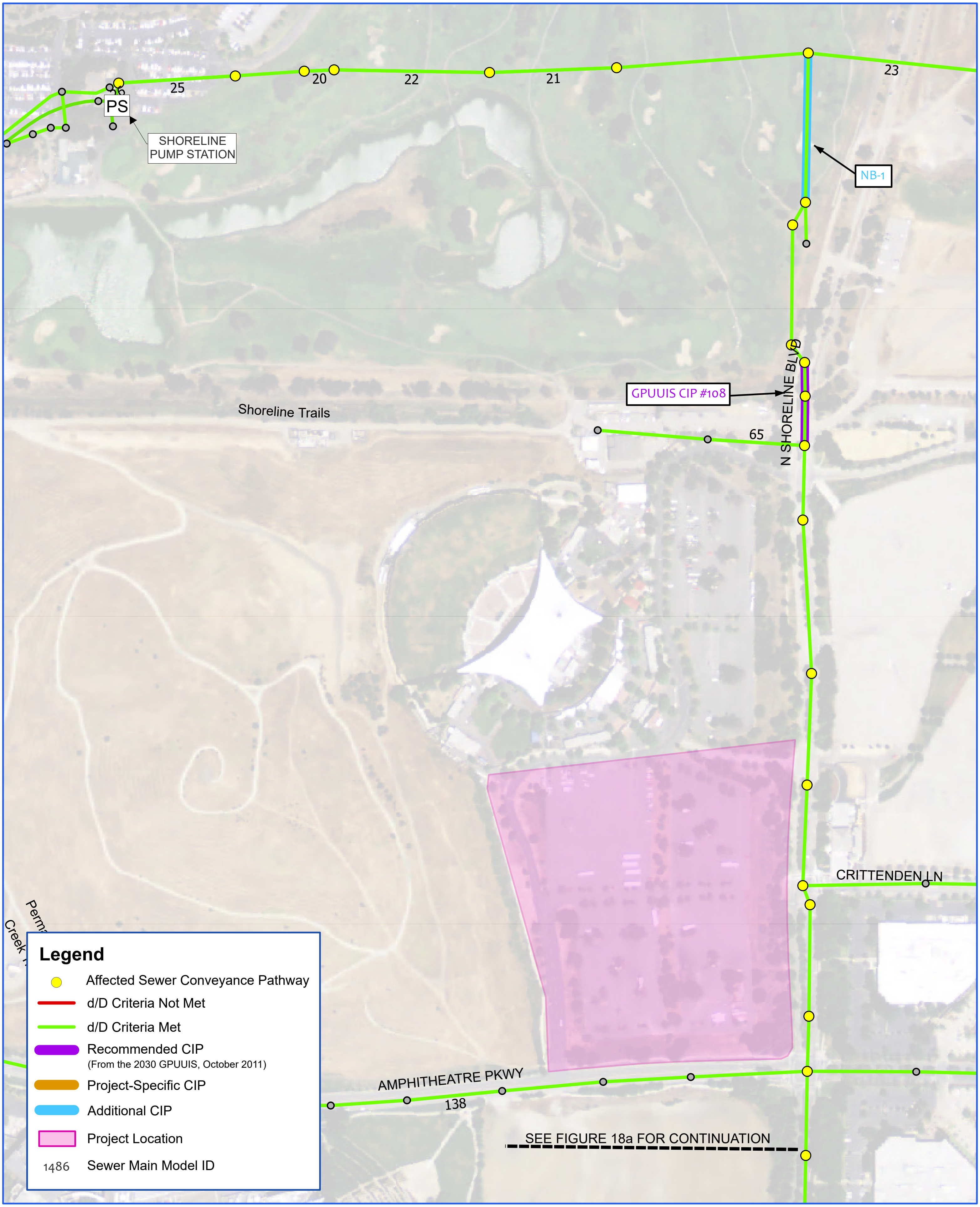
Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

0 260 520 Feet

FIGURE B-18a: **PWWF - With Project - Scenario 3**

Sewer System Model - Future Cumulative Condition

North Bayshore Master Plan Utility Impact Study | December 2022



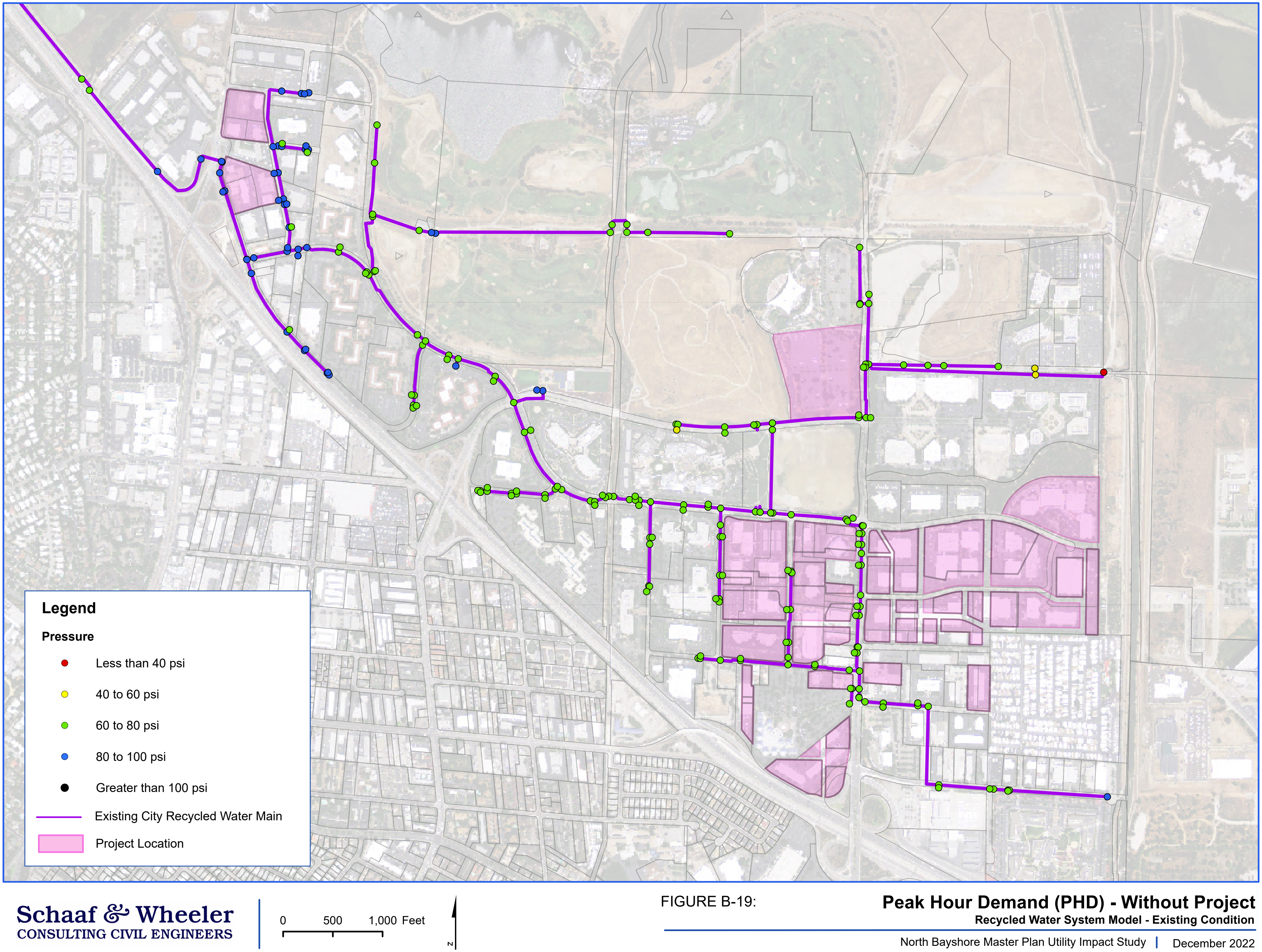
Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

0 175 350 Feet

FIGURE B-18b: **PWWF - With Project - Scenario 3**

Sewer System Model - Future Cumulative Condition

North Bayshore Master Plan Utility Impact Study | December 2022



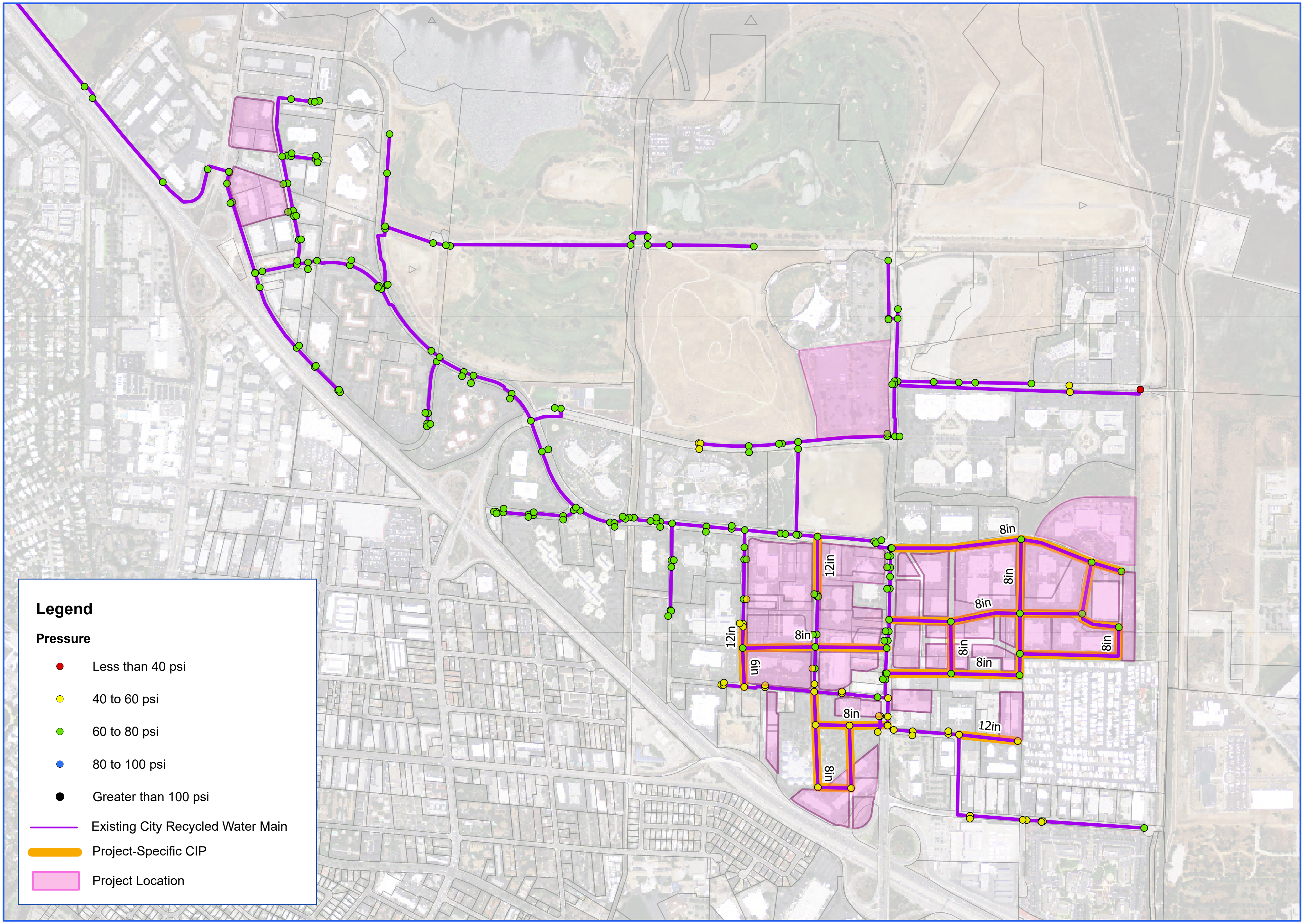
Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

FIGURE B-19:

Peak Hour Demand (PHD) - Without Project

Recycled Water System Model - Existing Condition

North Bayshore Master Plan Utility Impact Study | December 2022



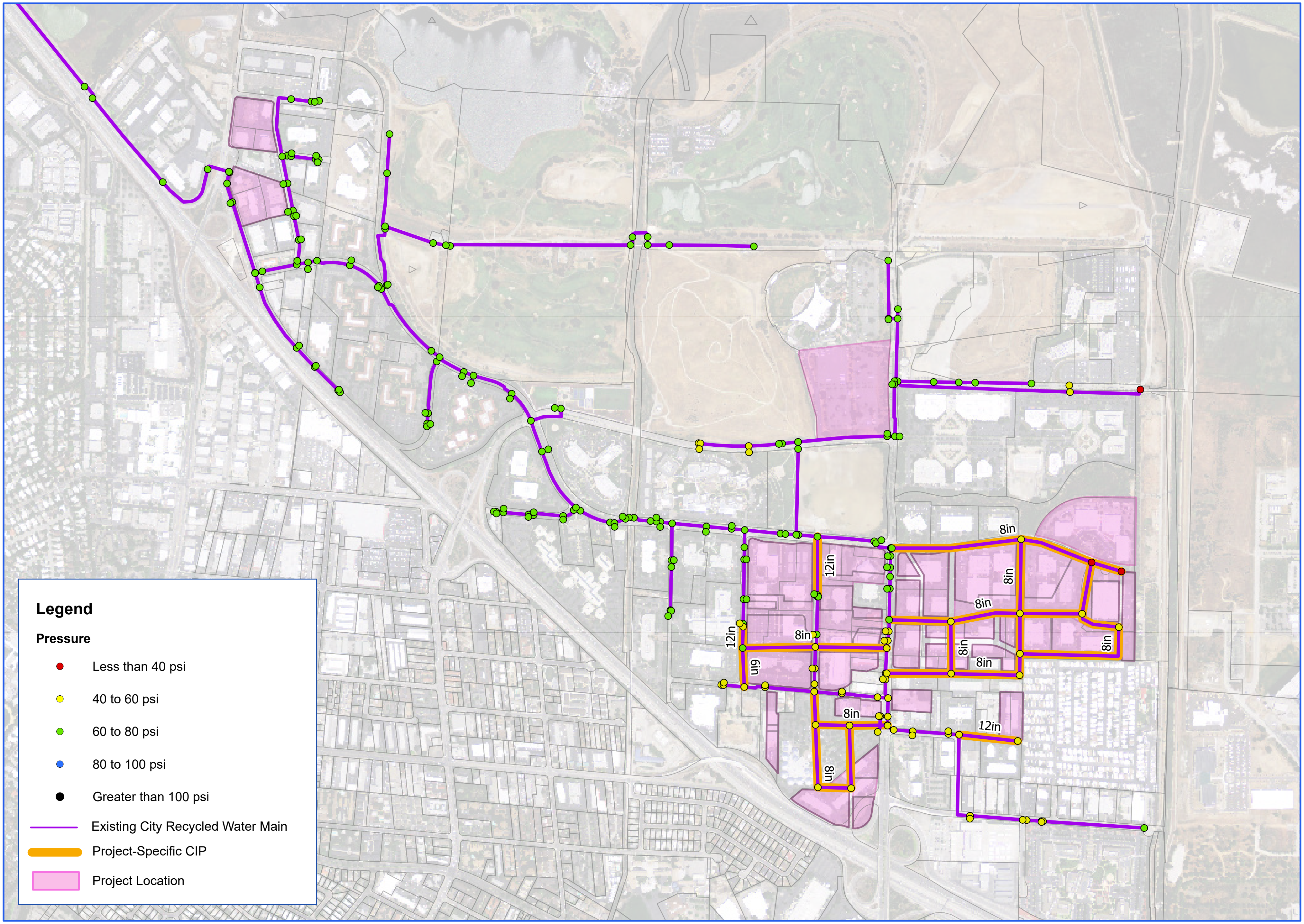
Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

0 500 1,000 Feet

FIGURE B-20: **Peak Hour Demand (PHD) - With Project - Scenario 1**

Recycled Water System Model - Existing Condition

North Bayshore Master Plan Utility Impact Study | December 2022



Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

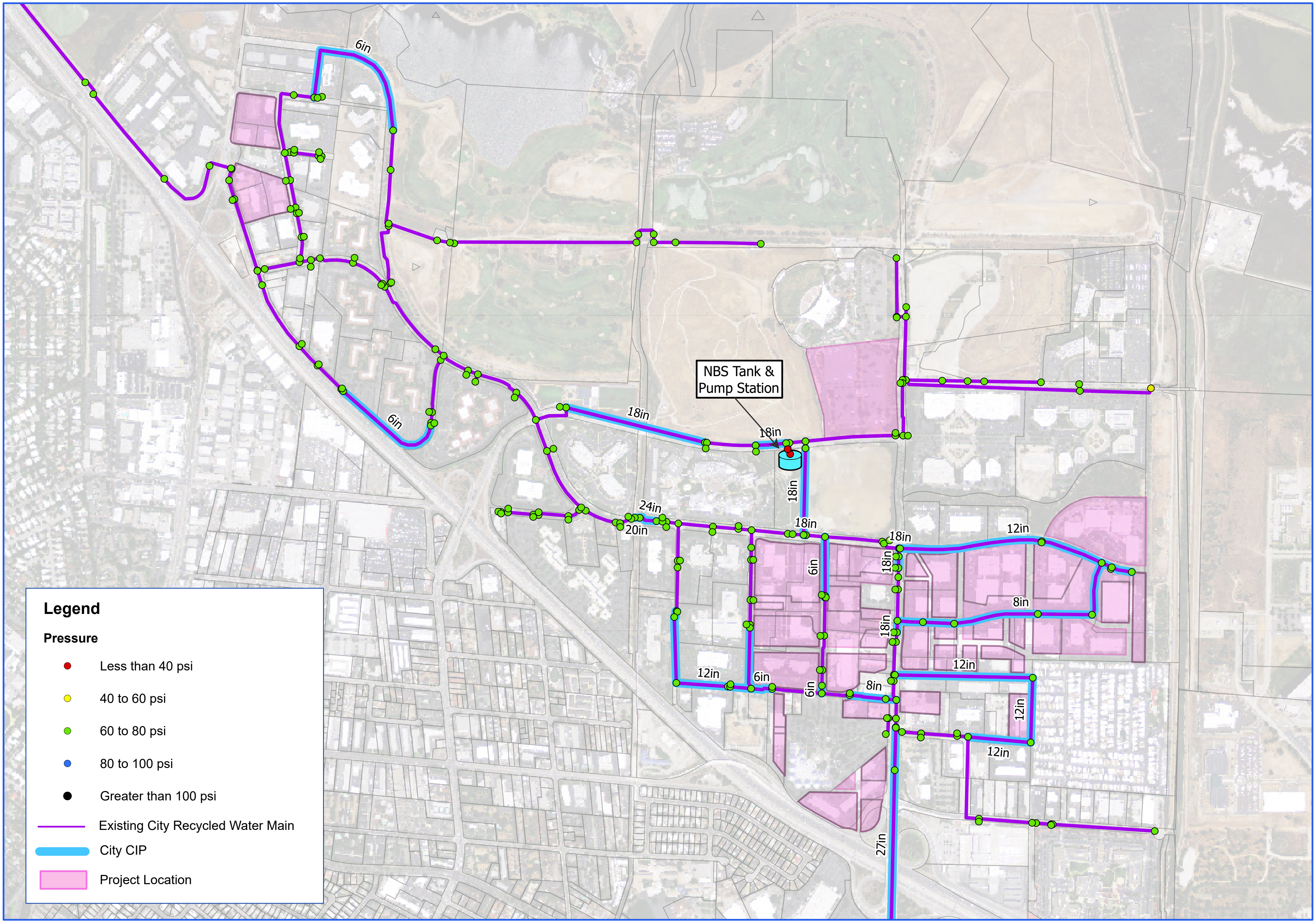
0 500 1,000 Feet

N

FIGURE B-21: **Peak Hour Demand (PHD) - With Project - Scenario 2**

Recycled Water System Model - Existing Condition

North Bayshore Master Plan Utility Impact Study | December 2022



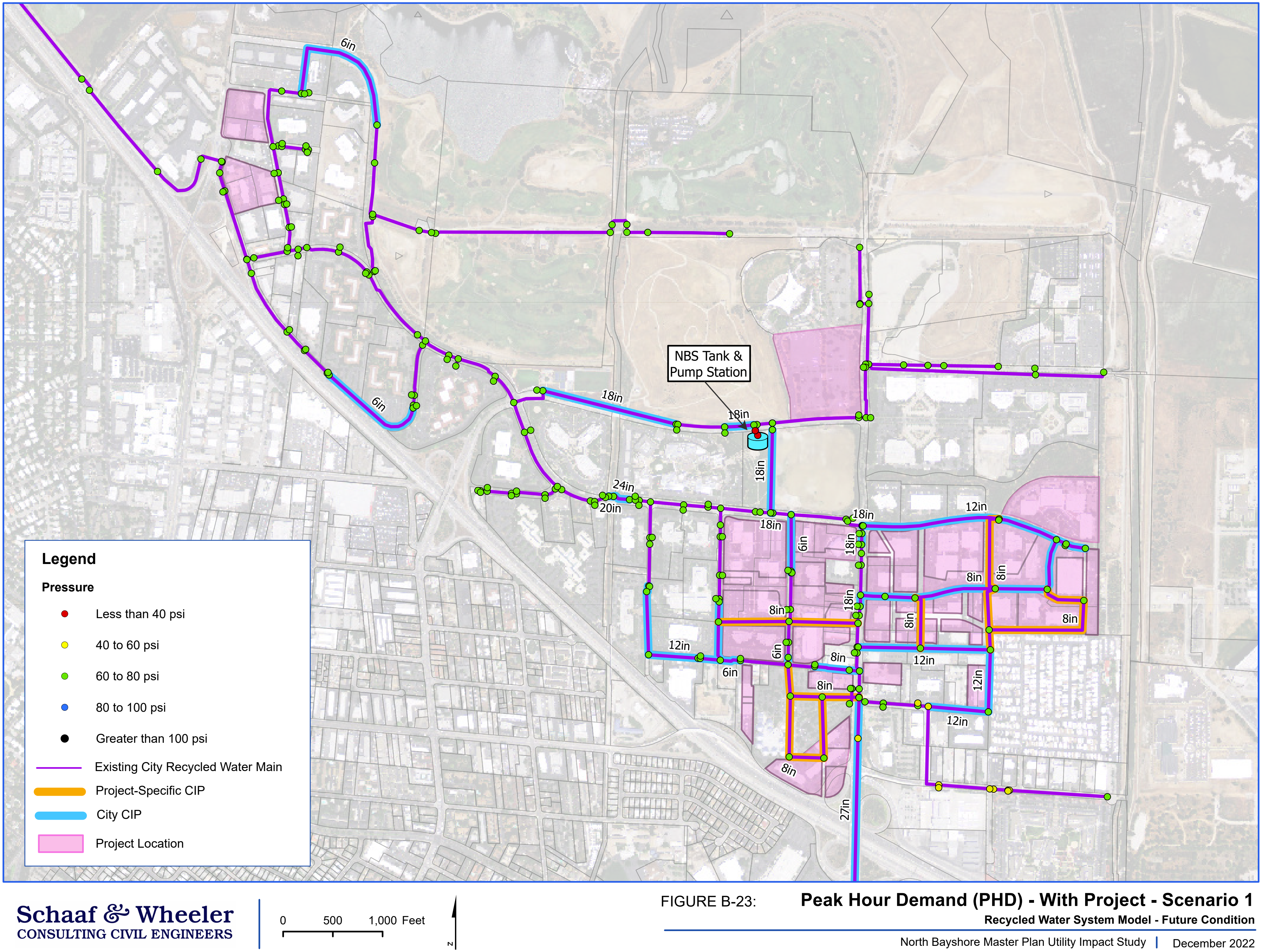
Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

FIGURE B-22:

Peak Hour Demand (PHD) - Without Project

Recycled Water System Model - Future Condition

North Bayshore Master Plan Utility Impact Study | December 2022

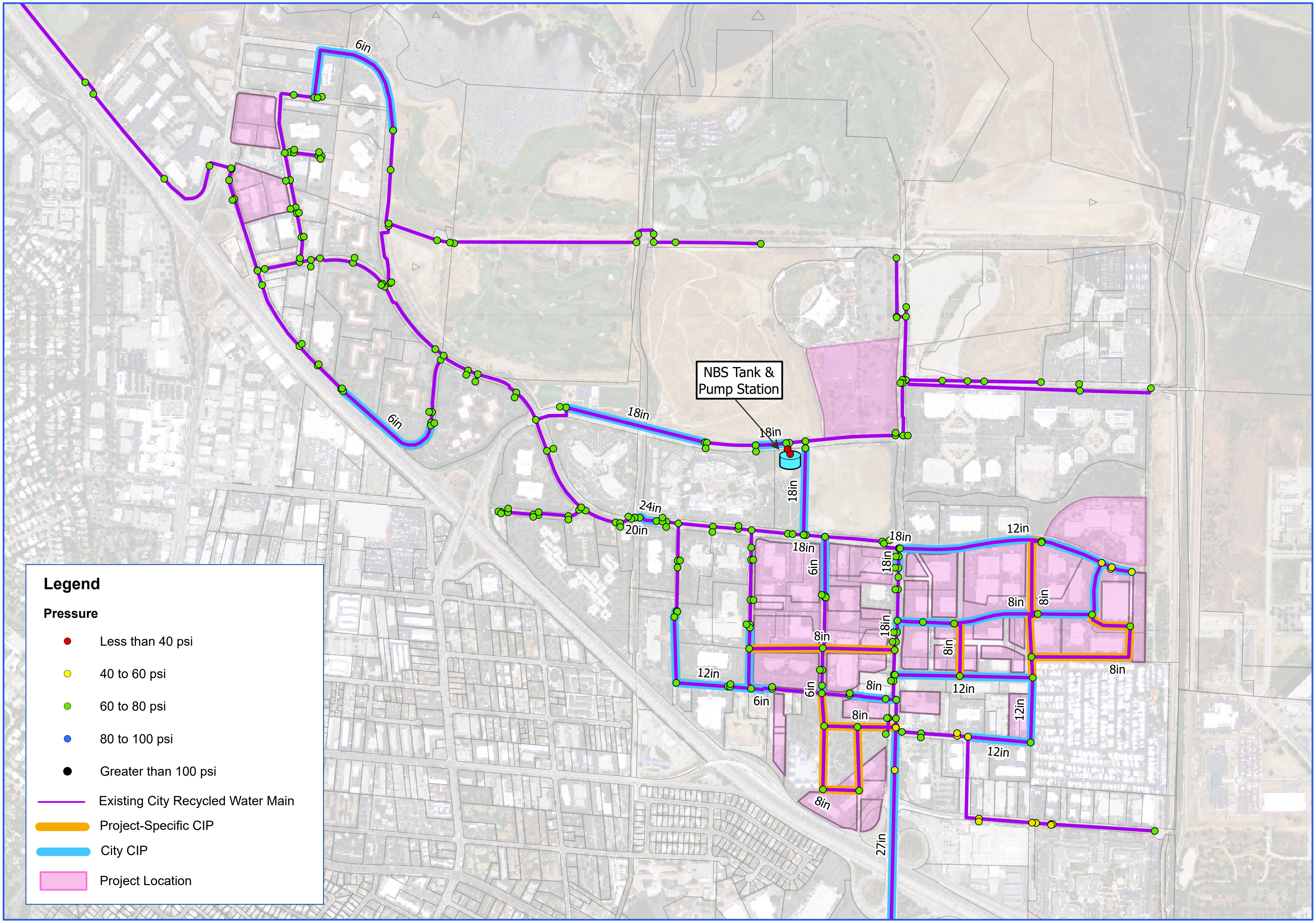


Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

FIGURE B-23: **Peak Hour Demand (PHD) - With Project - Scenario 1**

Recycled Water System Model - Future Condition

North Bayshore Master Plan Utility Impact Study | December 2022



Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

FIGURE B-24: **Peak Hour Demand (PHD) - With Project - Scenario 2**

Recycled Water System Model - Future Condition

North Bayshore Master Plan Utility Impact Study | December 2022