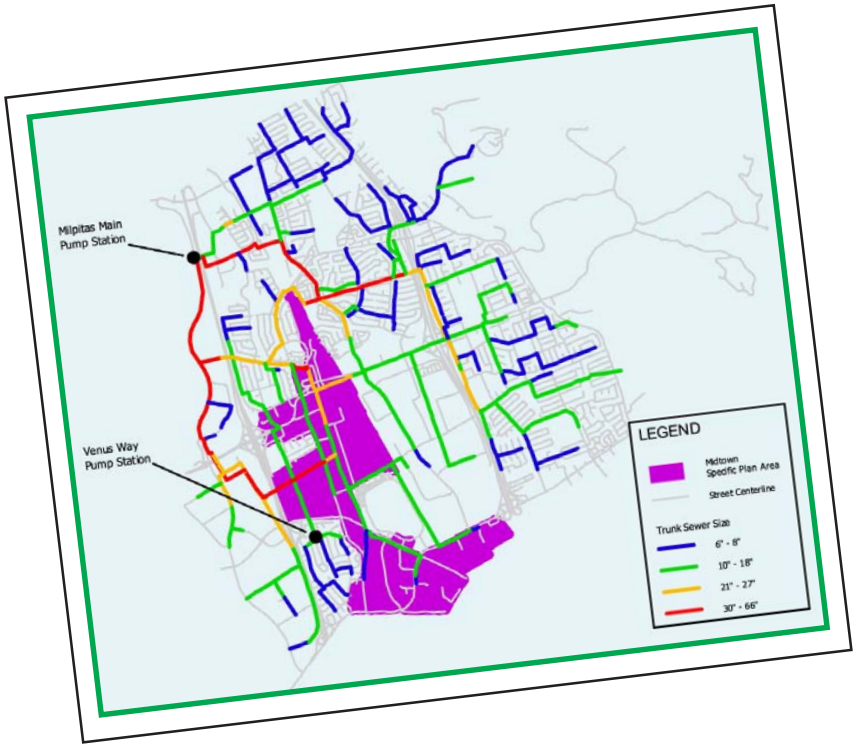
City of Milpitas



Sewer Master Plan Update

December 2009

RMC

EXECUTIVE SUMMARY

The 2009 Sewer Master Plan Update is a re-evaluation of the 2004 Sewer Master Plan Revision (RMC 2004) using updated land use information. This document provides new information required for the City planning and financial efforts. The 2009 Update defines the sewer collection system improvements necessary to accommodate the City's future land use development plans to buildout, including assorted General Plan Amendments and the Milpitas Transit Area.

The objectives of the 2009 Sewer Master Plan Update are:

1. Update the land use under three potential development scenarios (Scenarios 1, 2, and 3),
2. Under each scenario, identify pipe and pumping deficiencies caused by this change in sewer flow, and recommend projects to relieve these deficiencies,

Capital Improvement Program

A summary of the sewer capital improvement projects that are recommended to correct potential wet weather conveyance and pumping capacity deficiencies under existing and future conditions is provided in Table ES-1 and is shown in Figure 7-1 on page 7-3. The specific timing and nature of improvement projects scheduled beyond FY 2012/2013 should be verified in future master plan updates or during preliminary design studies.

Table ES-1: Summary of Capital Improvement Projects

PROJECT	LOCATION	DESCRIPTION [a]	ESTIMATED CAPITAL COST ($1,000) [b]
		NEAR-TERM (FY 08/09 – FY 10/11)	
10	South Main Street north of East Curtis Ave (Curtis Avenue between South Main Street and South Abel Street)	• Construct diversion at N Main St. and Curtis Ave • Construct 625 LF of 18-inch diameter sewer between S Main St and S Abel St	860[c]
10B	S. Abel Street north of Curtis Ave	• Replace 1,460 LF of 15-inch with 21-inch diameter sewer	990
11B	Great Mall Project (Great Mall Parkway)	• Replace 360 LF of 15-inch with 18-inch diameter sewer • Replace 1,820 LF of 10-inch with 18-inch diameter sewer • Replace 450 LF of 10-inch with 15-inch diameter sewer	1,490
11C	Great Mall Project (Montague Expressway)	• Replace 885 LF of 10-inch with 12-inch diameter sewer • Replace 30 LF of 8-inch with 15-inch diameter sewer • Replace 325 LF of 8-inch with 12-inch diameter sewer	480
		MID-TERM (FY 10/11– FY 11/12)	
11A	Great Mall Project (South Main Street North of Great Mall Parkway)	• Replace 560 LF of 18-inch with 21-inch diameter sewer[d] • Replace 400 LF of 18-inch with 27-inch diameter sewer[d] • Replace 590 LF of 18-inch with 27-inch diameter sewer • Replace 370 LF of 12-inch with 27-inch diameter sewer	840 or 1,570
		LONG-TERM (FY 13/14– FY 18/19)	
11D	Great Mall Project (South Main Street south of Capitol Avenue)	• Replace 2,060 LF of 8-inch with 12-inch diameter sewer	800
		INDEFINITE	
1	I-880 Crossing	• Replace 225 LF of 18-inch with 27-inch diameter sewer	540
2	North Milpitas Blvd near Jason Ave and Homme Way	• Replace 490 LF of 8-inch with 10-inch diameter sewer	160
5A	Smithwood Street near Abbott Blvd	• Replace 385 LF of 15-inch with 21-inch diameter sewer • Replace 500 LF of 15-inch with 18-inch diameter sewer	550
6A	South Milpitas Blvd between Calaveras Blvd and Turqoise	• Replace 150 LF of 12-inch with 18-inch diameter sewer • Replace 595 LF of 12-inch with 15-inch diameter sewer	380
11E[e]	Great Mall Project (East Curtis Street)	• Replace 1,415 LF of 18-inch with 21-inch diameter sewer • Replace 690 LF of 15-inch with 18-inch diameter sewer	0 or 1,370
12	Montague Expressway west of Gladding	• Replace 495 LF of 10-inch with 12-inch diameter sewer	190
		GRAND TOTAL	**7,293 or 9,394**

Footnotes:

a. Length of pipe is expressed in Linear Feet (LF) and is rounded to the nearest 5 feet
b. Expressed in November 2009 dollars using the November 2009 San Francisco ENR CCI of 9719.42. Rounded to the nearest $10,000.
c. Project 10 has already been built. The cost listed in an estimated construction cost.
d. These segments of Project 11A only apply to Scenarios 2 and 3.
e. Project 11E is new compared with 2004 Sewer Master Plan Revision and only applies to Scenarios 2 and 3.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS

ADWF	Average Dry Weather Flow
BWF	Base Wastewater Flow
CCI	Construction Cost Index
CIP	Capital Improvement Program
City	City of Milpitas
ENR	Engineering News Record
ft	Feet
FY	Fiscal Year
gpd	Gallons per day
GWI	Groundwater Infiltration
in	Inches
LF	Lineal feet
LWU	Large Water User
Main PS`	Milpitas Main Pump Station
MGD	Million gallons per day
MTA	Milpitas Transit Area
PWWF	Peak Wet Weather Flow
RDI/I	Rainfall Dependent Inflow and Infiltration
sf	Square feet
SF	San Francisco
WD	Weekday
WE	Weekend
WPCP	San Jose/Santa Clara Water Pollution Control Plant
WWF	Wet Weather Flow

Chapter 1 INTRODUCTION

This chapter presents the purposes, objectives, and scope for the 2009 Sewer Master Plan Update (Update). It also summarizes previous sewer master plans and studies done by the City of Milpitas (City) that are pertinent to the sanitary sewer system.

This report presents the results and recommendations of the 2009 Sewer Master Plan Update for the City. This introductory chapter presents the background information on the purpose, objectives, and scope of this Update. The City's sewer system and service area, and the contents and organization of this Update report.

For an overview description of the City and its sewer system, refer to the Introduction section of the 2004 Sewer Master Plan Revision (2004 Revision).

1.1 Project Purpose

This Update defines the sanitary sewer system improvements necessary to accommodate the City's buildout land use and updates the findings of the City's 2004 Master Plan Revision (RMC 2004). This Update was necessary to re-evaluate the City's sewer system capacity needs as a result of several near- and long-term development projects currently in the planning process that were not considered in the 2004 Revision. These additional developments include the following:

1. Nineteen (19) General Plan Amendments, which are currently in planning and approval stages throughout the City. Most of these projects are very high density, multi-family housing developments that will contribute a significant sewer flow.
2. The Milpitas Transit Area Specific Plan, which is currently in review and outlines a development vision for the area of the City including and just south of the Great Mall. The area is currently dominated by light industrial land use and will be converted to high density residential, commercial, and mixed use land uses over the next 20 years. The switch from light industrial to high density residential will increase the sewer flow in an area already identified for needing sewer main improvements in the near future.

The City also wanted to re-evaluate the flow contributions from large water users (LWUs). Due to changes in operations, many of the LWUs identified in the previous Master Plan have reduced water use and as a result, have lower sewer flows. Also, some LWUs have left the City or have gone out of business.

1.2 Objectives and Scope

The four objectives of this Update are:

1. Update the land use under three potential development scenarios (Scenarios 1, 2, and 3),
2. Under each scenario, identify pipe and pumping deficiencies caused by this change in sewer flow, and recommend projects to relieve these deficiencies,

The City's Hydra 6.0 sewer model will be the tool for identifying the recommended Capital Improvement projects.

The scope was created as an amendment to the previous Water and Sewer Impact Fee contract and is organized as follows:

Sewer Model Update. RMC did research to determine the City's large dischargers, updated the buildout land use scenario from the 2004 Revision to include Scenarios 1, 2, and 3, and modeled the City's collection system using the updated land use scenarios.

Sewer Master Plan Update. This work included examining the results of the model runs for each land use scenario and updating the recommended Capital Improvement Program (CIP). Cost estimates were developed for each recommended project. Finally, all the data and results were compiled into the Update report.

For this Update, the Midtown Buildout land use developed in the 2004 Revision was modified to include Scenarios 1, 2, and 3. Each scenario was analyzed only under buildout conditions, and an analysis of mid-term phases of development were not included. Phasing recommendations are based on the timing of recommendations in the 2004 Revision.

1.3 Previous Studies

Several studies have been prepared that have analyzed the City's sewer collection system.

1.3.1 1994 Sewer Master Plan Update

The master planning effort conducted by Carollo Engineers in 1994 considered all previous master plan efforts and developed a new capital improvement program to accommodate the City's future land use development plans to the year 2010. As part of this effort, a computer model of the City's sanitary system was developed using the hydraulic model SANSYS. The computer model was used to evaluate the sewer system improvement needs.

1.3.2 2003 Sewer Master Plan

The most recent planning effort was conducted by RMC in 2003, which produced the 2003 Master Plan. This Plan provided the most up-to-date information required for the City's planning and financial efforts towards their Capital Improvement Program. The 2003 Master Plan was a comprehensive update and re-evaluation of the 1994 Sewer Master Plan Update (Carollo Engineers 1994).

1.3.3 2004 Sewer Master Plan Revision

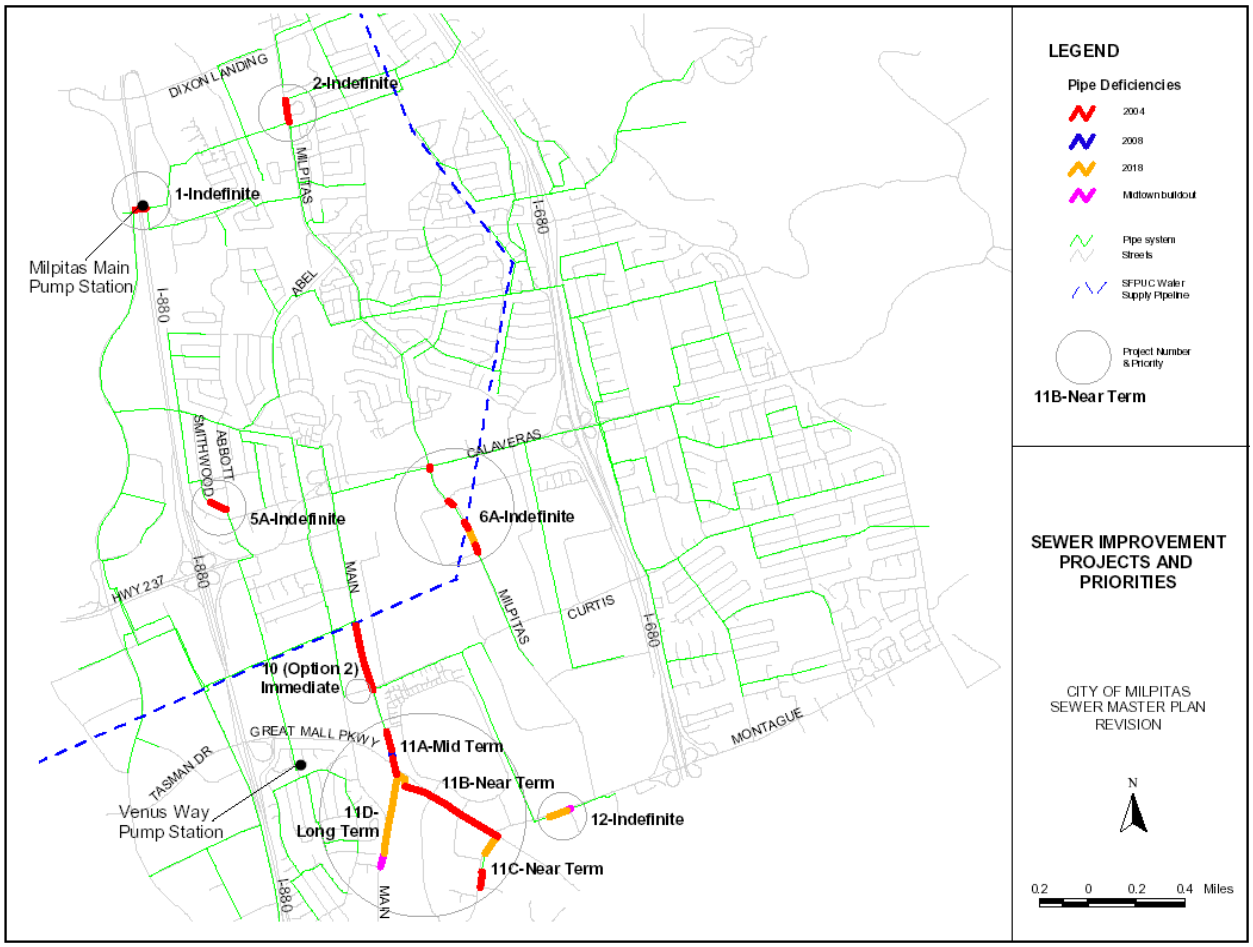
The 2004 Revision was a re-evaluation of the 2003 Sewer Master Plan (RMC 2003). The 2004 Revision provided information required for the City planning and financial efforts and defined the sanitary sewer system improvements necessary to accommodate the City's future land use development plans to the buildout year 2018.

The City of Milpitas Utility Engineering Department identified the need for the 2004 Revision due to several potential planning issues:

1. Not all of the sewer capacity improvements recommended in the 1994 Sewer Master Plan Update had been implemented, and new land use development patterns for the City, such as the Midtown Specific Plan, had since been defined that could stress the system beyond the 1994 assumptions.
2. The City was nearing its wastewater capacity at the WPCP. New development in the City could trigger the need to purchase additional capacity at the plant.
3. The City was experiencing maintenance problems (i.e. need for frequent cleaning) with some of its siphons.

As noted above, this Update builds on of the work completed for the 2004 Revision. The final projects proposed for the 2004 Revision are shown in Figure 1-1.

Figure 1-1: 2004 Master Plan Revision Recommended Capital Improvement Projects



Objectives of the 2004 Revision included the following:

1. Conduct a wet weather flow monitoring program,
2. Conduct a topographical survey of the sewer system,
3. Update and calibrate the sewer system compute model under Hydra 6.0, and,
4. Update the potential wet weather conveyance and pumping capacity deficiencies and associated 2002 Capital Improvement Program under existing (2004), near-term (2008), and long-term (2018) conditions using the information from the wet weather flow monitoring and topographic survey data.

1.4 Report Content

This Update report uses the same organization as the 2004 Revision. Because this Update relies on work completed as part of the 2004 Revision, the report mainly focuses on changes from the 2004 Revision. Refer to the 2004 Revision for additional background information not found in this Update.

The report is organized as follows:

- CHAPTER 1 – INTRODUCTION (this introduction)
- CHAPTER 2 – LAND USE, describes Scenarios 1, 2, and 3 and discusses the changes to existing and future land use data from the 2004 Revision.

- CHAPTER 3 – WASTEWATER FLOWS, discusses the basis for sanitary flow projections for the City based on land use information from Chapter 2.
- CHAPTER 4 – HYDRAULIC MODEL UPDATE AND CALIBRATION, contains a new pipeline that has recently been added to the City's existing collection system.
- CHAPTER 5 – SANITARY SEWER SYSTEM ANALYSIS, summarizes the recent changes to the dry weather capacity needs at the WPCP and wet weather conveyance and pumping needs identified using the hydraulic model.
- CHAPTER 6 – SEWER PROJECT ALTERNATIVE ANALYSIS, presents the sewer project recommendations proposed to mitigate the deficiencies identified in Chapter 5.
- CHAPTER 7 – RECOMMENDATIONS, presents the recommended CIP based on the alternative analysis conducted in Chapter 6.

Chapter 2 LAND USE

Land use information provides the basis for estimating sanitary flows in the City's sewer collection system. This chapter describes updates to the land use data used for the 2004 Revision. Three different land use scenarios were evaluated as part of this Update and are described in this section.

2.2 Existing Land Use

The existing land use designations for the City were largely unchanged for this amendment; however, the list of large dischargers was updated based on more recent water use data collected between March 2006 and February 2007. The changes to large dischargers are included in this section as they are current customers, and for this analysis are assumed to exist through buildout except when future development plans overlap. However, the analysis included in this Update does not include a re-evaluation of flows caused by existing land use, only future buildout land use.

2.2.1 Large Dischargers

For the purposes of sewer master planning, larger water users are often treated differently from other users. Certain businesses or industries, particularly industries with large process flows, can use far more water, and therefore generate higher wastewater loads, than is typical for their land use.

Based on review of recent potable water use records, the City suspected that water use and sewer flows from the largest water users in the City have changed since the 2004 Revision, which used Fiscal Year (FY) 2001/2002 data. As part of this Update, more recent potable water use records (March 2006 to February 2007) were reviewed to identify any changes in the list of users. The criterion for determining LWUs was not changed from the 2004 Revision; all users that exceed an annual average water use of 30,000 gpd are included in the LWU list.

The updated list of large dischargers is shown in Table 2-1. Only 12 of the original 17 LWUs are still currently included.

Table 2-1: Large Dischargers[a]

Rank	Location	Manhole # (G_ID)[b]	FY 2000/2001 Annual Average Water Use (gpd)	Mar 06 – Feb 07 Average Water Use (gpd)[c]	06-07 Winter Average Water Use (gpd)[c,d]
1	Abel St.	1370	297,000	340,785	**263,759**
2	Hillview Dr.	847	163,500	161,000	**161,000**
3	Mccarthy Blvd.	605	99,600	130,873	**134,426[e]**
4	Ames Ave.	250	149,700	124,242	**108,822**
5	Barber Ct.	1398	95,125[e]	122,750	**114,137[e]**
6	Mccarthy Blvd.	635	74,500	121,332	**129,404**
7	Milpitas Blvd.	836	166,500	106,778	**123,764**
8	Main St.	1299	75,200	102,257	**100,327**
9	Hillview Dr.	847	85,200	82,114	**35,720**
10	Milpitas Blvd.	847	167,798	64,697	**46,204**
11	Barber Ln.	1392	52,552[c]	41,697	**43,705[e]**
12	Alder Dr.	666	9,725[c]	40,001	**45,868[e]**
13	Yosemite Dr.	849	46,500	38,828	**35,821**
14	Milpitas Blvd.	1465	35,566	35,859	**22,934[e]**
15	Calaveras Blvd	804	23,940[c]	35,642	**34,421[e]**
16	Milpitas Blvd.	839	236,900	30,121	**13,612**
		Total	**1,779,306**	**1,578,976**	**1,413,924**

Footnotes:

a. Large dischargers were identified based on water use records since no specific discharge flow data for each discharger were available.
b. Refers to hydraulic model manhole numbering system.
c. Source: March 2006 through February 2007 water use records provided by the City.
d. Average over November 2006-February 2007 period.
e. These winter average water use values occur over the December 2006 – mid-January 2007, due to incomplete billing data.

Winter average water use (November through February) is typically used to estimate wastewater flows, because little to no water is used for irrigation. However, for several users in the above list, winter water use is higher than annual average water use, due to an increase in water use toward the end of 2006 in several users.

Each of the top ten water users were contacted to acquire information about their current and anticipated future water use, including any expected trends and water conservation programs. Of the ten large dischargers, only Large Discharger #2 provided information relevant to this analysis. Large Discharger #2 plans to institute water conservation programs in order to maintain current average water use despite expected growth in operations in the future. All other large dischargers who were contracted were either non-responsive, did not have estimates of expected future water use, or refused to give any information.

2.3 Future Land Use

Since the 2004 Revision was completed, there have been several changes to future land use, including:

- General Plan Amendments (19 total)
- Transit Area Specific Plan
- Updated large water user information

From this updated information, three new land use scenarios were developed and analyzed in the Hydra model:

- **Scenario 1**: This scenario includes the buildout land use for the City, as described in the 2004 Revision, as well as the 19 General Plan Amendments pending with the City's planning department. These 19 projects are completing the approval process and are assumed to be completed within the next 5 years. Figure 2-1 shows the locations of these projects, and the breakdown of land use for the Scenario 1 projects is shown in Table 2-3.

- **Scenario 2**: This scenario includes the buildout land use for the City plus the current plans for the Milpitas Transit Area (MTA) Specific Plan. The MTA Specific Plan is currently being finalized. The Specific Plan development will not be completed for approximately 20 years, however some projects will begin the planning and approval process following approval of the MTA Specific Plan and EIR. Figure 2-2 shows the location of the MTA, and Figure 2-3 shows the latest land use plan for the MTA. The proposed development density for the MTA Specific Plan is shown in Table 2-4.

- **Scenario 3**: This scenario combines the projects from both Scenarios 1 and 2 with the buildout land use for the rest of the City, and also includes modifications to the large discharger list. Figure 2-4 shows the locations of the changes for Scenario 3. Refer to Table 2-3, and Table 2-4 for the proposed land use changes.

The development density assumptions for the future land use categories are listed in Table 2-2 below.

Table 2-2: Land Use Densities Assumptions for Future Land Use[a]

Land Use Category	Land Use Code	Design Densities		
		Residential Density (DU/acre)	Person/ DU	Maximum FAR
Multifamily Very High	MFVH	31-40	2.7	NA
Very High Density Transit-Oriented Residential	VHD-TOD	41-60	2.7	NA
High Density Transit Oriented Residential	HD-TOR	31-40	2.7	NA
Residential – Retail High Density Mixed Use		31-40	2.7	NA[b]
Mixed Use	MXD	21-30	2.7	0.75 (2.5)[c]
Boulevard Very High Density Mixed Use	Blvd VH MXD	41-60	2.7	1.5 (2.5)[d]
Transit Oriented Development Overlay Districts [e]				
Multifamily Very High with TOD Overlay Zone	MFVH-TOD	41-60	2.7	NA
Mixed Use with TOD Overlay Zone	MXD-TOD	31-40	2.7	1.0
Manufacturing/Warehousing with TOD Overlay	IND-TOD	NA	NA	0.4
Gateway Office Overlay Zone	CMRL-OO	NA	NA	1.5

Notes:

a. Sources: Milpitas Midtown Specific Plan, Draft (EDAW, August 2001); Milpitas Transit Area Specific Plan, Draft (Dyett & Bhatia, December 2006); NA: Not Applicable
b. No maximum FAR is identified for Residential-Retail High Density Mixed Use, but the category is required to have 200 square feet of retail for every 1000 square feet of residential space.
c. Retail Mixed Use as identified in the Milpitas Transit Area Specific Plan is allowed a maximum FAR of 2.5.
d. A maximum FAR of 2.5 may be permitted on individual sites.
e. Transit Oriented Development (TOD) overlay zones are areas located within approximately a quarter-mile radius of the transit stations where special development standards (i.e. density and parking requirements) are tailored to the area's proximity to the transit stations

Table 2-3: Scenario 1 (19 General Plan Amendments) Proposed Land Use Changes

Project #	Project Name	Current Zoning	Proposed Zoning	Office (SF)	Commercial (SF)	Residential Units
Outside of the Midtown Specific Plan Area Projects						
3206	S Main St - Matteson	Gen Comm-TOD	R4-TOD	--	2,700	126
3151	Californian - Barry Swenson	Highway Svc	R4	--	--	176
3205	Estrella - Warmington	Ind Park	R4	--	--	369
3170	Murphy Ranch - Fairfield	Ind Park	R4	--	--	659
3207	Calaveras Station (Trumark)	Highway Svc	R4-PUD	--	--	360
3196	Starlite (Dixon & Milpitas)	Neigh Comm	MXD	--	--	3
1	Sinclair II*	Ind Park	R4	--	--	79
2	Landmark Towers* (Billings Chev)	Gen Comm	R4-PUD	48,960	148,805	375
3	Menlo Equities* (Abbott)	Ind Park	R4	--	--	275
3208	Town Center	Town Center	Town Center	--	16,891	65
Midtown Specific Plan Area Projects						
3152	South Main Manor - Sylvia Leung	MXD-TOD	MXD-TOD	--	--	22
3199	Aspen Village - Global Premier	R4	R4	--	--	101
3189	Baystone	R4-TOD	R4-TOD	--	--	391
3178	Centria - DR Horton	R4-TOD	R4-TOD	--	--	464
3204	Paragon - DR Horton	R4	R4	--	--	147
3169	Parc Place - DR Horton	R4	R4	--	--	285
2430	KB Homes	Gen Comm & R4	R3-PUD & R4	--	70,000	683
3144	Apton	MXD-TOD	MXD-TOD	--	--	93
3192	DeVries Place - Mid Pen	MXD-TOD	MXD-TOD	--	--	103

Table 2-4: Scenario 2 (Transit Area Specific Plan) Proposed Land Use Changes in MTA

Land Use	Units	Value[a]
Residential	DU	7,109
Office (Commercial)	sq.ft.	993,843
Hotel	sq.ft.	175,500
Retail (Commercial)	sq.ft.	287,075

Footnotes:

a. Values are the "reasonable worst-case scenario" for development within the Milpitas Transit Area, which equals 90% of the average of the high-end and low-end density estimates for development.

Table 2-5 summarizes the overall land use breakdown in the City for each of the modeled scenarios.

Table 2-5: Future Land Use Acreage by Land Use Category

LAND USE CATEGORY	CODE	ESTIMATED ACREAGE					
		Scenario 1		Scenario 2		Scenario 3	
		Acres	% Total	Acres	% Total	Acres	% Total
Valley Floor Residential							
Single Family Low	SFL	1,440	23.8%	1,440	23.8%	1,440	23.8%
Single Family Medium	SFM	170	2.8%	170	2.8%	170	2.8%
Multifamily Medium	MFM	215	3.6%	215	3.6%	215	3.6%
Multifamily High	MFH	203	3.4%	195	3.2%	194	3.4%
Multifamily Very High	MFVH	140	2.3%	75	1.2%	210	2.3%
Mobile Home Park	MHP	55	0.9%	55	0.9%	55	0.9%
Sub-total		**2,223**	**36.8%**	**2,150**	**35.6%**	**2,285**	**37.8%**
Hillside Residential							
Single Family Very Low	HVL	15	0.2%	15	0.2%	15	0.2%
Single Family Low	HL	115	1.9%	115	1.9%	115	1.9%
Single Family Medium	HM	30	0.5%	30	0.5%	30	0.5%
Sub-total		**160**	3%	**160**	3%	**160**	3%
Commercial							
Town Center	TC	10	0.2%	10	0.2%	10	0.2%
Retail Sub-Center	RSC	60	1.0%	63	1.0%	63	1.0%
General Commercial	CMRL	237	3.9%	240	4.0%	237	3.9%
Professional/Admin. Offices	PAO	45	0.7%	45	0.7%	45	0.7%
Mixed Use	MXD	95	1.6%	95	1.6%	95	1.6%
Sub-total		**447**	**7.4%**	**453**	**7.5%**	**450**	**7.5%**
Overlay Districts							
Multifamily Very High with TOD	MFVH-TOD	90	1.5%	20	0.3%	20	0.3%
Mixed Use with TOD	MXD-TOD	35	0.6%	37	0.6%	37	0.6%
Manufacturing/Warehouse TOD	IND-TOD	105	1.7%	37	0.6%	37	0.6%
Gateway Office Overlay Zone	CMRL-OO	15	0.2%	15	0.2%	15	0.2%
Sub-total		**245**	**4.1%**	**109**	**1.8%**	**109**	**1.8%**
Industrial							
Industrial Park	INDP	722	12.0%	785	13.0%	711	11.8%
Manufacturing/Warehouse	IND	702	11.6%	620	10.3%	570	9.4%
Sub-total		**1,424**	**23.6%**	**1,405**	**23.3%**	**1,281**	**21.2%**
Other							
Large Water Use	LWU	240	4.0%	240	4.0%	259	4.3%
Large Hotel	Hotel	50	0.8%	50	0.8%	50	0.8%
Parks/Recreation Irrigated	PRKI	325	5.4%	325	5.4%	325	5.4%
Public/Semi-Public	CVC	40	0.7%	65	1.1%	40	0.7%
Schools	SCHL	205	3.4%	205	3.4%	205	3.4%
Open Space Non-Irrigated	PRK	365	6.0%	365	6.0%	365	6.0%
Undeveloped/Vacant Area	Vacant	315	5.2%	297	4.9%	315	5.2%
Sub-Total		**1,540**	**25.5%**	**1,547**	**25.6%**	**1,559**	**25.8%**
New Milpitas Transit Area Categories							
Boulevard Very High Density Mixed Use	Blvd VH MXD	–	–	55	0.9%	55	0.9%
High Density Transit Oriented Residential	Hi TOD Res	–	–	81	1.3%	81	1.3%
Very High Density Transit Oriented Residential	VH TOD Res	–	–	48	0.8%	48	0.8%
High Density Mixed Use	Hi TOR Rtl	–	–	20	0.3%	20	0.3%
Sub-total		**–**	**–**	**204**	**3.4%**	**204**	**3.4%**
Total		**6,040**	**100%**	**6,040**	**100%**	**6,048**	**100%**

For this update, the three scenarios investigated offer a range from near-term (in planning) developments (Scenario 1) to long-term, build out projects (Scenario 2 and 3).

The parcels containing large dischargers (LWU land use category) were assumed to maintain their current land use through build-out, except when overlapped by the planned developments discussed above, such as the Milpitas Transit Area or other general plan amendments. In those cases, the build-out development plans were assumed to supersede existing land use.

The following land use maps (Figure 2-1, Figure 2-2, Figure 2-3, and Figure 2-4) illustrate the locations of the land use changes for the three scenarios, highlighting the parcels that will change from the 2004 Revision buildout scenario.

Figure 2-1: Scenario 1 (19 General Plan Amendments) Development Locations

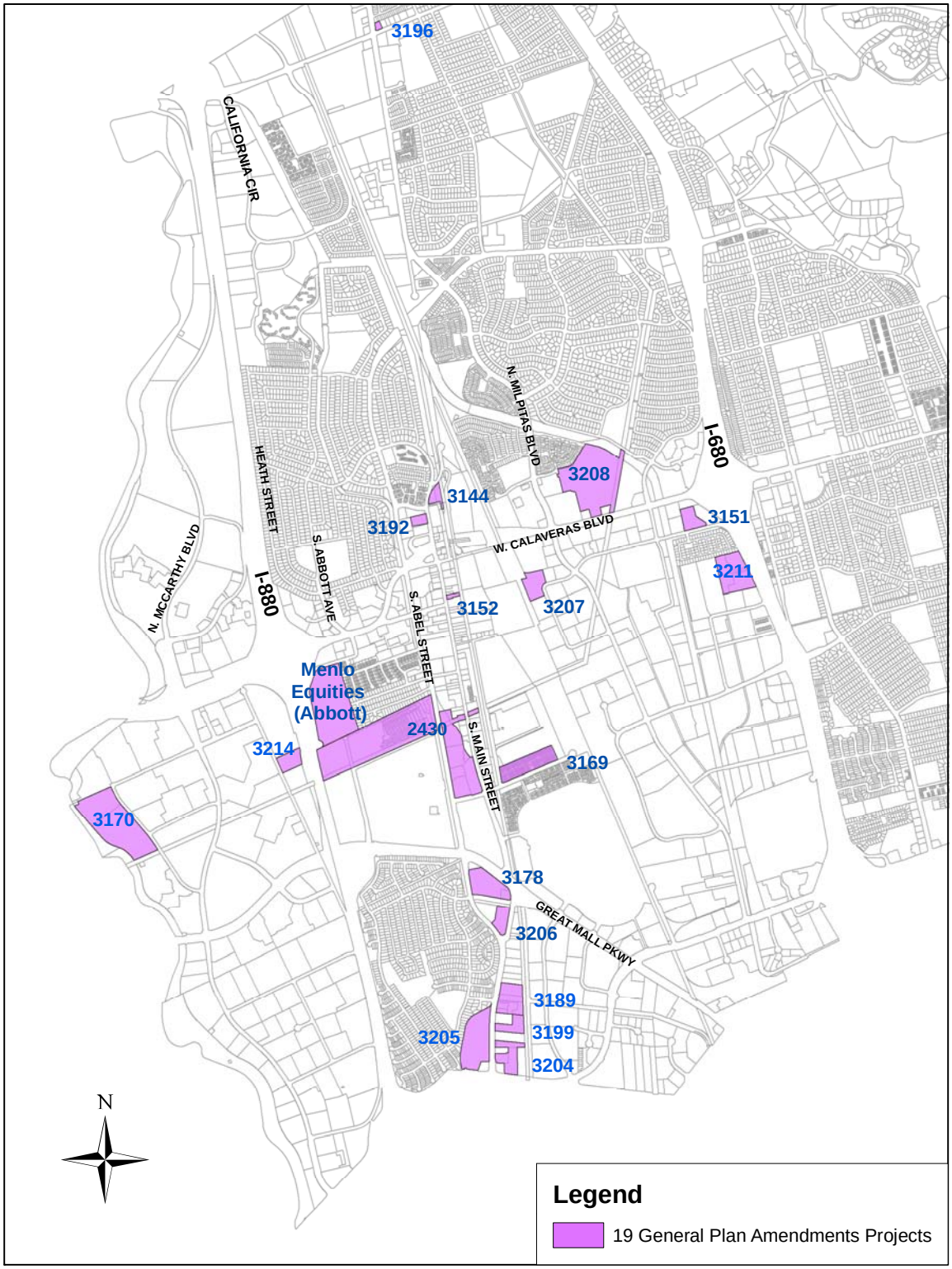


Figure 2-2: Scenario 2 (Transit Area Specific Plan) Development Locations

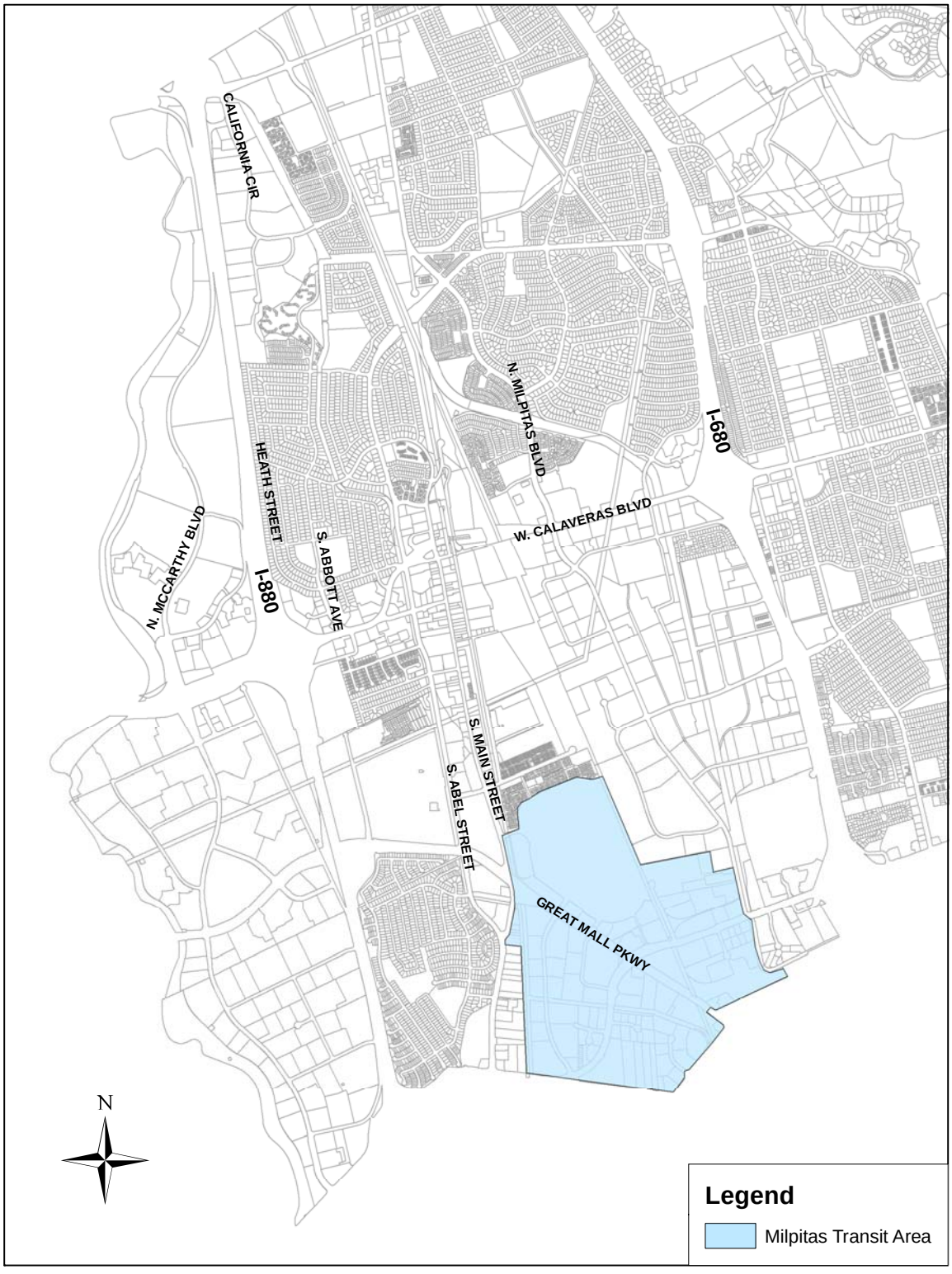


Figure 2-3: Milpitas Transit Area Specific Plan

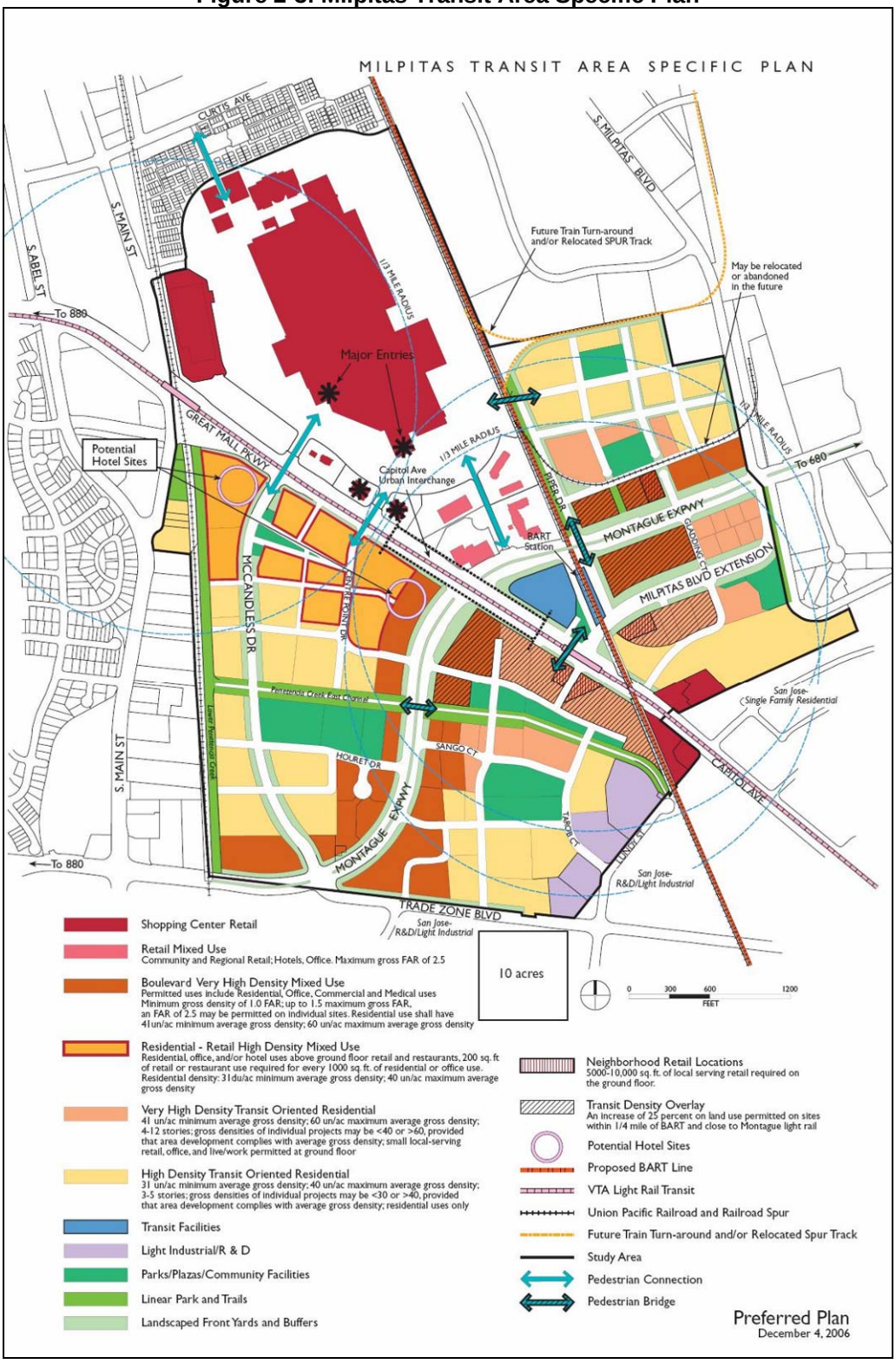
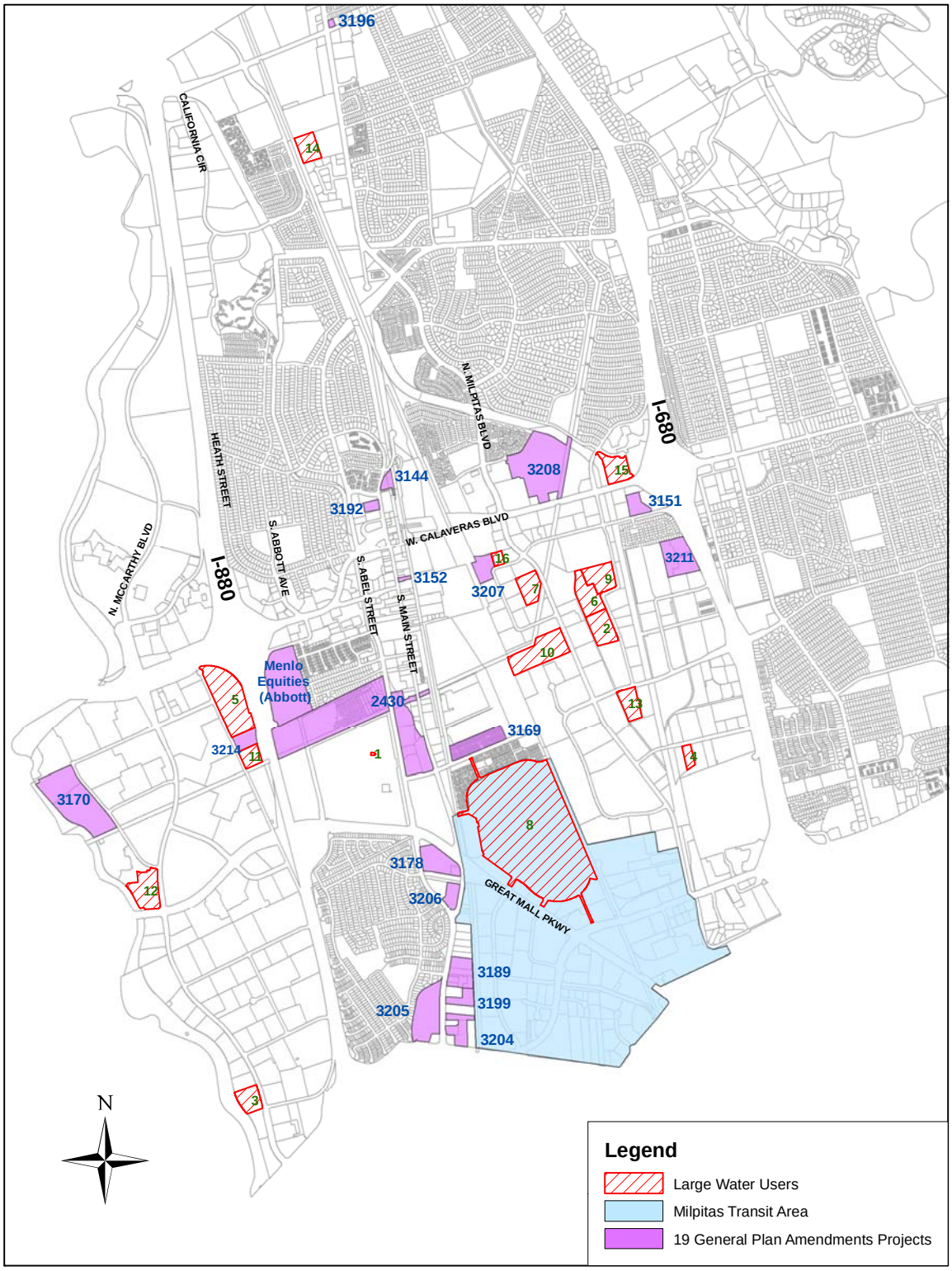


Figure 2-4: Scenario 3 (19 GPAs, Transit Area, and LWU Update)
Locations of Developments and Large Dischargers



Chapter 3 WASTEWATER FLOWS

This chapter discusses the calculation of wastewater flows based on the changes in land use discussed in Chapter 2. Flows for each of Scenarios 1, 2, and 3 in this analysis were input into the City's Hydra 6.0 sewer model for the analysis. Only sections modified for this Update from the 2004 Revision are included.

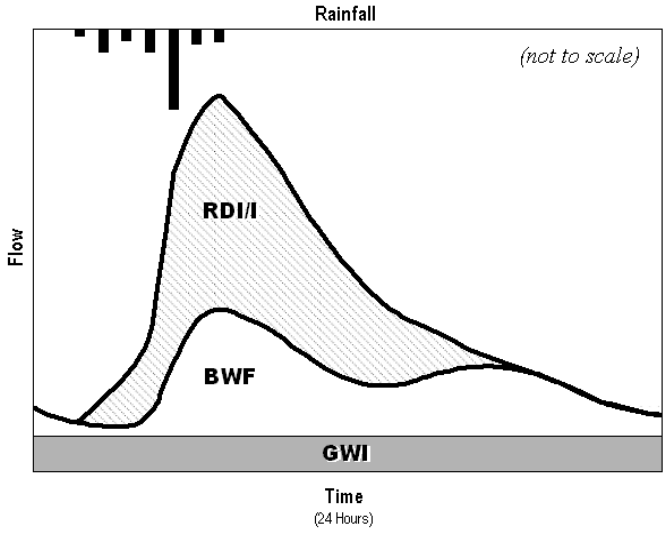
3.1 Existing Flows

As described in the 2004 Revision, average base wastewater flow (BWF) was estimated by applying a unit flow factor to each land use. Hourly multipliers were then applied to the average flow to define the change in flow over a typical day. Existing flows were not changed from the 2004 Revision. Please refer to the 2004 Revision for further discussion of the assumptions and methodology for the development of existing BWF, GWI, and RDI/I and calibration of the model. The water system model was not re-calibrated for this Update.

3.2 Design Flows for System Analysis

Wastewater flows typically include three components: BWF, groundwater infiltration (GWI), and rainfall-dependent infiltration/inflow (RDI/I). BWF represents the sanitary and process flow contributions from residential, commercial, institutional, and industrial users of the system. GWI is groundwater that infiltrates into the sewer through defects in pipes and manholes. GWI is typically seasonal in nature and remains relatively constant during specific periods of the year. RDI/I is storm water inflow and infiltration that enter the system in direct response to rainfall events. RDI/I can occur through direct connections such as holes in manhole covers or illegally connected roof leaders or area drains, or through defects in sewer pipes, manholes, and service laterals. RDI/I typically results in short term peak flows that recede quickly after the rainfall ends. These three flow components are illustrated conceptually in Figure 3-1.

Figure 3-1: Wastewater Flow Components



For this Update, only base wastewater flow has been changed from the 2004 Revision. Refer to the 2004 Revision for a description of GWI and RDI/I flows used in this analysis.

3.2.1 Design Base Wastewater Flow

Design BWFs were developed for each scenario established in Chapter 2 (Scenarios 1, 2 and 3). For existing land use categories, the unit BWF factors and diurnal flow patterns established in the 2004 Revision were used as the design quantities for each scenario and are shown below in Table 3-1.

Table 3-1: Unit BWF Factor and Diurnal Flow Pattern

Land Use Category	Land Use Code	BWF Generation per Person		BWF Generation per Acre	
		Unit BWF Factor (gpd/person)	Diurnal Flow Pattern [a]	Unit BWF Factor (gpd/acre)	Diurnal Flow Pattern[a]
Valley Floor Residential					
Single-Family Low	SFL	70	Res_av13	NA	NA
Single-Family Medium	SFM	70	Res_av13	NA	NA
Multifamily Medium	MFM	90	Res_site4	NA	NA
Multifamily High	MFH	90	Res_site4	NA	NA
Mobile Home Park	MHP	70	Res_av13	NA	NA
Hillside Residential					
Single-Family Very Low	HVL	90	Res_site4	NA	NA
Single-Family Low	HL	90	Res_site4	NA	NA
Single-Family Medium	HM	90	Res_site4	NA	NA
Commercial					
Town Center	TC	NA	NA	1,700	Com_general
Retail Sub-center	RSC	NA	NA	1,000	Com_general
General Commercial	CMRL	NA	NA	1,000 [b]	Com_general [c]
Professional/Admin. Offices	PAO	NA	NA	1,000	Com_general
Industrial					
Industrial Park	INDP	NA	NA	400	Ind_av67
Manufacturing/Warehousing	IND	NA	NA	600 [d]	Ind_av67
Other					
Large Water Use	LWU	NA	NA		Ind_av67
Large Hotel	Hotel	100	Res_av13	NA	NA
Public/Semi-public	CVC	NA	NA	500	Com_general
Schools	SCHL	10	Res_av13	NA	NA

Footnotes:

a. The diurnal flow pattern refers to the associated pattern based on the eight dry weather flow monitoring sites.
b. Except for McCarthy Ranch area: a unit BWF factor of 1,800 gpd/acre was assumed and Com_site5 diurnal flow pattern was used.
c. Except for industrial park along McCarthy Boulevard: 1,800 gpd/acre was used for weekday.
d. Except for industrial area corresponding to dry weather flow monitoring site 7: 600 gpd/acre and 0 gpd/acre were used for weekday and weekend, respectively.

New land use categories have been developed as part of the Milpitas Transit Area, which affects Scenarios 2 and 3. These new land uses are essentially variations of existing land use categories, with similar unit BWF factors. Table 3-2 summarizes the unit BWF for each new category.

Table 3-2: Design Unit BWF Factors and Diurnal Flow Patterns for Milpitas Transit Area

Land Use Category	Land Use Code	BWF Generation per Person			BWF Generation per Acre		
		Unit BWF Factor (gpd/person)		Diurnal Flow Pattern[c]	Unit BWF Factor (gpd/acre)		Diurnal Flow Pattern[c]
		WD[a]	WE[b]		WD[a]	WE[b]	
Transit Area Residential							
High Density Transit Oriented	Hi TOD Res	85	90	Res_site4	NA	NA	NA
High Density Transit Oriented with Required Retail	Hi TOR Rtl	85	90	Res_site4	3,000	3,000	Com_general
Very High Density Residential	MFVH	85	90	Res_site4	NA	NA	NA
Transit Area Commercial							
Boulevard High Density Mixed Use	Blvd VH MXD	85	90	Res_site4	2,000	2,000	Com_general

Footnotes:

a. WD = Weekday flow factor.
b. WE = Weekend flow factor.
c. The diurnal flow pattern refers to the associated pattern based on the eight dry weather flow monitoring sites.

3.2.2 Design Flows

Design base wastewater flows were developed for each of the three scenarios established in Chapter 2 of this Update (Scenario 1, 2, and 3). Table 3-3 shows the updated flows for Scenario 1 (19 General Plan Amendments). Table 3-4 shows the incremental flows for Scenario 2 (MTA Specific Plan). Table 3-5 shows the incremental flow change for Scenario 3. Table 3-6 has been updated to show Scenarios 1, 2, and 3 for this Update.

Table 3-3: Scenario 1 (19 General Plan Amendments) Base Wastewater Flow Change

Proj #	Proj Name	Existing 2002 BWF (gpd)	2004 Buildout BWF (gpd)	New BWF Due to Proposed Development (gpd)	Change in BWF from 2004 Buildout (gpd)
Outside of the Midtown Specific Plan Area					
3206	S. Main Street – Matteson	0	8,100	30,750	22,650
3151	Californian – Barry Swenson	3,000	15,900	42,800	26,900
3205	Estrella – Warmington	11,100	4,500	89,700	85,200
3170	Murphy Ranch – Fairfield	0	8,700	160,150	151,450
3207	Trumark – Read Rite Site	7,600	4,600	87,500	82,900
3196	Starlite (at Dixon & Milpitas)	300	400	750	350
--	Sinclair II	8,950	5,370	19,200	13,800
--	Landmark Towers (Billings Chev)	5,400	5,400	100,200	94,800
--	Menlo Equities (Abbott)	20,900	12,550	66,800	54,250
3208	Town Center	37,500	74,900	19,290	-55,650
	Total Incremental BWF Change (Outside Midtown)				**476,650**
Inside the Midtown Specific Plan Area					
3152	South Main Manor – Sylvia Leung	0	3,000	5,350	2,350
3199	Aspen Village – Global Premier	2,700	26,050	24,550	-1,500
3189	Baystone	4,700	86,600	95,000	8,400
3178	Centria – DR Horton	0	93,500	112,750	19,250
3204	Paragon – DR Horton	1,400	43,000	35,700	-7,300
3169	Parc Place – DR Horton	7,200	70,300	69,300	-1,000
2430	KB Homes	2,200	156,950	169,200	12,250
3144	Apton	0	10,800	22,600	11,800
3192	DeVries Place – Mid Pen	0	11,950	25,050	13,100
	Total Incremental BWF Change (Within Midtown)				**57,350**
	Total Incremental BWF (Scenario 1) Change				**534,000**

Table 3-4: Scenario 2 (Transit Area Specific Plan) Base Wastewater Flow Change

Land Use	2004 Master Plan BWF (gpd)	Average Base Wastewater Flow (gpd)[a]
Residential	790,000	1,987,000
Commercial	18,000	72,000
Industrial	157,000	73,000
Hotel	30,000	100,000
School	0	13,000
Total Transit Area BWF	**1,201,000**	**2,244,000**
Total Incremental BWF (Scenario 2) Change[c]		**1,043,000**

Footnotes:

a. Flows are rounded to the nearest 1,000 gpd.

b. "Existing Land Use" includes all parcels within the Transit Area that do not have proposed land use changes from the 2004 Revision assumptions.

c. "Scenario 2 Change in BWF" includes the incremental demand change from the Transit Area projects.

Table 3-5 below shows the combined incremental flow change of Scenario 3. Note that the change in incremental flow only includes the 19 General Plan Amendments (Scenario 1) and the MTA Specific Plan changes (Scenario 2), and contains a reduction in BWF due to change in water use by large dischargers.

Table 3-5: Scenario 3 (19 GPAs, Transit Area, LWU Update) Base Wastewater Flow Change

	BWF (gpd)[1]
Scenario 1 Incremental BWF Change	534,000
Scenario 2 Incremental BWF Change	1,043,000
Large Dischargers Incremental BWF Change	-850,400
Total Incremental BWF (Scenario 3) Change	**726,600**

Table 3-6 summarizes each flow component and the total flow for Scenarios 1, 2, and 3, as well as the buildout conditions from the 2004 Revision. GWI and RDI/I were assumed to be unchanged from the 2004 Revision for the three scenarios evaluated for this Update. Please refer to the 2004 Revision for details on the assumptions and methodology for developing these flow components.

Table 3-6: Wastewater Design Flows for 3 Scenarios

	ESTIMATED FLOW (MGD)			
	2004 Master Plan Rev – Buildout	Scenario 1	Scenario 2	Scenario 3
Base Wastewater Flow	10.9	11.4	11.9	11.6
Groundwater Infiltration	1.9	1.9	1.9	1.9
Average Dry Weather Flow	**12.8**	**13.3**	**13.8**	**13.5**
Peak Hour Flow	**18.6**	**19.1**	**19.6**	**19.9**
Rainfall-Dependent Infiltration and Inflow	5.8	5.8	5.8	5.8
Peak Wet Weather Flow[b]	**24.4**	**24.9**	**25.4**	**25.7**

Notes:

a. The accuracy of these numbers is estimated to be within 5 to 10% due to the assumptions made regarding unit BWF factors, GWI rates, land use densities, etc.

b. "R" values, a 10-year design storm, and shape of hydrographs as defined in 3.2.3 and Appendix I of the 2004 Revision; based on the results of modeling of the system after removal of hydraulic constraints in order to determine the "true" peak flows that would occur in the system if capacity restrictions were removed.

3.3 Wastewater Flow Projections

The average dry weather flow (ADWF) for the entire City was estimated based on the incremental change in sewer flow due to the development plans of Scenario 1, 2, and 3, which were based on the land use numbers developed in Chapter 2 and the unit BWF presented in this chapter. Areas of the City not affected by these changes were not recalculated for this update. It was assumed that the average existing dry weather GWI under unsaturated conditions is approximately 1.3 MGD based on the Groundwater Infiltration Evaluation (Kennedy/Jenks Consultants, October 1999).

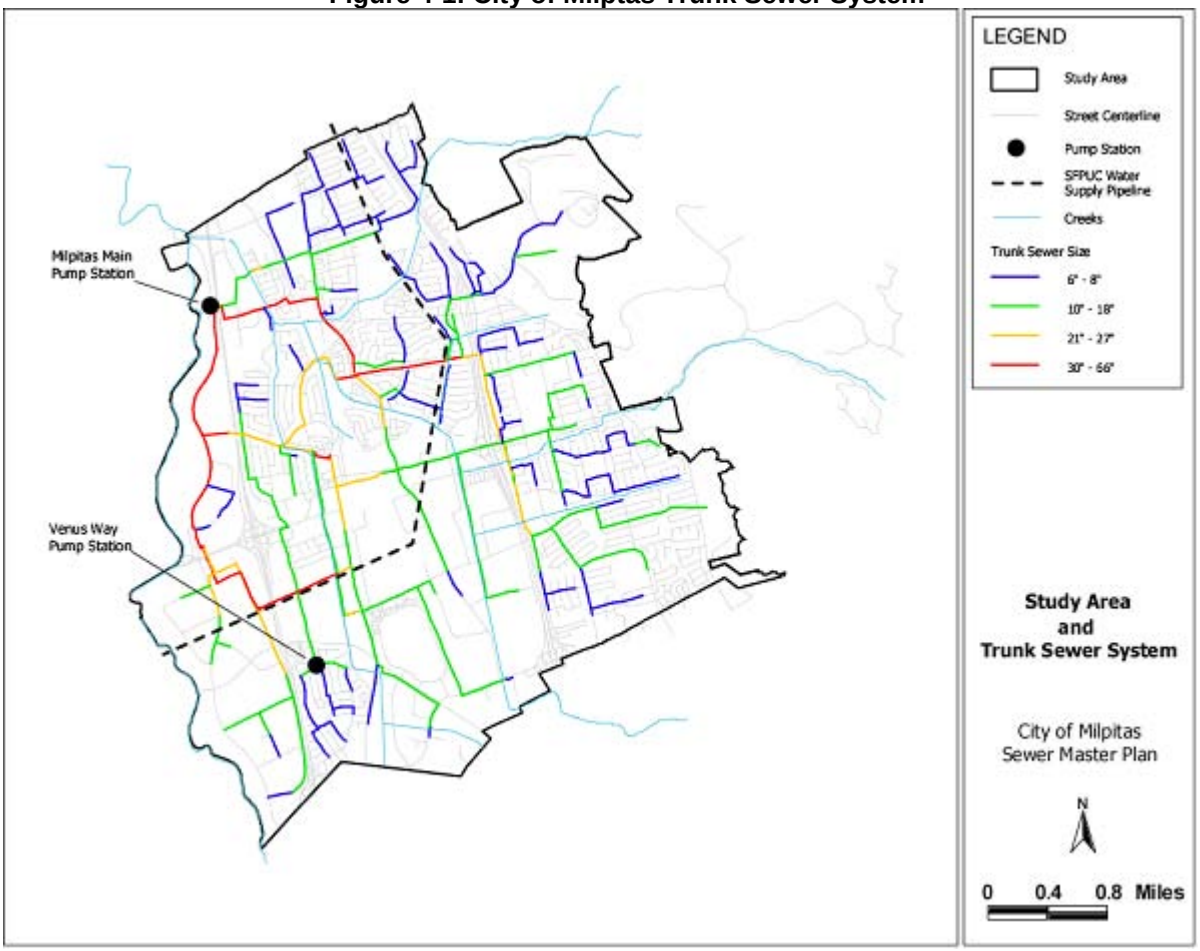
Chapter 4 HYDRAULIC MODEL UPDATE AND CALIBRATION

Chapter 4 in the 2004 Revision presents a history of the City's Hydra model and the updating process used to ensure that the model represents actual winter 2003/2004 conditions (i.e., conditions for which calibration data are available) as accurately as possible. The Chapter is included herein, with minor updates.

Figure 4-1 below shows the sewer mains that are included in the City's hydraulic model, categorized by diameter. Please refer to the 2004 Revision for information regarding model calibration.

The only change to the City's collection system for this analysis is the addition of the 24-inch Curtis Avenue diversion along Curtis Avenue between South Main Street and South Abel Street.

Figure 4-1: City of Milptas Trunk Sewer System



4.1 HYDRA Model History

Carollo Engineers developed a hydraulic model for the City in 1992 using the SANSYS hydraulic model software. The sanitary sewer system information was imported into the model from the existing Sewer Information Management and Maintenance System data files provided by the City at that time. Carollo Engineers updated the files to include sewer lines constructed since the 1984 plan, based on as-built drawings provided by the City. Some field verification was performed at that time, but was not documented in the 1994 Master Plan.

In 1999, West Yost & Associates converted the SANSYS model developed by Carollo Engineers to the current HYDRA Version 6.0 model. The converted model was never reviewed or calibrated. The City had already started crosschecking the integrity of the HYDRA model and recognized that there were a number of errors (such as negative slopes) in the model that needed to be corrected before the model could be used for capacity analysis purposes. In addition, the City staff was not specifically trained to use the new model.

4.2 HYDRA Model Update

As part of the 2002 Master Plan, the HYDRA model calibration process was reviewed, updated and supplemented to augment the collection system information originally imported from SANSYS into HYDRA. The imported information included the sanitary sewer system geometry and operational settings of the Venus Way Pump Station, the wetwell at the Main PS, and flow diversions within the collection system.

Error! Reference source not found. summarizes the collection system information required for input in HYDRA to develop a model that represents winter 2004 conditions as accurately as possible. The table is organized by system elements (pipe, manhole, pump, flow diversion). It includes the source of the original data, comments on the completeness and accuracy of this data and a brief description of what was done to update and supplement this data for the purpose of this Master Plan Revision.

Following is a description of the key changes that were made to the HYDRA collection system layer as part of this Master Plan Revision.

- **Pipe and Manhole Information as of 1999** – The City had already started crosschecking the integrity of the HYDRA model in terms of pipe and manhole information after it was imported from SANSYS. HYDRA's sewer profiles were checked for additional inaccuracies in pipe size, and rim and invert elevations (resulting in negative slopes and inverts above ground) that had not been identified/corrected. The identified inaccuracies and ways to correct them are summarized in the *Sanitary Sewer System Model Acceptability Review TM* in Appendix D of the 2004 Revision. No surveying was conducted as most of the identified errors could be corrected based on the sewer maps. Six pipes with negative slopes are still found in the collection system. However, those were either estimated to be "real" (creek or railroad crossings) or were not expected to impact the hydraulic analysis.

  Only "abnormal" rim elevation information (ground below invert) was corrected since the recently completed rim elevation survey data was not available for a more comprehensive update. Therefore, potential errors (accuracy anticipated to be within two feet) in rim elevation should be accounted for when defining the criteria for manhole overflows. The land subsidence impact on pipe invert elevation and pipe slope was not evaluated for the purpose of this Master Plan Revision.

- **CIP completed since 1994** – The City identified only one CIP project completed since 1994 and that was not included in HYDRA's collection system layer. This project consisted of two reaches of 24-inch diameter sewer replacing 15-inch diameter sewers on Terra Mesa Way. Record drawings were used to update the model.

- **Flow Diversions** – During calibration efforts for the 2002 Sewer Master Plan, significant differences between modeled and metered flows were identified. These differences could be due to misrepresentations of the flow diversions hydraulics. In addition, existing record drawings and sewer maps did not provide all the information necessary, such as presence and height of weirs, to estimate the hydraulics of these diversions. A basic field investigation of the 11 flow diversions included in the sewer system was performed. The investigation included observation of the flow direction, measurement of invert depth and height of the weir, and photographic reconnaissance. The flow diversion located on Main Street immediately North of Hetch Hetchy is shown on Figure 4-2 as an example of the flow diversion structures included in the sewer system. The result of the flow diversion investigation (conducted by E2 Consulting Engineers in August 2002) and the estimated flow diversion hydraulics input to HYDRA are detailed in *Flow Diversion Field Investigation and Modeling TM* in Appendix E of the 2004 Revision.
- **Topographic Survey** -– Based on the CIP recommendation in the 2002 Master Plan, 36 manholes were surveyed for rim and invert elevations in 2004. Surveyed information was used to update the HYDRA collection system layer. The results of the topographic study can be found in Appendix J of the 2004 Revision.

4.3 Calibration Data

In general, hydraulic models are calibrated by comparing monitored flow data to modeled hydrographs. In more sophisticated modeling (fully dynamic model), monitored flow velocity and flow depth are also compared with modeled velocity and flow depth. In addition, to verify whether the model is "realistic," historical field data such as operation issues, known deficiencies, or complaint logs can be used.

For the purpose of this Master Plan Revision, a wet weather flow monitoring program was conducted to collect downstream flow data to calibrate the model. The entire flow monitoring program, which also served other purposes (see Section 3.1.2. and Section 3.1.3), consisted of four temporary flow meters installed for a three-month period in December 2003–March 2004. Three additional temporary flow meters were installed for a one-month period in January–February 2004. Details on the flow monitoring program and flow data relative to model calibration are provided in the *Wet Weather Wastewater Flow Monitoring Program (2004),* which can be found in Appendix I of the 2004 Revision.

Operational issues, known deficiencies, and complaint logs were explored through discussions with Public Works staff and by checking the O&M database. Particular attention was paid to the past wet seasons. No area was identified as having repeated problems due to capacity issues. All the known deficiencies are related to root intrusion, debris and grease, which are operation and maintenance rather than capacity issues. Therefore, the model was calibrated based on flow monitoring data only.

4.4 Calibration Results

The model was calibrated for BWF factor (2002 Master Plan) and GWI and RDI/I (2004 Master Plan Revision) rates. The model was considered calibrated when the following criteria were met:

- The difference between the average metered and modeled flow over a 24-hour period was less than 10%, and,
- The difference between the peak hour metered and modeled flow over a 24-hour period was less than 10 to 20%.

These criteria are considered reasonable given the accuracy of the flow meters, the accuracy of the model developed based on many assumptions (estimated flows, hydraulic of the flow diversions, uniform Manning coefficient, etc.), and the incremental capacity of a pipe for a given diameter.

As shown in Figure 4-1, collection system parameters, operational settings, and winter 2003/2004 wastewater flows were adjusted until the model was considered calibrated.

The 2002 Master Plan calibration results for BWF factors and the calibration results and confirmation for GWI and RDI/I are presented and discussed in further detail in Appendix F of the 2004 Master Plan Revision.

Table 4-1: Collection System Data

SYSTEM ELEMENTS	KEY PARAMETERS	SOURCE OF EXISITING HYDRA DATA [a]	COMPLETENESS AND ACCURACY OF EXISITING HYDRA DATA	HYDRA MODEL UPDATE
Pipe	Size	SY_MILBO	Known issues. Verification required.	Pipe sizes were verified as part of the *Sanitary Sewer System Model Acceptability Review TM*. The City's sewer maps served as a reference to verify pipe size. Record drawings for projects constructed since 1994 were used to input new pipe size.
	Invert Elevation (and slope) [b]	SY_MILBO	Known issues (negative slopes, invert above ground). City started correcting and revising sewer inverts. Additional verification required	Invert elevations were verified as part of the *Sanitary Sewer System Model Acceptability Review TM*. The City's sewer maps served as a reference to verify/update invert elevation information. Record drawings for projects constructed since 1994 were used to input new pipe invert elevation. Results of the detailed topographic survey (invert elevation and slope) were incorporated in the model.
	Length	SY_MILBO	No known issue. Trunk sewer alignment overlaid accurately on aerial photo.	Unchanged
	Manning's Coefficient	Project.des	Same coefficient (0.013) for all pipes	Unchanged

SYSTEM ELEMENTS	KEY PARAMETERS	SOURCE OF EXISITING HYDRA DATA [a]	COMPLETENESS AND ACCURACY OF EXISITING HYDRA DATA	HYDRA MODEL UPDATE
Manhole	Rim Elevation	SY_MILBO	Known issues (invert above ground). City started correcting and revising rim elevation. Additional verification required.	Rim elevation was verified and corrected as part of the *Model Acceptability Review TM*. Record drawings for projects constructed since 1994 were used for new manhole rim elevations. Results of rim and invert manhole elevations survey study, completed in 2004, were incorporated into the model.
	Invert Elevation	SY_MILBO	Known issues	Invert elevation was updated using updated upstream invert elevation of downstream pipe. Results of rim and invert manhole elevations survey study, completed in 2004, were incorporated into the model.
	Rim & Invert Elevation	SY_2002	Verification recommended as part of 2002 Master Plan CIP	Rim and invert elevations were surveyed and updated in HYDRA for 36 manholes.
Pumps	Number of pumps, pump capacity	Project.des	Venus Way PS modeled as one variable speed pump in a 0.1-cft wet well capable of pumping 2.3 cfs (1.5 MGD)	Updated information based on City's input: Venus Way PS consists of 2, 5-hp pumps. The operating capacity is 1.6 MGD with both pumps running There is no standby pump.
			Main PS not modeled (outlet of the system).	The water surface elevation in the Main PS wetwell set the model downstream condition. Water surface elevation documented in Main Pump Station Evaluation – Initial Draft (Kennedy Jenks, 2002) was used to set the downstream condition in HYDRA.
Diversions	Inflow vs. diverted flow	SY_MILBO	No documentation available	Revised based on *Flow Diversion Modeling TM*

a. Refers to the HYDRA files that were provided by the City at the start of this Master Plan
b. Slope is calculated from sewer inverts in HYDRA

Chapter 5 SEWER SYSTEM ANALYSIS

This chapter summarizes the updated sewer system capacity analysis performed for this Master Plan update. The chapter focuses primarily on changes to the analysis made for this Update, although the City's contracted capacity limit at the San Jose/Santa Clara WPCP has been updated in the text to reflect recent changes.

The collection system was analyzed under three previously discussed flow scenarios, each of which uses the 2018 Midtown Buildout scenario from the 2004 Master Plan:

- **Scenario 1**: Addition of 19 General Plan Amendments
- **Scenario 2**: Addition of the Milpitas Transit Area Specific Plan
- **Scenario 3**: Addition of 19 General Plan Amendments, Milpitas Transit Area Specific Plan, and Update of Large Water User data

5.1 Dry Weather Capacity Needs at the WPCP

Currently, all wastewater collected from the City is pumped via the Main PS to the WPCP. The WPCP has a wastewater treatment capacity of 167 MGD. The WPCP receives and treats wastewater from a total of eight cities and districts. The WPCP's treatment capacity is allocated to each tributary agency on the basis of the peak five-day dry weather flow, also referred to as the peak week flow. The City recently purchased additional capacity at the plant from West Valley Sanitation District to bring the City's total contracted capacity at the plant to 13.5 MGD, up from the previous capacity of 12.5 MGD listed in the 2004 Revision.

Table 5-1 below lists the required Average Dry Weather Flow (ADWF) needed for the City's flows at the WPCP. The ADWF corresponds to the treatment capacity need for the City at the WPCP with the flows for each Scenario listed.

Table 5-1: Average Dry Weather Treatment Capacity Requirement

	ESTIMATED FLOW (MGD)			
	2004 Master Plan Rev – Buildout	Scenario 1	Scenario 2	Scenario 3
Base Wastewater Flow	10.9	11.4	11.9	11.6
Groundwater Infiltration	1.9	1.9	1.9	1.9
ADWF Treatment Requirement	**12.8**	**13.3**	**13.8**	**13.5**

Based on the City's current contracted capacity of 13.5 MGD, the City will need to purchase additional capacity only for Scenario 2, which includes additional flows from the Milpitas Transit Area at buildout.

5.2 Wet Weather Conveyance and Pumping Capacity Issues

This section presents the wet weather capacity deficiency criteria, and the identified potential conveyance and pumping deficiencies under the Scenarios 1, 2, and 3. The City's Hydra sewer model was updated under Scenarios 1, 2, and 3 to identify pipeline and pumping deficiencies.

5.2.1 Capacity Deficiency Criteria

Table 5-2 summarizes the criteria used to determine conveyance and pumping capacity deficiencies. These capacity deficiency criteria have not changed for this Update.

Table 5-2: Capacity Deficiency Criteria

	Capacity Deficiency Criteria
Conveyance	A pipe is considered deficient if either or both of the following conditions occurs at peak hour flows[a]: 1. The hydraulic grade line is less than 3 ft below ground surface at a manhole.[b] 2. The ratio of the peak hour flow to the pipe hydraulic capacity[c] exceeds 1.2.[d]
Pumping	A pump station is considered deficient if the pump station FIRM capacity[e] cannot pump peak hour flows[a]

Footnotes:

a. Peak hour flows are established in the Hydra Model.

b. It is assumed that there is potential for manhole overflow if the hydraulic grade line is less than 3 ft. below the ground surface. This definition accounts for potential error in rim elevation data and model accuracy. This criterion is of primary importance: a manhole overflow could represent public health risk and carries significant fines imposed by the Regional Water Quality Control Board, and could result in increase regulatory scrutiny through the pending EPA's CMOM regulations.

c. The hydraulic capacity is calculated based on the physical characteristics of the pipe and does not account for reduced capacity due to root intrusion, excessive grease accumulation, or debris. The City is responsible to ensure that 100% of the pipe capacity is available for wastewater flow.

d. This criterion was used in the 2002 Master Plan. It implies that the City allows the existing system to operate under surcharge conditions for short period of time during a 10-year storm event.

e. The City defines the FIRM capacity as the capacity with the largest pump not operating.

5.2.2 Conveyance Capacity Deficiencies

The updated HYDRA hydraulic model was run for Scenarios 1, 2, and 3 as defined in Chapter 2. Potential wet weather conveyance capacity deficiencies under each scenario were identified based on the criteria presented above.

Figure 5-1, Figure 5-2, and Figure 5-3 show the location of identified potential wet weather conveyance capacity deficiencies for each scenario. Table 5-3 summarizes the deficiencies and pipe characteristics for each section.

Figure 5-1: Scenario 1 (19 General Plan Amendments) Capacity Deficiency Locations

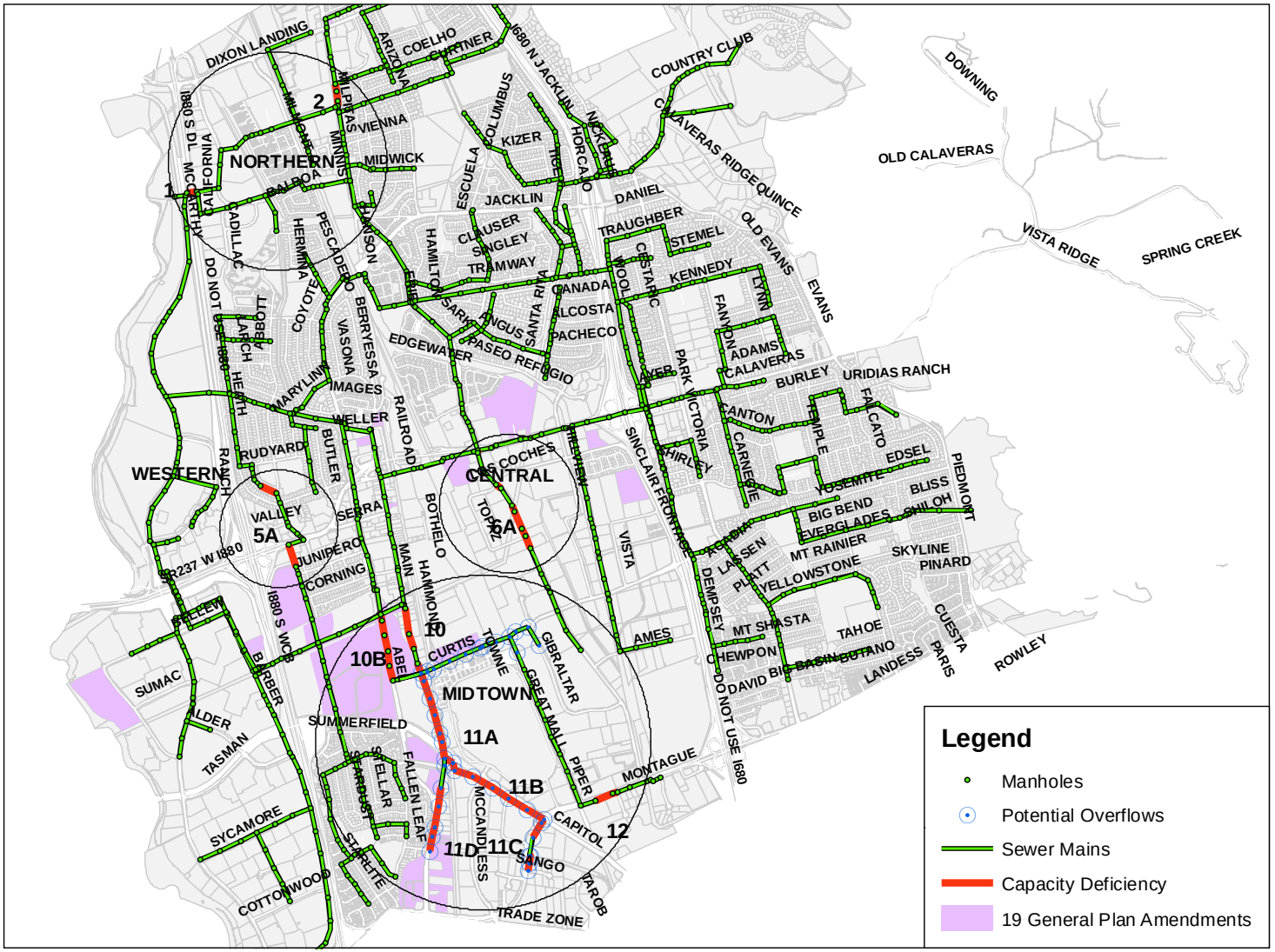


Figure 5-2: Scenario 2 (Transit Area Specific Plan) Capacity Deficiency Locations

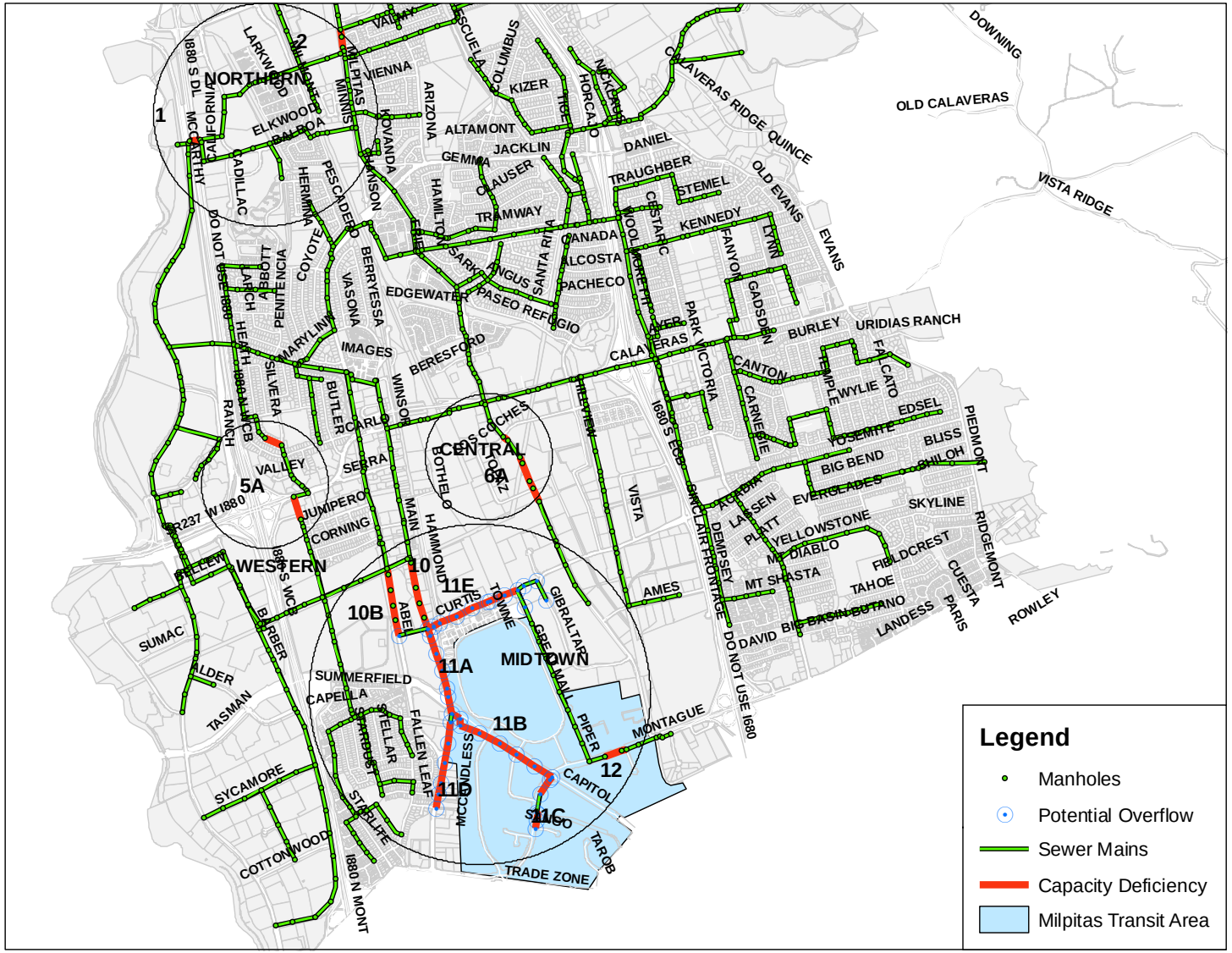


Figure 5-3: Scenario 3 (19 GPAs, Transit Area, LWU Update) Capacity Deficiency Locations

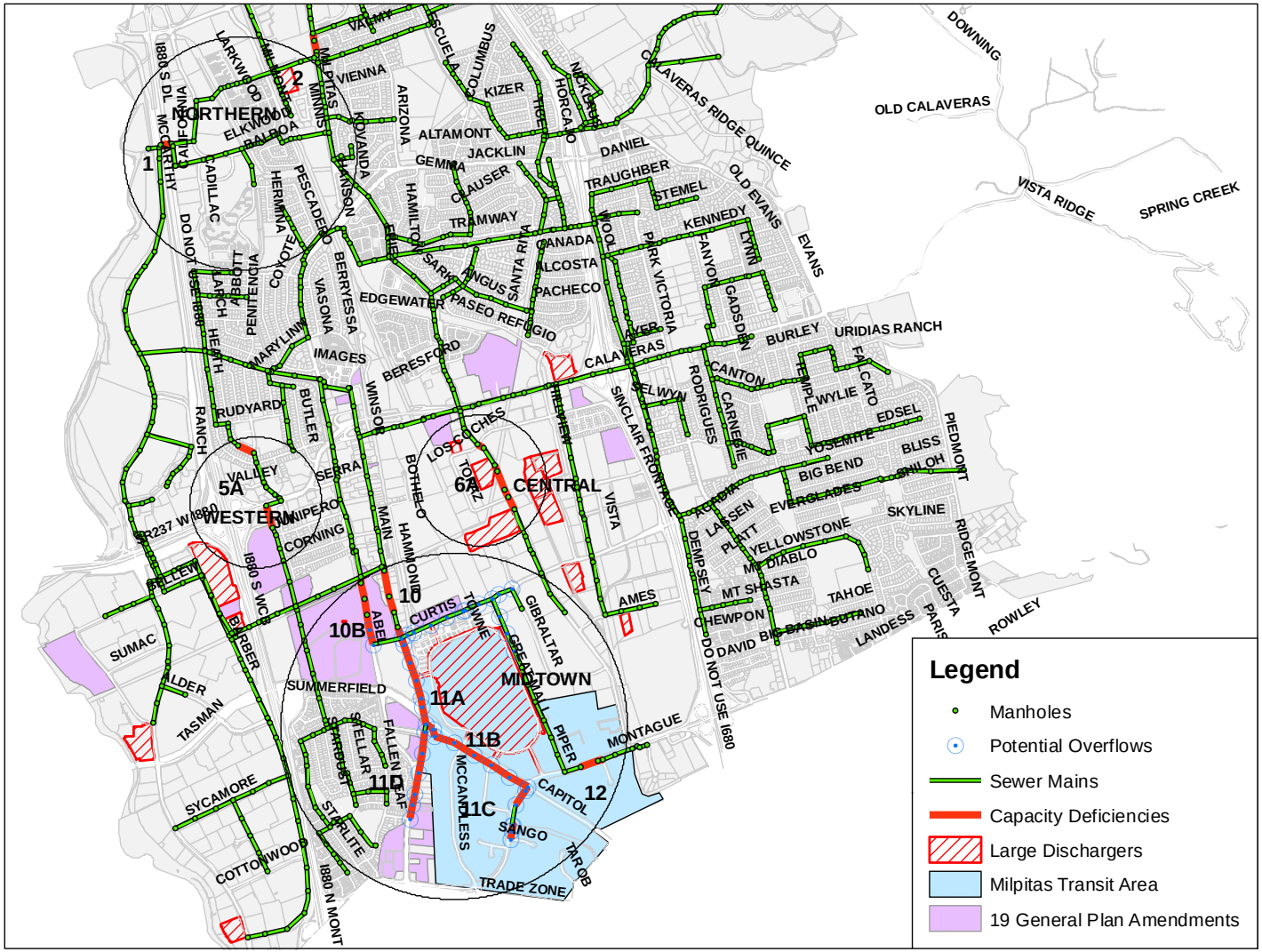


Table 5-3: Scenario 1(19 General Plan Amendments), 2 (Transit Area), and 3 (19 GPAs, Transit Area, LWU update) Capacity Deficiencies

SECTION	PIPE ID		STREET	EXISTING DIAMETER (in)	LENGTH (ft)	DEPTH (ft)	Scenario 1		Scenario 2		Scenario 3	
	G_ID	SY_NAME					Deficiency Ratio[a]	Depth to HGL (ft)[b]	Deficiency Ratio[a]	Depth to HGL (ft)[b]	Deficiency Ratio[a]	Depth to HGL (ft)[b]
NORTHERN AREA												
1	1506	4601	Under I-880	18	222	14.5	2.7	12.7	2.77	12.7	2.99	12.7
	423	14603	N Milpitas Blvd between Jason and Homme	8	224	10.1	1.38	6.7	1.35	6.7	1.52	6.7
	426	14602	N Milpitas Blvd north of Homme Way	8	169	9.4	1.5	4.1	1.46	4.1	1.65	4.1
2	1500	14604	N Milpitas Blvd south of Homme Way	8	95	10.8	1.45	9.2	1.42	9.2	1.6	9.2
WESTERN AREA												
	499	19203	Smithwood	15	383	8	2.19	6.4	2.21	6.4	1.98	6.4
5A	1359	20201	South of Calaveras Blvd, eat of I-880	15	500	10.3	1.37	8.6	1.38	8.6	1.22	8.4
CENTRAL AREA												
	831	32607	S Milpitas Blvd south of Calaveras	15	51	11.1	1.66	9.7	1.65	9.7	1.45	9.7
	835	46103	S Milpitas Blvd south of Los Coches	18	132	9.3	1.58	7.7	1.58	7.7	1.34	7.78
	840	46108	S Milpitas Blvd btwn Los Coches and Turquoise	12	153	11.3	1.86	9.6	1.89	9.6	1.7	9.8
	842	46401	S Milpitas Blvd btwn Los Coches and Turquoise	12	420	9.7	1.21	7.3	1.23	7.3	1.1	7.8
6A	844	46503	S Milpitas Blvd north of Turquoise	12	174	9.2	1.3	6.7	1.33	6.7	1.2	7.2
MIDTOWN AREA												
	1292	34502	S Main St north of E Curtis Ave	18	561	9.1	1.66	7.7	1.87	4.3	1.38	7.6
	1294	34506	S Main St north of E Curtis Ave	18	339	9.1	1.75	7.6	1.98	2.2	1.46	7.3
	1296	35201	S Main St north of E Curtis Ave	18	331	8.4	1.5	7.1	1.69	-0.2	1.25	6.7
10	1298	35205	S Main St north of E Curtis Ave	18	241	8.5	1.67	7.1	1.88	-1.2	1.39	6.8
	1335	34402	S Abel St south of Hetch Hetchy pipeline	15	122	7.2	1.22	8.2	1.43	8	1.22	8.1
	1337	34403	S Abel St south of Hetch Hetchy pipeline	15	342	7	1.27	6.4	2.05	5.4	1.42	5.7
	1339	34507	S Abel St south of Hetch Hetchy pipeline	15	341	7.1	1.28	4.5	2.06	2.7	1.42	3.7
	1341	35202	S Abel St north of E Curtis	15	328	7.4	1.26	3.1	2.13	-0.04	1.4	1.9
10B	1343	35206	S Abel St north of E Curtis	15	328	7.5	1.27	0.9	2.13	-3.3	1.4	-0.7
	1300		S Main St south of E Curtis	18	161	9.8	--	0.5	1.31	-1.2	1.1	-0.5
	1302		S Main St south of E Curtis	18	401	10.2	--	0.7	1.33	-0.4	1.1	0.2
	258	35602	S Main St north of Great Mall Dr	18	401	11.5	2.13	3	2.53	1.1	2.09	2.5
	260	35603	S Main St north of Great Mall Dr	18	190	11.7	2.08	2.7	2.47	0.5	2.04	2.2
11A	262	36301	S Main St/Great Mall Pkwy	12	369	14.4	6.17	-3.2	7.3	-9.6	6.05	-3.6
	908	36302	Great Pkwy east of S Main	15	193	14.2	1.2	-0.4	1.46	-0.9	1.2	-0.4
11B	910	36304	Great Mall Pkwy east of S Main	15	168	14.2	1.24	0.5	1.55	0.1	1.27	0.5
11B	913	36305	Great Mall Pkwy btwn S Main and McCandless	10	429	13.8	3.07	-10.1	3.35	-12.4	2.82	-8.4
	915	49401	Great Mall Pkwy north of Centre Pointe Dr	10	431	14.3	3.06	-7.9	3.34	-10	2.85	-6.7
	918	49101	Great Mall Pkwy/McCandless	10	495	13.1	3.11	-11.4	3.4	-13.7	2.9	-9.8
	919	49501	Great Mall Pkwy south of Centre Pointe Dr	10	465	14.8	3.27	-7.6	3.29	-7.7	2.8	-5.2
	921	49502	Great Mall Pkwy/Montague Expwy	10	451	16.4	2.43	-4.6	2.36	-4.2	2.01	-2.2
11C	923	49503	Montague Expwy/E Capitol Ave	10	80	15.2	1.47	-1.2	1.79	-1.5	1.53	-1.3
	925	49505	Montague Expwy btwn Centre Pointe and E Capitol	10	385	12	1.48	-4.1	1.81	-5.2	1.55	-4.3

SECTION	PIPE ID		STREET	EXISTING DIAMETER (in)	LENGTH (ft)	DEPTH (ft)	Scenario 1		Scenario 2		Scenario 3	
	G_ID	SY_NAME					Deficiency Ratio[a]	Depth to HGL (ft)[b]	Deficiency Ratio[a]	Depth to HGL (ft)[b]	Deficiency Ratio[a]	Depth to HGL (ft)[b]
	927	50204	Montague Expwy/Sango Ct	8	183	5	2.11	-2.9	2.62	-4.5	2.3	-3.5
	930	50203	Montague Expwy north of Sango Ct	8	143	5.7	2.27	-1.9	2.83	-3.1	2.46	-2.3
	932	50202	Montague Expwy north of Sango Ct	8	28	6	3.37	-0.4	4.18	-0.7	3.62	-0.5
	264	36306	S Main St south of Great Mall Pkwy	8	478	8.7	2.38	-0.3	2.3	-6	2.02	-4.6
	267	36601	S Main St south of Great Mall Pkwy	8	412	8.1	2.12	-3.2	2.1	-4.6	1.85	-3.4
	269	36602	S Main St south of Great Mall Pkwy	8	457	8.5	1.99	-1.5	1.94	-2.7	1.75	-1.9
	271	36515	S Main St south of Great Mall Pkwy	8	234	8.3	1.91	-1	1.83	-1.4	1.7	-1.2
11D	273	37204	S Main St south of Great Mall Pkwy	8	315	8.2	1.6	-0.5	1.42	-0.9	1.43	-0.9
	1307	35302	E Curtis Ave east of South Main	18	390	9.5	--	--	1.38	0.4	1.13	4.8
	1346	35301	E Curtis Ave east of South Main	18	381	9.6	--	--	1.35	-0.4	1.1	4.3
	1348	47406	E Curtis Ave east of South Main	18	357	9	--	--	1.29	-1.4	1.06	3.1
	1350	47404	E Curtis Ave east of South Main	15	318	9.2	--	--	1.35	-1.5	1.11	1.8
11E	940	47403	E Curtis Ave east of South Main	15	312	9.4	--	--	1.34	-0.5	1.1	1.7
	275	49601	Montague Expwy west of Gladding	10	395	9.9	1.25	8.3	1.66	5.7	1.4	7.8
12	278	61108	Montague Expwy at Gladding	10	98	11	1.3	9.1	1.57	6.2	1.32	8.5

Footnotes:

a. "Deficiency Ratio" is equal to the ratio of the design flow to maximum pipe capacity.

b. "Depth to HGL (ft)" is equal to the depth from the ground surface to the HGL of the pipe segment at the upstream end of the pipe. Negative values mean that flow in the pipe is overflowing (i.e., HGL is above the ground surface elevation).

Capacity deficiencies are grouped as projects to coincide with the numbering convention used in the 2004 Revision. The following sections summarize the changes in deficiencies due to Scenarios 1, 2, and 3.

5.2.2.1 Northern Area

The northern area has two sections, Section 1 and 2, where potential deficiencies were identified in the 2004 Revision. No additional deficiencies were found in this Update.

- **Section 1 –** This section is located under I-880 near the California Circle and the Main PS. Only one pipe in this area was found to be deficient (1506/4601[1]). Pipe 1506/4601 has a flat slope of 0.02 percent (compared with 0.13-4.5 percent for the same-size pipes immediately upstream and downstream). City's maintenance staff mentioned that this section was sometime backing-up due to Main PS operations. This should not be the case unless the entire interceptor sewer system is backing up, since the north interceptor sewer starts at higher elevation than three other branches of the interceptor system. Based on model results, the backup is likely due to pipe 1506 under I-880 being a hydraulic bottleneck.
- **Section 2 –** This section is located on North Milpitas Boulevard between Sunnyhills Court and Washington Drive. Three pipe segments in this area show a capacity deficiency.

5.2.2.2 Western Area

The Western Area has one section, Section 5A, where potential deficiencies were identified.

- **Section 5A –** This section is located on Smithwood Street near Abbott Avenue. With the updated model, two pipes, pipe 499/19203 and 1359/20201, were identified as deficient in this section. Pipe 1359 was not previously identified as deficient. Pipe 499 has a flat slope of 0.03 percent. Pipe 1359 has a flat slope of 0.05 percent. Since these pipes were not identified as deficient in the original 2002 Master Plan, surveyed data was only available for the manhole upstream of pipe 499 (G_ID 500/SY_NAME 19203), but not the downstream end.[2]

5.2.2.3 Central Area

The Central Area has one section, Section 6A, where potential deficiencies were identified. Changes to the identified deficiencies from the 2004 Revision under the 3 new land use scenarios are highlighted below.

- **Section 6A –** This section is located on South Milpitas Boulevard between Turquoise Avenue and Calaveras Boulevard. Five pipes were identified as deficient on this section of Milpitas Boulevard in both the 2004 Revision and this Update. Pipes 831/32607 and 835/46103 have flat slopes of 0.16 percent and 0.05 percent, respectively. The SFPUC water pipeline is located at pipe 840/46108. All pipes immediately downstream of 12-inch pipes 840/46108, 842/46401, and 844/46503 are 18-inch pipes.

5.2.2.4 Lower Hillside Area

No deficiencies were identified in this area.

[1] Note that pipes are referred to using their respective G_ID/SY_NAME number from the updated HYDRA collection system layer (e.g. pipe 79/14302).
[2] Surveyed data for the upstream manhole is referenced as manhole I.D 501 instead of 500.

5.2.2.5 Midtown Area

The Midtown Area is most affected by the changes in Scenarios 1, 2, and 3. The Milpitas Transit Area Specific Plan has been in development over the past two years and calls for additional residential, retail, and mixed land uses in a portion of the previous Midtown Specific Plan area. Five previously identified sections are affected by the land use changes: Sections 10, 11A, 11B, 11C, 11D, and 12. Two new sections were identified as well: Sections 10B and 11E.

Section 10B is a new section that includes changes due to the Curtis Ave flow diversion project completed in summer 2007. The 24-inch Curtis Ave flow diversion pipe was installed at the intersection of Curtis and South Main Street as a recommendation from the 2004 Revision with the purpose of reducing potential sewer overflows in the Midtown Area. This diversion connects the 18-inch sewer main running south to north on South Main Street to a parallel 15-inch sewer main on South Abel Street.

Changes to the identified deficiencies from the 2004 Revision under Scenarios 1, 2, and 3, are highlighted below. For each scenario they are:

- **Section 10 –** According to the 2004 Revision, this section, located north of the intersection of South Main Street and East Curtis Avenue, shows a capacity deficiency under existing conditions. Due to this deficiency, a backwater effect is seen along Curtis Avenue east of South Main Street, where manhole overflows are indicated. The newly-built Curtis Ave diversion presumably helps to relieve some of the backwater effects in this and upstream sections under existing flow conditions, however, at buildout, the Section 10 pipes have capacity deficiencies in each of Scenarios 1, 2, and 3.
- **Section 10B –** This is a new section of deficiencies due to flow being diverted to the S. Abel Street sewer main by the construction of the 24-inch Curtis Avenue flow diversion. The 24-inch Curtis Ave pipe connects the pipes at on the upstream end of Section 10, at the intersection of South Main and Curtis Avenue, to the 15-inch Abel Street sewer main. At buildout, due to the diverted flow, the 15-inch Abel Street main has capacity deficiencies in all segments downstream to Calaveras Boulevard.
- **Section 11A –** This section includes three pipe segments located on South Main Street north of Great Mall Parkway, upstream of Section 10. Under Scenarios 1, 2, and 3, pipe 262/36301 on South Main Street continues to be a hydraulic bottleneck for the two upstream tributary areas along Great Mall Parkway (Section 11B) and South Main Street (Section 11D). Even with the Curtis Avenue diversion in place, this section continues to be surcharged. Hence, these deficiencies are not due to downstream backwater. This bottleneck could potentially cause overflow upstream along South Main Street (pipe buried at a depth of 8 feet) under existing scenario, according to the 2004 Revision.
- **Section 11B -** This section includes all seven pipes on Great Mall Parkway between South Main Street and Montague Expressway. These sections have capacity deficiencies under Scenarios 1, 2, and 3, and, as stated in the 2004 Revision, the deficiencies are not due to backwater effects.
- **Section 11C –** This section is upstream of Section 11B and includes five pipe segments on Montague Expressway between Great Mall Parkway and Sango Court. Under Scenarios 1, 2, and 3, these pipes have capacity deficiencies.
- **Section 11D -** This section consists of five pipe segments upstream of Section 11A and was previously identified in the 2004 Revision as being vulnerable to potential overflow due to backwater effects. These pipes are deficient under Scenarios 1, 2, and 3.
- **Section 11E –** This section is along Curtis Avenue east of South Main Street, and consists of eight pipe segments, five of which are deficient under Scenarios 2 and 3. This section was not deficient under the 2004 Revision analysis, although the section did have potential for overflows due to backwater from the bottleneck at Curtis Avenue and South Main Street. The deficiencies are caused by the new residential development occurring as a result of the MTA Specific Plan.

- **Section 12 –** This section was largely unaffected by the new developments in Scenarios 1, 2, and 3, although pipe 278/61108 still exhibits marginal deficiency under each of Scenarios 1, 2, and 3.

5.2.3 Pumping Capacity Deficiencies

The Milpitas Main Pump Station is currently undergoing improvements to include seismic strengthening of the pump station and replace aging equipment. The new Main PS will have a capacity of 39.5 to 43.8 mgd and will be able to accommodate projected PWWFs of approximately 40-mgd. Due to the increase in BWF in each of Scenarios 1, 2, and 3, the Main PS will experience an increase in flow of 0.44 to 1.3 mgd. Under PWWF, the capacity of the new Main PS will be able to accommodate the new flows, however the capacity improvements currently in design should be checked to ensure that the firm capacity of the new Main PS will be able to accommodate this additional flow during ADWF.

Chapter 6 SEWER PROJECT ALTERNATIVE ANALYSIS

This chapter summarizes the updated projects recommended to address the deficiencies in Chapter 5 for the three design flow scenarios:

- **Scenario 1**: Addition of 19 General Plan Amendments
- **Scenario 2**: Addition of the Milpitas Transit Area Specific Plan
- **Scenario 3**: Addition of 19 General Plan Amendments, Milpitas Transit Area Specific Plan, and Update of Large Water User data

6.1 Design Criteria

The following design criteria were used to develop the sanitary sewer and pump station improvement project alternatives to correct the potential wet-weather conveyance and pumping capacity deficiencies identified in Section 5.2 of this Update.

Additional pipe capacity need was calculated (using HYDRA) as either a parallel pipe to convey flow in excess of the existing pipe design capacity or replacement (relief) pipe to carry the entire estimated flow. In order to identify the required improvements, the following assumptions were made:

- Pipes that had a ratio of design flow to design capacity greater than or equal to 120 percent were identified as deficient and were considered for replacement.
- Recommended pipe sizes were based on peak hour flows using a maximum allowable percent full of 90 percent for 10-inch and larger diameter pipes.
- Replacement pipes were preferred over parallel pipes because 1) the difference in the parallel and replacement pipe was generally only one or two diameters; 2) long-term maintenance is more efficient with fewer pipes and manholes in the system, and 3) underground utility congestion is minimized with fewer pipes.
- In general, short reaches of non-deficient pipes located between pipes that are deficient were included in the cost estimates to avoid downsizing of pipes in the direction of flow.
- Pump stations were included in the alternative analysis program if the pump station firm capacity could not pump the calculated peak wet weather flows.

6.2 Cost Estimate Criteria

The following cost estimate criteria were used to develop planning level capital cost estimates for identified sanitary sewer and pump station improvement projects.

6.2.1 Sanitary Sewer and Pump Costs

Sanitary sewer installation costs vary according to several factors including pipe materials, complexity of construction, traffic control, street repair, etc. The cost estimates used in this Master Plan for installation of sewer pipes under “average” conditions is $19/inch/diameter/lineal foot for 8- to 27-inch diameter. This cost includes mobilization, traffic control, trenching, dewatering, pipe installation and lateral connections, manholes, and pavement replacement.

Preliminary cost estimates are based on bids received for recent construction projects in the Bay Area. A summary of the cost estimates used are found in Appendix H of the 2004 Revision.

Cost estimates were adjusted using the Engineering News Records (ENR) construction cost index (CCI). The ENR CCI is the primary index utilized by the sewer planning and engineering community to adjust

cost estimates developed in different years. Cost estimates are based on the November 2009 ENR San Francisco Cost Index (SF ENR CCI) of 9719.42.

6.2.2 Construction Contingency and Project Implementation Multiplier

Construction contingency and project implementation multipliers were applied to each potential improvement project estimated installation cost.

A construction contingency of 30% of the estimate for pipe installation was applied to determine the construction estimate. The construction contingency is used to cover potential construction issues unforeseen at the planning level.

A project implementation multiplier of 30% was applied to the total construction cost estimate (initial estimate plus 30% contingency). The project implementation multiplier should cover:

- Administration costs
- Environmental assessments and permits
- Planning and engineering design
- Construction administration and management
- Legal fees

6.3 Description of Conveyance Capacity Improvement Projects

The same number (7) of sewer conveyance capacity improvement projects as in the 2004 Revision have been developed for the City to correct the wet weather conveyance capacity deficiencies identified in the updated Chapter 5. However, these projects have been expanded to include additional segments, due to Scenarios 1, 2, and 3. These projects and their associated costs are listed in Table 6-1. The total length for these projects ranges between 2 and 3 miles with an associated total estimated planning level cost of $7.3 to $9.4 million.

Table 6-1: Estimated Capital Cost for Sewer Conveyance Capacity Improvement Projects

Proj	LOCATION	LENGTH (ft)	No. of Pipe Reaches	Year of Initial Capacity Deficiency[a]	Estimated Capital Cost, ($1000)[a]
Northern Area					
1	I-880 Crossing	222	1	2004	540
2	N Milpitas Blvd at Jason Avenue and Homme Way	488	3	2004	160
Western Area					
5A	Smithwood Street near Abbott Boulevard	883	2	2004	550
Central Area					
6A	S Milpitas Blvd btwn Calaveras Blvd and Turquoise	746	3	2004	380
Midtown Specific Area					
10	S Main St north of E Curtis Ave	1,472	4	Buildout	860
10B	S Abel St north of E Curtis Ave	1,461	5	Buildout	990
11A	S Main St North of Great Mall Dr	960 – 1,923	3 - 6	2004	840 – 1,570
11B	Great Mall Pkwy btwn Montague Expwy & S Main St	2,638	7	2004	1,490
11C	Montague Expwy btwn Great Mall Pkwy & Sango Ct	1,237	6	2004	480
11D	S Main St south of Great Mall Pkwy	2,061	6	Buildout	800
11E	E Curtis Ave east of S Main St	0 - 2,160	0 - 8	Buildout	0 – 1,370
12	Montague Expwy west of Gladding	493	2	Buildout	190
	Total	**12,700 – 15,800**	**38 - 49**		**7,293 – 9,394**

Footnotes:

a. This Master Plan Update does not include a re-evaluation of existing or intermediate land use conditions, only buildout. The year of capacity deficiency is assumed to be the same as shown in the 2004 Revision. Projects not included in the 2004 Revision do not have a determined capacity deficiency date before buildout.

b. Costs based on November 2009 San Francisco ENR CCI of 9719.42.

Sections 6.3.1 through 6.3.7 that follow describe the projects, including the proposed pipe sizes and estimated project costs. Each section specifies any differences between Scenarios 1, 2, and 3 in recommended pipeline improvements.

6.3.1 Project No. 1 – I-880 Crossing

This project involves the construction of one reach of pipe across I-880, as shown on Figure 6-2. The existing pipe is 18 inches in diameter and 222 feet long. For Scenarios 1, 2, and 3, the hydraulic grade line for this section shows that surcharge is less than a foot above the crown of the pipe for all three scenarios. The pipeline is about 13 feet deep; therefore no manhole overflows are expected. Table 6-2 lists the proposed pipe construction required for this project. The amount of surcharge for this project has increased slightly for Scenarios 1, 2, and 3 in this Update; however the recommended project has not changed from the 2004 Revision. The total estimated capital cost for this option is $540,000. This project would require a trenchless crossing of I-880.

Table 6-2: Proposed Improvements for Project 1

PIPE ID (G_ID/ SY_NAME) [a]	DIAMETER (in)		LENGTH (ft)	TYPE	COMMENTS
	Exst	Recomm			
1506/4601	18	27	222	Replace	Pipe crosses under I-880 at N. McCarthy Rd. Pipe will exceed its 25-year life expectancy by 2010 based on the Utility Depreciation Study (Schaaf & Wheeler, 2002)

Footnotes:

a. Refers to HYDRA numbering system

6.3.2 Project No. 2 – North Milpitas Boulevard near Jason Avenue and Homme Way

This project is unaffected by the new projects in each of Scenarios 1, 2, and 3, but remains a recommended project due to deficiencies identified in the 2004 Revision. This project includes the construction of three reaches of pipe along North Milpitas Boulevard as shown in Figure 6-2. The three reaches flow from north to south. The existing pipes are 8 inches in diameter and total 488 feet in length. The hydraulic grade line for this section at buildout is over nine feet under ground surface; therefore no manhole overflows are expected. Table 6-3 lists the proposed pipe construction required for this project. The total estimated capital cost for this project is $160,000.

Table 6-3: Proposed Improvements for Project 2

PIPE ID (G_ID/ SY_NAME) [a]	DIAMETER (in.)		LENGTH (ft)	TYPE	COMMENTS
	Exst.	Recomm.			
1500/14604	8	10	95	Replace	Pipe flows north to south
423/14603	8	10	224	Replace	Pipe flows north to south
426/14602	8	10	169	Replace	Pipe flows north to south

Footnotes:

a. Refers to HYDRA numbering system

Figure 6-1: Northern Area Projects

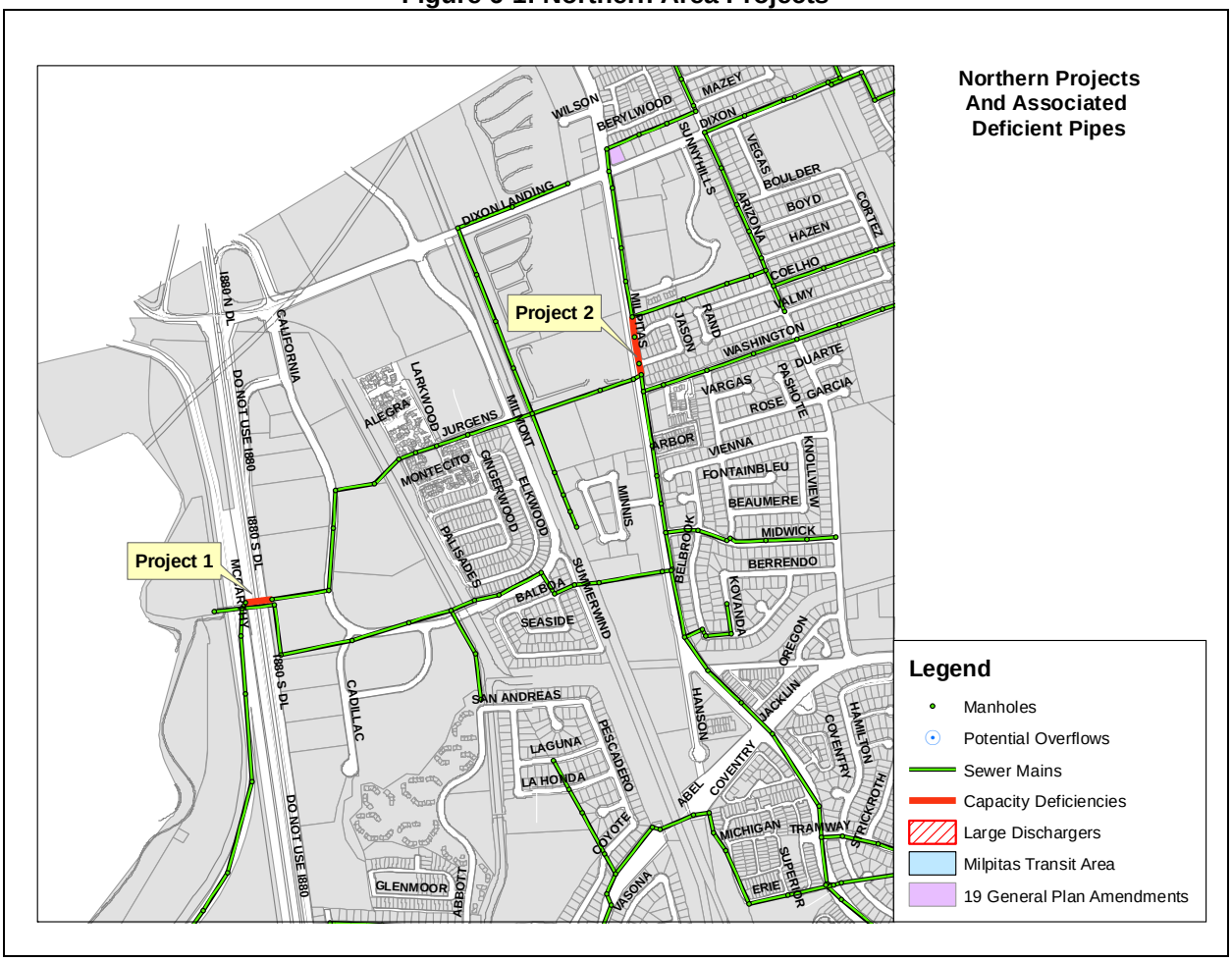
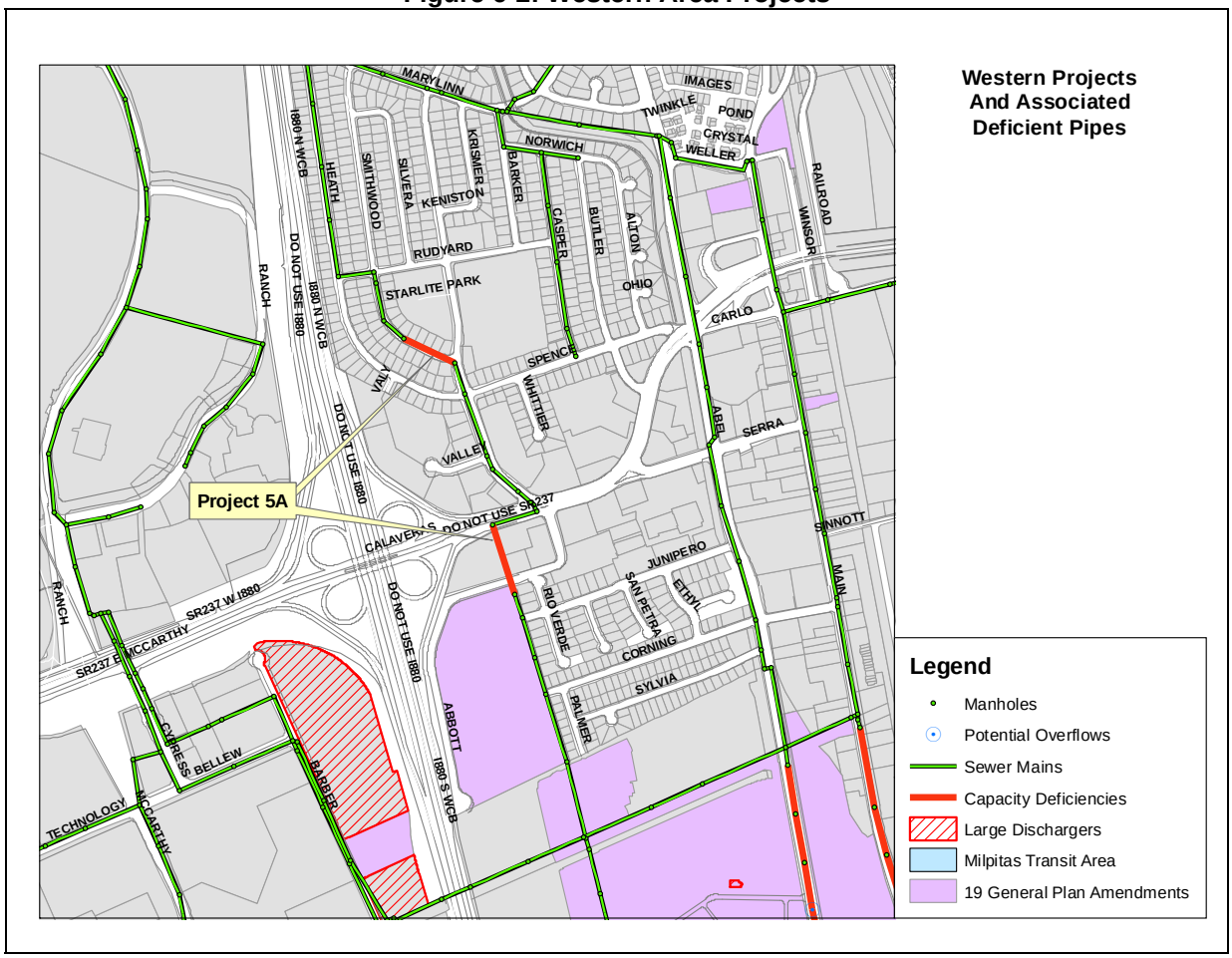


Figure 6-2: Western Area Projects



6.3.3 Project No. 5A – Smithwood Street Near Abbott Boulevard

Project 5A includes the construction of two separate reaches of pipe: one along Smithwood Street near Abbot Boulevard and one just south of Calaveras Boulevard to Abbott Avenue, as shown in Figure 6-2. The existing pipe for segment 499 is 15 inches in diameter and 383 feet in length, and for segment 1359 it is 15 inches in diameter and 500 feet in length. The hydraulic grade line is over six feet under the ground surface for each segment of pipe in each of Scenarios 1, 2, and 3; therefore no manhole overflow is expected. Table 6-4 lists the proposed pipe construction required for this project. The recommended improvement for pipe 499 is identical to that recommended in the 2004 Revision. The recommended improvement for pipe 1359 is a new project for this Update. The total estimated capital cost for this project is $550,000.

Table 6-4: Proposed Improvements for Project 5A

PIPE ID (G_ID/ SY_NAME) [a]	DIAMETER (in)		LENGTH (ft)	TYPE	COMMENTS
	Exst	Recomm.			
499/19203	15	21	383	Replace	
1359/20201	15	18	500	Replace	Alignment does not follow a road alignment; easement under private property

Footnotes:

a. Refers to HYDRA numbering system

6.3.4 Project No. 6A – South Milpitas Boulevard Between Calaveras Boulevard and Turquoise

Project 6A includes the construction of five reaches of pipe along South Milpitas Boulevard between Calaveras Boulevard and Turquoise as shown in Figure 6-2. No changes to the recommendations from the 2004 Revision are made due to Scenarios 1, 2, and 3, as there were no changes in the development occurring upstream of these identified deficiencies. In Scenario 3, one large discharger (LWU-10) is located upstream of these deficiencies, but the change in flow was minimal and did not affect the recommendations. The existing pipes in this section range in size between 12 and 18 inches in diameter and total 929 feet in length. Pipes 831/32607 and 835/46103 have minimum surcharge as shown on the hydraulic grade lines for these pipelines at buildout; therefore, no improvements of these pipelines are proposed. One reach of pipe (838/46107) does not need to be replaced because it is currently the same diameter as the recommended upstream pipes. The pipelines that are proposed to be replaced are all 12 inches in diameter and they total 746 feet in length. Table 6-5 lists the proposed pipe construction required for this project. The total estimated capital cost for this project is $380,000.

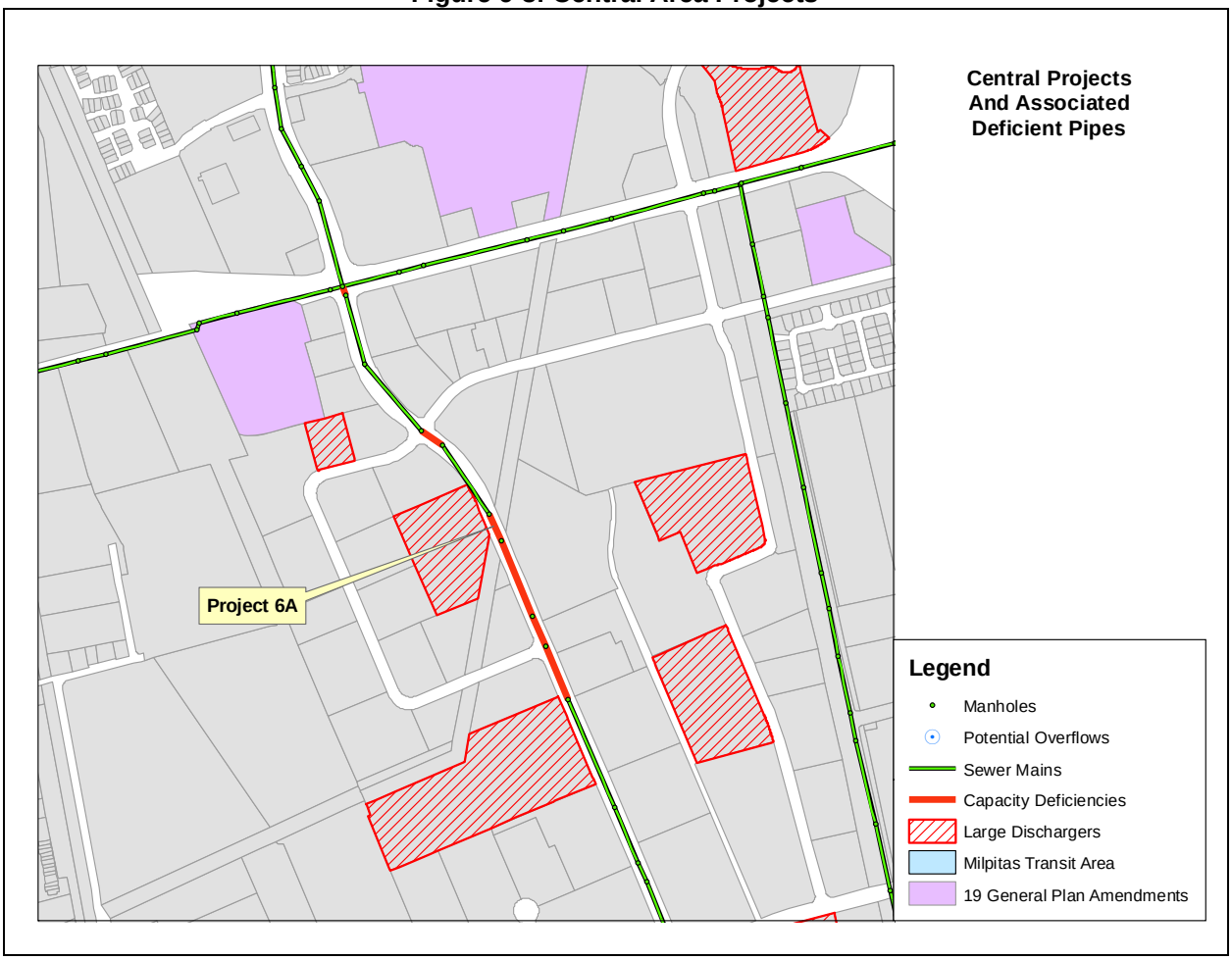
Table 6-5: Proposed Improvements for Project 6A

PIPE ID (G_ID/ SY_NAME) [a]	DIAMETER (in)		LENGTH (ft)	TYPE	COMMENTS
	Exst.	Recomm.			
831/32607	15	Not needed			The surcharge is minimum even at buildout. No improvement is recommended.
835/46103	18	Not needed			The surcharge is minimum even at buildout. No improvement is recommended
838/46107	18	Not needed			Pipe not deficient and same size as recommended upstream pipes
840/46108	12	18	152	Replace	
842/46401	12	15	420	Replace	
844/46503	12	15	174	Replace	

Footnotes:

a. Refers to HYDRA numbering system

Figure 6-3: Central Area Projects



6.3.5 Project No. 10 – South Main Street North of Curtis Avenue

In the 2004 Revision, Project 10 included four reaches of pipe along South Main Street between Curtis Ave and the SFPUC water pipeline. The existing pipes in this section are all 18 inches in diameter. Despite the implementation of the Curtis Avenue flow diversion, the South Main Street sewer main north

of Curtis Avenue still experiences surcharging under Scenarios 1, 2, and 3 at buildout, although the level of surcharge is less than prior to the construction of the diversion. The existing pipe is all 18 inches in diameter and is 1,472 feet long. The hydraulic grade lines for these pipes show minimum surcharge and are more than 6 feet below ground level, so no overflows are expected. This project has been implemented by the City. Table 6-6 lists the pipe construction improvements that were implemented as part of this project.

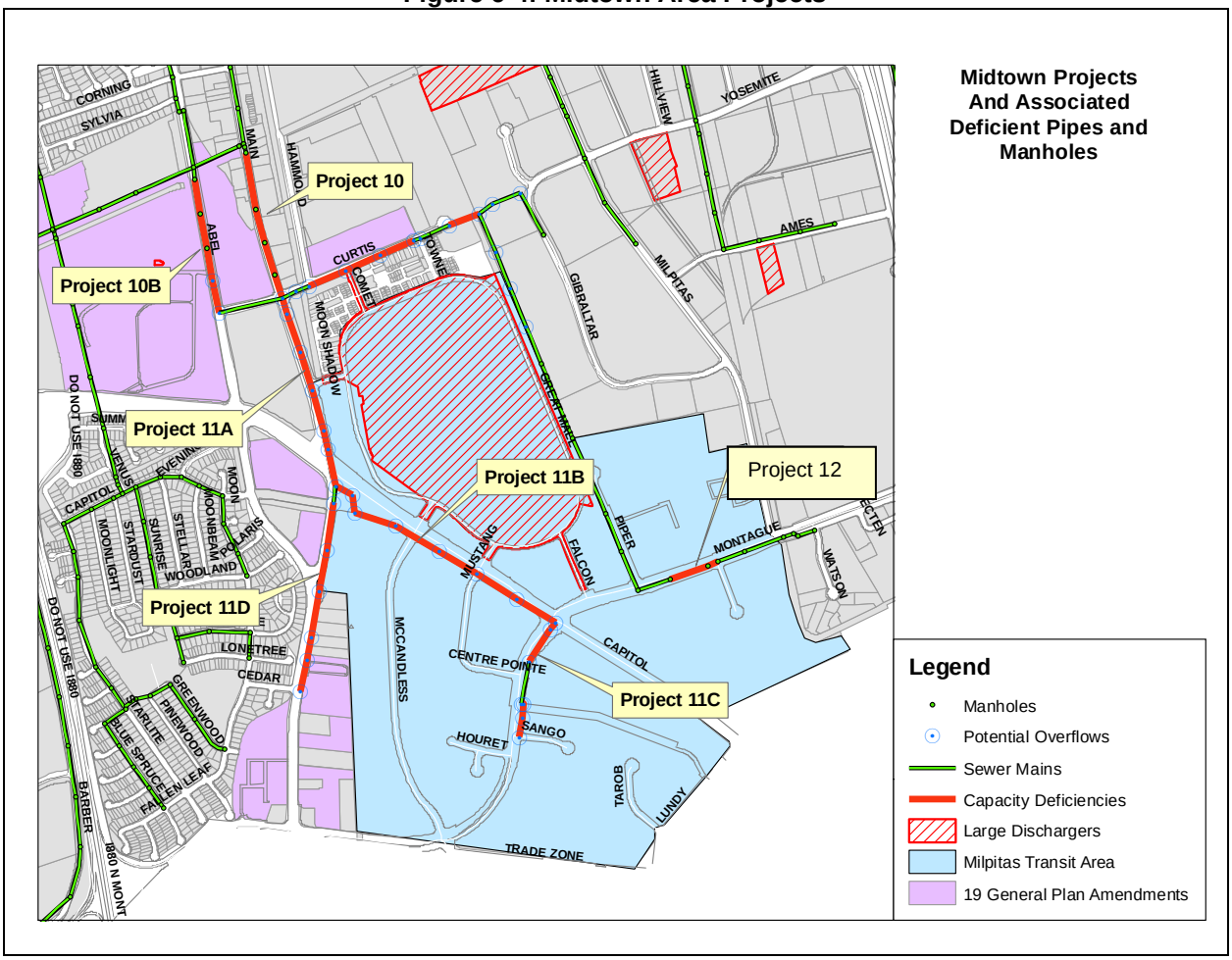
Table 6-6: Proposed Improvements for Project 10

PIPE ID (G_ID/ SY_NAME) [a]	DIAMETER (in)		LENGTH (ft)	TYPE	COMMENTS
	Exst.	Recomm.			
1292/34502	18	27	561	Replace	This project has been constructed.
1294/34506	18	27	339	Replace	This project has been constructed.
1296/35201	18	27	331	Replace	This project has been constructed.
1298/35205	18	27	241	Replace	This project has been constructed.

Footnotes:

a. Refers to HYDRA numbering system

Figure 6-4: Midtown Area Projects



6.3.6 Project No. 10B – South Abel Street North of Curtis Avenue

Project 10B is related to Project 10 in that, when implemented, it will reduce some of the backwater effects experienced in the upstream mains within the Midtown area of the collection system. Project 10B includes 5 reaches of pipe along South Abel Street between Curtis Ave and the SFPUC water pipeline, as shown in Figure 6-4. The existing pipes are 15 inches in diameter and 1,461 feet in length. The proposed pipe construction required for this project is shown in Table 6-7 below. The total estimated capital cost for this project is $990,000.

Table 6-7: Proposed Improvements for Project 10B

PIPE ID (G_ID/ SY_NAME) [a]	DIAMETER (in)				LENGTH (ft)	TYPE	COMMENTS
	Exst.	Recomm. S1	Recomm. S2	Recomm. S3			
1335/34402	15	21	21	21	122	Replace	
1337/34403	15	21	21	21	342	Replace	
1339/34507	15	21	21	21	341	Replace	
1341/35202	15	21	21	21	328	Replace	
1343/35206	15	21	21	21	328	Replace	

Footnotes:

a. Refers to HYDRA numbering system

6.3.7 Project No. 11 – Great Mall Project

This project includes the construction of twenty-six reaches of pipe along South Main Street, East Curtis Avenue, Great Mall Parkway, and Montague Expressway as shown in Figure 6-4. The existing pipes are 8 to 18 inches in diameter and total 6,895 feet in length. This project has been divided into five phases for construction based on the recommended replacement pipes and location. Table 6-8 lists the proposed pipe construction required for this project. The recommendations vary depending on which of Scenarios 1, 2, or 3 is in effect. The total estimated capital cost for this project ranges from $3,800,000 for Scenario 1 to $5,710,000 for Scenarios 2 and 3.

Table 6-8: Proposed Improvements for Project 11

PIPE ID (G_ID/ SY_NAME) [a]	DIAMETER (in)				LENGTH (ft)	TYPE	COMMENTS
	Exst.	Recommended S1	S2	S3			
Phase A – South Main Street North of Great Mall Parkway							
1300/35207	18	--	21	21	161	Replace	
1302/35208	18	--	21	21	401	Replace	
255/35601	18	--	27	27	401	Replace	Pipe not deficient, but replace to match upstream diameter
258/35602	18	27	27	27	401	Replace	
260/35603	18	27	27	27	190	Replace	
262/36301	12	27	27	27	369	Replace	
Phase B – Great Mall Parkway							
908/36302	15	18	18	18	193	Replace	
910/36304	15	18	18	18	168	Replace	
913/36305	10	18	18	18	429	Replace	
918/49101	10	18	18	18	495	Replace	
915/49401	10	18	18	18	431	Replace	
919/49501	10	18	18	18	465	Replace	
921/49502	10	15	15	15	451	Replace	
Phase C – Montague Expressway							
923/49503	10	12	12	12	80	Replace	
925/49505	10	12	12	12	385	Replace	
934/50201	10	12	12	12	418	Replace	Pipe not deficient, but replace to match upstream diameter
932/50202	8	15	15	15	28	Replace	Pipe has a much milder slope than the upstream pipe and therefore requires larger pipe size
930/50203	8	12	12	12	143	Replace	
927/50204	8	12	12	12	183	Replace	
Phase D – South Main Street South of Great Mall Parkway							
912/36303	8	12	12	12	165	Replace	
264/36306	8	12	12	12	478	Replace	
267/36601	8	12	12	12	412	Replace	
269/36602	8	12	12	12	457	Replace	
271/36515	8	12	12	12	234	Replace	
273/37204	8	12	12	12	315	Replace	Pipe only requires 10-in pipe, but replacement with downstream diameter recommended.
Phase E – East Curtis Ave East of South Main Street							
1303/35204	18	--	21	21	150	Replace	Pipe not deficient, but replacement with upstream diameter recommended
1305/35203	18	--	21	21	137	Replace	Pipe not deficient, but replacement with upstream diameter recommended
1307/35302	18	--	21	21	390	Replace	
1346/35301	18	--	21	21	381	Replace	
1348/47406	18	--	21	21	357	Replace	
1352/47405	15	--	18	18	61	Replace	Pipe not deficient, but replacement with upstream diameter recommended
1350/47404	15	--	18	18	318	Replace	
940/47403	15	--	18	18	312	Replace	

Footnotes:

a. Refers to HYDRA numbering system

6.3.8 Project No. 12 – Montague Expressway West of Gladding Court

This project includes construction of two reaches of pipe to correct a bottleneck on Montague Expressway at Gladding Court as shown on Figure 6-4. The existing pipes are 10 inches in diameter and 493 feet in length. The proposed pipe construction entails replacement of the existing sewer with 12-inch diameter pipe, with the same recommendation for each of Scenarios 1, 2, and 3. The surcharges in these pipelines are minimal and are not observed until buildout. Table 6-9 lists the proposed pipe construction required for this project. The total estimated capital cost for this project is $190,000.

Table 6-9: Proposed Improvements for Project 12

PIPE ID (G_ID/ SY_NAME) [a]	DIAMETER (in)		LENGTH (ft)	TYPE	COMMENTS
	Exst.	Recomm.			
275/49601	10	12	395	Replace	
278/61108	10	12	98	Replace	

Chapter 7 RECOMMENDATIONS

This chapter provides recommendations for implementation of the capital improvement projects developed in Chapter 6 to correct potential wet-weather conveyance deficiencies under buildout conditions. These recommendations include budget cost estimates for project implementation.

7.1 Capital Improvement Program

Eleven sewer capacity improvement projects were identified and described in Chapter 6. The recommended sewer improvement projects are summarized in Table 7-1 on the following page and shown in Figure 7-1.

It is recommended that the City follow a similar prioritization schedule as recommended in the 2004 Revision because each of Scenarios 1, 2, and 3 examined for this Update were analyzed only at buildout, and not the intermediate phases as in the 2004 Revision. The projects recommended in this Update are largely the same as in the 2004 Revision, with a few exceptions due mainly to the increased development in the Milpitas Transit Area. Development plans under Scenarios 1, 2, and 3 are in progress, and many plans, particularly the MTA Specific Plan, do not have a set implementation schedule developed yet. It is recommended that the City re-examine the impact of these development projects as specific development plans are finalized.

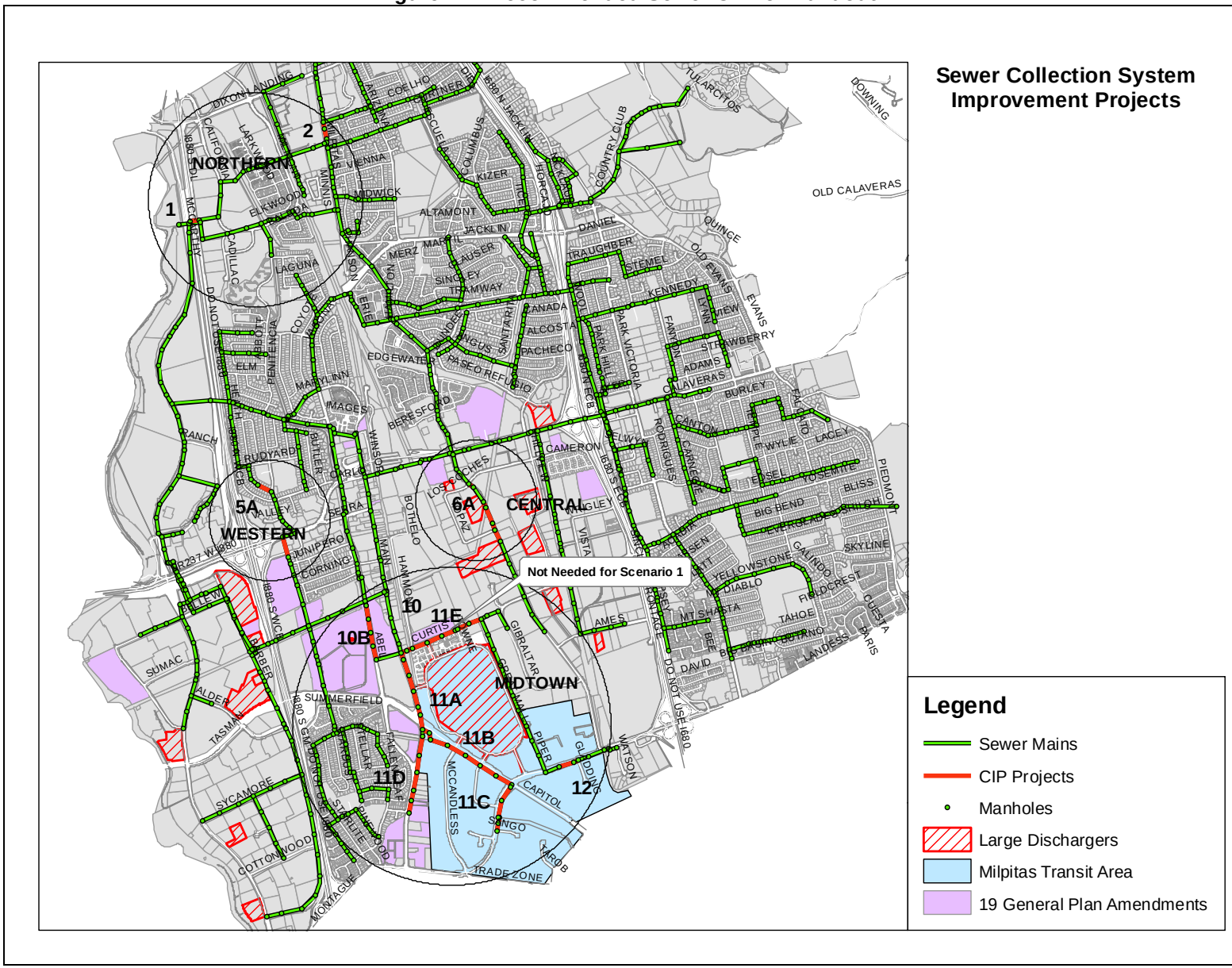
Table 7-7-1: CIP Recommendations

PROJECT	LOCATION	DESCRIPTION [a]	ESTIMATED CAPITAL COST ($1,000) [b]	COMMENTS/RECOMMENDATIONS
NEAR-TERM (FY 08/09 – FY 10/11)[c]				
10	South Main Street north of East Curtis Ave (Curtis Avenue between South Main Street and South Abel Street)	• Construct diversion at N Main St. and Curtis Ave • Construct 625 LF of 18-inch diameter sewer between S Main St and S Abel St		▪ This project will alleviate the potential for upstream overflows in the vicinity of the Great Mall. ▪ This project has been constructed.
10B	South Abel Street north of East Curtis Avenue	• Replace 1,460 of 15-inch with 21-inch diameter sewer	$990	▪ This project will alleviate the potential for upstream overflows in the vicinity of the Great Mall. This project has been constructed.
11 B	Great Mall Project (Great Mall Parkway between South Main Street and Montague Expressway)	• Replace 360 LF of 15-inch with 18-inch diameter sewer • Replace 1,820 LF of 10-inch with 18-inch diameter sewer • Replace 450 LF of 10-inch with 15-inch diameter sewer	$1,490	▪ Bottleneck in downstream pipes could result in upstream overflows. ▪ This project is scheduled to be constructed in FY2009-2010 according to the City's 2007-12 Capital Improvement Program Annual Report.
11 C	Great Mall Project (Montague Expressway)	• Replace 885 LF of 10-inch with 12-inch diameter sewer • Replace 30 LF of 8-inch with 15-inch diameter sewer • Replace 325 LF of 8-inch with 12-inch diameter sewer	$480	▪ Bottleneck in downstream pipe could result in upstream overflows. ▪ This project is scheduled to be constructed in FY2008-2009.
MID-TERM (FY 010/11 – FY12/13)[c]				
11 A	Great Mall Project (South Main Street north of Great Mall Parkway)	• Replace 560 LF of 18-inch with 21-inch diameter sewer **(Scenario 2 and 3 only)** • Replace 400 LF of 18-inch with 27-inch diameter sewer **(Scenario 2 and 3 only)** • Replace 590 LF of 18-inch with 27-inch diameter sewer • Replace 370 LF of 12-inch with 27-inch diameter sewer	$840 or $1,570	▪ Bottleneck in downstream pipe could result in upstream overflows. ▪ A portion of this project is scheduled for construction in FY2010-2011 (replace 590 LF of 18 inch with 27 inch and replace 370 LF of 12-inch with 27-inch). If budget is available, it is recommended that the other sections be completed concurrently to avoid cost of two separate projects.
LONG-TERM (FY 13/14– FY 18/19)[c]				
11 D	Great Mall Project (South Main Street south of Great Mall Parkway)	• Replace 2,060 LF of 8-inch with 12-inch diameter sewer	$800	▪ Capacity improvements should be reconfirmed according to more specific Milpitas Transit Area development plans.
INDEFINITE[d]				
1	I-880 Crossing	• Replace 225 LF of 18-inch with 27-inch diameter sewer	$540	▪ The pipe has approximately 13 feet of cover and there are no anticipated overflows under all scenarios.
2	North Milpitas Boulevard near Jason Avenue and Homme Way	• Replace 490 LF of 8-inch with 10-inch diameter sewer	$160	▪ The pipe has approximately 10 feet of cover and there are no anticipated overflows under all scenarios.
5A	Smithwood Street near Abbott Boulevard	• Replace 385 LF of 15-inch with 21-inch diameter sewer • Replace 500 LF of 15-inch with 18-inch diameter sewer	$550	▪ The pipe has approximately 7 feet of cover and there are no anticipated overflows under all scenarios.
6A	South Milpitas Boulevard between Calaveras Boulevard and Turquoise	• Replace 150 LF of 12-inch with 18-inch diameter sewer • Replace 595 LF of 12-inch with 15-inch diameter sewer	$380	▪ The pipe has approximately 8 feet of cover and there are no anticipated overflows under all scenarios.
11E	Great Mall Project (East Curtis Street)	• Replace 1,415 LF of 18-inch with 21-inch diameter sewer • Replace 690 LF of 15-inch with 18-inch diameter sewer	$0 or $1,370	▪ This project is not needed under Scenario 1. ▪ Capacity improvements should be reconfirmed according to more specific Milpitas Transit Area development plans.
12	Montague Expressway west of Gladding Avenue	• Replace 495 LF of 10-inch with 12-inch diameter sewer	$190	▪ The surcharge in these pipelines are minimum and are not observed until buildout.
		GRAND TOTAL	**$6,420 or $8,520**	

Footnotes:

a. Additional details and local maps are provided in Chapter 6, Section 2. Length of pipe is expressed in Linear Feet (LF) and is rounded to the nearest 5 feet.
b. Expressed in November 2009 dollars using the November 2009 San Francisco ENR CCI of 9719.42. Rounded to the nearest $10,000. See details of cost estimation in Chapter 6, Section 2
c. Phasing recommendations are based on 2004 Revision, and updated to reflect current dates.
d. Projects are not recommended to be undertaken unless further development or project necessitates them.

Figure 7-1: Recommended Sewer CIP for Buildout



References

Carollo Engineers, “City of Milpitas Sewer Master Plan Update,” June 1994.

CH2MHill, “City of Milpitas Sewer System Master Plan,” November 1984.

CH2MHill, “Intensive Flow Evaluation,” November 1984.

City of Milpitas, Citywide Ortho-Photo 0.25-ft pixel resolution, July 2001.

City of Milpitas, “General Plan,” December 1994, Amended June 1998.

City of Milpitas “Sewer System 1” = 100’ Maps,” Updated 1999.

City of Milpitas, “Resolution No. 6796 of the City Council of the City of Milpitas,” December 1999.

Dyett & Bhatia, “Milpitas Transit Area Specific Plan: Draft Preferred Plan”, April 2006

EDAW, “Milpitas Midtown Specific Plan,” Draft, August 2001.

Kennedy/Jenks Consultants, “Groundwater Infiltration Evaluation,” November 1999.

Kennedy/Jenks Consultants, “Main Pump Station Evaluation,” Initial Draft, August 20, 2002.

Pizer, Inc. HYDRA Version 6.0 Users Manual, May 2000.

RMC, Inc., “2002 Sewer Master Plan”, March 2003.

RMC, Inc., “2002 Water Master Plan”, January 2003.

RMC, Inc., “2004 Sewer Master Plan Revision,” March 2004.

RMC Water & Environment, “Wastewater Treatment Capacity Purchase Assessment TM,” March 2006.

Schaaf & Wheeler, “City of Milpitas Utility Depreciation Study,” June 28, 2002.