Technical Memorandum

Subject: **Sanitary Sewer Capacity Evaluation for the Proposed Downtown Precise Plan**

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Reference: Project 0011096, Task 2.33

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At the request of the City of Santa Clara (City), Woodard & Curran evaluated potential sanitary sewer capacity impacts of the proposed Downtown Precise Plan (Precise Plan) using the City's sanitary sewer hydraulic model. This technical memorandum (TM) summarizes the approach, model input, and results of the analysis.

The proposed Specific Plan redevelops the area in 46 existing parcels with assessor's parcel numbers (APN) 269-20-074 to 087, 269-20-089 to 091, 269-20-095, 269-22-072, 269-22-079, 269-22-084, 269-22-088 to 089, and 269-22-093 to 115. The area is bounded by Homestead Road to the south, Madison Street to the west, Lafayette Street to the east, and Benton Street to the north.

The developer proposes to divide the area to be redeveloped into ten (10) blocks, named A through J, as shown in **Figure 1**, provided by the City, and requests the analysis of two scenarios: one focused on housing and one focused on office space. The Housing Emphasis Scenario includes 1,071 housing units, 729,620 square feet (SF) of commercial use (of which 197,900 SF would be for retail use). The Office Emphasis Scenario includes 964 housing units, 909,500 SF of commercial use (of which 197,900 SF would be for retail use). The difference between the land use in the scenarios occurs only on block D.

Flow from the redeveloped parcels would enter the City's sanitary sewer system at numerous locations along the surrounding streets as follows:

- Flows discharged into the Benton Street or Homestead Road trunks eventually converge in the Brokaw Road trunk. The flow then continues to the Coleman Avenue trunk and the De La Cruz Boulevard trunks.

- Flows discharged into the Monroe Street trunk eventually reach flow split manhole S37-90 and can then travel east to the Benton Street trunk or north along Monroe Street eventually discharging into the El Camino Real south trunk.

- Flows discharged into the Madison Street trunk travel north and eventually discharge into the El Camino Real south trunk. Flow then continues east along this trunk and eventually drain into the De La Cruz Boulevard east trunk. The El Camino Real south trunk has several flow split manholes (S47-59, S47-77, and S47-56). However, there are no overflows at these manholes. That is, all flow remains in the El Camino Real south trunk even under future peak wet weather flow (PWWF) conditions. Flows then reach the De La Cruz Boulevard trunks.

- The De La Cruz Boulevard east and west trunks are interconnected (at manholes S48-11, S48-2, and S48-3). Flow then converges (at manhole S68-23) and continues north and east to the W. Trimble Road sewer, eventually crossing Highway 101 and the Guadalupe River onto W Trimble Road, finally discharging to the City of San Jose's interceptor system on Zanker Road.

The existing sewers serving the area are all at least 12-inches in diameter except for the Madison Street (6-inch between Franklin Street and Lewis Street and 8-inch for remaining sewers) and Monroe Street (8-inch between Benton Street and El Camino Real) sewers. **Figure 2** shows the sewer lines that would receive flow from the Precise Plan area (affected lines in red), and **Figure 3** shows the site and surrounding modeled sewers.

Figure 1. Location of the Redevelopment Blocks of the Downtown Precise Plan

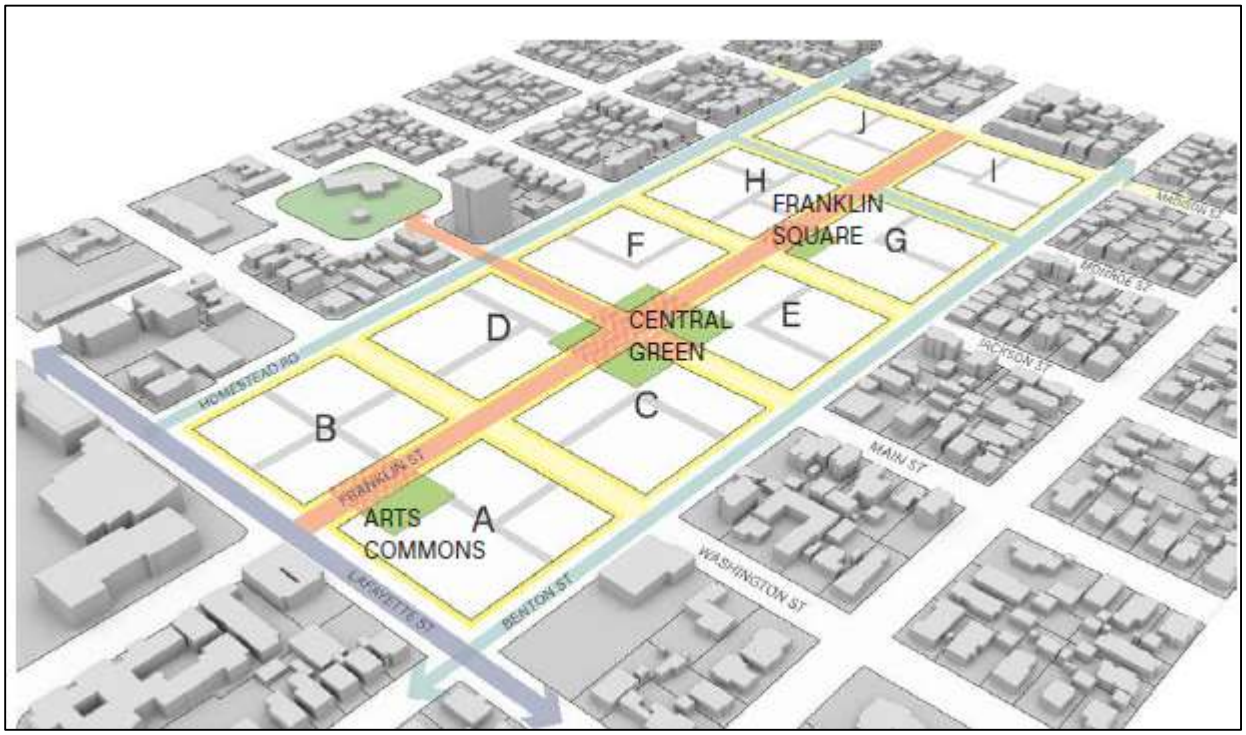


Figure 2: Trunk Sewers Downstream of the Proposed Project Site

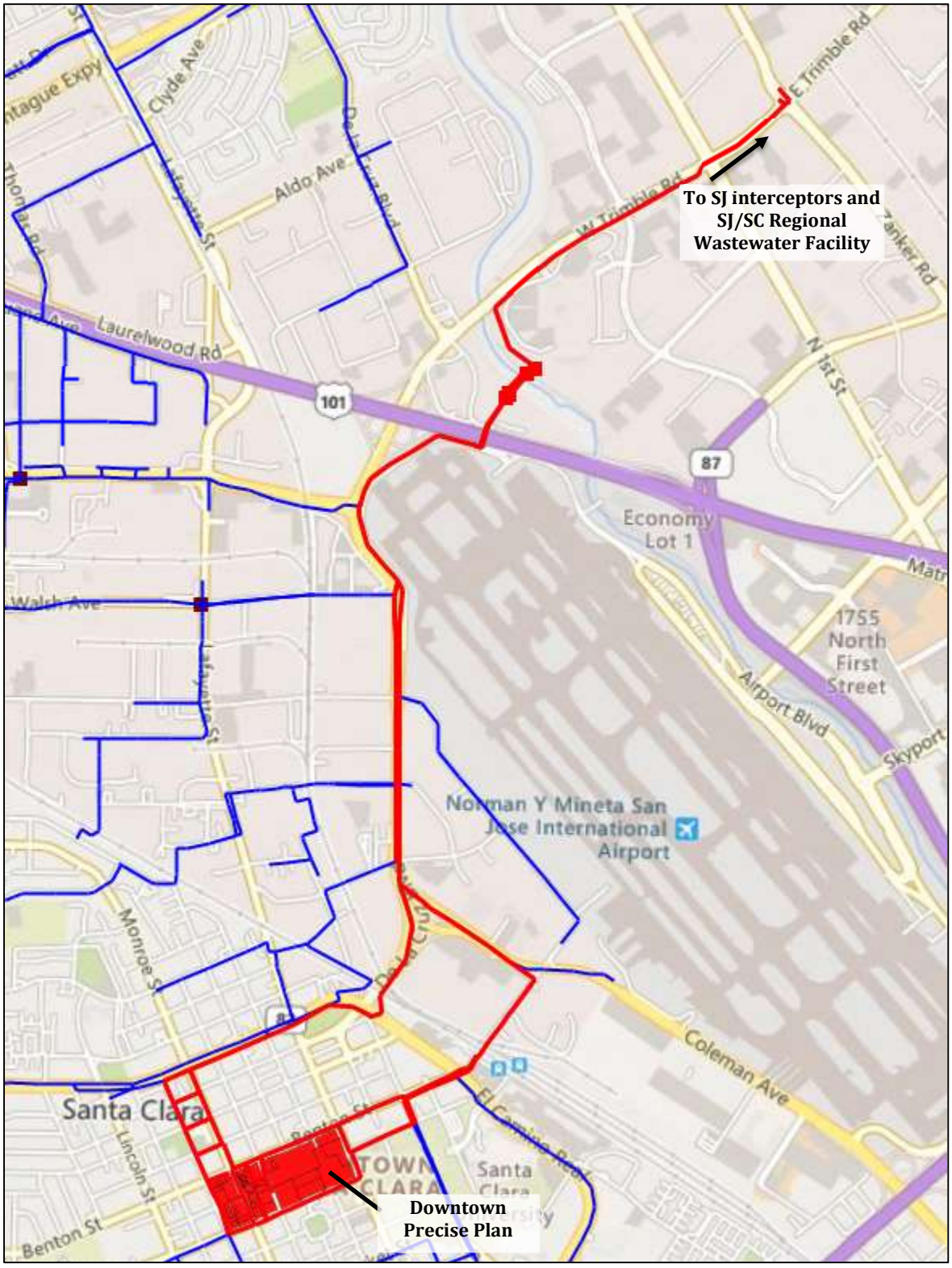
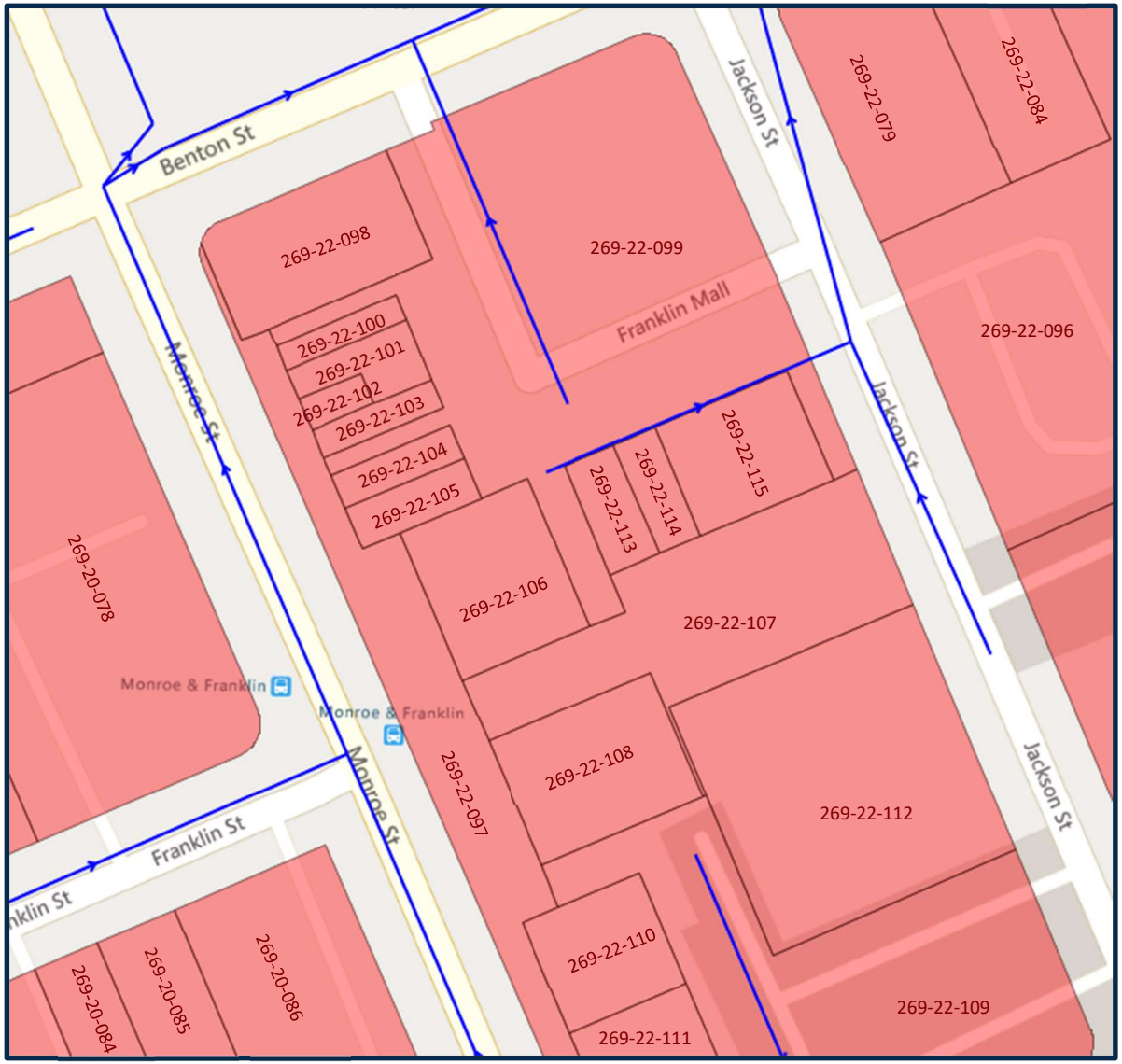


Figure 3: Modeled Sewers around Proposed Precise Plan Site.


Benton St
Jackson St
269-22-079
269-22-084
269-22-098
269-22-099
Franklin Mall
269-22-096
269-22-100
269-22-101
269-22-102
269-22-103
269-22-104
269-22-105
Monroe St
Jackson St
269-22-115
269-22-114
269-22-113
269-20-078
269-22-106
269-22-107
Monroe & Franklin
Monroe & Franklin
269-22-097
269-22-108
269-22-112
Jackson St
Franklin St
269-20-084
269-20-085
269-20-086
269-22-110
269-22-109
269-22-111

1. APPROACH

To evaluate the potential sewer capacity impact of the proposed development, the following model configurations were used:

- *Sewer network*: The City's current solutions network was used. The network consists of the City's expanded trunk sewer system that was developed as part of the Sanitary Sewer Master Plan Update (2016 Master Plan). The network includes:
    - Improvements recommended by the 2016 Master Plan (P3, P4, P5, and E1 Modified).
    - Recently constructed project P6 alternative (per the conformed drawings dated September 2019 with City of Santa Clara tracking number 12,175-D).
    - NVIDIA improvements (per the conformed drawings dated December 2014 with CSC tracking number 11,988-D).
    - Project P7 (Calabazas Creek Trunk Upsize) improvements recommended in the recent Master Plan Addendum Report (dated June 2022).
    - City's selected Patrick Henry Drive (PHD) Alternative 3 (Gravity Scenario E) to address improvements needed to convey development flows from the PHD Specific Plan. These improvements are described in the PHD Evaluation of Capacity Improvement Project Alternatives TM (dated December 3, 2021). The proposed improvements include disconnecting the Old Ironside Drive 12-inch sewer at manhole S93-54 (just upstream of the Hetch Hetchy ROW crossing) and re-routing PHD flows south along Old Ironside Drive to PHD eventually discharging to the GAP west trunk at manhole S83-5. It should be noted that the Alternative 3 improvements include upsizing and lowering a portion of the GAP west trunk (from PHD to manhole S93-53). The GAP trunks receive flow from the Calabazas Creek trunk and Bowers Avenue trunk, both of which convey flow from Cupertino Sanitary District (CuSD).
    - Additional improvements recommended because of recent development reviews such as the Freedom Circle improvements (described in the Freedom Circle Development Review TM dated February 27, 2021).
    - The soon to be lined GAP sewers (per the City's 2021 Santa Clara Sewer Repairs spreadsheet provided via email dated September 16, 2021).
    - New set points at Tasman Drive and Westside Lift Stations as provided by the City's Water & Sewer Utilities department (in an email dated March 14, 2022). These improvements were recommended by the 2016 Master Plan projects P1 and P2.

  It should be noted that there are no recommended 2016 Master Plan nor more recent improvements (as listed above) downstream of the proposed Precise Plan development.
- *Sanitary sewer load*: The Updated General Plan Phase 3 Loads (aka 2035 Loads) were used for this analysis. The 2035 loads were updated for the 2016 Master Plan, which includes updated base loads, updated development assumptions consistent with the City's 2035 General Plan, and projected

loads for additional developments that were approved between 2009 (after the completion of the original 2035 Loads) and the completion of the 2016 Master Plan. The model also includes developments that have been evaluated since completion of the 2016 Master Plan including the recent Freedom Circle Focus Area and Greystar General Plan Amendment and PHD Specific Plan (both discharging to the GAP trunks and eventually to the Lafayette trunks) as well as developments where a formal sewer model run analysis was not conducted (formal analysis not needed due to their small discharge).

- In addition to the wastewater flows generated within the City's service area, the City also receives flow from Cupertino Sanitary District (CuSD). CuSD recently provided an update to their projected future flows into the Santa Clara system. The updated PWWF is 14.5 mgd, which is slightly higher than the 13.8 mgd PWWF assumed for the City's 2016 Master Plan (equivalent to CuSD's current contractual maximum flow rate). The model has been updated to reflect the most recent PWWF discharge projection of 14.5 mgd. The model has also been updated with the updated future peak dry weather flow (PDWF) of 8.1 mgd. These flows were based on CuSD's future build out scenario as described in CuSD's Flow Modeling Analysis Report (dated December 6, 2019). This scenario includes existing loads, estimated loads from the Vallco development and other approved developments and loads from the City of Cupertino's 2040 General Plan (GP) growth estimates.
- *Flow Scenario*: System capacity was evaluated based on the ability of the sanitary sewer system to convey future peak wet weather flow (PWWF) under design storm conditions. This analysis used the same 10-year design storm that was used for the 2016 Master Plan.

2. MODEL INPUT

Parcels included in the Precise Plan were added to the model as individual subcatchments with the following settings, based on the sewer model run request received October 6, 2022, and subsequent clarifications received October 14 and 20, 2022:

- *Sanitary Sewer Loads:* Two different scenarios were evaluated, the housing emphasis and office emphasis scenarios. The housing emphasis scenario consists of 1,071 residential dwelling units and 729,620 SF of non-residential (office and retail) area and are estimated to discharge 275,073 gallons per day (gpd; or 0.275 million gallons per day, mgd) into the sewer system. The residential dwelling unit type are split between condominiums (40 percent) and apartments (60 percent) per City's Planning Department. For Block A, the non-residential area includes a hotel and retail space. **Table 1** shows the unit flow factors used for the development land uses. **Table 2** specifies the flow of the housing emphasis scenario by block (as shown on Figure 1). A more detailed breakdown by block and parcel along with the assumed discharge location is shown in **Table 3**. The development was distributed to the relevant parcels based on their respective area ratio of the parcels (by block).

  The office emphasis scenario consists of 964 residential dwelling units and 909,500 SF of non-residential area and are estimated to discharge 275,684 gpd or 0.276 mgd into the sewer system. The difference between the land use in the scenarios occurs only on block D. **Table 4** specifies the flow of the office emphasis scenario by block (as shown in Figure 1). **Table 5** specifies the flow by block and parcel along with the assumed discharge location. The discharge was distributed to the relevant parcels based on their respective area ratio of the parcels in each block.

  The two scenario flows would replace a General Plan 2035 flow of 208,471 gpd (0.2085 mgd) as estimated for these parcels.

- *Diurnal Profile:* Per Figure 2-3 in the City's 2016 Sewer Master Plan Update, the commercial diurnal curve was applied to the non-residential flows, and the residential diurnal curve was applied to the residential flows.
- *Rainfall Event:* The rainfall event used was the same 10-year design event used for the 2016 Master Plan Update.
- *RDI/I Parameters:* The RDI/I parameters used were the calibrated parameters from the 2016 Master Plan. This means that RDI/I response is assumed to neither increase nor decrease with the Precise Plan.

Table 1: Unit Flow Factors

Type of Development	Unit Flow Factor[a]	Units
Townhouse or Condominiums	175	gpd/DU
Apartments	154	gpd/DU
Hotel - per SF	0.48[b]	gpd/SF
Commercial Offices	0.1	gpd/SF
Retail	0.1	gpd/SF

a. Unit flow factors per the City's 2016 Master Plan.
b. Unit flow factor per the *San Jose/Santa Clara Water Pollution Control Plant Specific Use Code & Sewer Coefficient* table.

Table 2: Sewer Load Estimates by Block for the Housing Emphasis Scenario

Block	Condo Units (DUs)	Apt Units (DUs)	Commercial (SF)	Retail (SF)	Residential Flow (mgd)	NonResidential Flow (mgd)
A[1]	51	77	74,160	40,700	0.0208	0.0397
B	34	52	99,240	30,600	0.0140	0.0130
C	44	65	92,520	13,800	0.0177	0.0106
D	73	109	0	19,700	0.0296	0.0020
E	47	70	85,920	12,900	0.0190	0.0099
F	0	0	179,880	32,800	0.0000	0.0213
G	46	70	0	21,300	0.0188	0.0021
H	36	53	0	9,700	0.0145	0.0010
I	71	106	0	7,100	0.0287	0.0007
J	27	40	0	9,300	0.0109	0.0009
TOTAL:	**428**	**643**	**531,720**	**197,900**	**0.1739**	**0.1011**

[1] The commercial square footage for Block A consists of hotel space.

Table 3: Sewer Load Estimates by Parcel for the Housing Emphasis Scenario

			Proposed Development and Average Sewer Flows			
			Residential		Non-Residential	
APN	Block	MH ID	Units (DUs)	Average Base Flow (GPD)	Area (SF)	Average Base Flow (GPD)
26922088	B	S37-91	64	10,332	96,049	9,605
26922089	B	S37-24	22	3,635	33,791	3,379
26922072	A	S37-21	128	20,787	114,860	39,667
26922096	C	S37-38	109	17,702	106,320	10,632
26922084	E	S37-38	50	8,191	42,601	4,260
26922079	E	S37-38	67	10,810	56,219	5,622
26922094	D	S37-40	98	15,939	10,624	1,062
26922093	D	S37-40	84	13,618	9,076	908
26922095	F	S37-88	0	0	212,680	21,268
26922108	G	S37-89	11	1,853	2,095	210
26922109	G	S37-89	48	7,800	8,820	882
26922110	G	S37-89	7	1,192	1,348	135
26922111	G	S37-89	15	2,467	2,790	279
26922112	G	S37-39	34	5,526	6,248	625
26922097	H	S37-36	13	2,092	1,404	140
26922098	H	S37-37	6	1,042	699	70
26922099	H	S37-37	36	5,881	3,947	395
26922100	H	S37-37	1	147	99	10
26922101	H	S37-37	2	263	176	18
26922102	H	S37-37	1	95	64	6
26922103	H	S37-37	1	165	111	11
26922104	H	S37-37	1	198	133	13
26922105	H	S37-36	1	239	160	16
26922106	H	S37-36	6	951	638	64
26922107	H	S37-36	13	2,171	1,457	146
26922113	H	S37-36	2	267	179	18
26922114	H	S37-36	1	225	151	15
26922115	H	S37-36	4	718	482	48
26920082	I	s37-94	22	3,619	894	89
26920083	I	S37-94	11	1,795	443	44
26920084	I	S37-94	12	1,914	473	47
26920085	I	S37-94	15	2,358	582	58
26920086	I	S37-47	43	7,029	1,736	174
26920087	I	S37-49	15	2,374	586	59

			Proposed Development and Average Sewer Flows			
			Residential		Non-Residential	
APN	Block	MH ID	Units (DUs)	Average Base Flow (GPD)	Area (SF)	Average Base Flow (GPD)
26920089	I	S37-48	14	2,319	573	57
26920090	I	S37-94	14	2,338	577	58
26920091	I	S37-94	16	2,609	644	64
26920095	I	S37-49	15	2,390	590	59
26920078	J	S37-47	28	4,570	3,906	391
26920075	J	S36-33	4	598	511	51
26920081	J	S36-34	3	476	407	41
26920080	J	S36-34	6	893	763	76
26920076	J	S37-33	3	418	358	36
26920079	J	S37-94	17	2,729	2,333	233
26920074	J	S36-33	4	716	612	61
26920077	J	S37-33	3	479	409	41
		TOTAL:	**1,071**	**173,930**	**729,620**	**101,143**

Table 4: Sewer Load Estimates by Block for the Office Emphasis Scenario

Block	Condo Units (DUs)	Apt Units (DUs)	Commercial (SF)	Retail (SF)	Residential Flow (mgd)	NonResidential Flow (mgd)
A	51	77	74,160	40,700	0.0208	0.0397
B	34	52	99,240	30,600	0.0140	0.0130
C	44	65	92,520	13,800	0.0177	0.0106
D	30	45	179,880	19,700	0.0122	0.0200
E	47	70	85,920	12,900	0.0190	0.0099
F	0	0	179,880	32,800	0.0000	0.0213
G	46	70	0	21,300	0.0188	0.0021
H	36	53	0	9,700	0.0145	0.0010
I	71	106	0	7,100	0.0287	0.0007
J	27	40	0	9,300	0.0109	0.0009
TOTAL:	**386**	**578**	**711,600**	**197,900**	**0.1566**	**0.1191**

Table 5: Sewer Load Estimates by Parcel for the Office Emphasis Scenario

			Proposed Development and Average Sewer Flows			
			Residential		Non-Residential	
APN	Block	Node ID	Units (DUs)	Average Base Flow (gpd)	Area (SF)	Average Base Flow (gpd)
26922088	B	S37-91	64	10,332	96,049	9,605
26922089	B	S37-24	22	3,635	33,791	3,379
26922072	A	S37-21	128	20,787	114,860	39,667
26922096	C	S37-38	109	17,702	106,320	10,632
26922084	E	S37-38	50	8,191	42,601	4,260
26922079	E	S37-38	67	10,810	56,219	5,622
26922094	D	S37-40	40	6,568	107,629	10,763
26922093	D	S37-40	35	5,612	91,951	9,195
26922095	F	S37-88	0	0	212,680	21,268
26922108	G	S37-89	11	1,853	2,095	210
26922109	G	S37-89	48	7,800	8,820	882
26922110	G	S37-89	7	1,192	1,348	135
26922111	G	S37-89	15	2,467	2,790	279
26922112	G	S37-39	34	5,526	6,248	625
26922097	H	S37-36	13	2,092	1,404	140
26922098	H	S37-37	6	1,042	699	70
26922099	H	S37-37	36	5,881	3,947	395
26922100	H	S37-37	1	147	99	10
26922101	H	S37-37	2	263	176	18
26922102	H	S37-37	1	95	64	6
26922103	H	S37-37	1	165	111	11
26922104	H	S37-37	1	198	133	13
26922105	H	S37-36	1	239	160	16
26922106	H	S37-36	6	951	638	64
26922107	H	S37-36	13	2,171	1,457	146
26922113	H	S37-36	2	267	179	18
26922114	H	S37-36	1	225	151	15
26922115	H	S37-36	4	718	482	48
26920082	I	s37-94	22	3,619	894	89
26920083	I	S37-94	11	1,795	443	44
26920084	I	S37-94	12	1,914	473	47
26920085	I	S37-94	15	2,358	582	58
26920086	I	S37-47	43	7,029	1,736	174
26920087	I	S37-49	15	2,374	586	59

			Proposed Development and Average Sewer Flows			
			Residential		Non-Residential	
APN	Block	Node ID	Units (DUs)	Average Base Flow (gpd)	Area (SF)	Average Base Flow (gpd)
26920089	I	S37-48	14	2,319	573	57
26920090	I	S37-94	14	2,338	577	58
26920091	I	S37-94	16	2,609	644	64
26920095	I	S37-49	15	2,390	590	59
26920078	J	S37-47	28	4,570	3,906	391
26920075	J	S36-33	4	598	511	51
26920081	J	S36-34	3	476	407	41
26920080	J	S36-34	6	893	763	76
26920076	J	S37-33	3	418	358	36
26920079	J	S37-94	17	2,729	2,333	233
26920074	J	S36-33	4	716	612	61
26920077	J	S37-33	3	479	409	41
		TOTAL:	**964**	**156,554**	**909,500**	**119,131**

3. MODEL RESULTS

Hydraulic profiles and predicted PWWF under future (2035) conditions in the sewers downstream of the Precise Plan site were reviewed. Model results by flow scenario are summarized in **Table 3** and discussed further below.

Without the Precise Plan: The model predicts the following results for the various sewer lines within and downstream of the Precise Plan area (percentages full are based on the depth of flow):

- *Monroe Street/Benton Street (S37-48 to S48-38; 12-, 18-, and 24-inch):* 24% to 66% full.
- *Homestead Road/Lafayette Street/Franklin Street/Benton Street (S37-48 to S48-38; 12-, 15- and 18-inch):* 11% to 70% full.
- *Brokaw Road (S48-38 to S48-30; 18-inch):* 53% to 57% full
- *Coleman Avenue (S48-30 to S48-3; 21- and 24-inch):* 59% to 78% full
- *Monroe Street/El Camino Real (S37-48 to S48-11; 8-, 12-, 15-, and 21-inch):* 28% to 91% full
- *De La Cruz Boulevard – East trunk (S48-3 to S68-20; 24-inch):* 53% to 78% full
- *De La Cruz Boulevard – West trunk (S48-2 to S68-20; 23.3-, 24, and 30-inch):* 26% to 77% full
- *De La Cruz Boulevard/W Trimble Road/ Guadalupe River Crossing (S68-20 to S68-8; 24-, 33-, and 48-inch):* 41% to 92% full
- *Trimble Road to Zanker Road (S68-4 to MH2; 48-inch):* 43% to 61% full

With the Precise Plan (Housing Emphasis Scenario): The model predicts the following results for the various sewer lines within and downstream the Precise Plan area (percentages full are based on the depth of flow):

- *Monroe Street/Benton Street (S37-48 to S48-38; 12-, 18-, and 24-inch):* 25% to 69% full.
- *Homestead Road/Lafayette Street/Franklin Street/Benton Street (S37-48 to S48-38; 12-, 15- and 18-inch):* 12% to 69% full.
- *Brokaw Road (S48-38 to S48-30; 18-inch):* 54% to 57% full
- *Coleman Avenue (S48-30 to S48-3; 21- and 24-inch):* 62% to 78% full
- *Monroe Street/El Camino Real (S37-48 to S48-11; 8-, 12-, 15-, and 21-inch):* 28% to surcharged. Even though there is one section of an 8-inch sewer that is surcharged due to throttle conditions (on Monroe Street immediately upstream of El Camino Real, between manholes S36-6 and S46-106), the pipe is not deficient, as the surcharge level (0.5 inches above pipe crown) is below the City's PWWF deficiency criteria (1 ft of surcharge above pipe crown).
- *De La Cruz Boulevard – East trunk (S48-3 to S68-20; 24-inch):* 54% to 78% full
- *De La Cruz Boulevard – West trunk (S48-2 to S68-20; 23.3-, 24, and 30-inch):* 26% to 77% full
- *De La Cruz Boulevard/W Trimble Road/ Guadalupe River Crossing (S68-20 to S68-8; 24-, 33-, and 48-inch):* 42% to 93% full
- *Trimble Road to Zanker Road (S68-4 to MH2; 48-inch):* 43% to 62% full

With the Precise Plan (Office Emphasis Scenario): The model predicts the following results for the various sewer lines within and downstream the Specific Plan area (percentages full are based on the depth of flow):

- *Monroe Street/Benton Street (S37-48 to S48-38; 12-, 18-, and 24-inch):* 25% to 69% full.
- *Homestead Road/Lafayette Street/Franklin Street/Benton Street (S37-48 to S48-38; 12-, 15- and 18-inch):* 12% to 69% full.
- *Brokaw Road (S48-38 to S48-30; 18-inch):* 54% to 57% full
- *Coleman Avenue (S48-30 to S48-3; 21- and 24-inch):* 62% to 78% full
- *Monroe Street/El Camino Real (S37-48 to S48-11; 8-, 12-, 15-, and 21-inch):* 28% to surcharged. Even though there is one section of an 8-inch sewer that is surcharged due to throttle conditions (on Monroe Street immediately upstream of El Camino Real, between manholes S36-6 and S46-106), the pipe is not deficient, as the surcharge level (0.5 inches above pipe crown) is below the City's PWWF deficiency criteria (1 ft of surcharge above pipe crown).
- *De La Cruz Boulevard – East trunk (S48-3 to S68-20; 24-inch):* 54% to 78% full
- *De La Cruz Boulevard – West trunk (S48-2 to S68-20; 23.3-, 24, and 30-inch):* 26% to 78% full
- *De La Cruz Boulevard/W Trimble Road/ Guadalupe River Crossing (S68-20 to S68-8; 24-, 33-, and 48-inch):* 42% to 93% full
- *Trimble Road to Zanker Road (S68-4 to MH2; 48-inch):* 43% to 62% full

The sanitary sewer pipes serving the Precise Plan area have sufficient capacity for the proposed plan in the two scenarios provided.

Table 3: Model Results under Future (2035) PWWFs

			Percent Full (Based on Depth of Flow)		
Sewer Reach	**Upstream Manhole**	**Downstream Manhole**	**Without the Precise Plan**	**With Precise Plan (Housing Emphasis Scenario)**	**With Precise Plan (Office Emphasis Scenario)**
Monroe Street/Benton Street	S37-48	S48-38	24% - 66%	25% - 69%	25% - 69%
Homestead Road/Lafayette Street/Franklin Street/Benton Street	S37-48	S48-38	11% - 70%	12% - 69%	12% - 69%
Brokaw Road	S48-38	S48-30	53% - 57%	54% - 57%	54% - 57%
Coleman Avenue	S48-30	S48-3	61% - 78%	62% - 78%	62% - 78%
Monroe Street/El Camino Real	S37-48	S48-11	28% - 91%	28% - Surcharged	28% - Surcharged
De la Cruz Boulevard (East Trunk)	S48-3	S68-20	53% - 78%	54% - 78%	54% - 78%
De la Cruz Boulevard (West Trunk)	S48-2	S68-20	26% - 77%	26% - 77%	26% - 78%
De la Cruz Boulevard/W Trimble Road/Guadalupe River Crossing	S68-20	S68-8	41% - 92%	42% - 93%	42% - 93%
Trimble Road/Zanker Road	S68-4	SJ Interceptor	43% - 61%	43% - 62%	43% - 62%