

APPENDIX E

Memo

To: Mike Britten, Jose Gutierrez – Carollo Engineers
From: William Wong – City of Modesto
CC: Rich Ulm, Jack Bond – City of Modesto
Date: 5/25/2006
Re: Estimated Sewer Flow Projections

The City of Modesto Community and Economic Development Department (CEDD) recently prepared a memorandum regarding population projections within the City's Sphere of Influence (SOI) at buildout (copy attached). This population projection will be used in support of a determination of the need for capacity and improvements at the City's sanitary sewer treatment facility. This analysis focuses on comparing estimated sewer flow demands from updated residential land uses to the sewer demands from population growth.

The May 4, 2006 CEDD analysis by Miguel Galvez refines and updates General Plan acreage figures and population assumptions that may affect municipal levels of service. It is expected that the assumptions of the current General Plan will be modified and incorporated into the next comprehensive update of the General Plan and accompanying MEIR.

Anticipated Flow Projections – Based On Land Use Updates

Using the information contained in the May 4, 2006 memorandum "Final Memo on Projected General Plan Buildout Population of the SOI" from the CEDD memorandum, the projected Village Residential densities have been increased, from 5.1 DU/ac¹ to the new range of 5.75 - 7.5 dwellings units per acre. Using the Mid-density value of 6.6 dwellings per acre, the following assumptions were made:

Table 1 - Assumptions

6.6	DU ² /ac	(Mid-density from May 4, 2006 memo)
2.9	People/DU	(From May 4, 2006 memo)
100	Gpd/cap	(From Current City of Modesto Standards)
Anticipated per acre flow	1,914	gpd/ac

The flow factor of 1,914 gpd/ac differs from the actual flow coefficient of 1,260 gpd/ac generated by the 2004 sewer flow-monitoring program for Village Residential (VR) from the Draft Wastewater Master Plan update. The generated VR wastewater flows are based on current densities, and would likely

¹ From the 1995 Urban Area General Plan (amended in 2003)

² DU = Dwelling Unit

increase with the proposed density increases, as indicated in the CEDD memorandum. Therefore, it would be prudent to factor these new densities for design purposes.

Table 2 – Estimated Sewer Flow based on Land Use (@ 6.6 DU/acre)

Land use Designation	Developable acreage within SOI (acres)	Using expected 90% build-out of developable acres ³	Flow Coefficient (gpd/ac)	Anticipated sewer flow (mgd)
Residential and Village Residential ³	5,121	4,608.6	1,914	8.82
Residential (North Ceres) ⁴ – Assumes Ceres Residential Densities similar to Modesto	146	131.4	1,914	0.25
Underdeveloped Residential in SOI ³ (Estimate 50% to intensify)	325	292.5	1,914	0.28
Regional Commercial ³	389	350.0	1,000	0.35
Commercial (estimated vacant within the City Limits)	100	90.0	1,000	0.09
Business Park ³	2,168	1,951.3	890	1.74
Mixed Use ³	17	14.9	1,100	0.02
Industrial (vacant in SOI) ⁵	1,456	1,310.4	1,000	1.31
Industrial (underdeveloped in SOI) ⁵ (Estimate 50% to intensify)	1,793	1,613.7	1,000	0.81
Anticipated Buildout Flow Subtotal:				13.7 mgd
2005 Annual Flow:				25.8 mgd
Total Build-out Flow:				39.5 mgd

Assuming that 90% of the developable acreage will develop at build-out, the anticipated additional generated flow, based on land use, will range from 12.5 to 14.9 MGD, with the mid-range flow at 13.7 MGD. However, based on the variable proposed densities, anticipated total flow at build-out can be reasonably expected to range between **38.3 to 40.7 MGD**, with 39.5 MGD being the mid-range buildout flow. Intensification of existing industrial customers that discharge to the cannery segregation facilities was not included in this estimate, and will be analyzed at a later date.

Anticipated Flow Projections – Based On Population Projections

The CEDD memorandum trend analysis was used to estimate the residential growth rate for the SOI. From 2000-2005, the annual growth rate has been an approximately 1.91%, and over the last 10 years, the annual rate has been 1.55%. The CEDD memorandum forecasts a growth rate between 1.60-1.90%. The CEDD memorandum projects the population of the SOI buildout to be between **333,600 to 356,800** people, with a mid-range population of **345,000** people.

Based on the growth rate information, a growth rate projection of 1.60% was used to 2011 and a growth rate of 1.75% from 2012 to the expected build-out of the SOI in 2030. The expected population increase of the SOI will be approximately **133,000** people, or a total of **343,000** people, which is within the projected mid-range buildout value from the CEDD memorandum. Using the average annual 2005

³ From May 4, 2006 “Final Memo on Projected General Plan Buildout Population of the SOI” by Miguel Galvez

⁴ From Draft Wastewater Collection System Master Plan by Carollo Engineers.

⁵ From 2003 Urban Growth Policy Review Report.

flow of 25.8 MGD, which includes all non-Cannery Segregation flows (residential, commercial, some industrial), and with an existing sewer service population of 219,908⁶, the gross per capita flow is approximately 117.3 gpd/cap. The associated flow increase will be approximately (133,000 people x 117.3 gpd/cap =) 15.6 MGD. Including the build-out of the North Ceres area (estimated at 2,300 additional people at buildout), the total anticipated flow would be 15.9 MGD, or a total **41.7 MGD**.

From the CEDD memorandum, expected build-out population, based on low density SOI buildout population, plus North Ceres, of (333,600 + 2,300 =) 335,900 people, the calculated build-out flow will be **39.4 MGD**. A high-density SOI build-out population, plus North Ceres, of (356,800 + 2,300 =) 359,100 people would have an expected build-out flow of **42.1 MGD**.

Table 3 – Estimated Flow based on Population Growth at 117.3 gpd/cap

	Projected Additional Population within SOI at buildout	Expected Sewer Flow increase at build-out of SOI (MGD)	Projected Additional Population served at build-out (SOI + N. Ceres)	Expected Sewer Flow increase at Build-out of SOI (MGD)	Projected Build-out Flow (MGD)
Low Density	113,600	13.3	115,900	13.6	39.4
Mid-Density	133,000	15.6	135,300	15.9	41.7
High Density	136,800	16.0	139,100	16.3	42.1

It is important to note that there are yearly fluctuations in the per capita flow rate. Historically, the per capita flow (gpd/cap) from 2000 to 2005 has fluctuated between 101.6 gpd/cap to 125.1 gpd/cap (See Table 4). These fluctuations may be attributed to variations in flow from the industrial operations, changes in domestic indoor water consumption, or a combination of both.

Table 4 - Per Capita Flow Estimate

Year	SOI Population	Estimated Sewer Service Pop.	Flow (MDG)	Per Capita Flow
2000	188,856	201,130	24.6	122.3
2001	193,100	205,374	25.7	125.1
2002	198,800	211,074	23.9	113.2
2003	203,300	215,574	21.9	101.6
2004	206,188	218,462	22.4	102.5
2005	207,634	219,908	25.8	117.3

However, using the most recent (2005) information, by removing the top year-round industrial flows (from customers who also discharge to the Cannery Segregation line during the canning season (Gallo, Frito-Lay, and Del Monte)), the 2005 domestic flow is reduced by 2.9 MGD to 22.9 MGD, and the per capita flow was adjusted to 104.1 gpd/cap. At this per capita flow, the expected domestic sewer flow, at build-out, would range between 37.9 MGD to 40.3 MGD. Total flow, with the year-round industrial customers and assuming no intensification of industrial discharge, would range between **40.8 MGD to 43.2 MGD**.

Therefore, based on population growth, and accounting for possible variations in sewer flow, the projected sewer flow is expected to range between **39.4 to 43.2 MGD** within the entire sewer service area, at buildout.

⁶Total sewer service population in 2005 is 219,908, which includes existing service connections in Modesto Municipal Sewer District No. 1, Empire Sanitation District and North Ceres.

Conclusions:

Two different methods were used to analyze and project future flows. The first method incorporates revised land uses of the General Plan, which have been updated from GIS and General Plan Amendments. The resulting anticipated generated flow based on land use is between **38.3 to 40.7 MGD**. The second method uses growth projections based on historical Annual Growth Rates, based on the Department of Finance population estimates. The resulting anticipated generated flow, based on population growth within the SOI is between **39.4 MGD to 43.2 MGD**.

Due to the difficulty of projecting the future sewer flows into the City of Modesto's wastewater system, due to probable variations of population growth trends, demographics, future General Plan Amendments, etc., it can be reasonably concluded that, based the best information provided to date, the City can reasonably expect the buildout sewer flow to fall between the **range of 38.3 to 43.2 MGD**.

Attachment: "Final Memo on Projected General Plan Buildout Population of the SOI"