San Luis Obispo Country Club County Service Area 18
Wastewater Treatment System Capacity Analysis
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Executive Summary

Recent requests for annexations have prompted the question of CSA 18's current loading and potential for additional connections to the wastewater collection and treatment system. This document demonstrates that with the projected loading at CSA 18 build-out, the treatment system will be operating at maximum capacity. Therefore any entities proposing annexation would be required to design and construct modifications to the existing treatment system to increase its capacity. The following analysis considers current properties connected to the system as well as properties on the sewer availability list, which are properties in CSA 18 that can connect to the system at any time. Capacity for these properties needs to be available before considering annexed properties. Additionally, there are properties on septic within CSA 18 that may connect to the system, and there is potential for additional units to be built on "underdeveloped" properties within CSA 18. Future policy may dictate that capacity be available for these properties as well before considering annexations.

Current CSA 18 Loading

Table 1 shows historical effluent flows for the CSA 18 Treatment Plant (Plant) over the last 6 years. There is no influent flow meter at the Plant. The maximum allowable effluent according to the operational permit for the Plant is 120,000 gallons per day averaged over the month. Note that in December 2003, the average flow for the month (107,608 gpd) was within 11% of the permitted maximum effluent flow.

Table 1: Historical Effluent Flow Statistics (in gallons per day)[1]

	1999	2000	2001	2002	2003	2004
Max Wet Weather Monthly Average[a]	83,548	102,533	99,285	96,631	107,608	107,026
Max Dry Weather Monthly Average[b]	77,288	79,525	89,901	84,757	104,681	78,783
Average Dry Weather Flow	72,184	71,734	76,155	79,649	89,507	74,149
Peak Dry Weather Flow[c]	129,818	104,727	116,923	111,000	142,978	102,400
Peak Wet Weather Flow[d]	159,628	174,953	252,480[e]	144,000	151,000	157,000

a Assumes wet weather is October through April
b Assumes dry weather is May through September
c Selected highest daily flow from dry weather months with verification of no rainfall contribution
d Selected the highest daily flow from wet weather months
e Suspected anomaly; not considered in analysis

As of January 1, 2005, there were 434 units connected to the sewer collection system and receiving usage charges. Another 14 properties within CSA 18 are vacant, zoned rural or single family residential and are charged a sewer service availability charge. Table 2 summarizes the existing and future number of dwelling units connected to the system. Additionally, 7 occupied properties in CSA 18 do not pay any charges because they are on individual septic systems and the sewer line is not currently in a location available for their use.[2] After looking at the size and zoning of the properties within CSA 18, an additional 20 homes could potentially be built on large parcels. However, the current agreement between CSA 18 and the Country Club (who accepts the discharge from the wastewater treatment plant to irrigate the golf course) specifies that the Club will only accept the effluent from 450 dwelling units[3]. Effluent from another 25 dwelling units was accepted by the Country Club via agreement during the annexation process for those properties[4]. The Country Club and School are currently considered to contribute an amount of wastewater that is equivalent to 20 and 7 dwelling units respectively[5]. Figure 1 shows the CSA 18 boundary as of January 1, 2005.

Table 2: Summary of Existing and Future Number of Connections within CSA 18

Existing Residential Dwelling Units	432
Country Club Equivalent Dwelling Units	20
Los Ranchos School Equivalent Dwelling Units	7
Vacant Properties Paying Availability Charge	14
Total at Build-Out	473
Allowable Dwelling Units	475

[1] San Luis Obispo County Water Quality Lab. California Regional Water Quality Control Board Annual Monitoring Reports 1999-2003.
[2] San Luis Obispo County Taxroll Access Database queried on June 8, 2004
[3] Resolution No. 86-540. "Agreement for Provision of Sewage Treatment and Disposal Facilities and for Acceptance and Disposal of Treated Sewage Effluent." December 16, 1986.
[4] Plant effluent acceptance letters from the Country Club to the County dated April 4, 1990 and February 6, 1993, "Agreement Regarding Extension of County Service Area 18 and It's Sewer Sys" dated June 22 ,1989.
[5] Ordinance No. 2317. "An Ordinance Establishing the County Service Area No. 18 Sewer Use Ordinance and District Rules and Regulations." July 10, 1987.

Using data from the year of maximum loading, 2003, average dry weather flow (ADWF) per connection is about 200 gallons per day (89,500 gpd / 434 connections). However, two of the connections are for the Country Club and Los Ranchos School. Assuming 80% of the domestic water use comes back as wastewater[6], these two commercial connections contribute about 6,300 gallons per day (see Attachment 1). Taking out this use, the contribution per household comes out to 195 gallons per day (83,200 gpd / 432 households). In San Luis Obispo County, the average household size is 2.5 people;[7] therefore the contribution per capita is conservatively about 80 gallons per day.

CSA 18 Build-Out Loading

Before annexations can be considered, the current treatment and collection system must be able to provide service to properties within the CSA 18 boundary. For analysis of build-out of CSA 18, the 14 vacant properties on the availability list must be included and are assumed to be developed with single family homes.

ADWF: Using 80 gallons per day per capita and 2.5 people per household, 2,800 gallons per day more flow will be contributed to the ADWF, for a total average of 92,300 gallons per day.

MDWMA: In the year 2001, the maximum dry weather monthly average (MDWMA) flow was 18% more than the ADWF. Assuming this trend continues, the MDWMA would be 109,000 gallons per day at build-out.

PDWF: The maximum factor between peak dry weather flow (PDWF) and ADWF was about 1.8 in 1999. Therefore PDWF at build-out is estimated to be 166,000 gallons per day.

PWWF: The difference between PDWF and peak wet weather flows (PWWF), which is considered the amount of inflow and infiltration (I/I), has ranged from 8,000 to 70,200 gallons per day over the last five years. For planning purposes, it is assumed that there is an average of 35,000 gallons per day for I/I during the wet weather season. This estimates that the PWWF at build-out will be about 201,000 gallons per day (166,000 + 35,000).

MWWMA: The difference between the MDWMA and maximum wet weather monthly average (MWWMA) has typically been one-third the difference between the PDWF and the PWWF. Adding one-third of 35,000 to the estimated MDWMA for build-out gives 120,700 gallons per day for the estimated MWWMA for build-out.

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[6] Domestic water use records for Los Ranchos School and the San Luis Obispo Country Club, 2002 - 2004
[7] U.S. Department of Commerce 2000 Census of Population and Housing. Profiles of General Demographic Characteristics. Table DP-1. May 2001.

Build-Out Loading Analysis and Conclusions

Table 3 below summarizes the approximate loading conditions at CSA 18 Build-Out as well as the related operational limits and historical maximum loading (all maximums but PWWF were in 2003. 2003 was a relatively dry year). Average dry weather flows are anticipated to increase by about 3% at build-out, but peak and wet weather flows may increase from 12% to 16%.

Table 3: CSA 18 Hydraulic Loading in Gallons per Day

	Historical Maximum	**Build-Out**	**Increase**	**Operational Limits**
Highest Wet Weather Monthly Average	107,608	120,700	12%	120,000
Highest Dry Weather Monthly Average	104,681	109,000	4%	120,000
Average Dry Weather Flow	89,507	92,300	3%	120,000
Peak Dry Weather Flow	142,978	166,000	16%	180,000
Peak Wet Weather Flow	174,953	201,000	15%	180,000

The monthly average flow limit according to Waste Discharge/Water Reclamation Requirements Order No. 99-18 from the Regional Water Quality Control Board dated April 9, 1999, as well as the design flow for the Treatment Plant, is 120,000 gallons per day. Considering that the estimated MWWMA at build-out exceeds the permitted limit (120,700), and there is potential for the PDWF or PWWF to occur for enough days to cause the monthly average to exceed the permit limit, **the treatment plant will be operating at maximum capacity at build-out**. For example, in 2003, if the maximum average monthly flow had been considered to be between July 12th and August 12th, the permit limit would have been exceeded.

The Treatment Plant is able to handle peak effluent flows up to 180,000 gallons per day. This limit has not historically been exceeded. However, assuming these projections are accurate, I/I will already need to be reduced by about 11,000 gallons per day before build-out (PWWF: 201,000 – 180,000 = 11,000) . After interviewing the operators of the CSA 18 collection system, they have indicated that there have been no historical major problems with collection system overflows or blockage problems. However, there is one known source of I/I located at Lift Station #4 that needs to be addressed. No video inspection or lift station analysis has been performed to identify sources of I/I.

Water Quality Limits

Excess sludge generation and chloride levels have been of constant concern, with effluent salts reaching or exceeding waste discharge limits.[1] Sources of salts are from increased chlorination of the wastewater effluent in response to solids carry-over. CSA 18 operations staff changed supplemental disinfectant from sodium hypochlorite to calcium hypochlorite to further decrease salt loading associated with this treatment step in 2002.

Water softeners in the community, in spite of an ordinance banning them[8], are suspected of being the major contributor to the salt loading problem. An audit was performed on the treatment plant, and modifications were recommended that would reduce the volume of sludge generated by 25%.[9] It is anticipated that a reduction in sludge generation would reduce the amount of chlorination needed before discharging the effluent. Assuming softeners are not installed in the new homes, **the additional load at build-out is not anticipated to significantly impact the treatment plant's ability to meet waste discharge water quality requirements.**

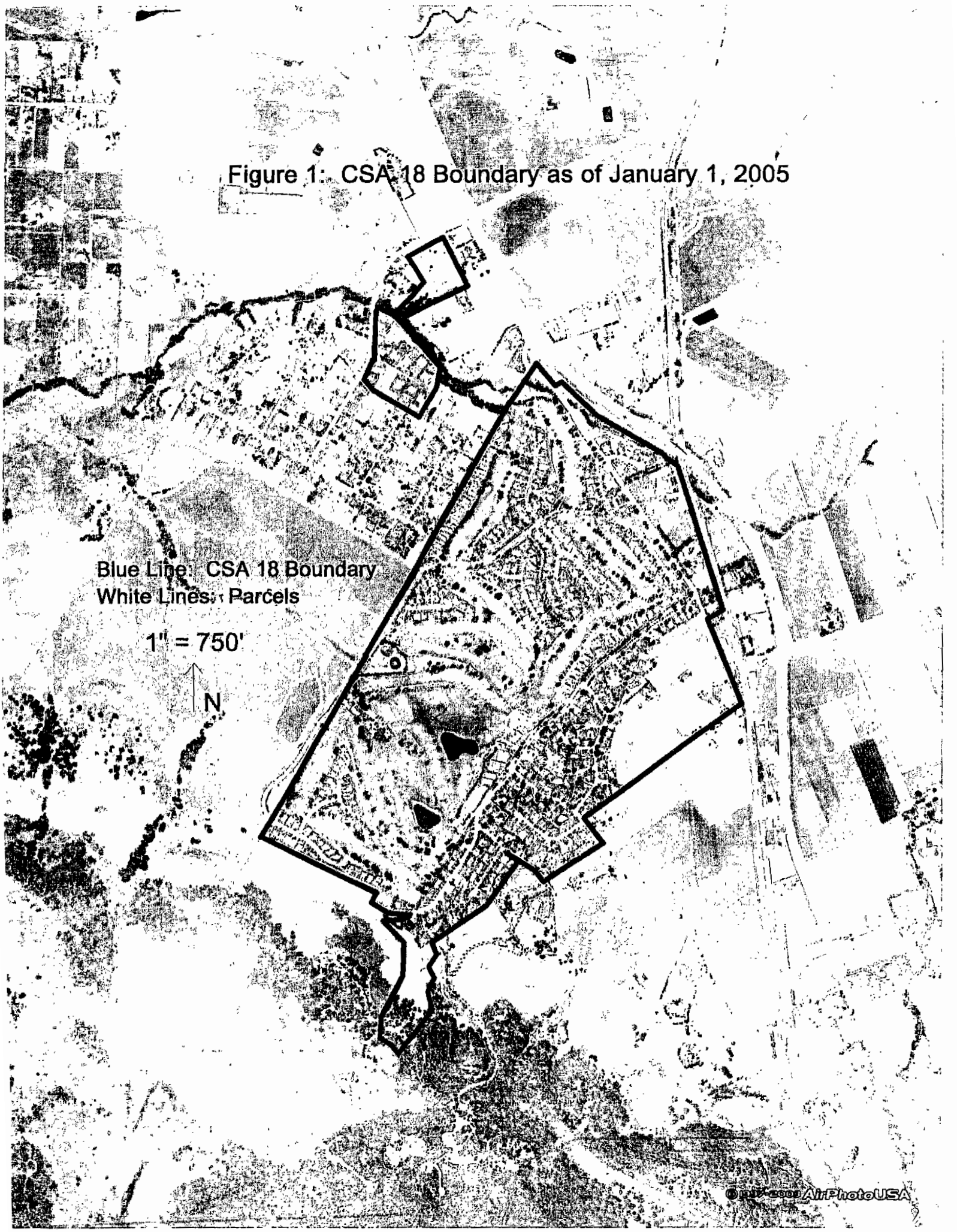
Recommendations

The CSA 18 Treatment Plant will be operating at or beyond capacity at build-out. The following action items and policies are recommended:

- Create a consolidated map and perform a video inspection of the sewer collection system to establish a baseline for the collection system's condition and identify and correct existing I/I problem areas.
- Program an expansion study to determine how many more connections can be accommodated using the available property at the Treatment Plant and considering sewer line/lift station capacity, effluent disposal options/limitations and water quality discharge limits.
- Entities proposing annexations, or CSA 18 property owners not paying availability charges, would have to design and construct any improvements necessary within the limitations identified in the expansion study.

[8] San Luis Obispo County Board of Supervisors. Ordinance Banning the Use of Self –Regenerating Water Softeners in CSA 18. July 10, 1992.
[9] Brown and Caldwell. Country Club Wastewater Treatment Plant Audit. February 2004.

Figure 1: CSA 18 Boundary as of January 1, 2005



Attachment 1

Country Club Wastewater Contribution

Average domestic water use 2002-2004 = 5,273 gpd
Assume 80% of domestic water use comes back as wastewater = 4,218 gpd
Golf Course = 35,000 rounds per year (no Mondays)
35,000 / (52 weeks * 6 days in a week) = 112 rounds (people) per day
38 GPD per round

Los Ranchos School Wastewater Contribution

Feb – Mar 2002 (30 day cycle) = 18300 cu ft
Dec – Feb 2003 (61 day cycle) = 25200 cu ft
Feb – Mar 2003 (30 day cycle) = 12100 cu ft

Assumptions:
Average = 14,000 cu ft per calendar month
425 students/teachers during school year
180 school days per year

If 80% of water use is returned as wastewater:
80% * 14000 cu ft = 11,200 cu ft

$$\frac{11{,}200 \text{ cu ft}}{\text{calendar month}} * \frac{1 \text{ calendar month}}{20 \text{ school days}} * \frac{180 \text{ school days}}{\text{calendar year}} = \frac{100{,}800 \text{ cu ft}}{\text{calendar year}}$$

$$\frac{100{,}800 \text{ cu ft}}{\text{calendar year}} * \frac{7.48 \text{ gal}}{\text{cu ft}} * \frac{1 \text{ calendar year}}{365 \text{ calendar days}} = \frac{2{,}065 \text{ gallons}}{\text{calendar day}} = \frac{4.86 \text{ gallons}}{\text{calendar day - student}}$$