Evaluation of Los Olivos Flows on Solvang WWTP

TECHNICAL MEMORANDUM

Wastewater Connection Evaluation

FINAL / November 2024

Evaluation of Los Olivos Flows on Solvang WWTP

TECHNICAL MEMORANDUM

Wastewater Connection Evaluation

FINAL / November 2024

Digitally signed by Jeffrey A. Weishaar
Contact Info: Carollo Engineers, Inc.
Date: 2024.11.22 11:47:14 -08'00'

REGISTERED PROFESSIONAL ENGINEER
JEFFREY A. WEISHAAR
No. 75245
CIVIL
STATE OF CALIFORNIA

Contents

Tables

Figures

INTRODUCTION

Background

In August 2024, the Los Olivos Community Services District (LOCSD) contracted with Carollo Engineers (Carollo) to evaluate the impact of connecting the LOCSD's wastewater flows to the City of Solvang's existing wastewater treatment plant (WWTP). This evaluation is part of a larger project to convert residential and commercial septic tanks within the LOCSD to a wastewater pipeline conveyance system.

As part of the evaluation, Carollo analyzed data from the City of Solvang and the LOCSD, including water quality of drinking water and wastewater within both service areas. Carollo analyzed this data to determine what effect the addition of LOCSD wastewater will have on the Solvang WWTP, and if any changes to treatment processes or plant capacity would be required in order to accept and treat LOCSD wastewater. The findings of this analysis are presented in this technical memorandum (TM).

During this analysis, the ability of the Solvang WWTP to accept and treat wastewater flow from LOCSD was gauged by the WWTP's ability to comply with its effluent permit limits. The treatment processes at the WWTP were simulated using a biological process model, which is discussed later in this TM.

Data Review

LOCSD provided Carollo with several sources of background information used in this evaluation. These sources include a report authored by Stantec in 2022 titled *Wastewater Collection and Treatment Basis of Design Report* (BODR), which estimated design wastewater flows and loads from the LOCSD as well as established design criteria for the future wastewater collection system within the LOCSD.

The wastewater constituents estimated in the BODR included five-day biological oxygen demand (BOD_5), total suspended solids (TSS), and total Kjedahl nitrogen (TKN). BOD_5 is a measure of the amount of oxygen required by microorganisms to break down matter in wastewater over a five-day period. TSS is a measure of the amount of particles suspended in wastewater, and TKN is a measure of the amount of ammonia and organic nitrogen in wastewater. These parameters are all important ways of assessing the level of pollution in wastewater, and all three are regulated in some form and part of the Solvang WWTP's effluent permit.

Lastly, Carollo obtained information on the LOCSD's drinking water supply from the Santa Ynez River Water Conservation District, Improvement District No. 1 (ID1), which provides all of the drinking water within the LOCSD service area.

Wastewater Data

The 2022 Stantec BODR divided the septic-to-sewer conversion project into three phases. Phase I captured the core downtown area within the LOCSD, which includes the commercial area and neighboring residential properties. Phase II includes the residential area to the east and south of Phase I. Finally, Phase III includes the remaining property in the LOCSD boundary that were not included in the previous phases, and also accounts for future growth within the LOCSD over the next 20 years.

For the purposes of this evaluation, Carollo considered the scenario where the full Phase III wastewater flows and loads would be connected to the Solvang WWTP. These future flows and wastewater concentrations are presented in Table 1 alongside Solvang wastewater flows and concentrations. The flows are presented as average daily maximum month flows (ADMMFs), which are the highest 30-day average flows that occur within a year. Influent wastewater concentrations provided are monthly averages. The combination of ADMMF flow with average wastewater concentrations typically provides a "worst-case" loading scenario for the WWTP, which was used for the analysis conducted in this report.

Additionally, the Solvang WWTP has an agreement with the Santa Ynez Community Services District (SYCSD) to provide up to 0.3 million gallons per day (mgd) of WWTP treatment capacity as shown in Table 1. A 2017 report prepared for the SYCSD titled *Recycled Water Facilities Plan* characterized the strength of SYCSD's wastewater, which is also included in Table 1.

Table 1 Wastewater Quality Parameters

Source	Constituent	ADMMF Flow (gpd)	Average Influent Wastewater Concentration (mg/L)	WWTP Influent Load (lb/day)
City of Solvang Wastewater(1)	BOD_5	713,000	263	2,018
	TSS		201	1,542
	TKN		59	453
LOCSD Phase III Wastewater(2)	BOD_5	133,800	416	451
	TSS		320	347
	TKN		63	68
SYCSD Wastewater(3)	BOD_5	300,000	320	658
	TSS		176	503
	TKN		63	148

Notes:
gpd - gallons per day; lb/day - pounds per day; mg/L - milligrams per liter
(1) WWTP average influent concentrations provided by City of Solvang.
(2) LOCSD estimated wastewater concentrations from 2022 Stantec BODR.
(3) SYCSD wastewater concentrations from 2017 Recycled Water Facilities Plan.

Salt Loading Data

An additional concern when considering the ability of the Solvang WWTP to accept wastewater flow from LOCSD is the concentration of certain constituents in the wastewater including total dissolved solids (TDS), sodium, and chloride. The Central Coast Regional Water Quality Control Board (RWQCB) has imposed WWTP effluent limits for these constituents on the City of Solvang and has recently altered those limits to be more stringent. However, none of these constituents are removed by conventional wastewater treatment such as is employed at the Solvang WWTP.

Drinking water in the City of Solvang is comprised of a blended mixture of water from the State Water Project as well as local groundwater wells. The flow-weighted drinking water quality concentrations for the City of Solvang are presented in Table 2 alongside the drinking water quality for the LOCSD, which is comprised entirely of water from ID1.

Table 2 Salt Loading Parameters

Constituent	Solvang Wastewater Concentrations[1] (mg/L)	Solvang Blended Drinking Water Concentrations[2] (mg/L)	LOCSD ID1Concentrations[3] (mg/L)
TDS	1,017	931	581
Sodium	185	61	46
Chloride	239	81	39

Notes:
(1) Average of Solvang wastewater data from 2012 to 2023.
(2) Average of flow-weighted concentrations of all active Solvang drinking water sources from 2012 to 2023.
(3) Average of ID1 water quality data sourced from Consumer Confidence Reports from 2012 to 2023.

Carollo has water and wastewater data for these constituents provided by the City of Solvang, but the concentrations of these parameters were not considered in the 2022 Stantec BODR. Therefore, Carollo has estimated the LOCSD wastewater concentrations by first subtracting the background Solvang drinking water concentrations from the total wastewater concentrations for these constituents, resulting in an estimated contribution in wastewater loading from water use, called the user contribution.

The user contribution loads were then converted to concentrations, and these same concentrations from the users in Solvang were used to calculate the user contribution load for LOCSD based on the Phase III flow estimate. The LOCSD drinking water contribution loads were calculated using the ID1 concentrations from Table 2 as well as the Phase III flow estimate. The user contribution loads and drinking water loads were added to form the LOCSD total contribution load in Table 3. Finally, the total LOCSD load was added to the loading data from Solvang to calculate an estimated WWTP load that includes wastewater from Solvang and LOCSD. The total WWTP load was converted to concentrations and compared alongside the WWTP effluent permit limits in Table 3.

Table 3 Estimated Wastewater Salt Loads

Constituent	LOCSD Average Drinking Water Contribution (lb/day)	LOCSD Average User Contribution[1] (lb/day)	LOCSD Average Total Contribution (lb/day)	Total Average WWTP Load (lb/day)	WWTP Concentration (mg/L)	WWTP Effluent Permit Limit[2] (mg/L)
TDS	648	101	749	6,303	949	1,500
Sodium	51	81	132	1,147	173	100
Chloride	44	97	140	1,455	219	150

Notes:
(1) Assumed same concentrations contributed by users in Solvang service area.
(2) 25-month rolling median effluent permit limit provided.

FINDINGS

Wastewater Data Analysis and Discussion

The influent wastewater flows and concentrations from Table 1 were input into the biological model developed by Carollo using BioWin modeling software. An diagram of the model configuration is included in Figure 1 on the following page. The model reflects the future treatment processes at the WWTP following the upcoming Phase 2 Upgrades project that is meant to address treatment deficiencies at the plant, as discussed below.

Currently, the plant is equipped with sequencing batch reactors (SBRs) that carry out biological treatment of the wastewater. New effluent permit limits imposed by regulators have caused the plant to struggle to treat all incoming flow while also complying with the effluent limits, and this is largely due to the operation of the SBRs.

The Phase 2 Upgrades project will include reconfiguring the existing SBRs to operate as flow through aeration basins, a process that allows more flow to be treated while also removing enough nitrogen to comply with effluent limits. The Phase 2 project will also add secondary clarifiers in order to further remove solids while contributing to the successful biological treatment of nitrogen. The Phase 2 Upgrades Project is currently entering the preliminary design phase and construction is anticipated to be completed in April 2028.

The model was run at the worst-case condition, using ADMMF and average wastewater concentrations to simulate the typical highest wastewater loads on the WWTP. The model results for BOD_5, TSS, and total nitrogen (TN) are summarized in Table 4 alongside the Solvang WWTP permit limits for comparison.

Table 4 Solvang WWTP Effluent Concentrations

Constituent	WWTP Effluent Permit Limit (mg/L)	Modeled Effluent Concentration (mg/L)
BOD_5(1)	30	2.4
TSS(1)	20	4.2
TN(2)	10	8.8

Notes:
(1) 30-day average effluent permit limit provided.
(2) 25-month rolling median effluent permit limit provided.

As can be seen from Table 4, even at worst-case maximum month wastewater loading, the future planned WWTP is able to effectively meet effluent permit limits while accepting full Phase 3 buildout ADMMF from LOCSD. This will only be possible, however, after the WWTP Phase 2 Upgrades project is constructed.

The Solvang WWTP is rated to treat 1.5 mgd of influent wastewater flow. Presently, however, the WWTP struggles to meet the effluent limits at current flows due to process limitations that the Phase 2 project is intended to address, and it is considered highly unlikely that the WWTP in its current state would continue to meet permit limits with higher flows from LOCSD.

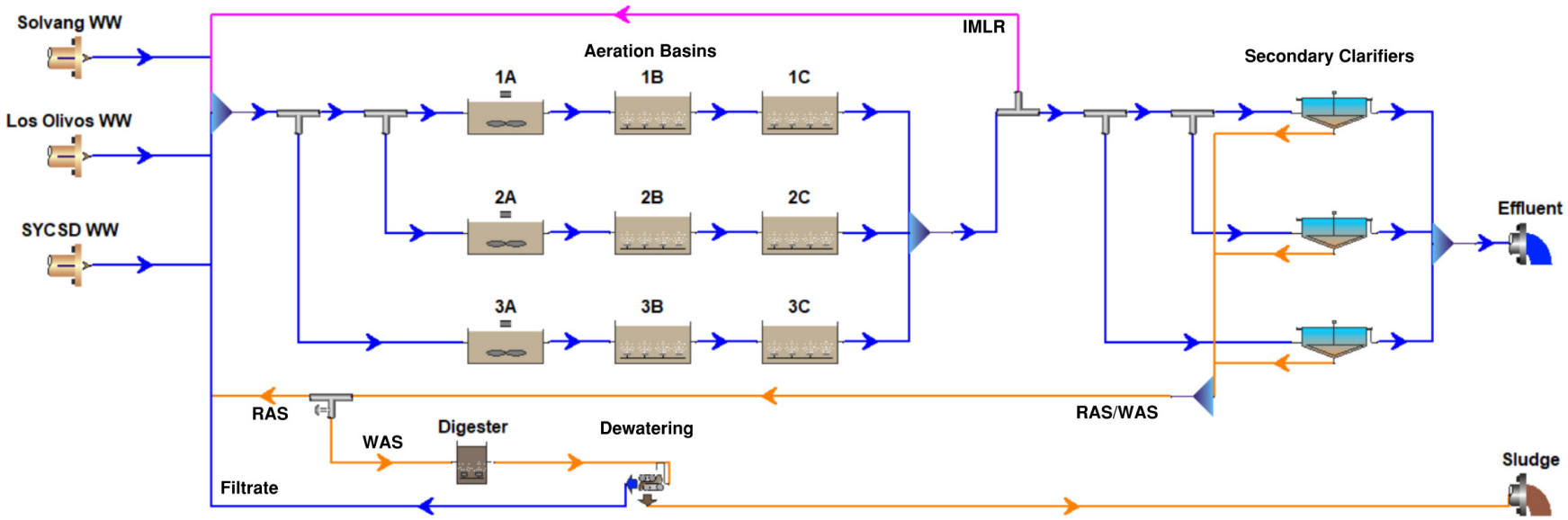

Figure 1 BioWin Model Diagram

Salt Data Analysis and Discussion

As shown in Table 2, the average background concentrations of TDS, sodium, and chloride in the LOCSD's drinking water are lower than those in the City of Solvang's blended drinking water, but still contribute to the salt load at the WWTP in addition to the estimated user contribution. Since salt is not removed at the WWTP, it simply passes through and exits with the WWTP effluent. Table 2 shows that the estimated salt load, including that from LOCSD, will violate the effluent permit limits at the WWTP.

This is an issue that has been ongoing for the City of Solvang, even before the permit limits were updated. Due to the hardness of Solvang's drinking water supply, many residents use automatic water softeners (AWSs) in their homes to soften their water before consumption. These AWS units discharge salt into the sewer every time they regenerate, which Carollo believes is a significant source of TDS, sodium, and chloride in Solvang's wastewater. The City of Solvang currently has a ban on the use of commercial AWS units but does not have any restrictions on residential use.

As discussed previously, the RWQCB has updated Solvang's permit for these constituents to require more restrictive limits which the WWTP is unable to meet. Solvang has contracted with Carollo to develop a compliance plan to provide to the RWQCB that will outline several options for compliance with the salt permit limits at the WWTP. The first option being considered is to not enact a ban or rebate program on residential AWS systems in an effort to eliminate them within Solvang city limits. While this likely won't solve the salt issue entirely, Carollo hopes that it will appease the regulators by demonstrating that Solvang is attempting to address the problem.

Summary and Recommendations

After analyzing estimated wastewater data and drinking water data from the LOCSD, Carollo has concluded that the Solvang WWTP will be able to receive Phase III LOCSD wastewater flows in the future. The addition of LOCSD wastewater will not affect the ability of the WWTP to meet its effluent permit limits, and the flow rate will not cause the WWTP to exceed its rated capacity. These conditions were checked at maximum-month flow and loading scenario, which is a conservative scenario. Additionally, Carollo does not foresee the background concentrations of TDS, sodium, or chloride in the LOCSD's drinking water as negatively affecting the WWTP's ability to meet permit limits for these constituents.

However, Carollo does not recommend that the LOCSD wastewater flows be connected to the Solvang WWTP until after completion of the Phase 2 Upgrades Project at the plant. This will allow the plant to be able to effectively receive and treat the additional flows from LOCSD and will also allow the LOCSD the time necessary to construct a new sewer collection system and connect it to the Solvang WWTP.

The Phase 2 Upgrades Project is currently underway as it is entering preliminary design. Construction of the project is anticipated to be completed in April 2028, which is the earliest that the Solvang WWTP would be able to receive wastewater flow from LOCSD.

Additionally, Carollo recommends that LOCSD implement an AWS ban or rebate program to eliminate AWS systems within its service area. Carollo believes this is a necessary step to comply with WWTP permit limits and appease the RWQCB, as discussed previously, and it is a step currently being pursued by the City of Solvang in its service area.