APPENDIX S

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TECHNICAL MEMORANDUM

DATE:	April 23, 2024	Project No.: 011-60-23-01 SENT VIA: EMAIL
TO:	Stan Gryczko, Public Works Utilities and Operations Director	
CC:	John Alexander, Wastewater Division Manager	
FROM:	Charles Hardy, PE, RCE #71015 Patrick Johnston, PE, RCE #59028	
REVIEWED BY:	Kathryn Gies, PE, RCE #65022	
SUBJECT:	Davis WWTP Capacity Impacts of Proposed Village Farms Development	

This technical memorandum (TM) summarizes the findings and conclusions of a West Yost evaluation to assess the impacts of the proposed Village Farms development on the City of Davis (City) Wastewater Treatment Plant (WWTP).

Key topics covered in this TM include:

- Background
- Comparison of Influent Flows to WWTP Capacity
- Conclusion

BACKGROUND

This TM builds upon a capacity analysis of the WWTP that West Yost completed for the City in 2022, which was documented in a *Capacity Analysis Report* (West Yost, August 2022). The *Capacity Analysis Report* provided then-current WWTP influent flows, loads and service area population; and defined the capacity of each WWTP process unit in terms of Average Dry Weather Flow (ADWF), based on an updated influent analysis.

The current ADWF defined in the *Capacity Analysis Report* was 4.3 million gallons per day (mgd), the average of ADWFs for the recent non-drought years 2012, 2013 and 2017 through 2019. The associated service area population for the current ADWF was about 69,000 people, and the associated current per capita ADWF presented was 62 gallons per day (gpd) per capita (gpd/capita). A target design ADWF of 5.3 mgd was established in the *Capacity Analysis Report* using the 62 gpd/capita flow rate and a previously established design population for the WWTP of 85,700 people.

This TM also relies on the information presented in the Collection System Impacts of Proposed Village Farms TM (Collection System TM) developed in parallel. The Collection System TM presents additional background information related to Village Farms and an analysis of impacts of the capacity impacts associated with adding the Village Farms connections to the City's wastewater collection system. The most critical information presented in the Collection System TM for this WWTP capacity analysis is as follows:

- The total equivalent dwelling units (EDUs) anticipated for existing and planned sewer connections within the City Limits is 28,553 EDUs, which includes Palomino Place, located at the southeast corner of Wildhorse Ranch.
- Buildout of the collection system also includes Nishi, Bretton Woods, DISC 2022 and Shriners developments, which would consist of 700, 240, 460 and 1,200 residential EDUs, respectively.
- The DISC 2022 development also includes 58 acres of non-residential development, equivalent to 257 EDUs using 2.4 persons per EDU and 61 gpd/capita from the West Yost analysis combined with a unit wastewater flow factor of 647 gpd per acre from the Mace Ranch Water Supply Assessment and a study on the Impacts of Innovation Center/Nishi Property Development on WWTP Capacity.
- Village Farms would add another 1,800 EDUs of residential development.
- The total EDUs that must be accounted for through this capacity study is 33,210 EDUs.
- At 2.4 persons per EDU, the total population is anticipated to be 79,700.
- With the addition of 2023 flows to the WWTP influent flow analysis, an updated current ADWF per capita flow is calculated as 61 gpd/capita, slightly lower than that established in the *Capacity Analysis Report*.
- The calculated EDUs, service area populations, and ADWFs for the development scenarios of interest are shown in Table 1.

Table 1. Total EDUs, Service Area Populations and ADWFs for Development Scenarios of Interest

Development Scenario	Total Dwelling Units, EDUs	Estimated Service Area Population,(a) people	ADWF,(b) mgd
Existing within City Limits	28,553	68,530	4.2
Buildout(c)	31,410	75,380	4.6
Existing plus Village Farms	30,353	72,850	4.4
Buildout plus Village Farms	33,210	79,700	4.9

(a) Population = EDUs x 2.4 persons per EDU
(b) ADWF, mgd = population x 61 gallons per day per capita ÷ 1,000,000 gallons/million gallons
(c) Buildout = existing connections plus Nishi, Bretton Woods, DISC 2022 and Shriners residential connections and DISC 2022 non-residential connections

As discussed in the Collection System, the methodology described above leads to an ADWF estimate for Village Farms of 0.264 mgd.

COMPARISON OF WWTP INFLUENT FLOWS TO CAPACITY

The *Capacity Analysis Report* included a conclusion that all of the WWTP facilities had available capacity at or above a 5.3 mgd influent ADWF design target except for the anaerobic digesters. The anaerobic digesters were determined to have a firm capacity (i.e., with one digester out of service) at a slightly lower ADWF of 5.1 mgd. The maximum influent ADWF is estimated to be 4.9 mgd, as shown in Table 1. Therefore, all the WWTP facilities should have sufficient capacity to support flows and loads associated with populations estimated under four development scenarios of interest.

City WWTP operations staff have raised concerns that the existing influent WWTP flows and loads may be approaching the capacity of the secondary treatment system. An analysis is currently underway to evaluate what factors could be contributing to the current observations. Inhibition of the secondary treatment process biology is being considered as one cause, where scientific literature identifies landfill leachate as source of inhibition to nitrification processes. Another possible cause of inhibition is low alkalinity in the influent flows. Finally, elevated ammonia loads from the UC Davis student population and/or the transient population associated with UC Davis activities is also a potential cause of the observed conditions. If the cause of the observed secondary treatment process impacts cannot be definitively identified and mitigated, expansion of the secondary treatment process may be required to accommodate the populations associated with the community buildout.

For purposes of this TM, the previously established 5.3 mgd ADWF capacity of the secondary treatment system is assumed to be valid. Moreover, the need to expand the WWTP to address elevated loads and/or inhibition issues would not be specifically driven by a few new developments within the City’s service area.

CONCLUSION

Based on the information presented in this TM, there are no WWTP process capacity deficiencies under any of the development scenarios analyzed, including the Buildout plus Village Farms. The Village Farms development would require use of an additional 0.2 to 0.3 mgd ADWF capacity but would not exceed the established limiting ADWF capacity of 5.3 mgd. No WWTP improvements are therefore needed to accommodate the Buildout plus Village Farms scenario.

REFERENCE

West Yost. 2022. *Davis Wastewater Treatment Plant Capacity Analysis Report*. August 2022.