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TECHNICAL MEMORANDUM

DATE: September 27, 2024
TO: Carter Reiff, PE
FROM: Glen M. Anderson, PE
SUBJECT: Pacific Gateway – Water and Sewer Demands and System Requirements

Introduction

As part of the preliminary development plans for the Pacific Gateway development (Project), Kier & Wright has contracted Schaaf & Wheeler to establish required water demands for the proposed development, and to provide recommendations on water system requirements. This memorandum serves to provide estimated water requirements for the development as well as preliminary water system infrastructure requirements.

The Project consists of developing existing farmland into industrial usage, as well as the addition of a university. The Project will convert approximately 1,577 acres of existing agriculture land into a mixed-use, master planned development consisting of modern industrial facilities, a university, business park, general commercial and the VFW Tracy post. The property is located in San Joaquin County, south of the city of Tracy. The project is enclosed by Tracy Blvd. on the west, S Bird Rd. on the east, and is predominantly located between the California Aqueduct and the Delta Mendota Canal excepting the University, AB FAB, and VFW sites north of the Delta Mendota Canal, and a portion south of the California Aqueduct, and north of Highway 132. The project area is shown in Figure 1.

WATER DEMANDS

Domestic Water Demand

The San Joaquin Public Works (SJPW) Improvement Standard, Section 4-2.0, establishes that industrial development site water demands shall be set at levels of similar facilities, or a minimum of 1,800 gallons per day per acre (gpd/ac). The 1,800 gpd/ac water demand is inconsistent with, and substantially greater than demands recently approved industrial developments within the County. Following the demand patterns of nearby industrial developments, Schaaf & Wheeler has established a proposed average day demand of 10 gpd per 1,500 square feet of industrial building per shift and 10 gpd per 250 square feet of office space within the industrial development, per shift. For this project, it is assumed that industrial developments will work two shifts per day and that the industrial development is 95% warehouse and 5% office space.

For commercial parcels, the SJPW Improvement Standard requires 2,000 gpd/ac.

Schaaf & Wheeler assumed the University would accommodate an average of 600 students per day initially and 5,000 students per day at buildout each generating an average day water demand of 12.81 gallons per day per student based upon research conducted.

The proposed development intends to join the water system that currently serves Community Service Area 16 (CSA 16), to the south of the development. CSA 16 serves a total of 55 connections within Par Country Estates and Hillside greens, each assumed at a 450 gpd demand.

Due to the size of the Project, it is anticipated that construction will occur in phases. Refer to shading in Figure 1 indicating the initial phase of development.

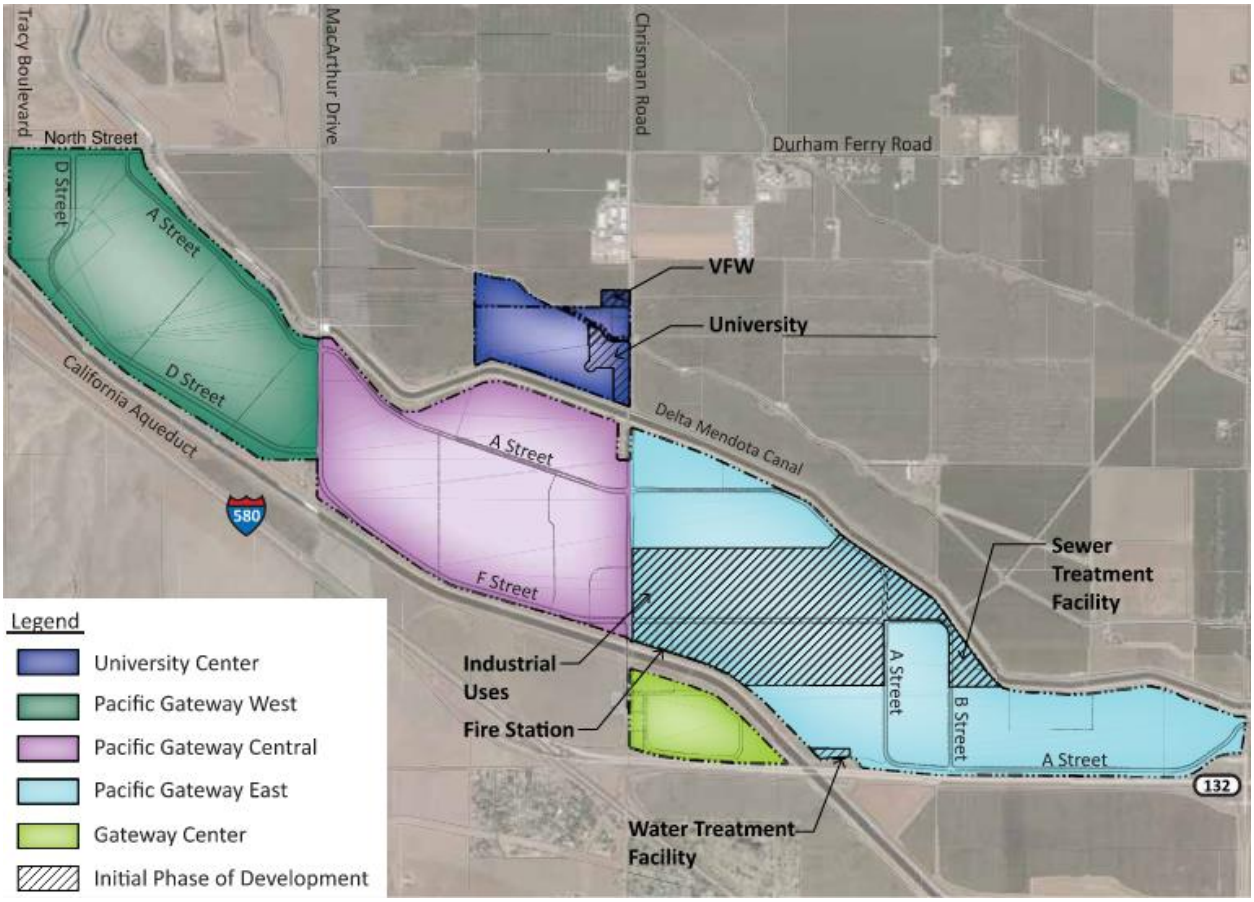

Figure 1. Project Area

Estimated building square footages are established for each of the areas identified. The estimated building size and associated average day water demands (ADD) for each area are summarized in Table 1.

The Maximum Day Demand (MDD) and Peak Hour Demand (PHD) are both essential when designing components of the overall water system for the project. Peaking factors 2.2 (Maximum Day Demand) and 3.8 (Peak Hour Demand) were utilized from section 4-2.0 of the 2014 SJPW Standards.

Fire Water Demand

The expected fire flow demand requirements were established from the 2019 California Fire Code (CFC). With the large building sizes anticipated, a base fire flow of 8,000 gpm for 4 hours is assumed. However, it is presumed that the buildings will be equipped with fire suppression systems, that will allow for a significant reduction in fire flow to 2,000 gpm for 2 hours. To be conservative, the fire demand was set at 2,000 GPM for 4 hours. The final fire demand for the industrial warehouse buildings may be adjusted later in the planning process.

Table 1. Average Water Demands

Area	Landuse	Initial Phase Area (SF)	Buildout Area (SF)	Initial Phase Water Demand (GPD)	Buildout Water Demand (GPD)	Initial Phase Water Demand (AFY)	Buildout Water Demand (AFY)
Pacific Gateway East	Industrial	3,962,000	11,124,274	66,033	185,405	74.0	207.7
Pacific Gateway Central	Industrial	0	6,856,474	0	114,275	0.0	128.0
Pacific Gateway West	Industrial	0	6,168,882	0	102,815	0.0	115.2
Gateway Center	Industrial	0	525,370	0	8,756	0.0	9.8
Gateway Center	Hotel/Commercial	0	109,592	0	5,032	0.0	5.6
University Center	University*	25,000	1,379,150	7,686	64,050	8.6	71.7
University Center	VFW**	11,500	11,500	528	528	0.6	0.6
University Center	Industrial	0	93,000	0	1,550	0.0	1.7
University Center	Commercial	0	38,908	0	1,786	0.0	2.0
CSA-16	Residential***	NA	NA	24,750	24,750	27.7	27.7
	Total	3,998,500	26,307,150	74,247	484,196	83.2	542.4

*University Assumes 600 students in first phase and 5,000 at buildout, with each student accounting for 12.81 GPD

**VFW treated as commercial

*** Assumes 55 connections at 450 GPD. CSA-16 parcels presumed to be on Septic and treated at place of use.

Irrigation Water Demand

The anticipated irrigation demand for the project site was estimated using the Estimated Total Water Use (ETWU) calculations. It is assumed that fifteen percent (15%) of the total area will be designated as Landscape Area (LA). Additionally, the irrigation calculation should include the required irrigation for the Golf Course at Par Country Estates (CSA 16). In Total, the estimated landscape area is approximately 314 acres. The evapotranspiration (ETo) of 53.48 inches for the project location was obtained from the nearest California Irrigation Management Information System (CIMIS) station, station 71 (Modesto). The Evapotranspiration Adjustment Factor (ETAF) is 0.45 (non-residential). Table 2 displays the irrigation demand for the development and the existing golf course, totaling approximately 390 ac-ft/year. To determine these values the formula ETWU = (Et) X (0.62) X [(ETAF X LA)] was used.

Table 2. Estimated Irrigation Demand

Pacific Gateway Irrigation Demand Estimates		
Total Area* **	1577	acres
Landscape Area %	15	%
Landscape Area	236.6	acres
Eto	53.48	in/year
Eto	4.46	ft/year
ETAF	0.45	unitless
Irrigation Demand	**294.1**	**ac-ft/year**

Par Country Estates Golf Course Demand Estimates		
Total Area	124	acres
Landscape Area %	100	%
Landscape Area	124.0	acres
Eto	53.48	in/year
Eto	4.46	ft/year
ETAF	0.45	unitless
Irrigation Demand	**154.2**	**ac-ft/year**

WATER SUPPLY

Capacity

As previously discussed, the Project site is currently used for agricultural purposes, with much of the land used for growing almonds. Water for the existing site is supplied through existing groundwater wells and surface water turnouts. Documentation on the existing wells indicate capacities ranging from 50 gpm to 1,500 gpm.

According to the University of California Drought Management program, almond trees require between 41 and 54 inches of water per year. This translates to between 3.4 and 4.5 acre-feet per acre. With one acre-foot being equivalent to 325,851 gallons, and assuming the low end of required watering, this is an average flow of 3,035 gpd/acre (2.11 gpm/acre). For the proposed development, the predevelopment water demand is estimated at approximately 3.84 million gallons per day. Post development water demand is estimated at approximately 0.49 million gallons per day – approximately 1/8th the existing use.

Domestic Water Sources

It is anticipated that the Project's domestic water needs will be met through the construction of between two and four groundwater wells, constructed in accordance with the State's standards. Additionally, CSA 16 owns and operates ground water wells that would remain in service. Lastly, the development is in the process of obtaining a will-serve letter from the Byron-Bethany Irrigation District (BBID) for this development, allocating up to 1,000 ac-ft/year of surface water.

Preliminary hydrogeology and water quality testing has not been performed, so the well details and treatment requirements are undetermined at this time. It is anticipated that each well for domestic use will require some type of wellhead treatment to meet drinking water standards. Additionally, any surface water provided by BBID will require treatment for domestic use to meet drinking water standards. Domestic water will be provided to the proposed project through a dedicated domestic water system.

Fire Water Sources

It is anticipated that the Project's fire water needs will be met through the construction of up to two groundwater wells, constructed in accordance with the State's standards or through an untreated surface water turnout. Fire water will be provided to the proposed project through a dedicated fire water system. Since this fire water system will not be connected to the domestic system, treatment is not anticipated.

Irrigation Water Sources

It is anticipated that the Project's irrigation water needs will be met through use of recycled water. Irrigation water will be provided to the proposed project through a dedicated recycled water system.

WATER SYSTEMS

Domestic Water System

To determine required pipe sizing, a pipe network was created in EPANET, and peak hour water demands were placed strategically at locations to simulate maximum water demands at potential building location. In addition to the pipes, approximate booster pump station and storage tank sizes were determined.

Preliminary pipe sizes were determined using the EPANET model and vary between 6-inch through 12-inch pipe within the project.

In addition to the system pipeline, storage tank(s) will be required for the domestic water system. State standards require a minimum storage volume equivalent to 8 hours of the MDD, plus the required fire flow demand. Since the fire system is entirely separate from domestic system, the domestic system is only required to store 8 hours of MDD flow. Table 3 summarizes the Project's required domestic storage in million gallons (MG). While only approximately 360,000 gallons of storage is required for domestic purposes, dead storage within tanks, and commonly available storage tank requirements lead Schaaf & Wheeler to recommend a minimum of 500,000 gallons of domestic storage. This storage may be split between two reservoirs, depending on project phasing and ultimate pressure zone configuration. A booster pump system will be installed adjacent to the storage tank(s) to supply water to the domestic system.

Table 3. Required Domestic Storage

Area	Landuse	Initial Phase Area (SF)	Buildout Area (SF)	Initial Phase Water Storage (MG)	Buildout Water Storage (MG)
Pacific Gateway East	Industrial	3,962,000	11,124,274	0.0484	0.1360
Pacific Gateway Central	Industrial	0	6,856,474	0.0000	0.0838
Pacific Gateway West	Industrial	0	6,168,882	0.0000	0.0754
Gateway Center	Industrial	0	525,370	0.0000	0.0064
Gateway Center	Hotel/Commercial	0	109,592	0.0000	0.0037
University Center	University*	25,000	1,379,150	0.0056	0.0470
University Center	VFW**	11,500	11,500	0.0004	0.0004
University Center	Industrial	0	93,000	0.0000	0.0011
University Center	Commercial	0	38,908	0.0000	0.0013
CSA-16	Residential***	NA	NA	0.0182	0.0182
	Total	3,998,500	26,307,150	0.0726	0.3732

*University Assumes 600 students in first phase and 5,000 at buildout, with each student accounting for 12.81 GPD

**VFW treated as commercial

*** Assumes 55 connections at 450 GPD. CSA-16 parcels presumed to be on Septic and treated at place of use.

Fire Water System

Schaaf & Wheeler prepared a fire flow model, similar to the domestic model, using EPANET. The model revealed that for a fire flow of 2,000 gpm. 12-inch pipeline is sufficient.

As previously stated, the identified design fire flow assumed for this project is 2,000 gpm for a 4-hour duration. State standards require that we store the fire flow, which will require 480,000 gallons of fire storage. Given dead volume within the storage tanks, it is estimated that a 600,000 gallon storage tank will be required. It may be possible to split this storage volume between multiple tanks, but a fire pump will be necessary at each tank location.

Irrigation Water System

Because little is known about the irrigation requirements at this time, no model has been created for the irrigation system That said, because irrigation is a non-essential use, irrigation schedules can be adjusted to minimize system peaks, reduce system component size. It is estimated that 8-inch pipe will be

sufficient to meet irrigation demands. The irrigation system will consist of a recycled water storage tank and booster station, located at the wastewater treatment plant.

WASTEWATER SYSTEMS

Sewage Collection System

The Project's wastewater will be collected from each parcel through a traditional wastewater gravity flow collection system that will be supplemented with lift stations at canal crossings and if dictated by the ultimate project design. Wastewater will be routed to the Project's wastewater treatment plant (WWTP), located at the south-eastern portion of the project. Figure 3 shows the conceptual layout of the collection system and the location of the WWTP.

Average day sewage flow is estimated to be 80% of the average daily potable water demand. Table 4 summarizes average daily sewage flow for the Project.

Manning's equation was used to generate a preliminary estimate of sewer pipe sizes within the project. IT is estimated that 6-inch through 12-inch sewer pipes will be adequate for the Project.The Project's wastewater will be collected from each parcel through a traditional wastewater gravity flow collection system that will be supplemented with lift stations at canal crossings and if dictated by the ultimate project design. Wastewater will be routed to the Project's wastewater treatment plant (WWTP), located at the south-eastern portion of the project. Figure 3 shows the conceptual layout of the collection system and the location of the WWTP.

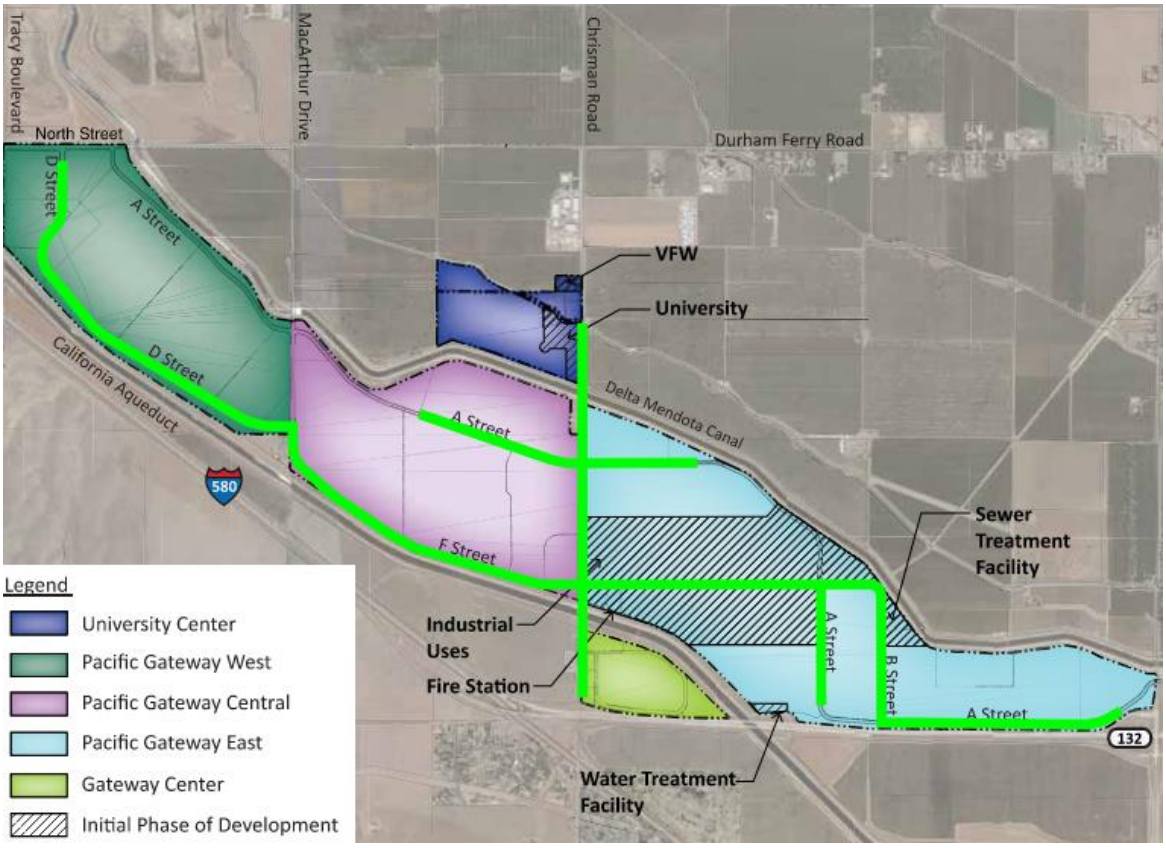

Figure 3. Wastewater Collection System

Table 4. Sewer Generation Rates

Area	Landuse	Initial Phase Area (SF)	Buildout Area (SF)	Initial Phase Water Demand (GPD)	Buildout Water Demand (GPD)	Initial Phase Sewage Generation (GPD)	Buildout Sewage Generation (GPD)
Pacific Gateway East	Industrial	3,962,000	11,124,274	66,033	185,405	52,827	148,324
Pacific Gateway Central	Industrial	0	6,856,474	0	114,275	0	91,420
Pacific Gateway West	Industrial	0	6,168,882	0	102,815	0	82,252
Gateway Center	Industrial	0	525,370	0	8,756	0	7,005
Gateway Center	Hotel/Commercial	0	109,592	0	5,032	0	4,025
University Center	University*	25,000	1,379,150	7,686	64,050	6,149	51,240
University Center	VFW**	11,500	11,500	528	528	422	422
University Center	Industrial	0	93,000	0	1,550	0	1,240
University Center	Commercial	0	38,908	0	1,786	0	1,429
CSA-16	Residential***	NA	NA	24,750	24,750	19,800	19,800
	Total	3,998,500	26,307,150	74,247	484,196	79,198	407,157

*University Assumes 600 students in first phase and 5,000 at buildout, with each student accounting for 12.81 GPD

**VFW treated as commercial

*** Assumes 55 connections at 450 GPD. CSA-16 parcels presumed to be on Septic and treated at place of use.

Sewage Treatment System

The project WWTP will be centered around a packaged membrane bioreactor wastewater treatment system with ultraviolet light disinfection. The WWTP will be expandable to accommodate phased construction, up to buildout. An operating permit issued by the Central valley Regional Water Control Board (CVRWQB) to establish operating, performance, and reporting requirements for on-site treatment and disposal facilities.

It is proposed that the wastewater be treated to the Disinfected Tertiary Recycled Water Standard, suitable for use throughout the project site to irrigate landscaping and/or the surrounding farms in the area. The WWTP is proposed to include the following components, in quantities corresponding to the level of buildout:

1. A flow equalization system (sewage pump station wet well).
2. Rotary drum screens for screenings removal.
3. Compactor for screenings disposal at landfill.
4. Packaged MBR-based waste water treatment train.
5. Recycled water disinfection system.
6. Recycled water pump station.
7. Diesel engine-driven emergency generator.
8. Ancillary supporting equipment, as required.

Figure 4 depicts a preliminary WWTP site plan.

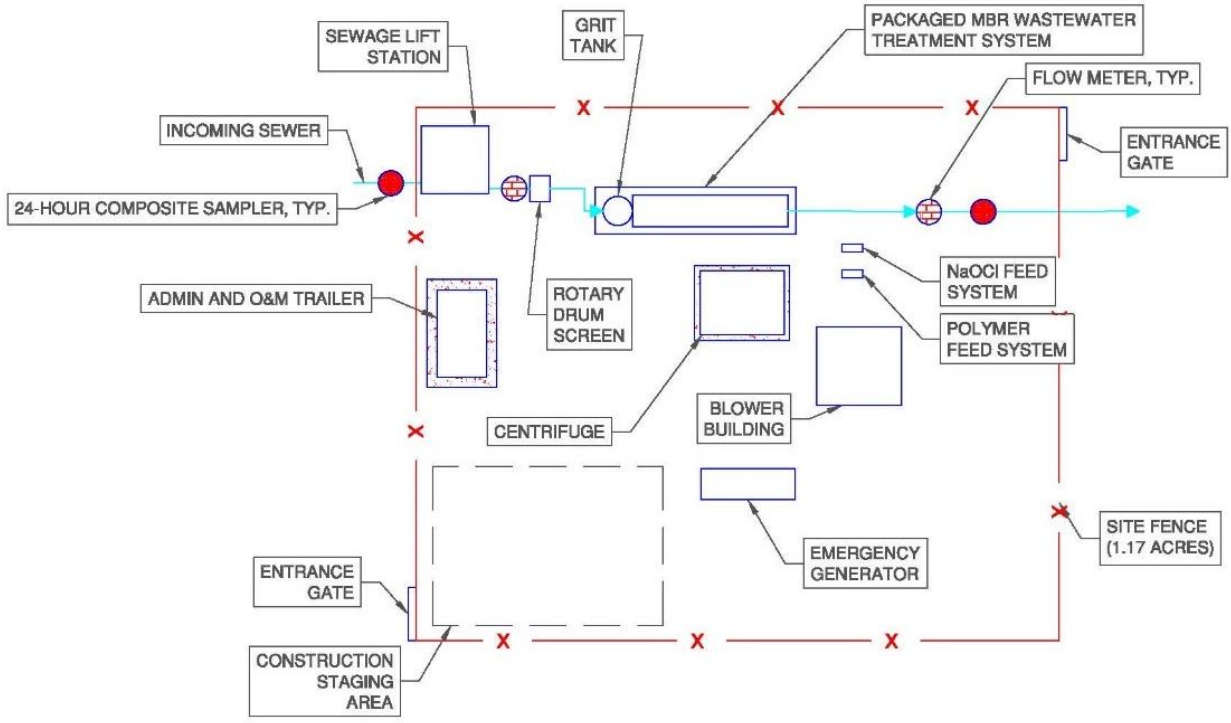

Figure 4. Preliminary WWTP Layout