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Technical Memorandum

10/14/2022

To: Julia Klein
Principal Planner
City of San Mateo

Prepared by: Courtney King, PE
Reviewed by: Amelia Luna, PE

RE: 1st & B (Downtown San Mateo) - Sanitary Sewer Flows Evaluation

Ms. Klein:

As part of the entitlement process for the proposed project at South B Street and 1st Avenue in the Downtown Core of San Mateo (Project), the City of San Mateo (City) has requested that Harvest Properties (Project Applicant) provide wastewater generation estimates for the existing site and proposed development. Sherwood Design Engineers, Inc. (SDE) has prepared this technical memorandum to establish a basis for these wastewater generation estimates.

To estimate the Project's wastewater generation flows, first water unit demand factors are used to calculate the projected water use for the proposed development. Standard consumptive factors are then applied to determine the projected wastewater flows. The unit demand factors are developed from industry-standard literature references and information from similar, contemporary urban developments in alignment with the latest California Green Building Standards Code (CALGreen, 2019) and the Leadership in Energy and Environmental Design (LEED) rating system. The proposed unit demand factors account for high-performance water conservation measures (such as low-flow fixtures), as required by CALGreen.

SDE is available to meet and discuss this information with City staff should any questions arise or should any additional information be required.

1. Existing Site

The existing site includes approximately 6,900 gross square feet (GSF) of restaurant space, 2,500 GSF of retail space, and 3,400 GSF of uncovered parking.

The existing site's wastewater flows are based on estimated annual water usage for Fiscal Year 2018-19, as provided by the City of San Mateo's Public Works Department (Attachment 1) and summarized in Table 1. Annual water usage is estimated by the City in order to charge customers for sewer service. The water usage estimates are based on water consumption for the five preceding winter months (November to March), which are used to avoid including water uses that do not produce wastewater, such as irrigation and cooling, which typically occur in the summer months.

The water usage data supplied by the City included the following tenants: China Bee Restaurant (restaurant/food-retail), Saigon Barber Shop (non-food retail), Poke Island (restaurant/food-retail),

Eggettes (restaurant/food-retail), and Donut Delite (restaurant/food-retail). As data was not available for Van Dalen Scales Corp (non-food retail), the water usage (by area, GSF) was estimated to be one-fourth that of the Saigon Barber Shop (by area, GSF).

The wastewater flows of the existing site are summarized in Table 2. Wastewater generation is calculated from water consumption using a 90% consumptive factor. Based on an average, daily water usage of 845 hundred cubic feet (CCF), the average, daily wastewater generation rate for the existing site would be 1,500 gallons per day (gal/d). The City of San Mateo typically uses a peaking factor of 3.0 (ratio of peak flow to average flow) to estimate the maximum, instantaneous peak into the City's wastewater system[1]. Using a peaking factor of 3.0, the maximum, instantaneous peak for the existing site would be 4,500 gallons per hour (gal/h). A peaking factor of 4.0 could also be used for small commercial establishments, as presented in Crites & Tchobanoglous (1998)[2]. Using a peaking factor of 4.0, the maximum, instantaneous peak for the existing site would be 6,000 gal/h.

Table 1: Existing Site - Water Usage (Fiscal Year 2018-19)

Existing Tenants			Water Usage Data (Fiscal Year 2018-19)[3]			
Tenant	Area (GSF)	Type of Tenant	Monthly Average (CCF per month)	Months in Year (No.)	Annual Water Usage (CCF per year)	Usage by Area (CCF/GSF-year)
China Bee Restaurant	2,316	Restaurant/Food-Retail	23.8	12	286	0.12
Saigon Barber Shop	534	Non-Food Retail	2	12	24	0.04
Poke Island	846	Restaurant/Food-Retail	7.2	12	86	0.10
Eggettes	1,912	Restaurant/Food-Retail	18	12	216	0.11
Donut Delite	1,793	Restaurant/Food-Retail	17.6	12	211	0.12
Van Dalen Scales Corp	1,935	Non-Food Retail	*data not available*		22*	0.01
Total	**9,300**				**845**	**0.09**

** Water usage (by area, GSF) for Van Dalen Scales Corp was estimated to be one-fourth that of Saigon Barber Shop (by area, GSF)*

Table 2: Existing Site - Wastewater Flows (Fiscal Year 2018-19)

	Water Usage			Wastewater Generation			Peak Wastewater Flows	
	Annual		Annual Average	Annual		Annual Average	*3.0 Peaking Factor Applied*	*4.0 Peaking Factor Applied*
	CCF per year	MGY	gal/d	CCF per year	MGY	gal/d	gal/h	gal/h
Total	845	0.63	1,700	760	0.57	1,500	4,500	6,000

[1] Email from Karen Magallanes, City of San Mateo. September 7, 2022.
[2] Crites, Ron, and George Tchobanoglous. Small and Decentralized Wastewater Management Systems. Boston: WCB/McGraw-Hill, 1998.
[3] City of San Mateo Public Works Department. Sewer Service Charge for Fiscal Year 2018-19 - Parcel No. 034-154-030.

2. Proposed Development

The proposed development will include approximately 35,000 GSF of office space (145 seats) and 7,300 GSF of retail space, with the potential for a future restaurant tenant within the proposed retail space. The proposed development will be in compliance with the latest CALGreen code, will pursue LEED Gold certification, and is being designed to run on all-electric systems with the potential exception for a future restaurant tenant.

Wastewater flows for each option are calculated based on estimated water usage, assuming a 90% pass through for consumptive flows (such as sinks) and a 100% pass through for non-consumptive flows (such as toilet flushing). Water usage is calculated based on the proposed unit demand factors presented in Section 2.1.

To capture the minimum and maximum wastewater flows for the Project, a “Retail Option” and a “Restaurant Option” have been developed, as detailed in Section 2.2 and Section 2.3.

2.1. Proposed Unit Demand Factors

The Project’s proposed water unit demand factors are presented in Table 3. The following sections describe the proposed water unit demand factors for each program at the Project.

Table 3: Proposed Water Unit Demand Factors

	Water Unit Demand Factor*
	gal/GSF-d
Office**	0.024
Retail	0.012
Restaurant	0.198

** based on average annual day demands*
*** includes recommended 50% factor of safety*

2.1.1. Office

The proposed office duty factor is based primarily on high efficiency fixtures required to meet LEED standards and in accordance with CALGreen (2019), Section 5.303 - Nonresidential Mandatory Measures, Indoor Water Use. Water demands for offices include restrooms, drinking fountains, and a small kitchen demand to account for office “micro-kitchens” with coffee/tea stations. Refer to Table 4 for office fixture flows and a unit demand build up using these standards. Application of these standard office fixture flows results in an interior office demand of 6 gallons per capita per day (gal/ca-d). Note that water use is dependent on human behavior (e.g., faucet flow durations).

The projections for the proposed development indicate office density at the Project will be approximately 250 GSF/seat, or 145 full time equivalent (FTE). The projected average daily occupancy in the proposed offices is calculated by reviewing occupancy at the annual level to account for weekends, holidays, and working from home. The resulting occupancy factor is 65%, or about 238 days of the year when offices are at full occupancy. Accounting for office density and anticipated occupancy, the duty factor would be 0.016 gal/GSF-d.

The City of San Mateo's standard water consumption factor for per capita water usage estimates is 65 gal/ca-d[4]. This water consumption factor appears to be based on the full daily demand of a person living and working in San Mateo. As noted in a 2021 California Department of Water Resources study[5], "current statewide median indoor residential water use is 48 gallons per capita per day". Using the City of San Mateo's per capita water usage of 65 gal/d and the statewide median residential water usage of 48 gal/d, it can be deduced that non-residential per capita water use would be 17 gal/ca-d. These non-residential demands could include offices, restaurants, retail spaces, entertainment venues, etc..

Given the estimated non-residential water use and factoring in human behavior uncertainty, SDE recommends applying a 50% factor of safety to the built up office unit demand previously presented (6 gal/ca-d). The resulting office unit demand is 9 gal/ca-d. Accounting for office density and anticipated occupancy, the proposed duty factor is 0.024 gal/GSF-d.

Table 4: Office Fixture Flows (LEED, CALGreen)

	Fixture Flows					Unit Demand (gal/ca-d)
	Flowrate	Unit	Duration	Unit	FTE Uses/Day	
Lavatory Faucet	0.5	gal/min	0.5	min	3	0.75
Water Closet	1.28	gal/flush	1	flush	3	1.92
Drinking Fountain	0.5	gal/min	0.25	min	3	0.38
Kitchen Sink	1.8	gal/min	0.25	min	1	0.5
Dishwasher	3.5	gal/cycle	1	cycle	0.1	0.4
Total Unit Demand *(LEED, CALGreen)*		**gal/ca-d**				**6**
Proposed Unit Demand *(includes 50% factor of safety)*		**gal/ca-d**				**9**

[4] Email from Karen Magallanes, City of San Mateo. September 7, 2022.
[5] California Department of Water Resources study, 2021: "Results of the Indoor Residential Water Use Study".

2.1.2. Retail & Restaurant

Demands at retail/commercial spaces can vary depending on the type of establishment. Retail spaces are expected to have demands mainly associated with restrooms for employees and transients (customers). Restaurants have a much higher water demand for activities including cooking, cleaning, and consumption.

The proposed retail and restaurant duty factors are based primarily on high efficiency fixtures required to meet LEED standards and in accordance with CALGreen (2019), Section 5.303 - Nonresidential Mandatory Measures, Indoor Water Use, as well as industry-standard equipment to serve restaurant cooking and cleaning needs. Refer to Table 5 and Table 6 for estimated retail & restaurant fixture flows and proposed unit demands. Accounting for retail and restaurant density, the proposed duty factors for the Project's retail spaces is 0.012 gal/GSF-d and for the Project's restaurant spaces is 0.198 gal/GSF-d.

Table 5: Retail Fixture Flows (LEED, CALGreen)

Fixture	Fixture Flows				Staff (FTE)		Transients (customers)		TOTAL
	Flowrate	Unit	Duration	Unit	Uses / Day	Unit Demand (gal/ca-d)	Uses / Day	Unit Demand (gal/ca-d)	Unit Demand (gal/GSF-d)
Lavatory Faucet	0.5	gal/min	0.5	min	3	0.75	0.5	0.125	
Water Closet	1.28	gal/flush	1	flush	3	3.84	0.3	0.384	
Unit Demand		**gal/ca-d**				**4.6**		**0.51**	-
Retail Density*		GSF/ca				550		130	
Total Unit Demand		**gal/GSF-d**				**0.008**		**0.004**	**0.012**

** per the SFPUC Water Use Calculator*[6]

Table 6: Restaurant Fixture Flows (LEED, CALGreen)

Fixture	Fixture Flows				Staff (FTE)		Transients (customers)		Total
	Flowrate	Unit	Duration	Unit	Uses / Day	Unit Demand (gal/ca-d)	Uses / Day	Unit Demand (gal/ca-d)	Unit Demand (gal/GSF-d)
Lavatory Faucet	0.5	gal/min	0.5	min	3	0.75	0.5	0.125	
Water Closet	1.28	gal/flush	1	flush	3	3.84	0.3	0.384	
Commercial Kitchen*	5.1	gal/meal	1	meal	0	0	1	5.1	
Unit Demand		**gal/ca-d**				**4.6**		**5.61**	-
Restaurant Density*		GSF/ca				435		30	
Total Unit Demand		**gal/GSF-d**				**0.011**		**0.187**	**0.198**

** per the SFPUC Water Use Calculator*[7]

[6] SFPUC District-scale Water Use Calculator, 2022: https://sfpuc.org/construction-contracts/design-guidelines-standards/onsite-water-reuse

[7] SFPUC District-scale Water Use Calculator, 2022: https://sfpuc.org/construction-contracts/design-guidelines-standards/onsite-water-reuse

2.2. Wastewater Generation - Retail Option

For the Retail Option, the entire 7,300 GSF of proposed retail space is assumed to be non-food retail. The estimated water demands and wastewater flows for this option are shown in Table 7. For this option, a peaking factor of 3.0 results in 2,700 gal/h of wastewater flows, while a peaking factor of 4.0 results in 3,500 gal/h of wastewater flows.

Table 7: Proposed Development (Retail Option) - Water Demands & Wastewater Flows

Program Area	Water Usage			Wastewater Generation			Peak Wastewater Flows	
	Annual		Annual Average	Annual		Annual Average	*3.0 Peaking Factor Applied*	*4.0 Peaking Factor Applied*
	CCF per year	MGY	gal/d	CCF per year	MGY	gal/d	gal/h	gal/h
Office*	401	0.30	815	388	0.29	793		
Retail	46	0.03	93	45	0.03	92		
Restaurant	-	-	-	-	-	-		
Total	**447**	**0.33**	**910**	**433**	**0.32**	**885**	**2,700**	**3,500**

***** *Includes 50% factor of safety for office wastewater flows*

2.3. Wastewater Generation - Restaurant Option

For the Restaurant Option, the entire 7,300 GSF of proposed retail space is assumed to be restaurant/food-retail. The estimated water demands and wastewater flows for this option are shown in Table 8. For this option, a peaking factor of 3.0 results in 6,300 gal/h of wastewater flows, while a peaking factor of 4.0 results in 8,400 gal/h of wastewater flows.

Table 8: Proposed Development (Restaurant Option) - Water Demands & Wastewater Flows

Program Area	Water Usage			Wastewater Generation			Peak Wastewater Flows	
	Annual		Annual Average	Annual		Annual Average	*3.0 Peaking Factor Applied*	*4.0 Peaking Factor Applied*
	CCF per year	MGY	gal/d	CCF per year	MGY	gal/d	gal/h	gal/h
Office	401	0.30	815	388	0.29	793		
Retail	-	-	-	-	-	-		
Restaurant	698	0.52	1,430	638	0.48	1,307		
Total	**1,099**	**0.82**	**2,250**	**1025**	**0.77**	**2,100**	**6,300**	**8,400**

3. Conclusions and Recommendations

The proposed development at South B Street and 1st Avenue will include approximately 35,000 GSF of office space (145 seats) and 7,300 GSF of retail space (with the potential for a future restaurant tenant); replacing approximately 6,900 GSF of restaurant space and 2,500 GSF of retail space that exists currently at the site. For the Retail Option, the entire 7,300 GSF of proposed retail space is assumed to be non-food retail; while for the Restaurant Option, it is assumed to all be restaurant/food-retail.

It is recommended that the City adopt the Project's proposed water consumption unit demand factors for estimating the Project's wastewater generation flows. Based on the project's programming and expected occupancy dwell times, using a peaking factor of 4.0 would be more conservative and is thus recommended for estimating the Project's peak wastewater flows. Using a peaking factor of 4.0, the Project's peak wastewater flows are estimated to be 8,400 gal/h for the Restaurant Option (most conservative). The existing site's peak wastewater flows are estimated to be 6,000 gal/h. Therefore, the anticipated new wastewater flows for the Project are 2,400 gal/h at a maximum.

SDE is available to meet and discuss this information with City staff should any questions arise or should any additional information be required.

Attachment 1

CITY OF SAN MATEO - PUBLIC WORKS DEPARTMENT
330 West 20th Avenue
San Mateo, CA 94403
tel (650) 522-7367
fax (650) 522-7381

RE:*Sewer Service Charge for Fiscal Year 2018-19 - Parcel No. 034-154-030*

Good day Mr. DeMartini,

Please find the summary below describing your sewer charge for Fiscal Year 2018-19.

Please call me at (650) 522-7367 or email at cpassarelli@cityofsanmateo.org if you have any questions.

Sincerely,

Chris Passarelli
Management Analyst, Public Works Department

FISCAL YEAR *2018-19* SEWER SERVICE CHARGE

USER/ PREMISE ID	MONTHLY AVERAGE x	MONTHS IN YEAR =	ANNUAL USAGE =	CLASS/RATE	TOTAL
Poke Island 0654100000	7.2	12	86.4	D/$30.35	$2,622.24
Saigon Barber 1654100000	2.0	12	24.0	B/$14.19	$439.08*
Donut Delight 2654100000	17.6	12	211.2	D/$30.35	$6,409.92
Eggettes 8554100000	18.0	12	216.0	D/$30.35	$6,555.60
China Bee Restaurant 9554100000	23.8	12	285.6	D/$30.35	$8,667.96
TOTAL					**$24,255.72**

*Minimum annual charge $36.59/month = $439.08/year