

## **Appendix K. Sanitary System Utility Impact Study**

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# TECHNICAL MEMORANDUM

**To:** De Novo Planning Group  
**From:** Harris & Associates  
**RE:** Sanitary System Utility Impact Study for the Brea Core Specific Plan  
**Date:** February 6, 2026

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## 1. Introduction

The City of Brea (City) is developing the Brea Core Specific Plan (BCSP) as part of their Focused General Plan Update. The BCSP is generally bounded by Lambert Road to the north, Imperial Highway (SR-90) to the south, Berry Street to the west, and SR-57 to the east. The BCSP will increase the number of residential units and allowable non-residential square footage as summarized in [Table 1](#).

**Table 1. Proposed BCSP Land Use Change Summary**

Land Use Designation	Existing Land Use	Proposed Land Use
Residential Units	1,417 Units	4,752 Units
Non-Residential Square Footage	5,113,863 Square Feet	6,379,588 Square Feet

This Technical Memorandum documents the analysis conducted by Harris and Associates (Harris) to estimate the rate of sewage generated by the allowable land uses within the BCSP that enters the City’s sewer system. This assessment evaluates the incremental impact of the BCSP land uses compared with existing land uses at the programmatic level. Hydraulic modeling of the sewer system was not included in the scope of this work.

For the existing condition, this analysis adopts the land use and analysis findings in the City’s *Sewer Master Plan* (SMP, 2021). Specifically, the SMP’s “existing condition” is used as the baseline for this analysis.

## 2. Existing System Description

The sewer system within the BCSP area is serviced by the City and consists of gravity sewers and one inverted siphon and generally flows into the southerly direction into Orange County Sanitation District (OCSD) trunk sewers. Most of the pipes in the area are 8-inches in diameter and made of vitrified clay pipe (VCP). The siphon within the BCSP area is a single 10-inch diameter VCP that crosses under Brea Creek Channel for 110 feet and flows east to west.

The BCSP area lies within four of the City’s eleven major sewersheds, including Fullerton, Brea, Rolling Hills, and Associated sewershed. The Fullerton and Brea sewersheds discharge to the OCSD Fullerton Brea Trunk Sewer/Fullerton Brea Interceptor, and the Rolling Hills and Associated sewersheds discharge to the OCSD Rolling Hills Sub-Trunk/Santa Ana River Interceptor. [Figure 1](#) shows the existing sewer system within the BCSP area and illustrates the sewershed boundaries.

[Table 2](#) provides the total area of the sewersheds and the area that falls within the BCSP, as well as the Average Dry Weather Flow (ADWF) and Peak Dry Weather Flow (PDWF) for the entire sewershed. A peaking factor was used to estimate the PDWF with the following equation:  $PDWF = 1.777 \times ADWF^{0.92}$ .

**Table 2. Major Sewershed Areas**

Sewershed Name	Area (acres)	Area within BCSP Area (acres)	% Within BCSP Area (acres)	Average Dry Weather Flow (MGD) <sup>1</sup>	Peak Dry Weather Flow (MGD) <sup>1</sup>
Fullerton	1,213	164	13.5	1.0542	1.8654
Brea	146	59	40.4	0.1805	0.3679
Rolling Hills	1,110	493	44.4	0.8595	1.5460
Associated	723	29	4.0	0.4747	0.8953

<sup>1</sup>These estimated flows are from the “existing condition” in the SMP.

### 3. Existing System Deficiencies Within the BCSP Area

The SMP evaluated the existing sewer system capacity based on estimated PDWF. A pipe was considered hydraulically deficient when the ratio of depth of flow to pipe diameter (d/D) during PDWF exceeded 0.64. Within the BCSP area, the SMP identified one hydraulically deficit pipe within the BCSP area under existing land use, summarized in [Table 3](#). A site visit of the siphon within the BCSP was conducted in 2021 as part of the SMP and was observed to not have any capacity, operation or maintenance concerns.

**Table 3. Summary of Existing Deficiencies within BCSP Area**

ID (Shown on Figure 1)	Location	Diameter (in)	Length (feet)	PDWF (MGD)	PDWF d/D
EX-1	Randolph Ave and Imperial Highway	10	383	0.8518	0.70

The SMP identified a second hydraulically deficient pipe in the BCSP area at State College Blvd and Imperial Highway under a modeled “near-term future developments” scenario. This scenario included projects at various planning stages. Where detailed development plans were available, the SMP estimated sewer flows using sewer generation factors based on dwelling units and square footage, in comparison to the factors used for their existing condition (and applied in this BCSP analysis) based on parcel land use acreage. This created a scenario with mixed generation factors.

To ensure consistent comparison of incremental changes between exiting and BCSP land uses across the entire BCSP area, this study uses the SMP’s “existing condition” scenario rather than the “near-term” scenario. However, because this pipe is within the BCSP and was identified as deficient under future demand scenarios, it is recommended that this pipe be re-modeled once detailed development plans in the Brea Mall area and other contributing areas become available. The location of this deficiency is shown in [Figure 5](#).

### 4. BCSP Sewerage Flow Changes

The incremental change in sewage flow rates between the existing condition and the BCSP land uses is estimated by land use type, acreage, and sewer generation factors. [Figure 2](#) presents the existing land use as adopted from the SMP. [Figure 3](#) shows the BCSP land uses and [Figure 4](#) highlights the parcels with a changed land use. [Table 4](#) presents the sewer generation factors used to estimate ADWF and their sources. These factors were used for the existing and proposed land use.

**Table 4. ADWF Sewer Generation Factors**

Land Use Type	Land Use	Sewerage Generation Factor (gpd/AC)	Source
Single-Family Residential	R-1, Single-Family Residential	1620	SMP <sup>1</sup>
Multi-Family Residential	R-2, Multi-Family Residential	2950	SMP <sup>1</sup>
High Density Residential	R-3, Multiple Family	5230	SMP <sup>1</sup>
Business/Commercial	C-G, General Commercial	1605	SMP
	C-C, Major Shopping Center	2085	SMP
	C-P, Administrative and Professional Office	4805	SMP
Industrial	C-M, Industrial Commercial	4805	SMP
	M-1, Light Industrial	2405	SMP
	M-2, General Industrial	2405	SMP
Parks	P/R/OS-PR, Parks, Recreation/Open Space-Parks	10.5	SMP <sup>2</sup>
Vacant	Vacant	0	Estimated <sup>3</sup>
Flood Plain	FP, Flood Plain	0	Estimated <sup>3</sup>
Public Facilities	PF, Public Facilities	200	Estimated <sup>2</sup>
Mixed Use	MU-1, Mixed Use I	3290	Estimated <sup>5</sup>
	MU-2, Mixed Use II	3290	Estimated <sup>5</sup>
	MU-3, Mixed Use III	2510	Estimated <sup>6</sup>
	Mixed Use 50	3290	Estimated <sup>7</sup>
	Mixed Use 18	2510	Estimated <sup>7</sup>

<sup>1</sup> Largest value in the range provided in the SMP to be conservative in the absence of detailed development plans

<sup>2</sup> Assumed based on similar projects in the area

<sup>3</sup> Assumed to contribute negligible flow to the sewer system based off the land use and location

<sup>4</sup> MU, Mixed Use factor was estimated as the average of Multi-Family Residential and Business/Commercial

<sup>5</sup> MU-1 and MU-2 factors were estimated as 50% of residential (15% single family and 85% high density), 40% business/commercial and 10% open space

<sup>6</sup> MU-3 factors were estimated as 50% of residential (55% single family and 45% high density), 40% business/commercial and 10% open space

<sup>7</sup> MU-1 and MU-3 factors were used for Mixed Use 50 and Mixed Use 18, respectively, aligning with their allowable housing densities

Sewer flow generated for existing land use and BCSP land uses is summarized in [Table 5](#). The incremental changes resulting from the allowable BCSP land uses compared to existing land use is 0.0753 MGD under ADWF and 0.1363 under PDWF. This results in a 4.6% ADWF increase and a 4.1% PDWF increase within the BCSP area.

Since the sewer flow in the BCSP area ultimately discharges to two different trunk interceptors, the incremental sewer flow increase from the BCSP to each sewershed and trunk interceptor is presented in [Table 6](#).

**Table 5. Sewer Flow Incremental Changes Within the BCSP Area**

Existing Land Use Designation	Future Land Use Designation	Area (acres)	Existing Condition, ADWF (MGD)	Existing Condition, PDWF (MGD)	BCSP ADWF (MGD)	BCSP PDWF (MGD)	Difference, BCSP - Existing ADWF (MGD)	Difference, BCSP - Existing PDWF (MGD)	% Change ADWF	% Change PDWF
C-C, Major Shopping Center	C-C, Major Shopping Center	14.5	0.0303	0.0712	0.0303	0.0711	0.0000	0.0000	0.0%	0.0%
	Mixed Use 50	14.3	0.0298	0.0701	0.0470	0.1067	0.0172	0.0366	57.8%	52.1%
C-G, General Commercial	C-G, General Commercial	3.7	0.0059	0.0157	0.0059	0.0157	0.0000	0.0000	0.0%	0.0%
	Mixed Use 18	7.4	0.0119	0.0301	0.0186	0.0454	0.0067	0.0153	56.4%	50.9%
	Mixed Use 50	54.0	0.0866	0.1872	0.1775	0.3623	0.0909	0.1751	105.0%	93.5%
C-M, Industrial Commercial	C-M, Industrial Commercial	11.8	0.0568	0.1270	0.0568	0.1270	0.0000	0.0000	0.0%	0.0%
	M-1, Light Industrial	6.2	0.0298	0.0702	0.0149	0.0371	-0.0149	-0.0331	-49.9%	-47.1%
	Mixed Use 50	7.7	0.0370	0.0855	0.0253	0.0604	-0.0117	-0.0252	-31.5%	-29.4%
C-P, Administrative and Professional Office	C-P, Administrative and Professional Office	2.0	0.0097	0.0249	0.0097	0.0249	0.0000	0.0000	0.0%	0.0%
	Mixed Use 18	2.0	0.0094	0.0243	0.0049	0.0134	-0.0045	-0.0109	-47.8%	-45.0%
	Mixed Use 50	3.3	0.0157	0.0389	0.0107	0.0274	-0.0049	-0.0114	-31.5%	-29.4%
FP, Flood Plain	FP, Flood Plain	10.4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0%	0.0%
M-1, Light Industrial	M-1, Light Industrial	60.1	0.1445	0.2997	0.1445	0.2997	0.0000	0.0000	0.0%	0.0%
M-2, General Industrial	M-2, General Industrial	52.7	0.1268	0.2657	0.1268	0.2657	0.0000	0.0000	0.0%	0.0%
MU-1, Mixed Use I	Mixed Use 50	131.9	0.4341	0.8246	0.4341	0.8246	0.0000	0.0000	0.0%	0.0%
MU-2, Mixed Use II	Mixed Use 50	22.9	0.0754	0.1647	0.0754	0.1647	0.0000	0.0000	0.0%	0.0%
MU-3, Mixed Use III	Mixed Use 18	5.7	0.0143	0.0356	0.0143	0.0356	0.0000	0.0000	0.0%	0.0%
PF, Public Facilities	PF, Public Facilities	23.4	0.0047	0.0128	0.0047	0.0128	0.0000	0.0000	0.0%	0.0%
P/R/OS-PR, Parks/Recreation/Open Space-Parks/Recreation	P/R/OS-PR, Parks/Recreation/Open Space-Parks/Recreation	19.9	0.0002	0.0007	0.0002	0.0007	0.0000	0.0000	0.0%	0.0%
R-1, Single-Family Residential	R-1, Single-Family Residential	84.7	0.1372	0.2857	0.1372	0.2857	0.0000	0.0000	0.0%	0.0%
	P/R/OS-PR, Parks/Recreation/Open Space-Parks/Recreation	1.9	0.0031	0.0089	0.0000	0.0001	-0.0031	-0.0088	-99.4%	-99.0%
R-3, Multiple Family	R-3, Multiple Family	0.2	0.0008	0.0026	0.0004	0.0013	-0.0004	-0.0013	-52.0%	-49.1%
	Mixed Use 18	68.3	0.3571	0.6891	0.3571	0.6891	0.0000	0.0000	0.0%	0.0%
<b>Totals</b>		<b>608.8</b>	<b>1.6211</b>	<b>3.3352</b>	<b>1.6963</b>	<b>3.4714</b>	<b>0.0753</b>	<b>0.1363</b>	<b>4.6%</b>	<b>4.1%</b>

**Table 6. BCSP Sewer Flow Incremental Change By Sewershed**

Sewershed	Entire Sewershed			Incremental Change within BCSP Area							% Change (BCSP - Existing)	
	Area (acres)	ADWF	PDWF	Area (acres)	Existing Condition, ADWF (MGD)	Existing Condition, PDWF (MGD)	BCSP Condition, ADWF (MGD)	BCSP Condition, PDWF (MGD)	Difference, BCSP - Existing ADWF (MGD)	Difference, BCSP - Existing PDWF (MGD)	ADWF	PDWF
Fullerton	1,213	1.1128	1.9606	140.73	0.3716	0.7148	0.3815	0.7322	0.0099	0.0174	2.7%	2.4%
Brea	146	0.2054	0.4143	40.76	0.1212	0.2551	0.1319	0.2757	0.0107	0.0206	8.8%	8.1%
<b>Totals</b>	<b>1,359</b>	<b>1.3182</b>	<b>2.3749</b>	<b>181.5</b>	<b>0.4929</b>	<b>0.9699</b>	<b>0.5134</b>	<b>1.0079</b>	<b>0.0205</b>	<b>0.0380</b>	<b>4.2%</b>	<b>3.8%</b>
Rolling Hills	1,110	1.2629	2.2026	400.96	1.0529	1.8633	1.1076	1.9552	0.0547	0.0889	5.2%	4.8%
Associated	723	0.5159	0.9667	26.36	0.0752	0.1645	0.0752	0.1645	0.0000	0.0000	0	0
<b>Totals</b>	<b>1,833</b>	<b>1.7788</b>	<b>3.1693</b>	<b>427.32</b>	<b>1.1281</b>	<b>2.0277</b>	<b>1.1828</b>	<b>2.1166</b>	<b>0.0547</b>	<b>0.0889</b>	<b>4.9%</b>	<b>4.2%</b>

## 5. Impacts and Recommendations

Overall, the BCSP land uses will increase ADWF to the City’s public sewer system by 4.6%. **Table 7** provides the incremental increase in flow from the BCSP land use that will contribute to the SMP identified deficient pipe at Randolph Ave and Imperial Highway. **Figure 5** illustrates the BCSP area parcels that are assumed to contribute flow to the existing deficient pipe, and highlights which parcels have a proposed land use change. The incremental PDWF change is 0.0178 MGD, which is approximately a 5.5% increase from the total PDWF in the existing pipe as modeled in the SMP. Based on a normal depth calculation, the maximum capacity of this pipe is exceeded with the additional flow from the BCSP. As shown in **Table 7**, the existing d/D was estimated to be 0.70 and approximately 0.72 with the proposed BSCP land use changes.

To assess the contribution of individual new developments to the deficient pipe, updated modeling should be conducted once detailed development plans are available. This modeling can identify the required pipe upgrades and associated costs. With this information, potential developer impact fees could be determined for new development or redevelopment within the BCSP area.

**Table 7. BCSP Sewer Flow Contributing to Deficiencies**

Deficiency ID (see Figure 5)	PDWF (MGD)	PDWF for BCSP Parcels with Proposed Land Use Change			% Change	Existing PDWF d/D	Proposed PDWF d/D
		Existing (MGD)	BCSP (MGD)	Difference, BCSP – Existing (MGD)			
EX-1	0.8518	0.3214	0.3392	0.0178	5.5%	0.70	0.72

The sewer generation factors used in this analysis were taken from the SMP, which were based on 2019 billing records and 2020 flow monitoring. As noted in the SMP, COVID-19 Stay-at-Home Orders were in effect during flow monitoring and influenced the results. Although adjustments were made to account for these conditions, the existing scenario likely resulted in conservative sewage loads. For planning purposes at this level, this conservative approach is considered appropriate to evaluate system capacity.

However, it is further recommended that each development proposal within the BCSP undergo a site-specific sewer system impact analysis as detailed development plans are available. Proposed square footage and dwelling units should be compared with existing building and use composition to more accurately determine the incremental change in sewer flows and the resulting impacts on the public sewer system.

## 6. References

*City of Brea Sewer Master Plan*, Prepared by AKM Consulting Engineers, November 2021