

Storm Drain System Capacity Study

STORM DRAIN SYSTEM CAPACITY STUDY

Tanforan Mall Redevelopment Project

PRODUCED FOR CITY OF SAN BRUNO

MAR 2025 (FINAL)

660 Mission Street, 2nd Floor
San Francisco, CA 94105
(415) 800-6805 www.lotuswater.com



Lotus Water
engineering

CONTENTS

1	Model Development.....	3
1.1	Existing Conditions Model Development	3
1.2	Proposed Conditions Model Development.....	5
2	Model Results.....	6
2.1	Existing Conditions Model Results	6
2.2	Proposed Conditions Model Results.....	7
2.3	Conclusions.....	8



1 MODEL DEVELOPMENT

1.1 Existing Conditions Model Development

An existing conditions model was developed of Tanforan Mall to determine peak flow and volumes draining to the San Bruno storm drain system during the 25-year, 24-hour storm.

The existing storm drain network at Tanforan Mall has multiple connections to the San Bruno storm drain system. BKF Engineers reviewed the existing site utility plan and as-built drawings to develop the existing condition drainage network map (Figure 1), which Lotus Water used as the basis for constructing the existing conditions SWMM model. Engineering judgement was used to fill gaps in the model where pipe slope, inverts, and diameters were missing. The existing drainage network has connections to San Bruno's storm drain system at four points as shown in Figure 1. Three relatively minor connections are located along Sneath Lane, and one major connection is located through the BART parcel to Huntington Ave.

Figure 1. Existing Storm Drain on Tanforan Mall with Multiple Outlets

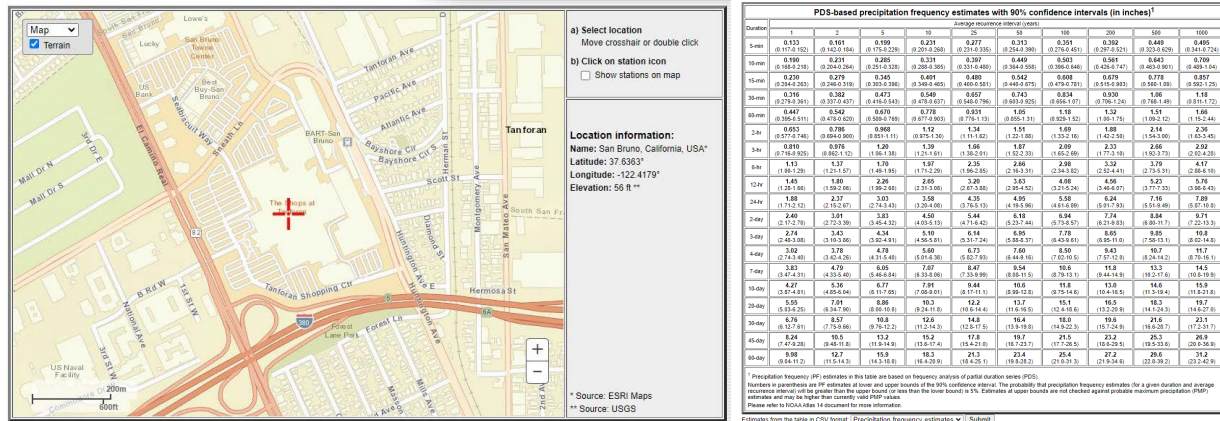


Subcatchments draining to each catch basin were delineated using the Digital Elevation Models (DEM's) from the [2017 San Mateo County LiDAR project](#), which covers all of San Mateo County. Roof areas were manually delineated with assumptions made about their connections to the onsite storm drain system based on proximity and adjacent topography.

Impervious surface for each subcatchment was determined using the [San Mateo County Impervious Surfaces map](#). This data set is a 5-class land use and land cover map of San Mateo County reflecting the state of the landscape in summer, 2018 when 6-inch imagery was collected for San Mateo County. The existing site is almost entirely impervious with a small amount of landscaping in parking lots.

Per the 2014 San Bruno SDMP, the City's design storm for the storm water collection system is the 25-year 24-hour storm. Using NOAA Atlas 14, the 25-year 24-hour storm at Tanforan is 4.35 inches. The design storm depth was assigned a type 1A SCS rainfall distribution to be consistent with the modeling performed for the 2014 SDMP.

Figure 2 NOAA Atlas 14 for 25-year 24-hour Storm



Pervious areas are modeled assuming well-draining urban land per [NRCS hydrologic soil information](#). Green-Ampt parameters for silt loam or a C-type soil were used from the [EPA SWMM 5 manual](#) shown below in Figure 3. The following parameters were used to represent pervious areas on site:

- Saturated hydraulic conductivity of 0.2 inches per hour
- Suction head of 6.6 inches
- Initial deficit 0.3

Figure 3 EPA SWMM Manual Green Ampt Parameters by Soil Type

Soil Texture Class	K	Ψ	φ	FC	WP
Sand	4.74	1.93	0.437	0.062	0.024
Loamy Sand	1.18	2.40	0.437	0.105	0.047
Sandy Loam	0.43	4.33	0.453	0.190	0.085
Loam	0.13	3.50	0.463	0.232	0.116
Silt Loam	0.26	6.69	0.501	0.284	0.135
Sandy Clay Loam	0.06	8.66	0.398	0.244	0.136
Clay Loam	0.04	8.27	0.464	0.310	0.187
Silty Clay Loam	0.04	10.63	0.471	0.342	0.210
Sandy Clay	0.02	9.45	0.430	0.321	0.221
Silty Clay	0.02	11.42	0.479	0.371	0.251
Clay	0.01	12.60	0.475	0.378	0.265

K = saturated hydraulic conductivity, in/hr
Ψ = suction head, in.
φ = porosity, fraction
FC = field capacity, fraction
WP = wilting point, fraction

Source: Rawls, W.J. et al., (1983). *J. Hyd. Engr.*, 109:1316.

1.2 Proposed Conditions Model Development

A proposed condition model was developed based on the Tanforan Mall Master Plan “maximum” mixed-use scenario. The proposal includes several buildings, parking garages, residential buildings, roadways, and garden plazas.

Subcatchments were delineated from the proposed grading plan and proposed storm drain utility plan. Assumptions were made about how buildings would drain based on the C.3 checklist, which groups buildings with at-grade areas together with bioretention planters.

Structures were modeled as 100% impervious. Courtyard areas between buildings were modeled with a percent impervious that matched Landscape Zones and C.3 checklist provided in Tanforan Phase 1 Application. The following impervious coverages were used for areas shown in Figure 4:

- Office/Lab amenity landscape = 66% impervious
- Residential courtyard = 42% impervious
- Retail gardens = 70% impervious
- Perimeter landscape = 79% impervious

Figure 4 Proposed Landscape Zones in Proposal and in Model



The proposed site storm drain system was modeled to match the proposed utility plan provided in the Tanforan Phase 1 Application.

2 MODEL RESULTS

2.1 Existing Conditions Model Results

Table 1. 25-year 24-hour storm flows from Tanforan Mall under existing conditions

Connection to San Bruno SD	Max. Total Inflow (cfs)	Total inflow (MG)	Contributing Area (ac)
Huntington1	38.98	4.31	37.0
Huntington2	0.57	0.064	0.5
Sneath1	1.31	0.147	1.3
Sneath2	0.53	0.059	0.5
Sneath3	3.51	0.392	3.3
Total	44.9	4.972	42.64

Figure 5. Existing conditions model showing drainage area by connection to San Bruno SD



2.2 Proposed Conditions Model Results

Table 2. 25-year 24-hour storm flows from Tanforan Mall under proposed conditions

Connection to San Bruno SD	Peak Flow (cfs)	Total Volume (MG)	Contributing Area (ac)
Huntington1	33.91	3.39	33.6
Huntington2	0.34	0.032	0.3
Sneath1	4.33	0.426	4.2
Sneath2	2.43	0.236	2.4
Sneath3	2.19	0.22	2.1
Total	43.2	4.304	42.64

Figure 6. Proposed conditions model showing drainage area by connection to San Bruno SD



Table 3. Comparison Between Existing and Proposed Model Results

	Existing Conditions	Proposed Conditions	% Change
Max. Total Inflow (cfs)	44.9	43.2	-3.8%
Total inflow (MG)	4.97	4.30	-13%
Contributing Area (ac)	42.64	42.64	0%

2.3 Conclusions

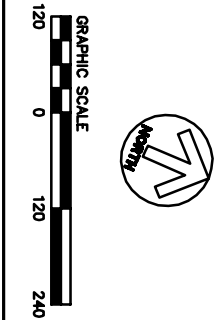
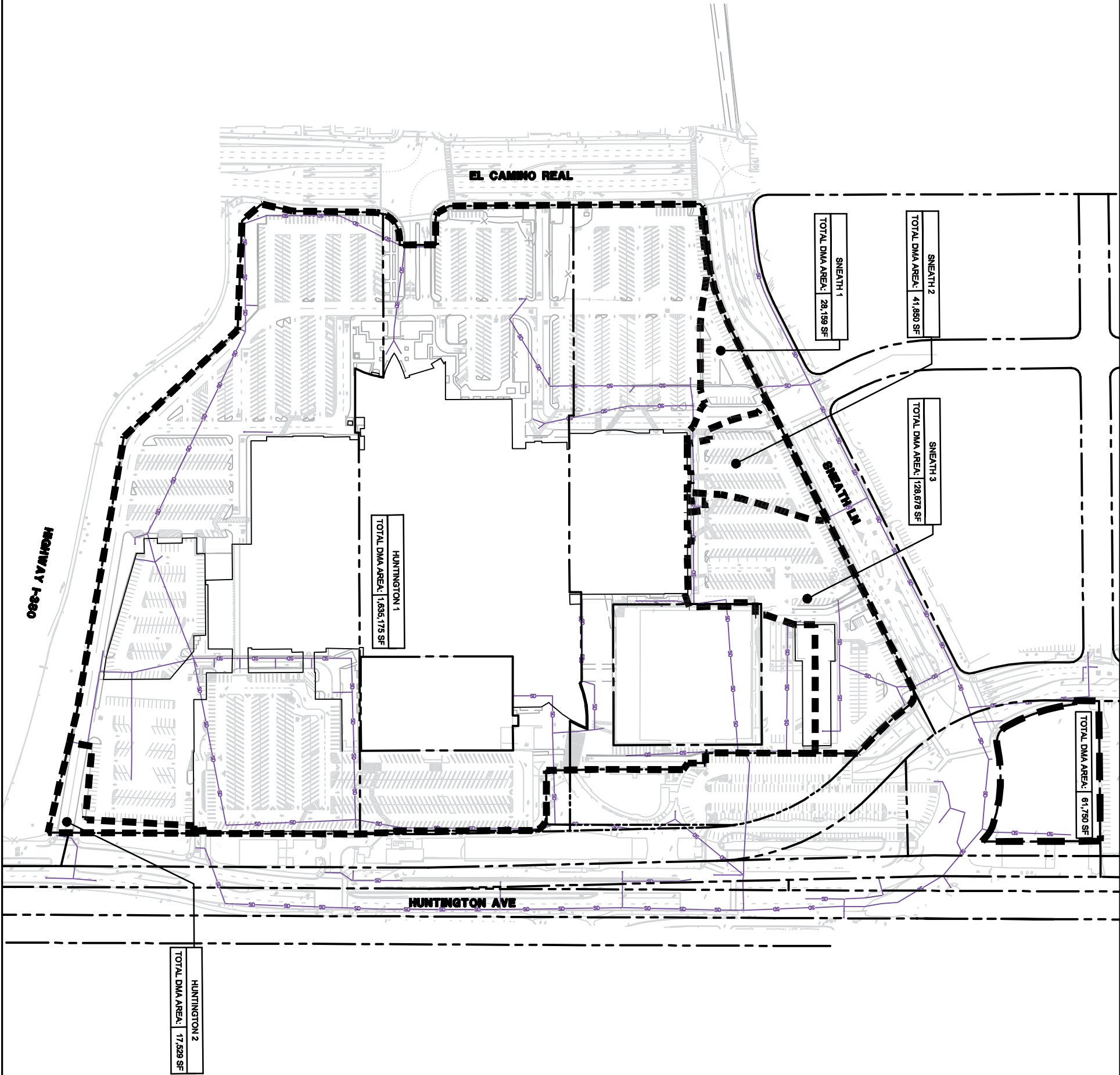
Under proposed conditions the model indicates the site will produce less total runoff and lower peak flows since the proposal includes the addition of landscape areas and bioretention planters throughout the development to meet C.3 requirements. The model predicts a 3.8% reduction to peak flow and a 13% reduction in total runoff volume for the 25-year, 24-hour storm. Therefore, the aggregate peak flow and total volume being discharged to the receiving storm drain system will decrease.

The proposed storm drain utility plan attempts to maintain the tributary area draining to each connection to San Bruno's storm drain system. However, based on best available information for the existing drainage system, approximately 3.6 acres of drainage area will shift from Huntington Avenue to Sneath Lane under proposed conditions.

Table 4. Drainage Area to San Bruno SD System for Existing and Proposed Conditions

	Existing Contributing Area (ac)	Proposed Contributing Area (ac)	Change (+/- ac)
Huntington1	37.0	33.6	-3.4
Huntington2	0.5	0.3	-0.2
Sneath1	1.3	4.2	+3
Sneath2	0.5	2.4	+1.9
Sneath3	3.3	2.1	-1.2
Total	42.6	42.6	0.0

As a result of the shift in drainage areas under proposed conditions, the storm drain mains on Huntington Avenue are predicted to experience a decrease in peak flow of 5.3 CFS (-13%) and in total volume of 0.952 MG (-22%). Conversely, the storm drain mains on Sneath Lane are predicted to experience an increase in peak flow of 3.6 CFS (67%) and in total volume of 0.284 MG (47%). The storm drain mains along Sneath Lane range from 16" to 24" in diameter at the Tanforan connection points. While the additional flow is not of a magnitude expected to cause significant flooding issues, especially considering this area has not previously experienced capacity concerns, the increase is still notable. Therefore, further analysis is required to confirm whether the existing system can adequately accommodate the additional flow without adverse impacts.



X-1 OF	Date: 03/14/2025	No.	Revisions
	Scale: 1" = 240'		
	Design: NH		
	Drawn: NH		
	Approved: JT		
	Job No: 20221218-10		

SAN BRUNO

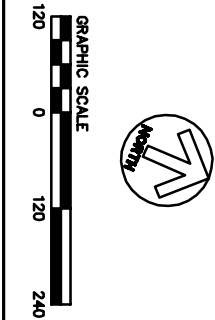
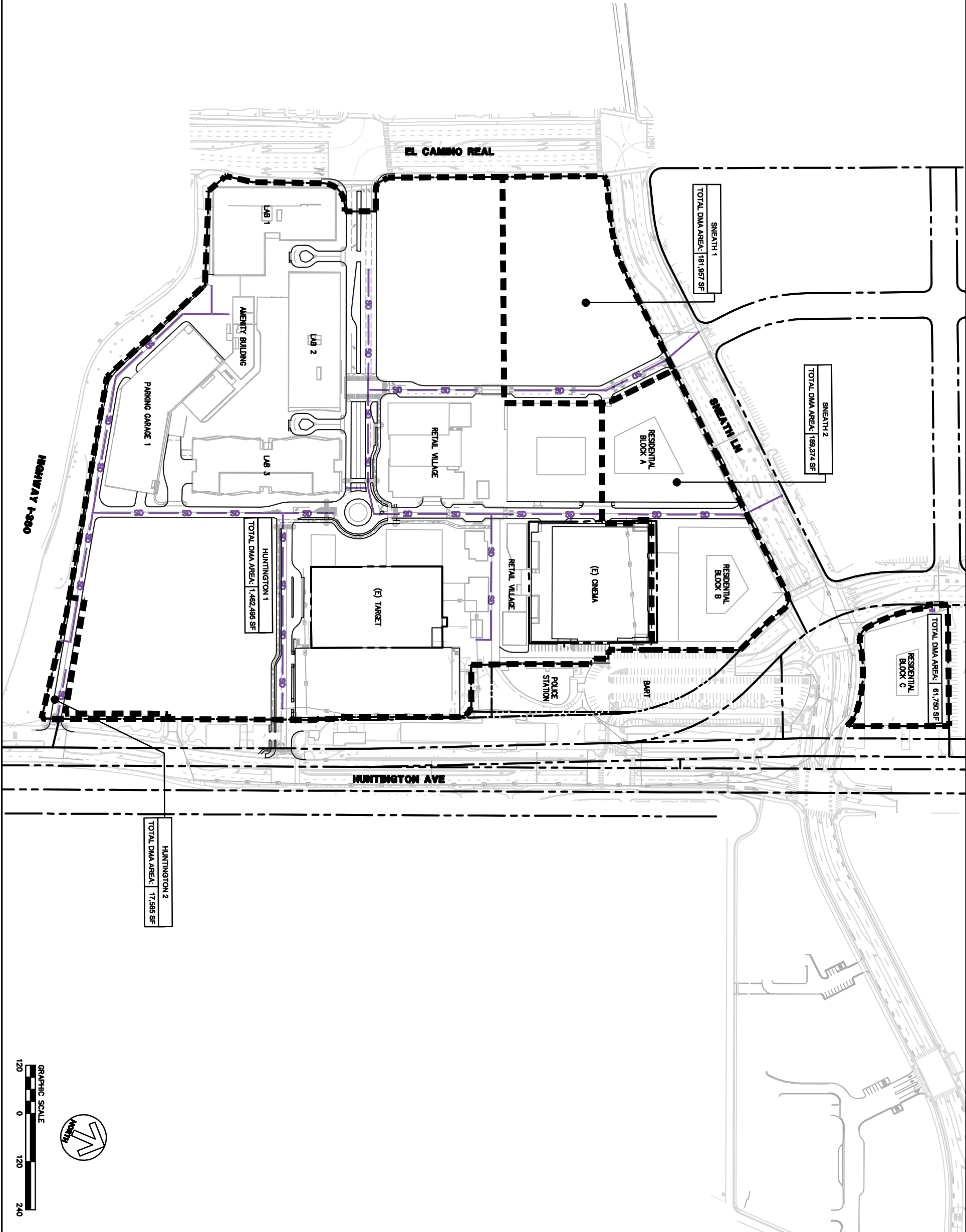
TANFORAN REDEVELOPMENT
STORMWATER MANAGEMENT EXHIBIT
EXISTING DRAINAGE MANAGEMEMENT AREAS

SAN MATEO COUNTY

CALIFORNIA

BKF

255 SHORELINE DRIVE
SUITE 200
REDWOOD CITY, CA 94065
(650) 482-6300
www.bkf.com



X-2 OF	Date: 03/14/2025	No.	Revisions
	Scale: 1" = 240'		
	Design: NH		
	Drawn: NH		
	Approved: JT		
	Job No: 20221218-10		

SAN BRUNO

TANFORAN REDEVELOPMENT
STORMWATER MANAGEMENT EXHIBIT
PROPOSED DRAINAGE MANAGEMENT AREAS

SAN MATEO COUNTY

CALIFORNIA



255 SHORELINE DRIVE
SUITE 200
REDWOOD CITY, CA 94065
(650) 482-6300
www.bkf.com