

Appendix E

Hydraulic Analysis

City of Folsom Housing Element Program H-2: Increased Residential Densities Implementation

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Introduction

Background

The City of Folsom is currently evaluating potential opportunity sites to increase residential densities in three key areas of the City: East Bidwell Corridor Green Zones, around the SACOG Transit Priority Area Green Zones (primarily along the Glenn/Iron Point light rail stations), and in the Folsom Plan Area's Town Center as part of the Housing Element Program H-2. This evaluation also includes revised residential density areas within the Folsom Plan Area.

Purpose

The purpose of this memorandum is to identify whether the proposed increased residential density will cause any adverse hydraulic impacts in the City's hydraulic model that may require additional infrastructure improvements. The following simulations will be run in the hydraulic model for this evaluation:

- Maximum Day Demand at Buildout (Steady State and Extended Period)
- Peak Hour Demand at Buildout (Steady State)

Evaluation Criteria

System Performance

The following system evaluation criteria will be used for this evaluation.

Table 1. System Evaluation Criteria

Maximum-Day Demand Plus Fire Flow ¹	
Maximum Pipe Velocity	10.0 fps
Desirable Pipe Velocity ³	3.0 to 5.0 fps
Pressure	20 psi in the pipelines in the vicinity of a fire; 40 psi without a fire ¹
Peak-Hour Demand	
Maximum Pipe Velocity ¹	7.0 fps
Pressure ²	30 psi or greater (existing service area); 40 psi or greater (new development) ^{1,2}
¹ Minimum pressure (without fire) requirements must be met when storage levels are at 30 percent of capacity, per City of Folsom. ² Per Waterworks standards Section 64602 (b) Each new distribution system that expands the existing system service connections by more than 20 percent or that may otherwise adversely affect the distribution system pressure shall be designed to provide a minimum operating pressure throughout the new distribution system of not less than 40 psi at all times excluding fire flow. ³ City staff desires maximum pipeline velocities around 3 fps during maximum day conditions.	

Storage Capacity Criteria

This evaluation utilizes the 2016 WMP Update storage approach which has three storage requirements: operational storage, emergency storage, and fire protection storage.

The following criteria was used for determining adequate system storage:

1. Operational Storage equal to 25 percent of maximum day demand.
2. Emergency Storage equal to 25 percent of maximum day demand.
3. Fire Flow Storage based on the volume of the largest fire flow requirement in the pressure zone for 4 hours.

The combined volume of each of these criteria is equal to 50% maximum day demand plus the required fire flow volume. The largest fire flow requirement is a 4,000-gpm flow for schools; for a 4-hour period this equates to just under 1 million gallons.

Updated Demand Projections

To be conservative, the evaluation utilized a baseline buildout demand using the 2020 Urban Water Management Plan (UWMP) demand factors. The 2020 UWMP factors can be found in Table 2 below.

Table 2. 2020 UWMP Demand Factors

Land Use Classification	Future Demand Factors	Units
Single Family	0.41	AFY/DU
Multi-Family	0.22	AFY/DU
Commercial/Industrial	2.5	AFY/Acres
Schools	1.79	AFY/Acres
Municipal/Parks	0.9	AFY/Acres

The UWMP demand factor is multiplied by the parcel area to calculate the buildout demand of each parcel. The City provided the latest version of the planned Folsom Plan Area land use that was incorporated into the combined land use for the City to identify the baseline buildout demand.

The opportunity sites north of Highway 50, and the updated land use designations in the south of Highway 50 for potential residential densification were provided by Ascent Environmental as shown in Figure 1. Ascent Environmental also provided an assumed percent of densification for each opportunity site which can be found in Appendix A.

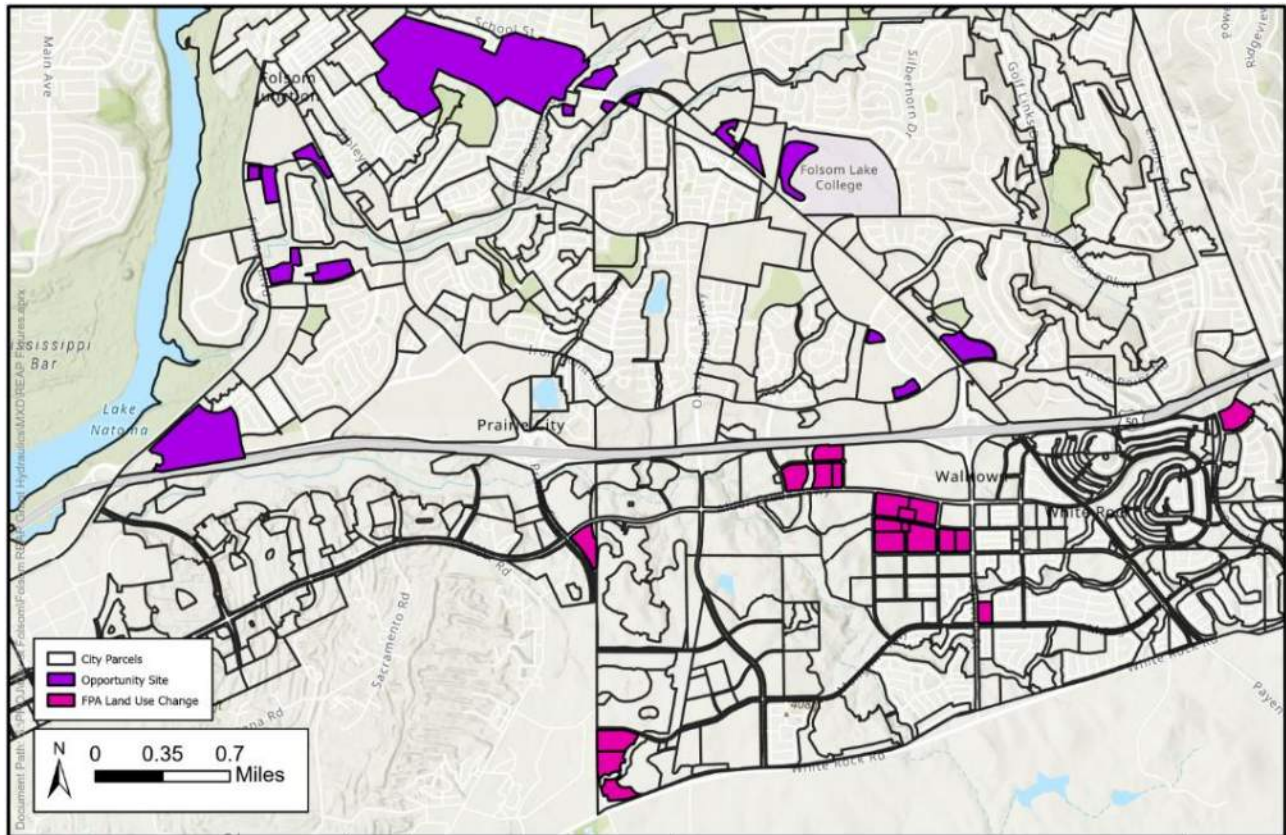


Figure 1. Opportunity Sites and Land Use Change Overview

These potential redevelopment areas were multiplied by the same 2020 UWMP factors to determine added demands for each parcel. The opportunity site demand was added to the baseline buildout demand and was added to the model manually. The FPA land use change parcels were compared with a previous land use parcels from November 2021 to determine the increase in demand within each zone. Table 3 below identifies the updated demand by zone resulting from the proposed residential densifications.

Table 3. Demand Breakdown by Zone

Pressure Zone	WMP Maximum Day Demand (gpm)	Proposed Densification Maximum Day Demand (gpm)	Difference (gpm)
1	5502	5572	70
2	10733	10879	146
3	7984	8018	34
FPA 2	1927	1971	44
FPA 3	2239	2305	66
FPA 6	295	291	-4

The buildout MDD includes several large users as identified in the 2016 WMP as well as additional large users with the south of Highway 50 (UC Davis and Dignity Health). The large water consumers have demand allocated manually in the distribution system model. Table 4 shows the full list of large users and their respective demands.

Table 4. MDD Water Demands for Large Users

Customer	Existing (gpm)	Build Out (gpm)
Intel	309	237
Aerojet	329	280
Kikkoman	68	98
Gekkeikan	51	42
Dignity Health	-	88
UC Davis	-	72
TOTAL	757	817

System Analysis

Maximum Day Demand

The maximum day demand scenario was simulated to include the proposed demand changes within the North of 50 and the South of 50. Figures 2 and 3 represent the maximum day demand velocities and pressures with the updated demands. It should be noted that the velocity in the 24-inch transmission main is 6.2 fps on MDD and the velocity in the 12-inch transmission main to the Zone 4 Tank is 6.3 fps on MDD. Both cases have been previously evaluated to be above the City’s desired velocity range but within the City’s 2016 WMP criteria of 7 fps and are not a result of the proposed residential densification. Therefore, there are no adverse impacts to the buildout model caused by the increase in demand. The junctions that are less than 30 psi are the junctions adjacent to the storage tanks which is to be expected.

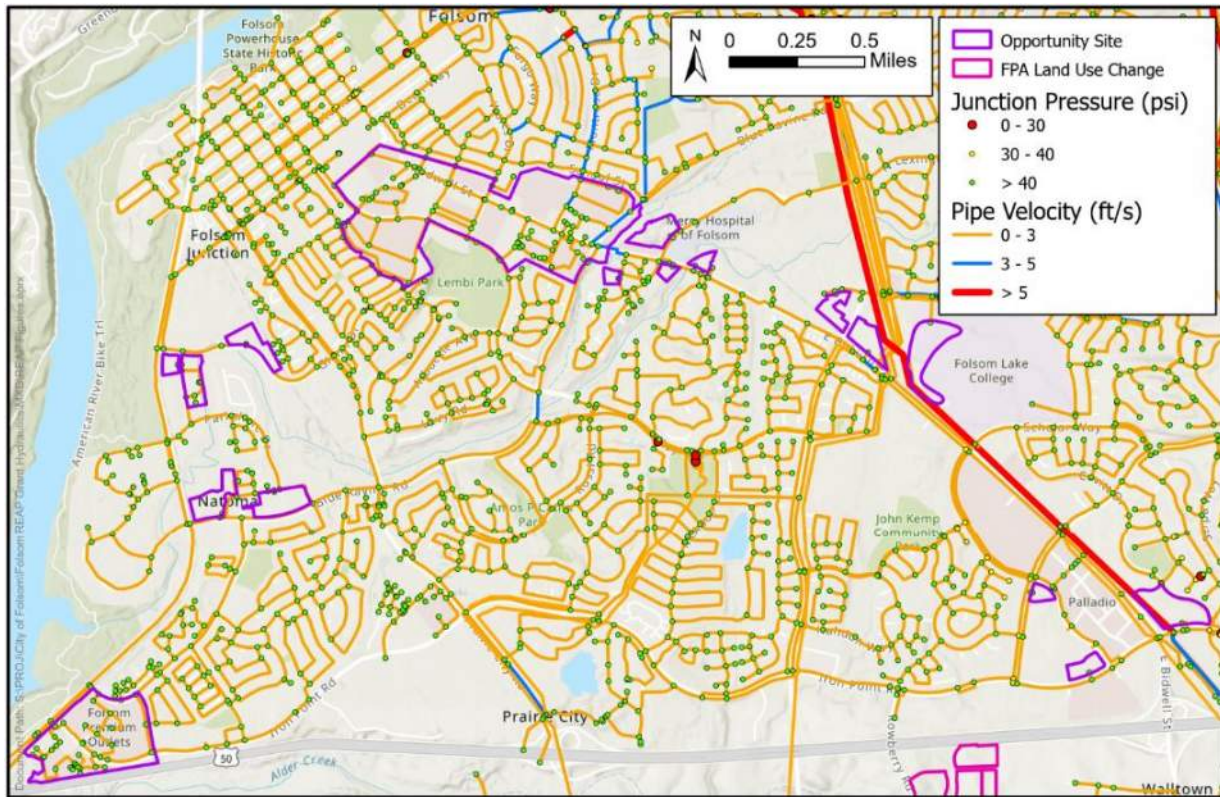


Figure 2. North of 50 Buildout Maximum Day Demand

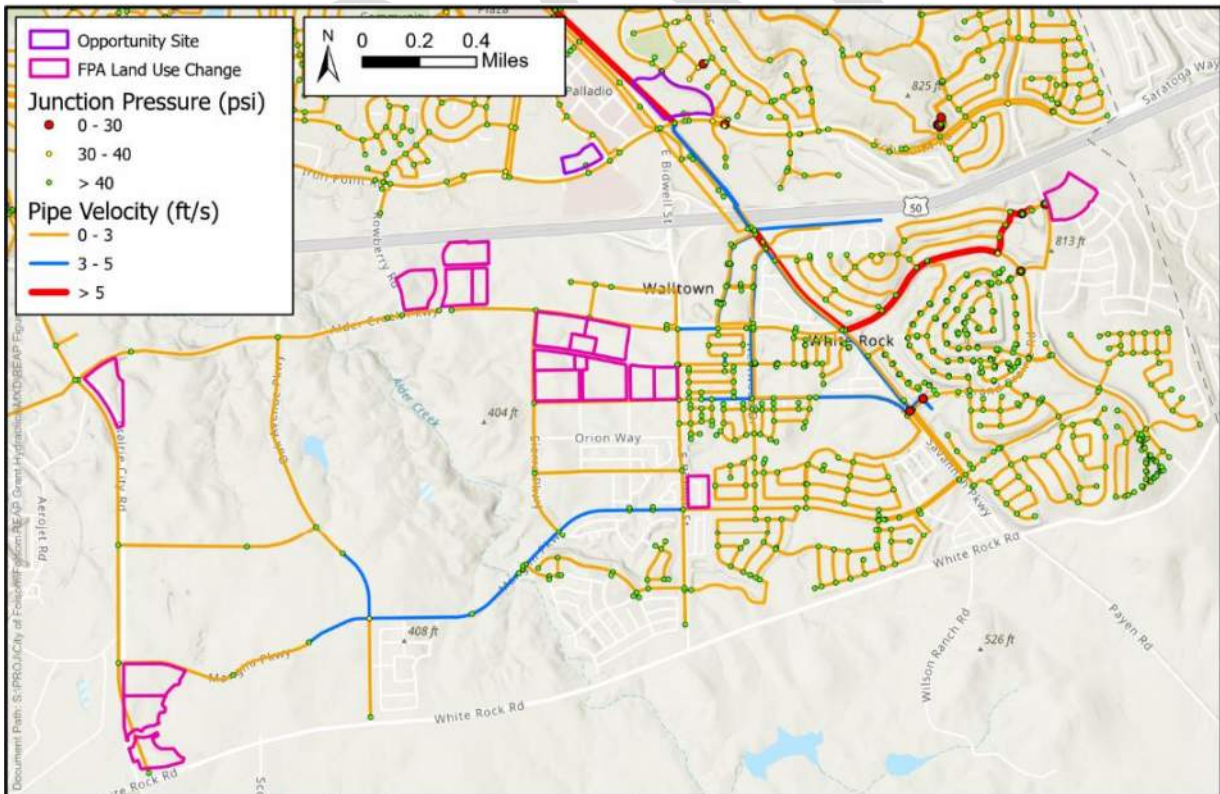


Figure 3. South of 50 Buildout Maximum Day Demand

Peak Hour Demand

The peak hour demand scenario was also simulated to include the proposed demand changes within the North of 50 and the South of 50. As shown in Figures 4 and 5, there are no adverse impacts to the buildout model caused by the increase in demand. The junctions that are less than 30 psi are the junctions adjacent to the storage tanks which is to be expected.

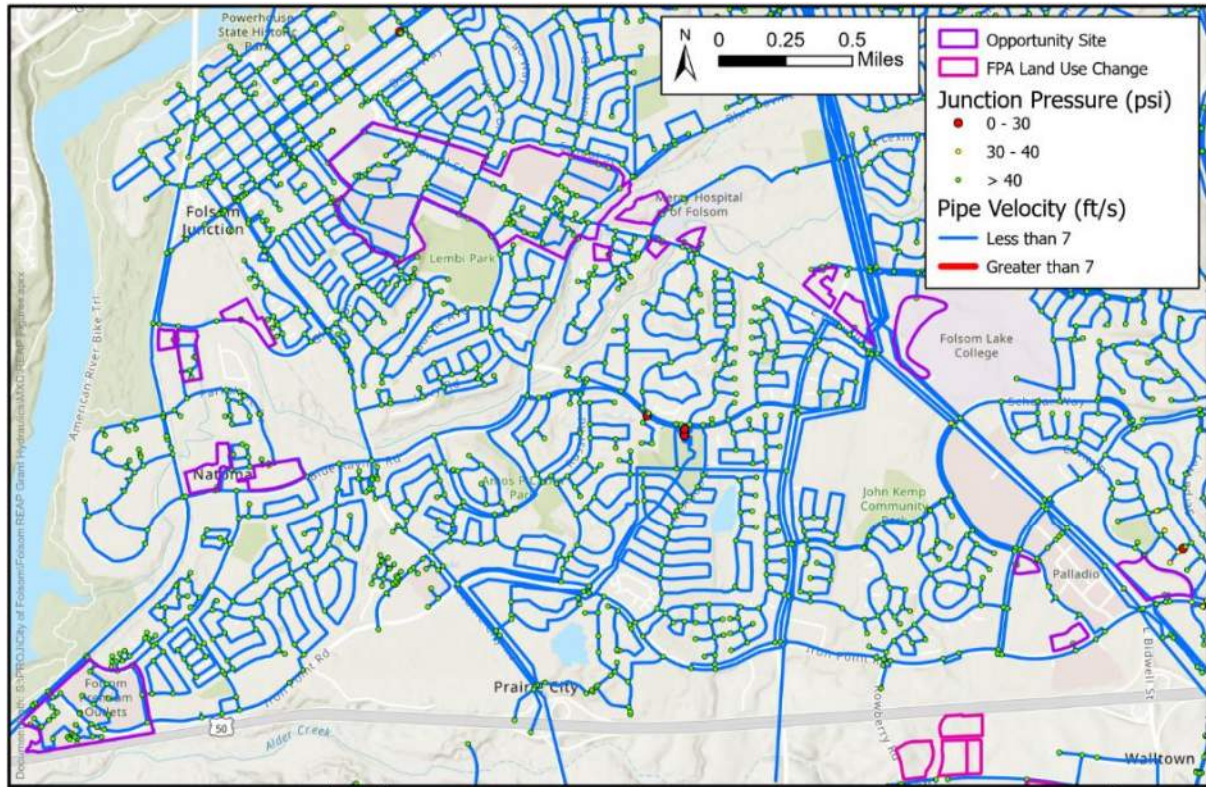


Figure 4. North of 50 Buildout Peak Hour Demands

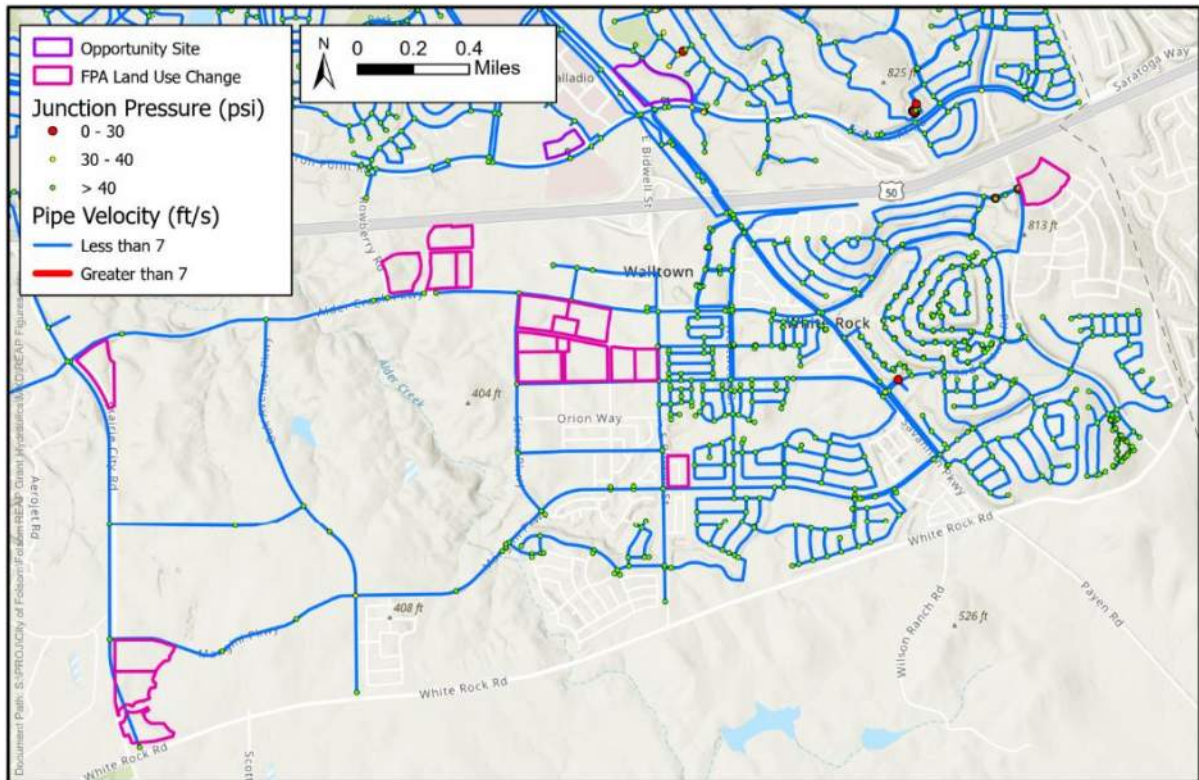


Figure 5. South of 50 Buildout Peak Hour Demands

Storage Capacity

The demands previously identified were used to identify what the updated minimum storage requirements would be with the proposed residential densification. Table 5 compares the original 2016 WMP minimum storage requirements to the proposed residential densification minimum storage requirements.

Table 5. Storage Requirements

Pressure Zone	Required Capacity (GPM) ²	Existing Firm Capacity (GPM)	Minimum Zonal Storage Requirements, MG				
			Emergency/Operational Storage ³	Fire Flow	New Minimum Usable Storage	2016 WMP Comparison	Existing/Planned Storage
1	5572	850	7.44	0.96	8.4	8.3	6.9
2	10879	18000	7.8	0.96	8.8	8.7	9
3	8018	15530	3.7	0.96	4.6	4.6	5
FPA 3 ⁶	4276	61,006	3.1	0.96	4	4	(2) 3 ⁴
FPA 5	807	9005	0.4	0.96	1.5	1.5	3
FPA 6	291	500 ⁵	0.2	*	*	*	*

¹The 2016 WMP storage requirements have been updated to incorporate the increase in demand as noted in FPA Parcel 85A Zone Supplemental Analysis dated August 30, 2021, and the UC Davis Folsom Ranch Hydraulic Analysis dated July 27, 2023.
²Required Capacity = maximum day demand.
³Volume = 1.0 maximum day for gravity zones.
⁴Two (2) 3 MG tanks were required by the City to provide redundancy and resiliency per the FPA Zone 3 Tank Sizing Memorandum dated December 12, 2019.
⁵Proposed pumping capacities.
⁶FPA Zone 2 included with Zone 3.
 *Storage is pumped from adjacent zone.

As identified in the 2016 WMP, an additional 1.4 MG of storage is required to be located within the current Zone 1 service area. With the densification there is now an additional 0.1 MG (1.5 MG total) of storage required in Zone 1. However, the existing/planned storage capacity in the remaining zones have sufficient surplus and, therefore, are not impacted.

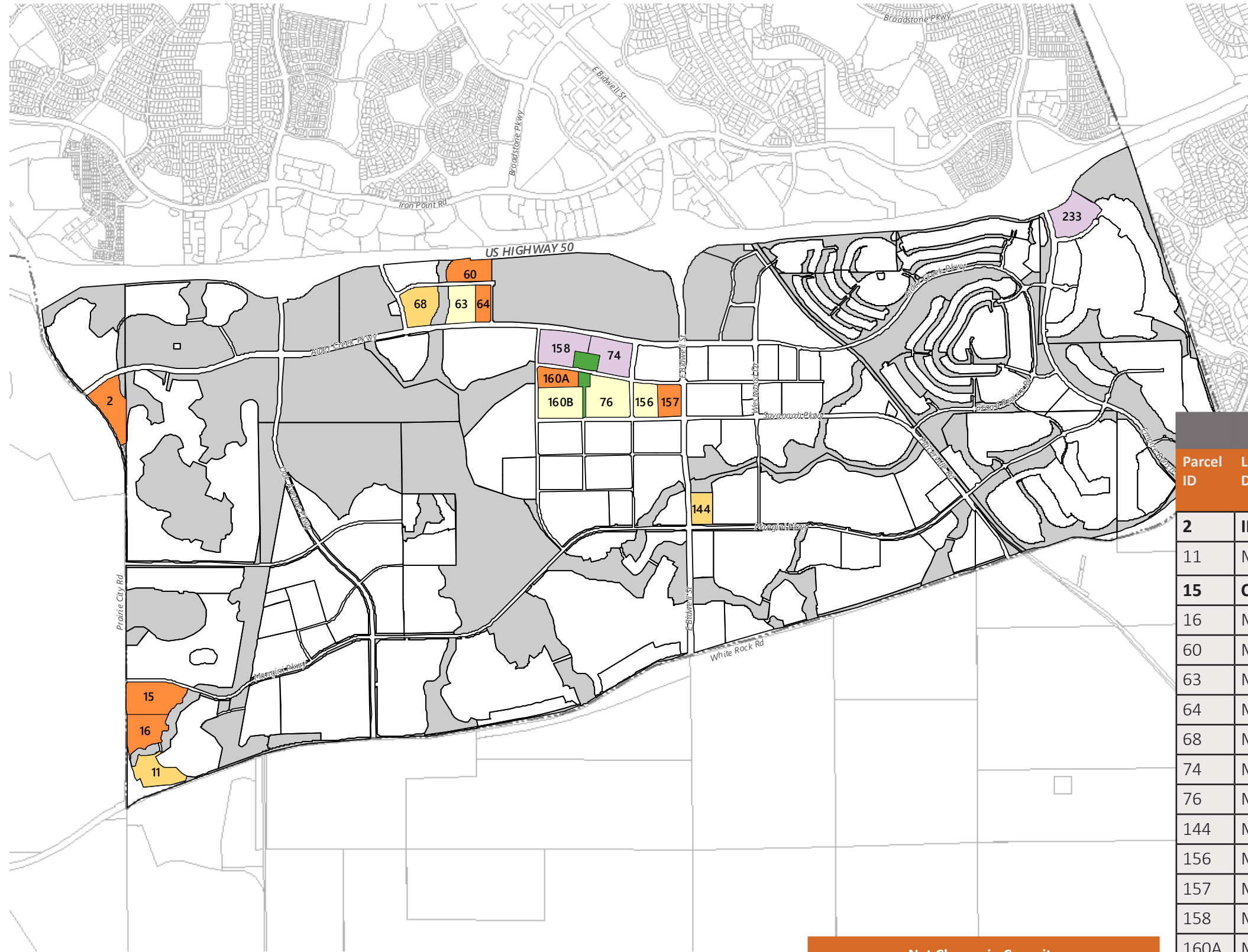
Recommendations

The proposed residential densification increases the buildout demand in the City’s system. However, there are no adverse hydraulic impacts to the City’s system caused by the increase in demand. The existing storage in the North of 50 and planned storage in FPA can accommodate the increased storage requirements. No additional improvements to the City’s infrastructure will be required.

Appendix A

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CITY OF FOLSOM HOUSING ELEMENT IMPLEMENTATION – FPASP Proposed Changes (Rev. 6/29/2023)



- Multi-Family Low Density (7 - 12 DU/Ac)
- Multi-Family Medium Density (12 - 20 DU/Ac)
- Multi-Family High Density (20 - 30 DU/Ac)
- Mixed Use (9 - 30 DU/Ac)
- General Commercial
- Regional Commercial
- Parks
- Open Space
- Folsom City Limits

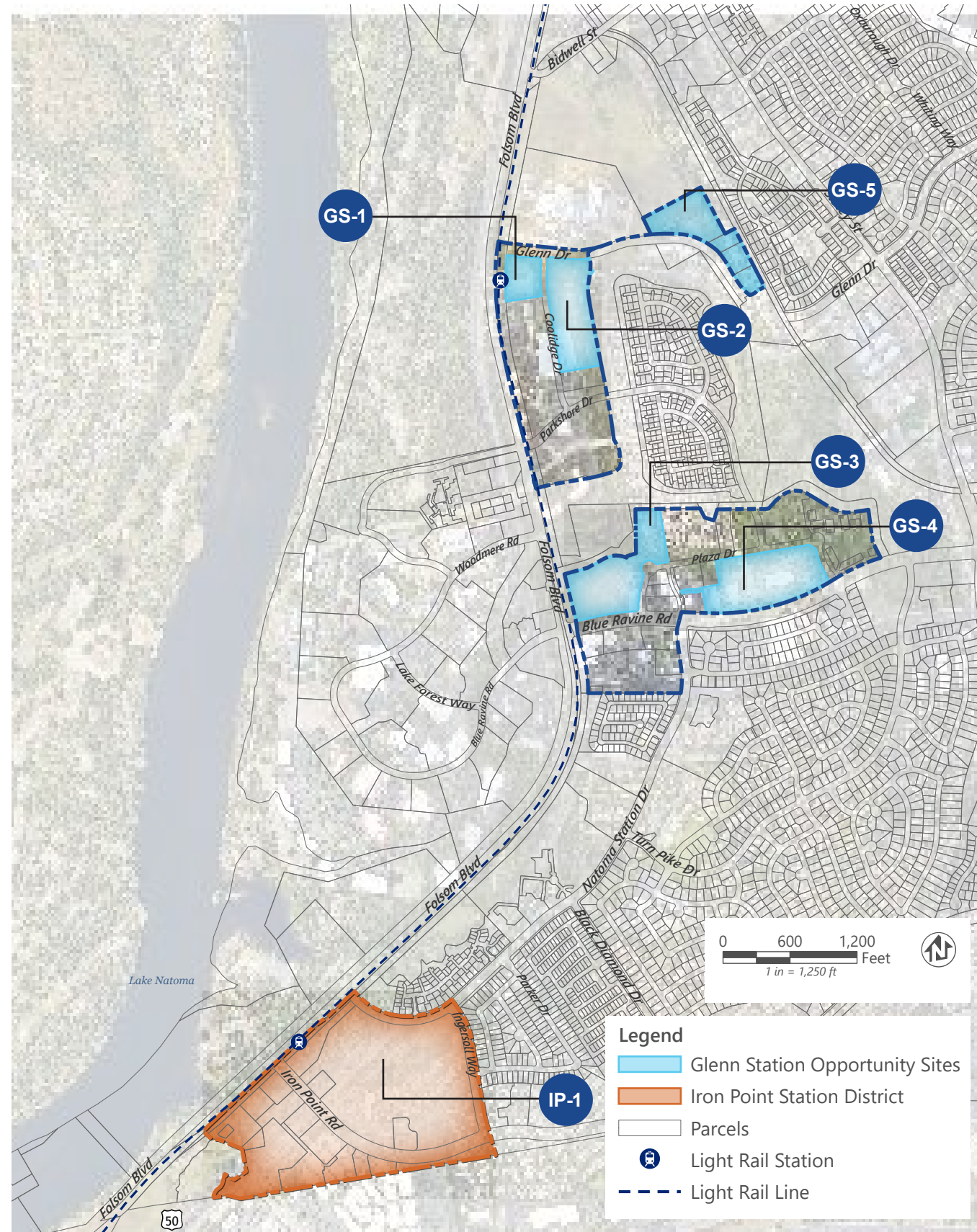
Parcel ID	Original Allocation			Revised Allocation			
	Land Use Designation	Units	Comm. Sq. Ft.	Land Use Designation	Units	Change in Units	Comm. Sq. Ft.
2	IND/OP	0	137,214	MHD	400	+400	-
11	MMD	155	-	MMD	160	+5	-
15	CC	0	142,659	MHD	320	+320	-
16	MHD	246	-	MHD	240	-6	-
60	MHD	192	-	MHD	270	+78	-
63	MLD	70	-	MLD	225	+47	-
64	MHD	108	-	MHD	225	+117	-
68	MMD	176	-	MMD	160	-16	-
74	MU	57	38,333	MU	366	+309	60,000
76	MLD	119	-	MLD	230	+111	-
144	MMD	109	-	MMD	130	+21	-
156	MLD	57	-	MLD	225	+168	-
157	MHD	145	-	MHD	225	+80	-
158	MU	72	43,560	MU	349	+277	50,500
160A	MHD	145	-	MHD	192	+47	-
160B	MLD	97	-	MLD	113	+16	-
233	GC	0	125,235	MU	250	+250	125,235

Net Change in Capacity	
Residential (units)	1,882
Non-Residential (square feet)	-228,833

Source: data downloaded from City of Folsom in 2020 and Sacramento County in 2018. Not to Scale.

CITY OF FOLSOM SACOG INCREASING RESIDENTIAL DENSITIES IMPLEMENTATION (REAP) - June 29, 2023

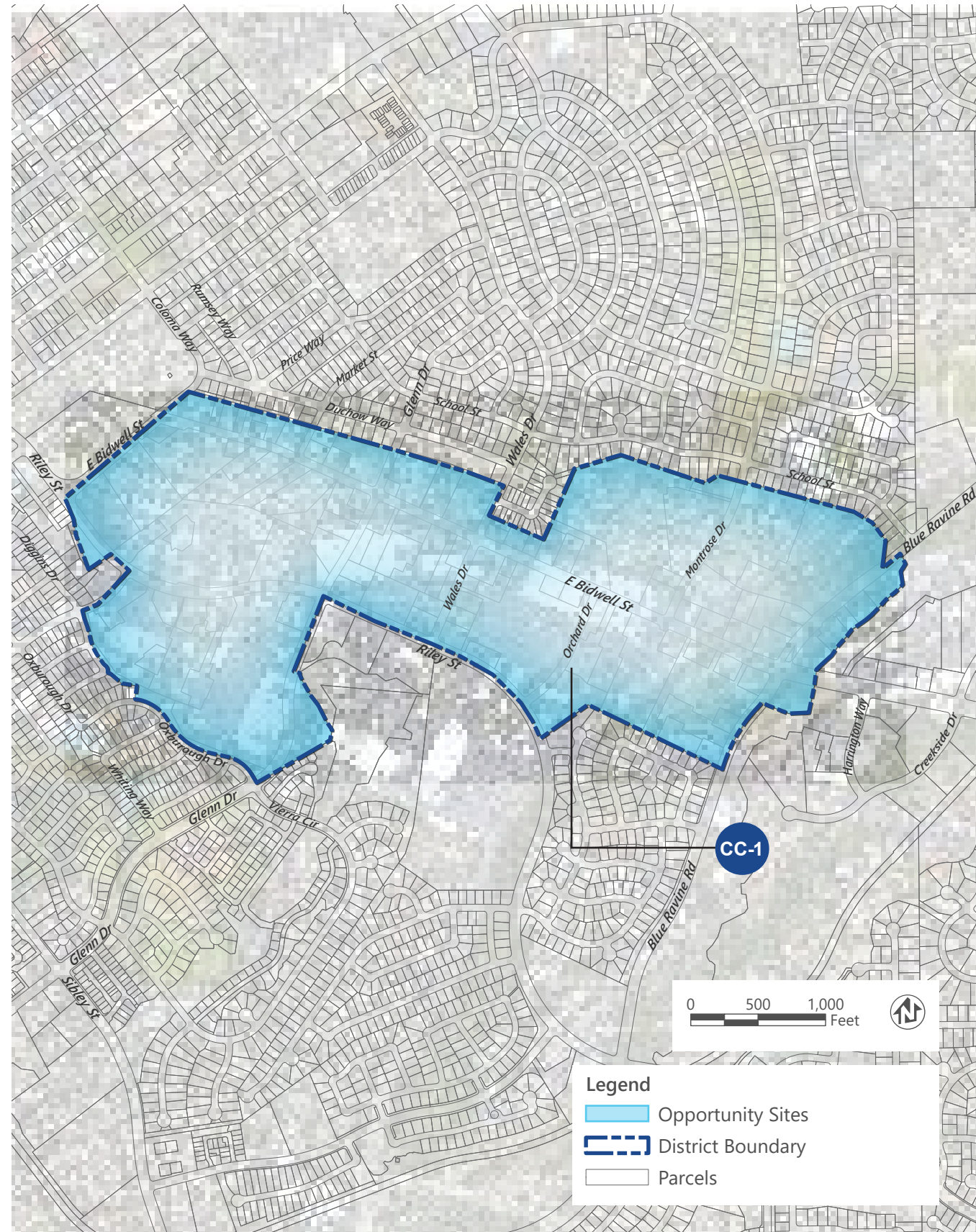
Folsom Boulevard Transit-Oriented Development Areas



Site ID	Site Description	Parcel Acreage	Potential Redevelopment (% of site)	Redevelopment Square Footage	Max FAR	Target Residential FAR	Residential Units	Non-Res GSF
Glenn Station District								
GS-1	Glenn Park & Ride	2.73	100%	118,919	3.00	2.00	238	0
GS-2	Maximus	8.5	25%	92,565	3.00	2.00	185	0
GS-3	Blue Ravine/ Folsom Car Dealership	9.75	25%	106,178	3.00	2.00	212	0
GS-4	Winco Foods Site	10.92	25%	118,919	3.00	2.00	238	0
GS-5	Glenn Drive Technology Park	7.39	25%	80,477	3.00	2.00	161	0
District Sub-total:		39.29		517,057			1,034	0
Iron Point Station District								
IP-1	Entire District Boundary	57.22	15%	373,875	3.00	2.00	748	0
District Sub-total:		57.22		373,875			748	0
TOD Area Total:		97		890,933			1,782	0

CITY OF FOLSOM SACOG INCREASING RESIDENTIAL DENSITIES IMPLEMENTATION (REAP) - June 29, 2023

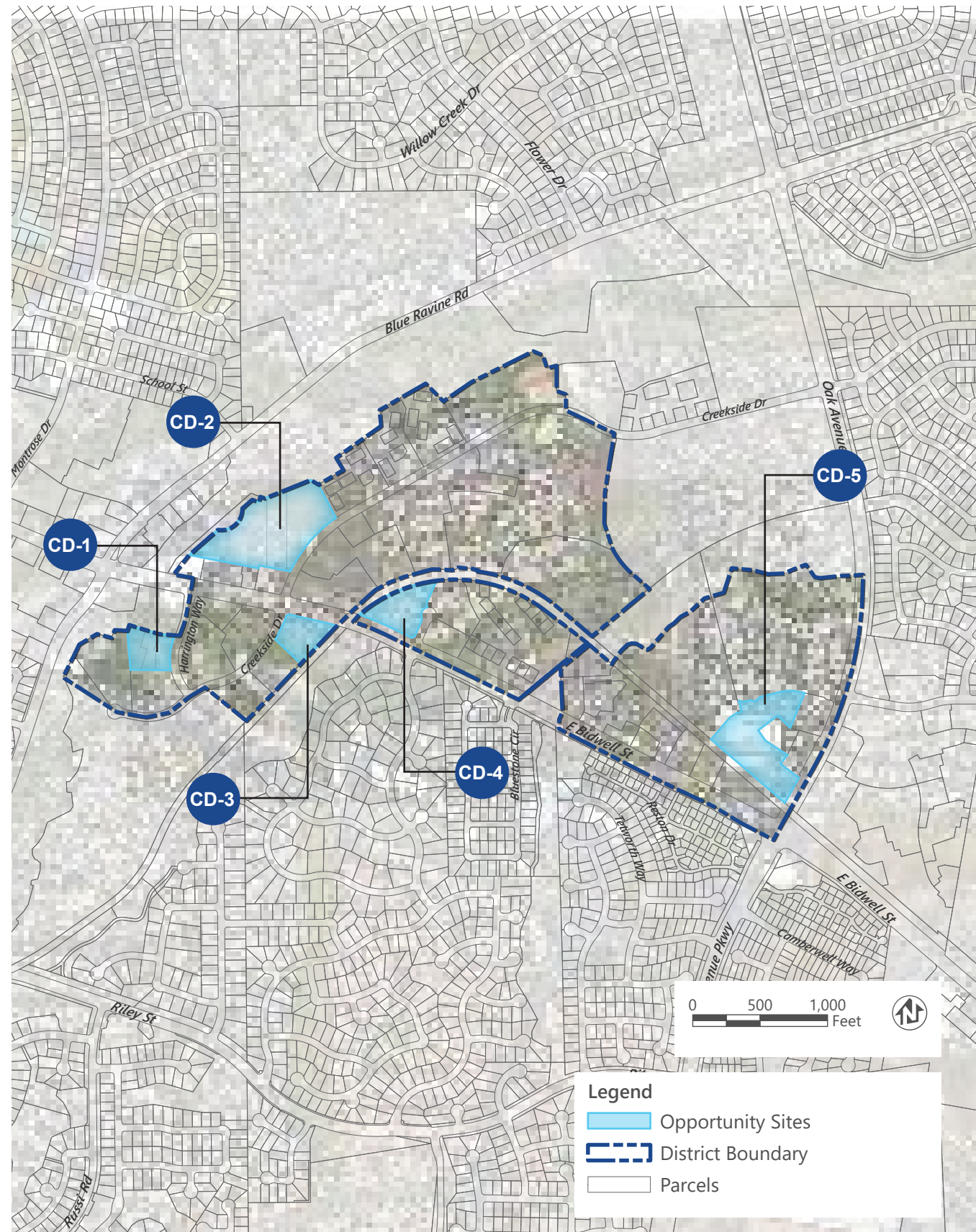
East Bidwell Corridor Mixed-Use Overlay Zone – Central Commercial District



Site ID	Site Description	Parcel Acreage	Potential Redevelopment (% of site)	Redevelopment Square Footage	Max FAR	Target Residential FAR	Residential Units	Non-Res GSF
Central Commercial District								
CC-1	Entire Boundary	190.53	15%	1,244,923	2.50	1.50	1,867	0
District Sub-total:		190.53		1,244,923			1,867	0

CITY OF FOLSOM SACOG INCREASING RESIDENTIAL DENSITIES IMPLEMENTATION (REAP) - June 29, 2023

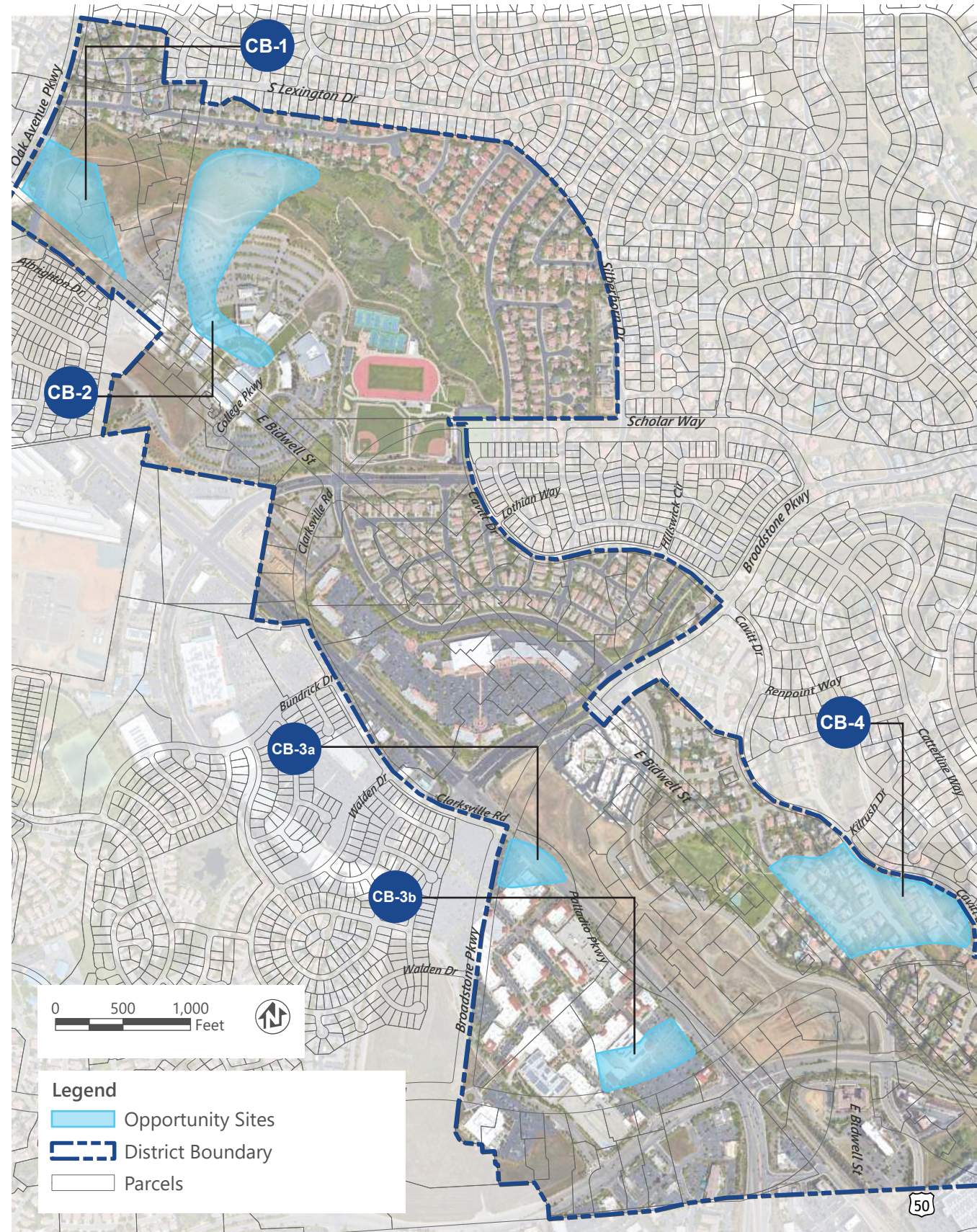
East Bidwell Corridor Mixed-Use Overlay Zone – Creekside District



Site ID	Site Description	Parcel Acreage	Potential Redevelopment (% of site)	Redevelopment Square Footage	Max FAR	Target Residential FAR	Residential Units	Non-Res GSF
Creekside District								
CD-1	(3) Harrington Way Parcels	1.95	75%	63,707	2.50	1.50	96	0
CD-2	(3) Creekside Parcels	8.2	55%	196,456	2.50	1.00	196	0
CD-3	Creekside Dr parking lot	1.9	25%	20,691	2.50	1.00	21	0
CD-4	Corner Parcel w/ of Woodsmoke, N of Bidwell	2.53	25%	27,552	2.50	1.50	41	0
CD-5	California Family Fitness Site	5.65	25%	61,529	2.50	1.50	92	0
District Sub-total:		20.23		369,933			446	0

CITY OF FOLSOM SACOG INCREASING RESIDENTIAL DENSITIES IMPLEMENTATION (REAP) - June 29, 2023

East Bidwell Corridor Mixed-Use Overlay Zone – College/Broadstone District



Site ID	Site Description	Parcel Acreage	Potential Redevelopment (% of site)	Redevelopment Square Footage	Max FAR	Target Residential FAR	Residential Units	Non-Res GSF
College/Broadstone District								
CB-1	Oak Ave Pkwy Triangle (3 parcels)	7.37	25%	80,259	2.50	1.50	120	0
CB-2	College District	15.5	25%	168,795	2.50	1.50	253	0
CB-3a	Kaiser Site - North	2.5	75%	81,675	2.50	1.50	123	0
CB-3b	Kaiser Site - South	6.12	50%	133,294	2.50	1.50	200	0
CB-4	Bidwell St site north of Palladio	20.5	25%	223,245	2.50	1.50	335	0
District Sub-total:		51.99		687,268			1,031	0