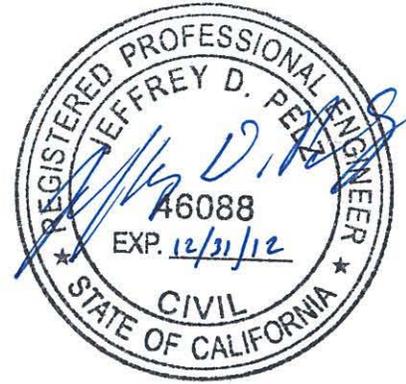


A P P E N D I X I

WASTEWATER AND TRUNK SEWER
TECHNICAL MEMO





MEMORANDUM

DATE: February 10, 2012

TO: Joanna Jansen, The Planning Center

CC: Cal Teraura, City of Vacaville

FROM: Jeffrey D. Pelz, R.C.E. #C46088

REVIEWED BY: Laura Dutt, R.C.E. #C64627

SUBJECT: Flows in the Elmira Road Trunk Sewer

Project No.: 425-00-11-03

The Elmira Road Trunk Sewer has a capacity of 39.8 million gallons per day (mgd) flowing full, and an allowable flow capacity of 35.8 mgd based on flowing at 90 percent of full-pipe capacity. For growth that is not infill development, the City of Vacaville (City) uses a collection system planning criterion that requires sewer upsizing if proposed new development will result in flows greater than 90 percent of the full-pipe capacity in large diameter sewers such as the Elmira Road Trunk Sewer. Therefore, in considering whether or not Brighton Landing flows can be accommodated in the existing trunk sewer, the allowable peak flow is 90 percent of the full-pipe capacity, or 35.8 mgd.

Pipe capacity must be compared to predicted peak flow. Peak flow is analyzed under two conditions, Q_d and Q_p . Q_d is based on City design standards, and is compared to 90 percent of full-pipe flow in a large diameter sewer. Q_p is a more extreme condition used to assess the risk of overflows.

The existing peak flow using Q_d is 26.5 mgd, which leaves considerable capacity available for Brighton Landing. In addition, the City is compiling information to verify that all other City capacity commitments can also be accommodated in the existing trunk sewer.

Based on the 1990 General Plan, the build-out flow using Q_d without Brighton Landing is 37.1 mgd. With Brighton Landing the flow would be 37.4 mgd. With or without Brighton Landing the Q_d flow exceeds the allowable flow of 35.8 mgd, triggering the need for mitigation of the cumulative impacts.

The buildout Q_p flow without Brighton Landing would be 46.3 mgd under the 1990 General Plan, well in excess of full-pipe capacity. Flow from Brighton Landing cannot be accommodated in the existing trunk sewer in the long-term.

TECHNICAL MEMORANDUM

DATE: January 26, 2012 Project No.: 425-00-11-03

TO: Joanna Jansen, The Planning Center / DCE
Nicola Swinburne, The Planning Center / DCE

CC: Cal Teraura, City of Vacaville Utilities Dept.

FROM: Laura Dutt, R.C.E. #C64627

REVIEWED BY: Jeff Pelz

SUBJECT: Brighton Landing EIR—Wastewater Collection and Treatment



INTRODUCTION

The Brighton Landing project is a proposed development project in the City of Vacaville (City). West Yost Associates (West Yost) is assisting The Planning Center / DCE (DCE) with the preparation of an EIR for the project. As a part of the work, West Yost has reviewed the background information for the project including the sanitary sewer modeling study prepared for the project by the project proponent. The purpose of this technical memorandum (TM) is to assess the potential impacts to the existing wastewater collection and treatment system of the proposed Brighton Landing project.

EXISTING CONDITIONS

The City operates and maintains gravity sewers, lift stations, force mains (pressure sewers), and Easterly Wastewater Treatment Plant (EWWTP) to provide sewer service to most developed areas within the City limits. EWWTP has an existing average dry weather flow (ASWF) capacity of 15 mgd, which is expected to be adequate through approximately the year 2026, depending on the pace of growth. The 2011 average dry weather flow (ADWF) was 7.5 million gallons per day (mgd) based on influent flows over the three month period from August through October 2011.

The project proponent has proposed a residential development located south of Elmira Road, east of Leisure Town Road, west of the PG&E Easement, and north of the Batch Property. Figure 1 shows the project area boundary and the nearby existing trunk sewers that would convey wastewater from the project to the City's Easterly Wastewater Treatment Plant (EWWTP). The project includes construction of onsite wastewater collection system facilities within the project area. It also includes construction of a regional sewer through the project area to convey flows from this project area and other growth areas to the City's EWWTP.

The Brighton Landing development is located at the downstream end of the existing collection system. The existing 54-inch trunk sewer in Elmira Road has ample capacity to accommodate flows from the project area, based on modeling to-date for the existing condition. However, the project area, in conjunction with the updated General Plan land uses, causes capacity issues along the 54-inch existing trunk sewer, which are addressed below in the Impact Discussion section.

WASTEWATER FLOW PROJECTIONS

Sanitary base flows for the project area were estimated using the “Brighton Landing Specific Plan” and the “City of Vacaville Brighton Landing Sanitary Sewer Modeling Study”, both prepared by Phillippi Engineering, and the City’s flow generation factors for proposed land uses. A peaking factor of 2.5 and an infiltration and inflow factor of 1,000 gallons per day per acre (gpd/acre) were used to estimate peak wet weather flows from the project area. The various land uses and wastewater flow generation factors used to estimate flows from the project area are summarized in Table 1. The estimated average dry weather flow (Q_a) is 0.251 mgd, and the estimated hourly peak wet weather flow (Q_d) is 0.822 mgd.

CONNECTION ALTERNATIVES

Wastewater must be conveyed from the project area to the City’s existing wastewater collection system. Two connection options have been presented by Phillippi Engineering in the Brighton Landing Specific Plan. Option No. 1 is a temporary connection alternative and Option No. 2 is the permanent alternative when the project area is fully built-out.

Option No. 1 consists of connecting the first 385 dwelling units directly to the 54-inch diameter Elmira Road Trunk Sewer. An onsite 12-inch trunk sewer would be located within the project area at the eastern boundary. All development flow would be tributary to this 12-inch on-site trunk sewer and conveyed north to the City’s existing 54-inch diameter Elmira Road Trunk Sewer. This connection alternative and the 12-inch on-site trunk sewer would be considered temporary until the large diameter regional trunk sewer through the project area (and extending to EWWTP) is constructed.

Option No. 2 is the proposed build-out point of connection. Wastewater flows from the western portion of the project area would connect directly into the proposed regional sewer. Flows from the eastern portion of the project area would be routed into a 12-inch build-out trunk sewer near the alignment of the temporary 12-inch trunk sewer, however it would be directed south towards the regional sewer rather than north towards the City’s existing 54-inch diameter Elmira Road Trunk Sewer. Figure 2 shows the temporary and build-out connection alternatives for the project area. Preliminary diameters for the regional sewer have been provided on Figure 2. However, sizing of the regional sewer is subject to further analysis as part of the sewer master plan.

Adequacy of Depth at Point of Connection

The existing 54-inch trunk sewer at the proposed temporary point of connection is approximately 15 feet deep. This should be ample depth to facilitate connecting the Brighton Landing project area to the City’s existing collection system.

Table 1. Wastewater Flow Projections

Proposed Development	I&I Area,	Land Use		Flow Factor		ADWF,	I&I Flow,	PWWF,
	ac	Quantity	Units	Value	Units	gpd	gpd ^(b)	gpd ^(c, d)
Private School – High School	50	1,200	students	30	gpd/student	36,000	50,000	140,000
Public School - Elementary ^(a)	11	800	students	25	gpd/student	20,000	11,000	61,000
Park	6	6	acres	0	gpd/acre	0	6,000	6,000
Residential - Low Medium Density	106.5	691	du	240	gpd/du	165,840	106,500	521,100
Residential - Low Density	16.7	80	du	240	gpd/du	19,200	16,700	64,700
Optional Parcel								
Option #1: Commercial Neighborhood	5.0	5.0	acres	1,900	gpd/acre	9,500	5,000	28,750
Option #2: Residential	5.0	18.0	du	240	gpd/du	4,320	5,000	15,800
Option #3: School Expansion	5.0	0.0	students	30	gpd/student	0.000	5,000	5,000
Totals (Based on Option #1 for Optional Parcel)						250,540	195,200	821,550
^(a) Estimated student enrollment for typical elementary school ^(b) Inflow/Infiltration (I&I) Factor = 1000 gpd/acre ^(c) Sanitary Flow Peaking Factor = 2.50 ^(d) Hourly Peak Wet Weather Flow (PWWF) = Average Dry Weather Flow (ADWF) x Peaking Factor + I&I Area x I&I Factor								

The depth of the proposed regional sewer will require consideration at several locations including (1) the depth of the regional sewer north of Elmira Road crossing under Alamo Creek; (2) a possible connection with the City's existing 54-inch Elmira Trunk Sewer for flow diversion; (3) connection with the City's existing 24-inch trunk sewer south of the project area; and (4) connection with the City's existing 27-inch trunk sewer south of the project area.

The design engineer for the regional sewer should complete and submit to the City an engineering analysis including detailed elevation data at locations along the regional trunk sewer where flow may be diverted from the City's existing trunk sewers into the proposed regional sewer.

POTENTIAL PROJECT IMPACTS AND RECOMMENDED MITIGATION MEASURES

Existing wastewater collection system facilities will convey flow from the new sewers constructed with the project to EWWTP. These existing sewers have been the subject of previous master planning, which included preparation of a computer hydraulic model. The hydraulic model was used for the purpose of evaluating capacity available to the Brighton Landing project and the potential impact of the project on the City's existing sewers.

Treatment Plant Impacts

The average dry weather flow (ADWF) capacity of Easterly WWTP is 15.0 mgd. Current average dry weather flows are 7.5 mgd, based on influent flow metering data from August through October 2011, the most recent period for which ADWF was calculated. The proposed project would produce an estimated 0.25 mgd (see Table 1), increasing the average dry weather flow to the plant to 7.75 mgd. Existing capacity at the treatment plant is adequate to accommodate flow from the proposed project.

Collection System Impacts

A development impact fee (DIF) funded project has been identified which will reduce long-term capacity limitations in the Elmira Trunk Sewer. The improvement project identified as DIF 54A, consists of a planned new sewer extending northeast from Fry Road near the railroad, then east to EWWTP. DIF 54A diverts flow from the City's existing 24-inch trunk sewer, thereby diverting flow away from the Elmira Trunk Sewer.

The new regional trunk sewer through Brighton Landing would alleviate capacity deficiencies identified in previous planning efforts and would replace project DIF 54A. The new regional trunk sewer would accommodate flows from north of Elmira Road designated in the ongoing General Plan update as the Northeast Growth Area and East of Leisure Town Road Growth Area, the Brighton Landing project, and other potential flow diversions into this planned improvement. Sizing of the regional sewer along the planned DIF 54A alignment, and through the project area, will need to consider the various potential connections along the proposed route. Potential connections include general plan growth areas, and any potential flow diversions from the existing collection system that will alleviate capacity deficiencies or eliminate the need for currently planned DIF projects.

Available information indicates no other collection system improvements are needed to accommodate the project.

CUMULATIVE IMPACTS

Previous hydraulic modeling for buildout of the General Plan and the ongoing General Plan update indicate that the existing Elmira Road Trunk Sewer will experience minor surcharging under the existing General Plan and does not have capacity to accommodate flows from growth areas outside the current sewer service area east of Leisure Town Road. Therefore, cumulative growth including the proposed project will trigger the need for the proposed regional sewer described above.

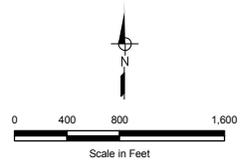
Similarly, projected buildout flows for EWWTP will exceed the current ADWF capacity of the treatment plant, triggering an expansion of the existing plant. The existing plant is designed to be readily expanded to meet future capacity requirements up to 22 mgd ADWF, and space is available for expanding beyond 22 mgd.

The projected ADWF for the current General Plan land use is estimated at 22.2 mgd. The projected ADWF for the on-going General Plan Update is estimated at 24.7 mgd. One or more treatment plant capacity expansions would be required to attain the General Plan Update buildout capacity. In addition, the treatment plant facilities plan would need to be updated to ensure the initial expansion improvements would be designed to accommodate the higher required buildout capacity.

FIGURE 1

DC&E
Brighton Landing EIR

Existing Wastewater
Collection System



- Notes:
1. WWTP = Wastewater Treatment Plant
 2. Trunk sewers consist primarily of sewers 12-inches in diameter and greater.

LEGEND

- Trunk Sewers
- Small Diameter Sewers
- 🔧 Lift Station
- Force Main
- ▨ Project Area
- ➔ Flow Direction

KEY MAP

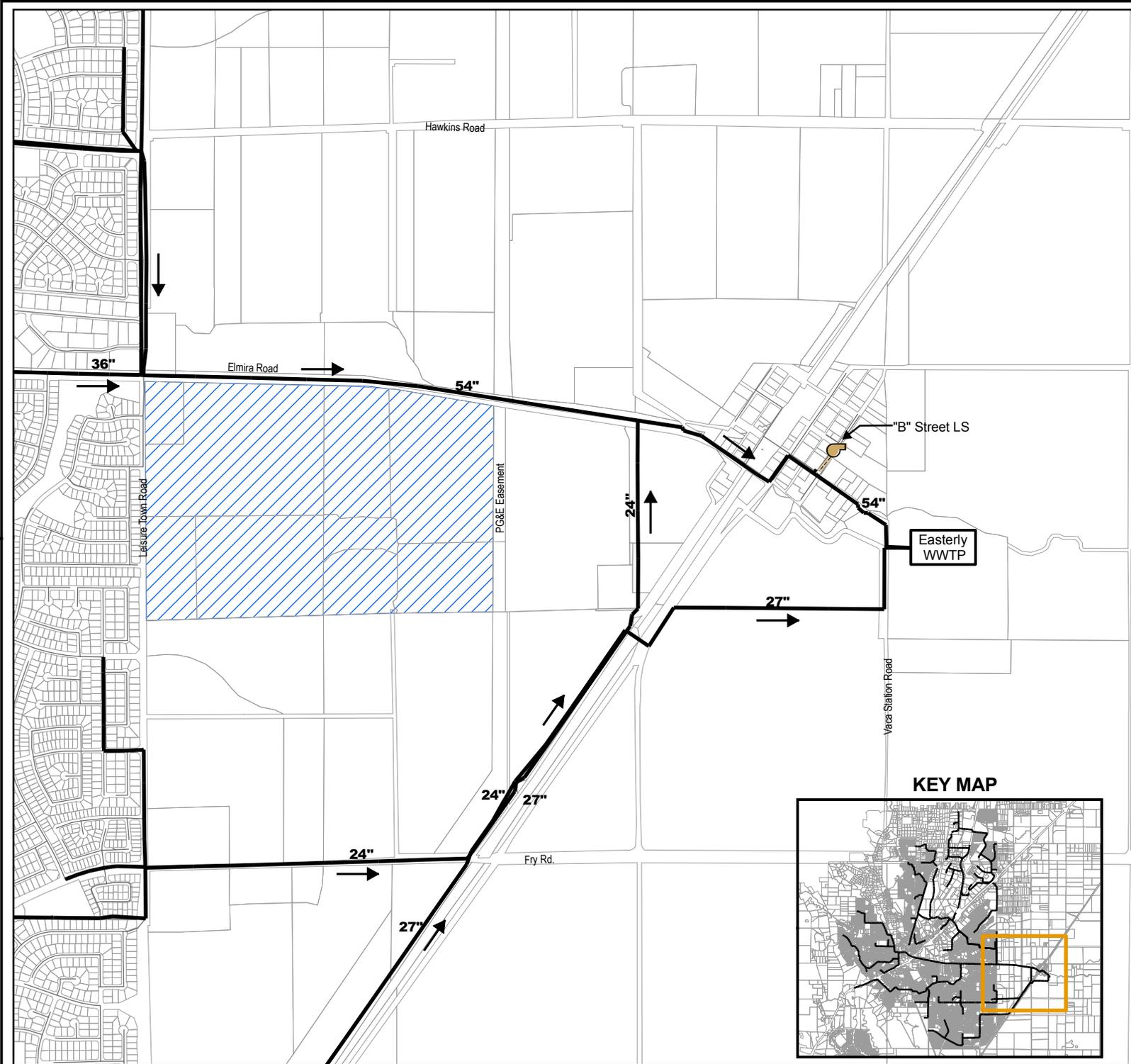
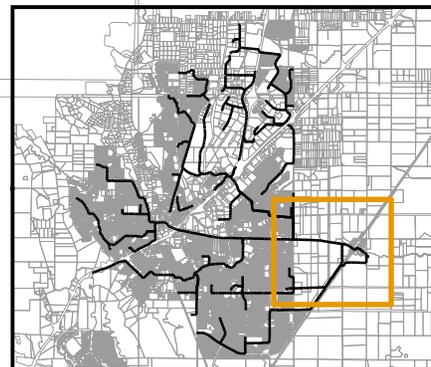
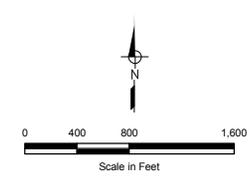


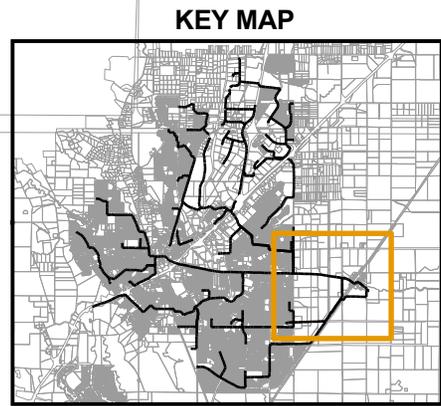
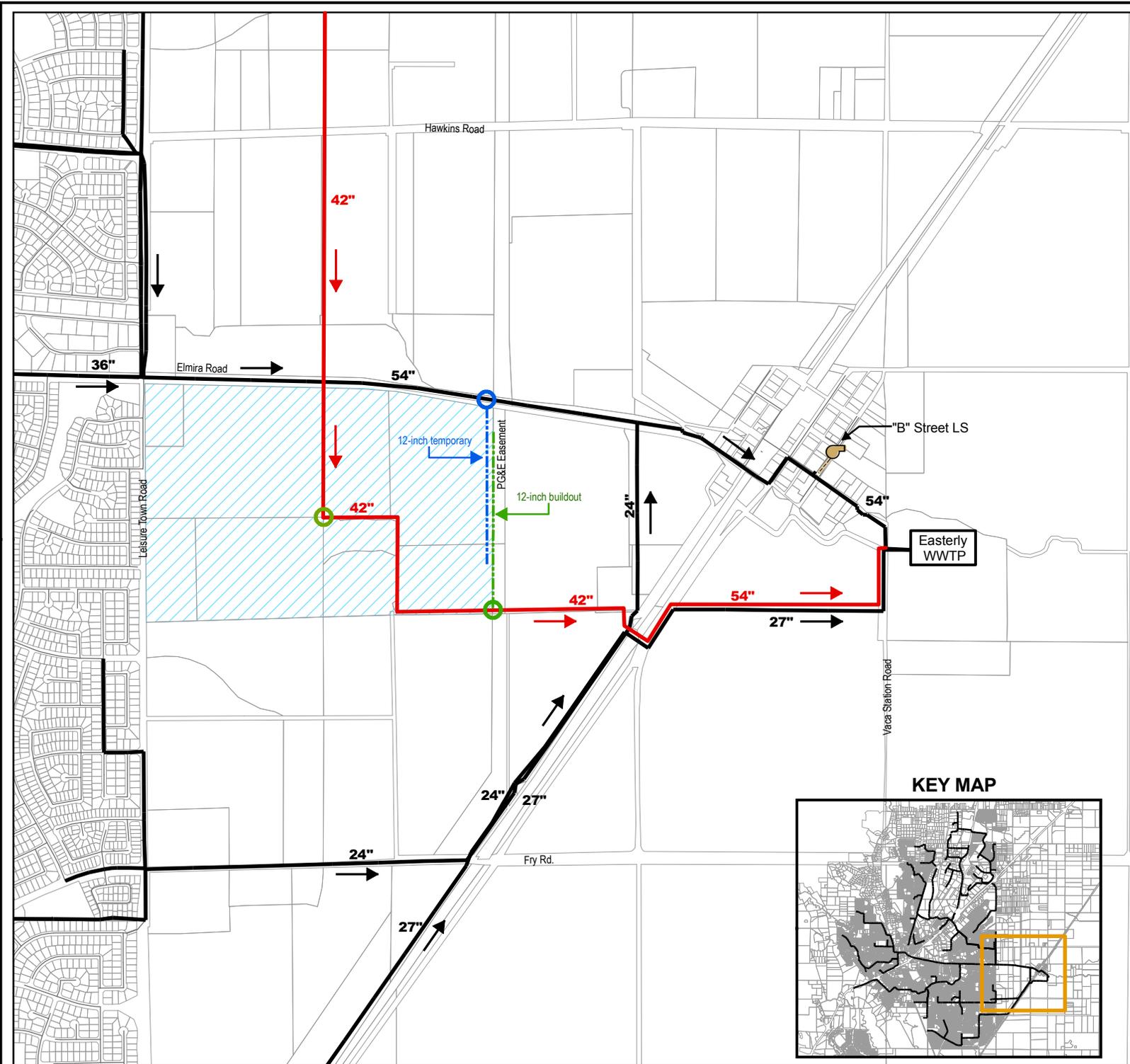
FIGURE 2
DC&E
Brighton Landing EIR
Sewer Connection Alternatives



- Notes:
1. WWTP = Wastewater Treatment Plant
 2. Trunk sewers consist primarily of sewers 12-inches in diameter and greater.
 3. Diameters for the regional sewer are preliminary, Sizing subject to further analysis as part of the sewer master plan.

LEGEND

- Trunk Sewers
- Small Diameter Sewers
- Lift Station
- Force Main
- Project Area
- Regional Sewer
- Connection Options**
- Build-out Connection
- Temporary Connection
- Build-out Sewer
- Temporary Sewer
- Flow Direction



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