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MEMORANDUM

TO:	Caroline Weston David J. Powers & Associates	DATE:	6/21/19
FROM:	Melissa Reardon, PE (C 90262) Caitlin Gilmore, PE (C 76810)	JOB#:	DPOW.104.18
SUBJECT:	Hydraulic Analysis for 3700/3710 Valle Verde Drive Project		

Schaaf & Wheeler has been retained by David J. Powers & Associates to provide a hydraulic analysis for a proposed project (Project) at 3700/3710 Valle Verde Drive in Napa, CA (City). The Project proposes the renovation of an existing vacant building at 3700 Valle Verde Drive to create 66 affordable housing units and the construction of a new multi-family residential building with 24 units at 3710 Valle Verde Drive. The City may also require partial removal of Zerba Bridge as a condition of the Project.

The Project is partially located in a Federal Emergency Management Agency (FEMA) 100-year Zone AE floodplain and partially in a 500-year Zone X associated with Salvador Creek, as shown in Figure 1, based on Flood Insurance Rate Map (FIRM) panel 06055C0508F and the Letter of Map Revision (LOMR) dated February 20, 2012. The Project is also subject to City Municipal Code requirements regarding changes to the floodplain.

Schaaf & Wheeler has been tasked with the hydrologic and hydraulic analysis for the Project as part of the Project's California Environmental Quality Act (CEQA) documentation. For this analysis, Schaaf & Wheeler has obtained the FEMA model for Salvador Creek and updated it in accordance with existing conditions. The impact was then analyzed of the proposed Project on the floodplain for FEMA property removal thresholds, City Municipal Code requirements, and ultimately CEQA thresholds of significance. The specific requirements for each of these impacts is described in the following sections.

Salvador Creek Model Development

The model used in this analysis is based on the FEMA model used to develop the FIRM for Salvador Creek. The FEMA model received was the model used in the LOMR dated February 20, 2012, to update Flood Insurance Study (FIS) 06055CV000C. Schaaf & Wheeler received this model and discovered that the software originally developed for the model, MIKE FLOOD 2008, was no longer supported by its developer, DHI Water & Environment. Schaaf & Wheeler updated the model to MIKE FLOOD 2016 for this analysis. While there are minimal differences in the results, which Schaaf & Wheeler attributes to software engine updates, updating the model to 2016 was viewed as essential.

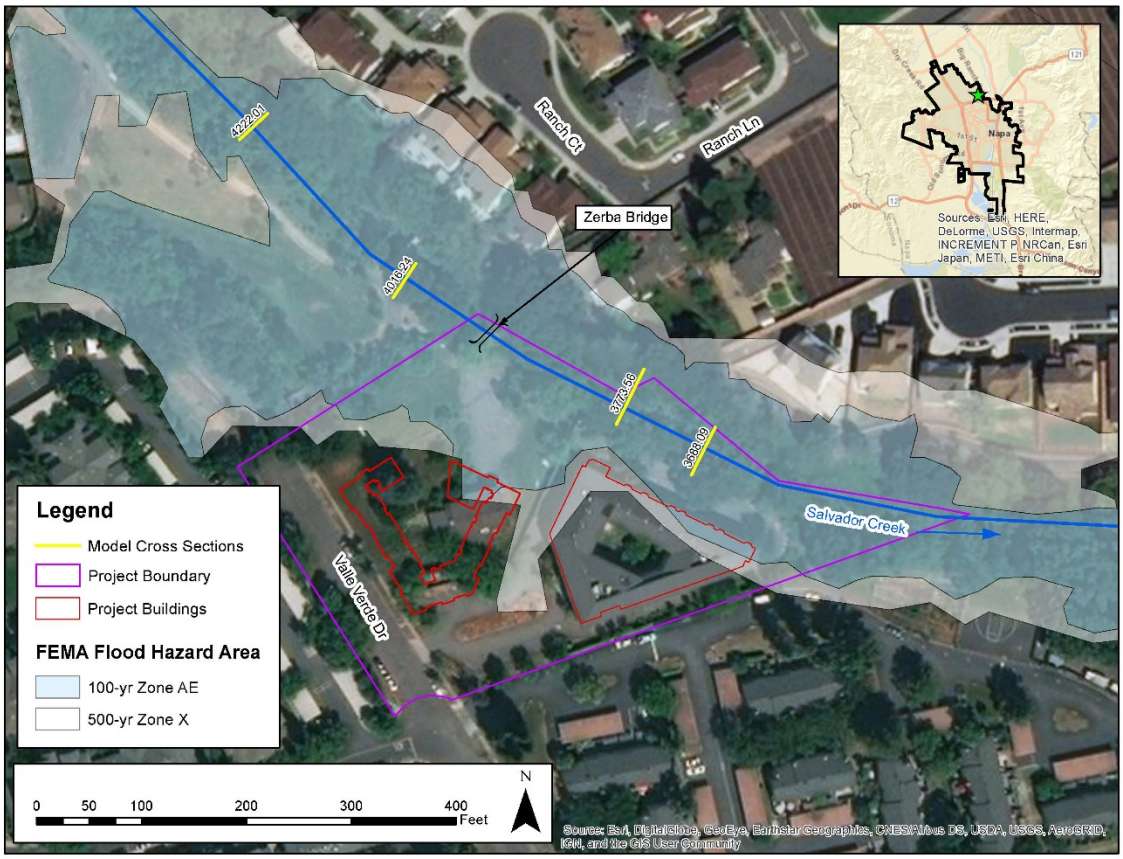

Figure 1. Project Location and Effective FEMA Flood Hazard Areas

The FEMA model was then further updated based on dimensional data for Zerba Bridge, at the northern boundary of the Project, collected during a site visit by Schaaf & Wheeler in March 2019. The existing model included the bridge deck and abutments only and were approximate. Updates included adding pier losses and refining bridge dimensions based off of the existing guardrails. This generally resulted in increased base flood elevations at the project site when compared to the effective map, but more accurately represents current conditions.

Base Flood Elevations and Creek Water Surface Elevations

For the new building construction on the Project site, the base flood elevation (BFE) based on the effective FEMA model updated to MIKE FLOOD 2016 is 39.0 feet NAVD88. However, the BFE based on the updated existing conditions Zerba bridge model is 39.2 feet NAVD88. Similarly, for the existing building, the BFE based on the effective FEMA model updated to MIKE FLOOD 2016 is 38.8 ft NAVD88, but the BFE based on the updated existing condition Zerba bridge model is 39.0 ft NAVD88. The maximum 100-year creek water surface elevation that corresponds with these base flood elevations is shown in Figure 2.

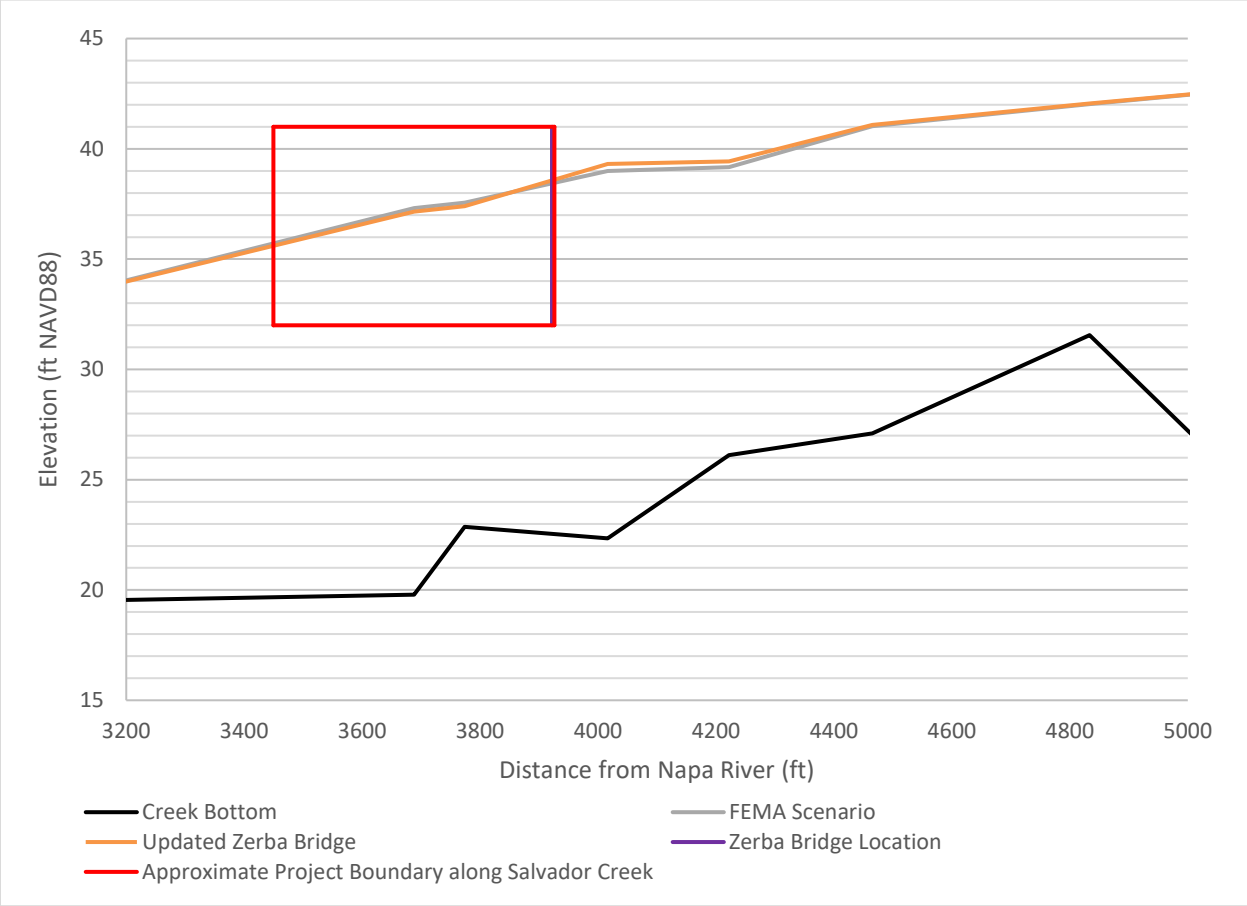

Figure 2 – Salvador Creek Profile of FEMA and Updated Zerba Bridge Scenario

With the new building and proposed grading around it, the BFE at the new building increases to 40.2 ft NAVD88. This increase is due to the proposed grading on site, which will raise the ground surface near the new building and impede flood flows. The BFE at the existing building, however, decreases to 38.3 ft NAVD88. Since the existing building is downstream of the new building, the reduction in BFE is likely due to the proposed grading at the new building and the resulting redirection of flood flows.

The City may require a portion of Zerba Bridge to be removed as part of the Project. The bridge deck and pier would be removed while the abutments would remain. A final scenario was completed which was based on the Zerba partial bridge removal and included the construction of the new building on-site. Under this scenario, the BFE at the new building is 39.5 feet NAVD88 and the BFE at the existing building is 38.0 ft NAVD88. A summary of the model scenarios and resultant BFEs at the new and existing buildings are shown in Table 1.

Table 1 – Building Base Flood Elevation Scenarios (feet NAVD88*)

Scenario	Existing Building BFE	New Building BFE
Approximate Effective BFE from FIRM (model not available)	38.0	38.2
Effective FEMA Model updated to MIKE 2016	38.8	39.0
Updated Zerba Bridge Model	39.0	39.2
Proposed Project with Updated Zerba Bridge Model (bridge remains in place)	38.3	40.2
Proposed Project with no Zerba Bridge Deck or Piers Model (partial bridge removal)	38.0	39.5

**Feet NAVD88 = Feet NGVD29 + 2.589 feet per VertCon*

FEMA Project Impact

To remove a structure from the special flood hazard area, the lowest grade adjacent to the structure must be greater than the base flood elevation. Note it is not a requirement of the City Municipal Code to remove the structures from the floodplain. As discussed in the previous section, the base flood elevation for the new building is 40.2 feet NAVD88 and the existing building is 38.3 feet NAVD88 which includes floodplain blockage by the new building with no bridge removal.

Based on information provided by David J. Powers & Associates, the proposed lowest adjacent grade is 41.2 ft. Therefore, the new building could be removed from the special flood hazard area as its lowest adjacent grade is equal to or greater than the base flood elevation.

The existing building has a lowest adjacent grade of 37.2 feet based on a topographic survey provided by David J. Powers & Associates. However, most of the building adjacent grade is above the BFE. The lowest adjacent grade on the northeast corner of the building would need to be elevated at or above the BFE to be removed from the floodplain.

Table 2 – Structure Elevations

Location	Elevation (ft NAVD)	Max BFE* (ft NAVD)	Above BFE?
Lowest Adjacent Grade to New building	41.2 ft	40.2 ft	Yes
Finished Floor elevation of New building	43.7 ft	40.2 ft	Yes
Lowest Adjacent Grade to Existing building	37.2 ft	38.3 ft	No
Finished Floor elevation of Existing building	41.7 ft	38.3 ft	Yes

**Varies depending on project scenario; see Table 1*

Municipal Code Project Impact

In order to meet City Municipal Code and the adopted California Building Code, several conditions must be met:

1. the finished floor elevations must be one foot above the 100-yr base flood elevation; and
2. the Project must not result in (a) greater than 1 foot cumulative impact in the floodplain or (b) greater than 1 foot rise in the water surface profile of the creek.

As stated in the previous section, the base flood elevation increases to 40.2 feet NAVD88 with construction of the new building. New building finished floor elevation per the CAD drawing information provided by David J. Powers is 43.7 feet, which is greater than the 100-year base flood elevation plus one foot of freeboard required by the CA Building Code. The existing structure for renovation has a finish floor elevation of 41.7 feet based on survey provided, which is greater than one foot above the BFE of 38.3 ft. Therefore, the Project meets the first condition of the City Municipal Code requirements.

Floodplain Impacts: Proposed Project

The Project results in an increase in floodplain elevations directly upstream of the Project due to overbank floodplain blockage as shown in Figures 3 and 4. The impact is less than the threshold of one foot. Therefore, the Proposed Project meets the second condition of the Municipal Code requirement.

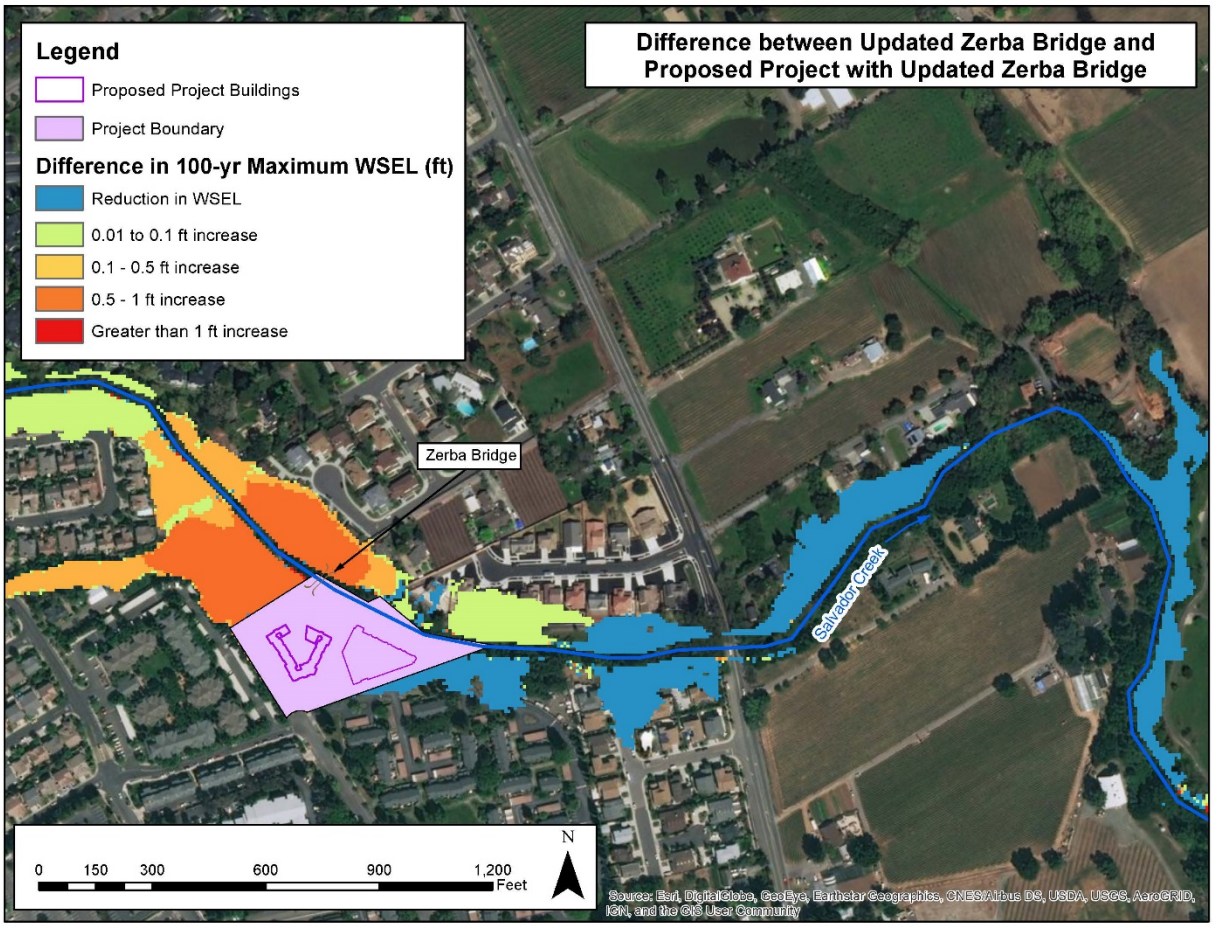

Figure 3 – Floodplain Impacts of Project Construction Only

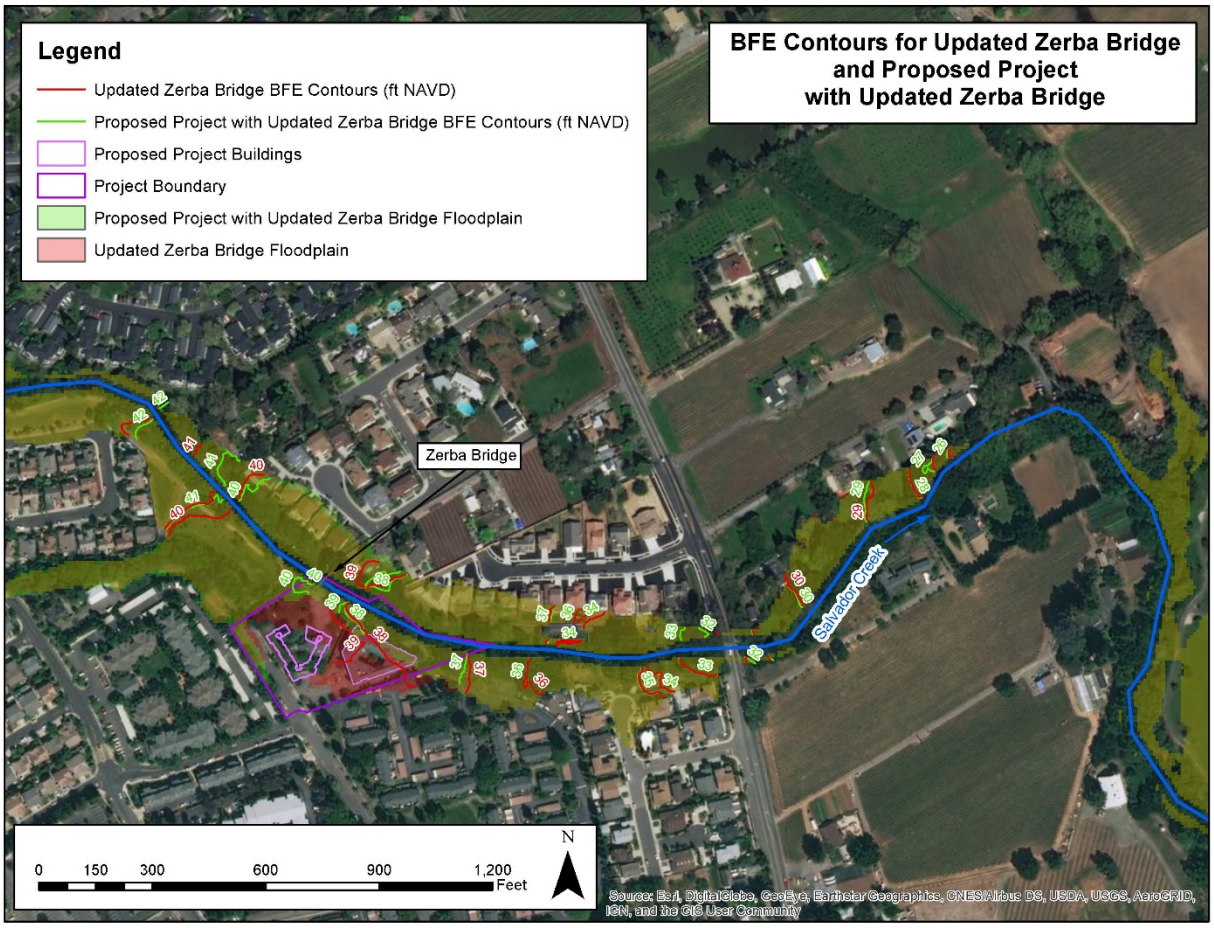

Figure 4 – Base Flood Elevation Contour Impacts of Project Construction Only

Floodplain Impacts: Proposed Project with Partial Bridge Removal

There are slight increases in flood elevations downstream of the Project due to the removal of the bridge deck and piers while the impacts from blockage due to the new building are lessened. Aside from the area directly upstream of the Project where they are slight increases, there is generally a reduction in floodplain depth upstream of the project when partial bridge removal is included. These cumulative changes are less than 1 foot, as shown in Figures 5 and 6. Consequently, the Project plus partial bridge removal also meets the second condition of the City Municipal Code requirements.

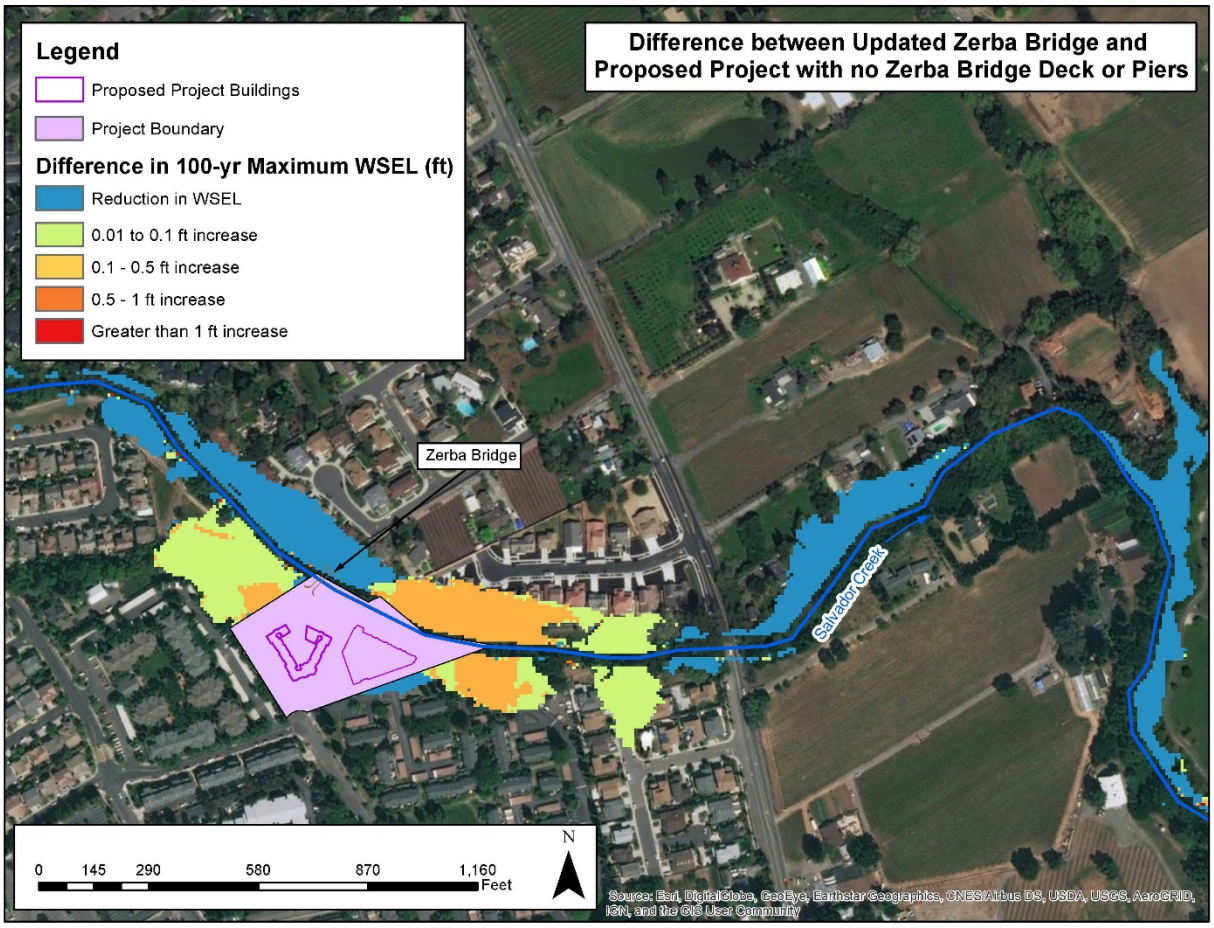

Figure 5 – Floodplain Impacts of Partial Bridge Removal and New Building Construction

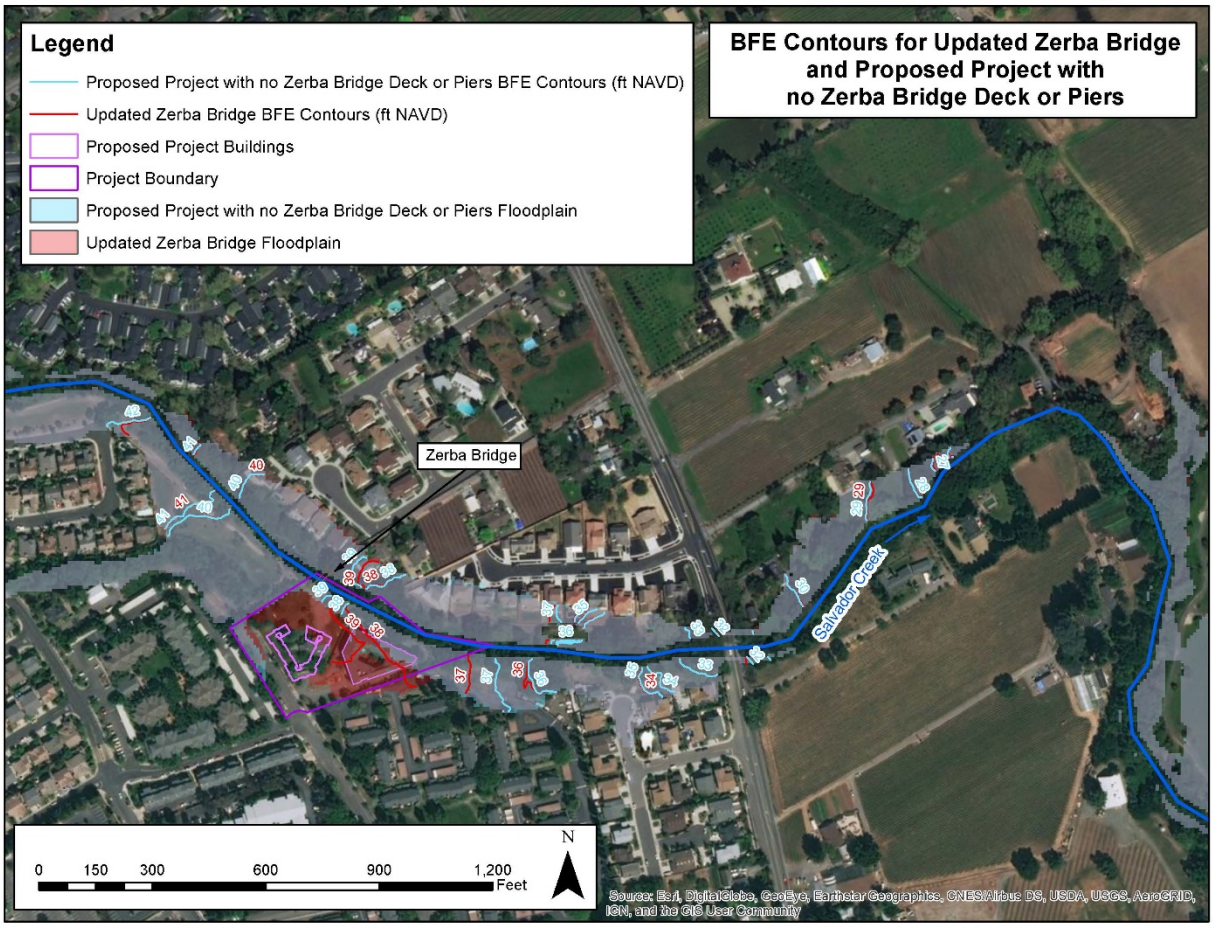

Figure 6 – BFE Contour Impacts of Partial Bridge Removal and New Building Construction

Creek Water Surface Profile Impacts

Water surface elevations in Salvador Creek upstream of the Project increase as a result of the proposed Project, but these increases are not greater than 1 foot, as shown in Figure 7. The project therefore meets both aspects of the second condition of the Municipal Code requirement.

With the proposed Project plus partial bridge removal, there are slight decreases in in-channel water surface elevation upstream of the Project whereas there are slight increases at the Project boundary. These slight increases are not greater than 1 foot. Consequently, the Project plus partial bridge removal meets both aspects of the second condition of the City Municipal Code requirements.

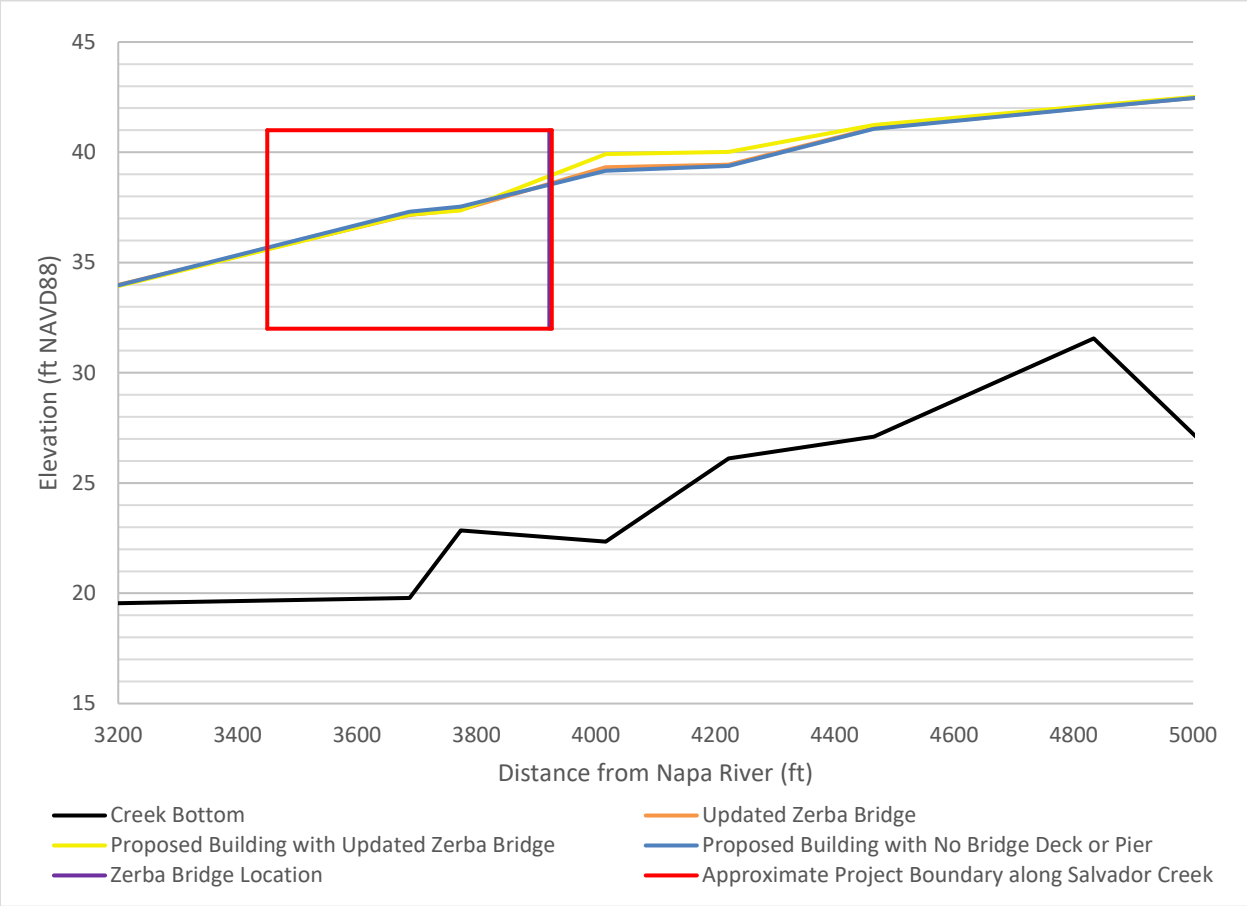

Figure 7 – Salvador Creek Profile of Project Scenarios

CEQA Threshold of Significance and Conclusions

For the CEQA analysis associated with this Project, threshold of significance include:

- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would: impede or redirect flood flows

As discussed in the Municipal Code Project Impact section, the Project results in less than 1 foot of cumulative impact in the floodplain and less than 1 foot rise in the water surface profile of the creek. The Project would meet Municipal Code requirements and would not significantly impede or redirect flows; and thereby meets the CEQA threshold without mitigation.