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M e m o r a n d u m

To: Reena Gohil, Environmental Planner
California Department of Transportation
District 10 Environmental
1976 E. Charter Way
Stockton, CA 95201

Date: July 25, 2017

Subject: Noise Technical Memorandum: Hickman Road over Tuolumne River Bridge Replacement Project, Stanislaus County (BRLO-5938(199))

Introduction

Stanislaus County (County) Department of Public Works proposes to replace the existing bridge on Hickman Road over Tuolumne River (Bridge No. 38C-0004) located 0.15 mile south of State Route 132 near the town of Waterford in northern Stanislaus County. The general setting is urban with recreational, commercial retail, and public facility uses. The bridge currently carries vehicular traffic over Tuolumne River.

The project is funded primarily by the federal-aid Highway Bridge Program (HBP) administered by the Federal Highway Administration (FHWA) through Caltrans Local Assistance. The replacement bridge will meet current applicable County, American Association of State Highway and Transportation Officials (AASHTO), and Caltrans design criteria and standards.

Project Purpose and Need

The existing Hickman Road bridge was last inspected by Caltrans in 2013 and has a sufficiency rating (SR) of 64.7 out of a possible score of 100, and is classified as Structurally Deficient (SD). In addition, the existing bridge is deemed “Scour Critical” with a scour rating of 3, meaning that the local scour and predicted future degradation will continue to undermine the bridge supports.

The purpose of this project is to remove the existing structurally deficient structure and replace it with a new bridge designed to current structural and geometric standards while minimizing adverse impacts to the Tuolumne River and the surrounding riparian area.

Project Description

Existing Bridge

Constructed in 1946, the existing Hickman Road over Tuolumne River Bridge is a reinforced concrete (RC) box girder on RC solid pier walls and RC wing abutments supported by steel piles. The bridge is 652.9 feet long, 33.5 feet wide, and within the existing 175 to 200 feet public right-of-way. The curb-to-curb width is 27.9 feet, with two 12-foot-wide travel lanes and two 2-foot-wide shoulders. The bridge is classified as SD and Scour Critical. The Caltrans bridge inspection report identifies major deficiencies:

- The bridge deck has 12 to 16 inch long transverse and pattern cracks throughout.
- There are several edge spalls of up to 3 feet long by 4 inch wide and 1 inch deep along the right curb in Span 4.
- There is an erosion gulley of approximately 3 feet wide by 5 feet deep along the right slope embankment at Abutment 8 due to roadway runoff.
- The scour protection at Piers 4 and 5 has deteriorated in front and at the upstream right side of the footing with up to 6 feet wide sections missing.
- Settlement and displacement has been observed at Piers 4 and 5.

Replacement Bridge

The replacement bridge will consist of a 750-foot ling cast-in-place (CIP) post-tensioned box girder with two 12-foot-wide travel lanes and two 8-foot-wide shoulders and one 5-foot wide sidewalk placed along the upstream edge. The replacement bridge will be constructed immediately upstream of the existing structure, in order to keep the existing road and bridge open to public traffic during construction. The new upstream road alignment will transition and connect back to the existing Hickman Road alignment using a design speed of 45 mph.

Utility Relocation

Several utilities run through the project site, including a PG&E gas pipe and AT&T telecommunication lines which are mounted to the existing bridge on the upstream and downstream face respectively. There are no overhead utilities located within the project area. All existing utilities will be relocated onto the new bridge without the need for a temporary relocation.

Right-of-Way

Construction of the new bridge on the proposed upstream alignment will require additional permanent right-of-way takes. In addition, temporary construction easements will be required to construct the project.

Detour Route

The new bridge will be constructed on a new upstream alignment adjacent to the existing bridge. Traffic will be able to use the existing bridge to cross Tuolumne River during the construction of the replacement bridge. The existing bridge will be demolished upon completion of the new bridge construction.

Demolition and Construction Staging

Demolition of the existing bridge will be performed in accordance with the Caltrans Standard Specifications modified to meet environmental permit requirements. All concrete and other debris resulting from the demolition of the existing bridge will be removed from the project site and disposed of by the contractor. The construction contractor will prepare a bridge demolition plan.

Construction Activities

Construction will consist of the following activities:

- Removing trees, clearing, and grubbing to accommodate the new bridge structure and road approach work
- Excavating for the new bridge foundations (maximum of 80 to 100 feet deep)
- Constructing the new bridge and road approaches, including excavating for and placing asphalt concrete.
- Removing the existing bridge
- Placing erosion control native grass seeds and mulch

Table 1 provides a description of the type of equipment likely to be used during the construction of the proposed project.

Table 1. Construction Equipment

Equipment	Construction Purpose
Drill Rig	Construction of drilled or driven pile foundations
Backhoe	Soil manipulation + drainage work
Bobcat	Fill distribution
Bulldozer / Loader	Earthwork construction + clearing and grubbing
Crane	Placement of precast concrete girders or false work beams
Dump Truck	Fill material delivery
Excavator	Soil manipulation
Front-End Loader	Dirt or gravel manipulation
Grader	Ground grading and leveling
Haul Truck	Earthwork construction + clearing and grubbing
Roller / Compactor	Earthwork and asphalt concrete construction
Paver	Asphalt concrete construction

Truck with seed sprayer	Erosion control landscaping
Water Truck	Earthwork construction + dust control

Construction Sequence/Schedule and Timing

Construction is currently scheduled to start in 2018 and take approximately 8 months to complete.

Regulatory Setting

23 CFR 772 requires that construction noise impacts be identified, but does not specify specific methods or abatement criteria for evaluating construction noise.

Section 14-8.02, Noise Control, of Caltrans standard specifications provides information that can be considered in determining whether construction would result in adverse noise impacts. The specification states:

- Do not exceed 86 dBA at 50 feet from the job site activities from 9 p.m. to 6 a.m.
- Equip an internal combustion engine with the manufacturer-recommended muffler. Do not operate an internal combustion engine on the job site without the appropriate muffler.

If adverse construction noise impacts are anticipated, project plans and specifications must identify abatement measures that would minimize or eliminate adverse construction noise impacts on the community. When construction noise abatement is identified, Caltrans will consider the benefits achieved and the overall adverse social, economic, and environmental effects and costs of the construction noise abatement measures.

Stanislaus County Regulations

Noise within the County is regulated by Chapter 10.46 of the Municipal Code. The Ordinance states that "It is unlawful for any person at any location within the unincorporated area of the county to create any noise or to allow the creation of any noise which causes the exterior noise level when measured at any property situated in either the incorporated or unincorporated area of the county to exceed the noise level standards." However, the County Code Standards are not applicable to noise from activities on or in publicly owned property and facilities, or by public employees while in the authorized discharge of their responsibilities.

Construction Noise

Noise at the construction site will be intermittent and its intensity will vary. The degree of construction noise impacts may vary for different areas of the project study area and also vary depending on the construction activities.

Roadway and/or bridge construction is accomplished in several different phases. General construction phases for typical roadway/highway projects and their estimated overall noise levels are summarized in **Table 1**, below.

Table 1. Construction Phases and Noise Levels	
Construction Activity/Phase	**Leq (dBA) at 50 Feet from Roadway Centerline**
Pile Driving	100 (dBA)
Ground Clearing	84 (dBA)
Excavation	88/78 (dBA)
Foundation	88 (dBA)
Erection	79/78 (dBA)
Finishing	84 (dBA)
Source: U.S. EPA, 1971.	

"Leq" is the equivalent continuous sound level or the average sound level over a period of time. Comparing the existing noise levels with the expected noise levels produced by various construction activities can assess construction noise impacts. During construction of the proposed project, noise from construction activities may intermittently dominate the noise environment in the immediate area of construction and some of the sensitive receptors in residential developments surrounding the project study area may be temporarily affected. The majority of construction noise will be from clearing of the project study area along with the placement of the new bridge abutments and structure. In addition, pile driving is proposed as part of the project and has the potential to have a significant impact on noise levels if sensitive receptors are within range of the area.

Table 2 summarizes noise levels produced by construction equipment that is commonly used on bridge replacement projects and is representative of the equipment necessary for proposed project construction. Construction equipment is expected to generate noise levels ranging from 80 to 100 dB at a distance of 50 feet and noise produced by construction equipment would be reduced over distance at a rate of about 7 dB per doubling of distance.

Table 2. Typical Construction Equipment Noise	
Equipment	**Maximum Noise Level (dBA at 50 feet)**
Pile Driver	100 dB
Scrapers	89 dB
Bulldozers	85 dB
Heavy Trucks	88 dB
Backhoe	80 dB
Pneumatic Tools	85 dB
Concrete Pump	82 dB
Source: Federal Transit Administration 1995.	

Sensitive Receptors

Some land uses are considered more sensitive to ambient noise levels than others because of the amount of noise exposure (in terms of both exposure duration and insulation from noise) and the types of activities typically involved. Residences, hotels, schools, rest homes, and hospitals are generally more sensitive to noise than commercial and industrial land uses.

Land uses within and adjacent to the project corridor consist of residential, commercial, agricultural, and open space. There are three sensitive receptors that could be affected by construction noise from the proposed project located approximately 200 feet away from the construction area (**Appendix: Figure 3**). All three sensitive receptors are residential houses.

During construction of the proposed project, noise from construction activities may intermittently dominate the noise environment in the immediate area of construction. Noise from construction activities generally attenuates at a rate of 6 to 7.5 dBA per doubling distance. Based on the proposed project site layout and terrain, an attenuation of 7 dBA is assumed because the majority of the noise will be located at a lower elevation than the sensitive receptors. Furthermore, the bluffs would dampen much of the noise before it reaches the residential homes that are located about 200 feet from construction activities.

Based on the loudest activity (pile driving: 100 dBA at 50 ft), these residences would experience maximum noise levels of about 79 dBA. Therefore, no adverse noise impacts from pile driving or other construction related noise are anticipated because construction would be conducted in accordance with Caltrans Standard Specifications Section 14-8.02, 42-1.02, applicable local noise standards, and control measures discussed in the Regulatory Setting section of this document. The majority of construction operations are anticipated during daylight hours only and would adhere to County standards (Monday to Friday, 7:00 AM to 9:00 PM and Saturday to Sunday, 8:00 AM to 5:00 PM).

Ground-borne Vibration and Noise

The most substantial vibration source associated with this project would be construction equipment and pile driving. Vibrations associated with construction activity would be considered significant if it exceeded a peak particle velocity (PPV) of 0.20 inches per second (in./sec.). This level has been identified by State and federal agencies as a level at which vibrations become readily perceptible to humans and may result in cosmetic damage to structures. The maximum vibration would occur during pile driving activities. The maximum construction vibration during bridge and abutment construction and paving is assumed to occur from equipment similar to a large dozer or loaded truck. The nearest receivers to proposed pile driving activities are two residential houses which are located approximately 300 feet west from the nearest pile driving location (**Appendix: Figure 3**).

Vibration from operation would not be a primary concern of a roadway or bridge project; however, construction may result in substantial vibration in the surround community. Ground-borne vibration generated by construction projects is usually highest during pile driving, soil compacting, jackhammering, and demolition-related activities. Vibration is calculated by the formula, PPVD=PPVR x

(25/D) 1.5, where D is the location of interest, PPVD is the vibration at the location of interest, and PPVR is the vibration level at 25 feet. The vibration level of pile driving at 25 feet is 1.1 in./sec. PPV, and the vibration level of a large dozer at a distance of 25 feet is 0.089 in./sec. PPV (Caltrans 2013).

Vibrations associated with construction activity would be considered significant if they resulted in a vibration level greater than 0.20 in./sec. PPV. Based on the proposed equipment and location of activities relative to local receivers, the vibration levels from pile driving would attenuate to 0.05 in./sec. PPV or less, and general construction and paving activities would attenuate to 0.04 in./sec. PPV or less. Thus, the vibration impact associated with construction of the proposed improvements would be less than significant.

Mitigation Measures

No adverse noise impacts from construction are anticipated because construction would be conducted in accordance with Caltrans Standard Specifications Section 14-8.02, 42-1.02. Construction noise would be short-term and intermittent. Construction operations are anticipated during daylight hours only (Monday to Friday, 7:00 AM to 8:00 PM). The following control measures shall be implemented in order to minimize noise and vibration disturbances during periods of construction

1. Use newer equipment with improved muffling and ensure that all equipment items have the manufacturers' recommended noise abatement measures, such as mufflers, engine enclosures, and engine vibration isolators intact and operational. Newer equipment will generally be quieter in operation than older equipment. All construction equipment should be inspected at periodic intervals to ensure proper maintenance and presence of noise control devices (e.g., mufflers and shrouding, etc.).

2. Utilize construction methods or equipment that will provide the lowest level of noise and ground vibration impact such as alternative low noise pile installation methods.

3. Turn off idling equipment.

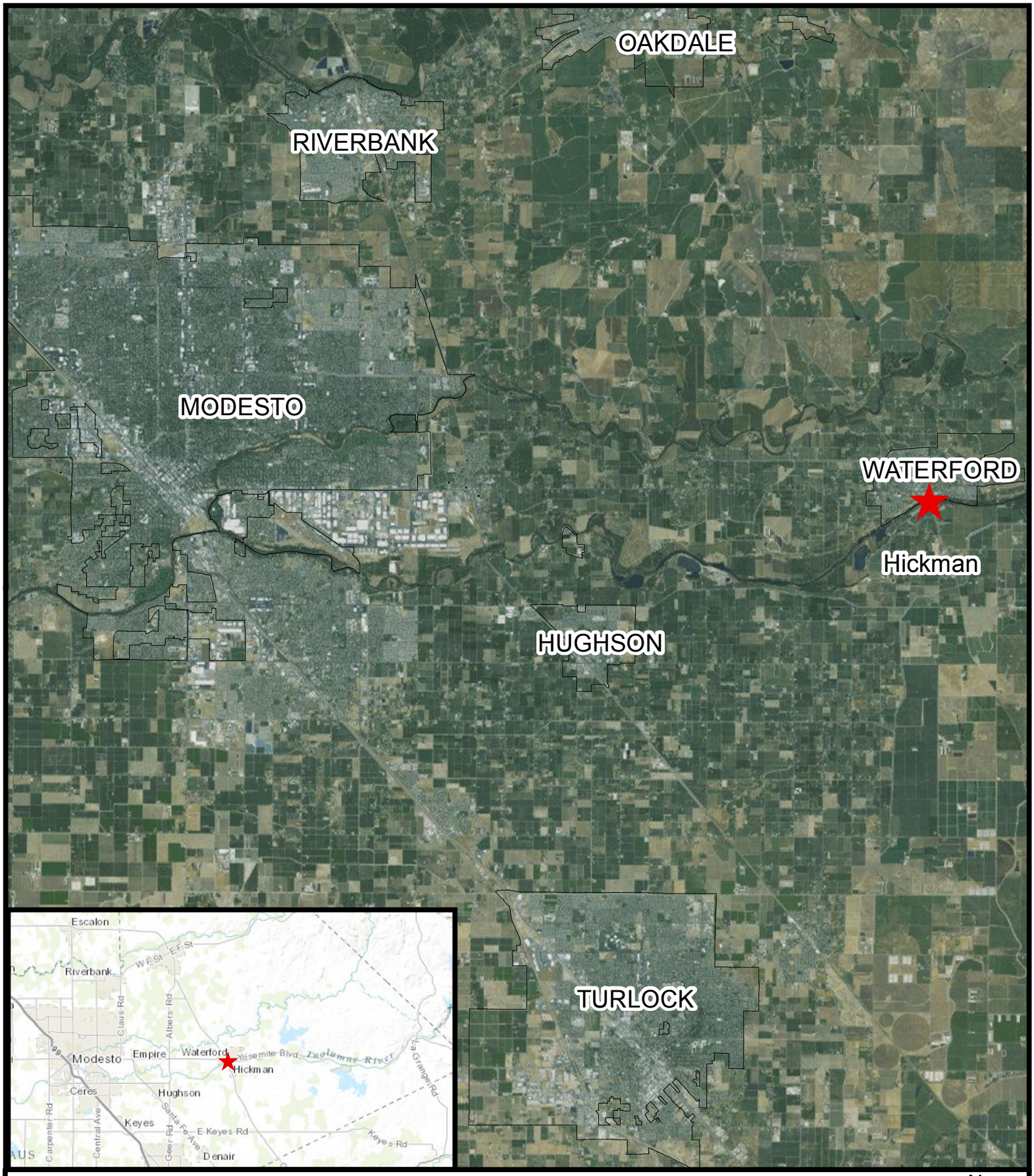
Conclusions

No long-term noise impacts will be caused by the project as the project is a bridge replacement and will not increase roadway capacity. A combination of abatement techniques with equipment noise control and administrative measures will be selected and implemented to provide the most effective means to minimize effects of construction activity impacts. A temporary increase in noise and vibration would likely occur during construction; however, application of abatement measures will reduce these impacts to less than significant.

Garett Peterson

Environmental Planner

Appendix: Figures



Project Location

0 1.25 2.5 5 Miles

N

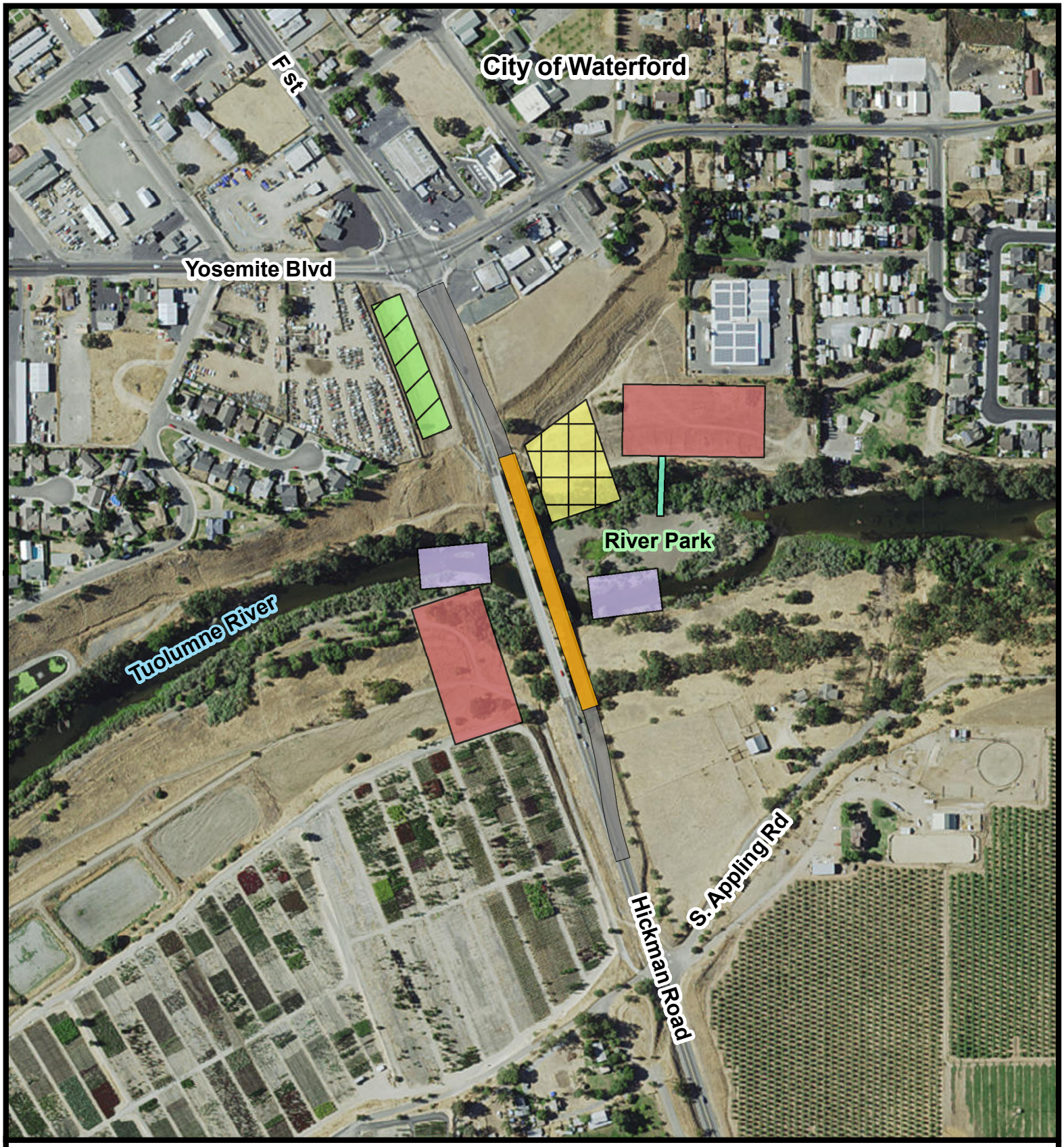
drake haglan AND ASSOCIATES

Sources: Esri Online Basemap, Aerial Imagery, Stanislaus County
Coordinate System: NAD 83
State Plane California II FIPS
Notes: This map was created for informational and display purposes only.

Project Name:
Hickman Road Bridge Replacement Project

Regional Map

Figure 1



Proposed Bridge
Proposed Road Alignmnet
Staging Area
Crane Assembly Area
Crane Pad
Access ramp trestle
Work Trestle Low Flow Channel

N

0 250 500 Feet

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Sources: Esri Online Basemap, Aerial Imagery, Stanislaus County
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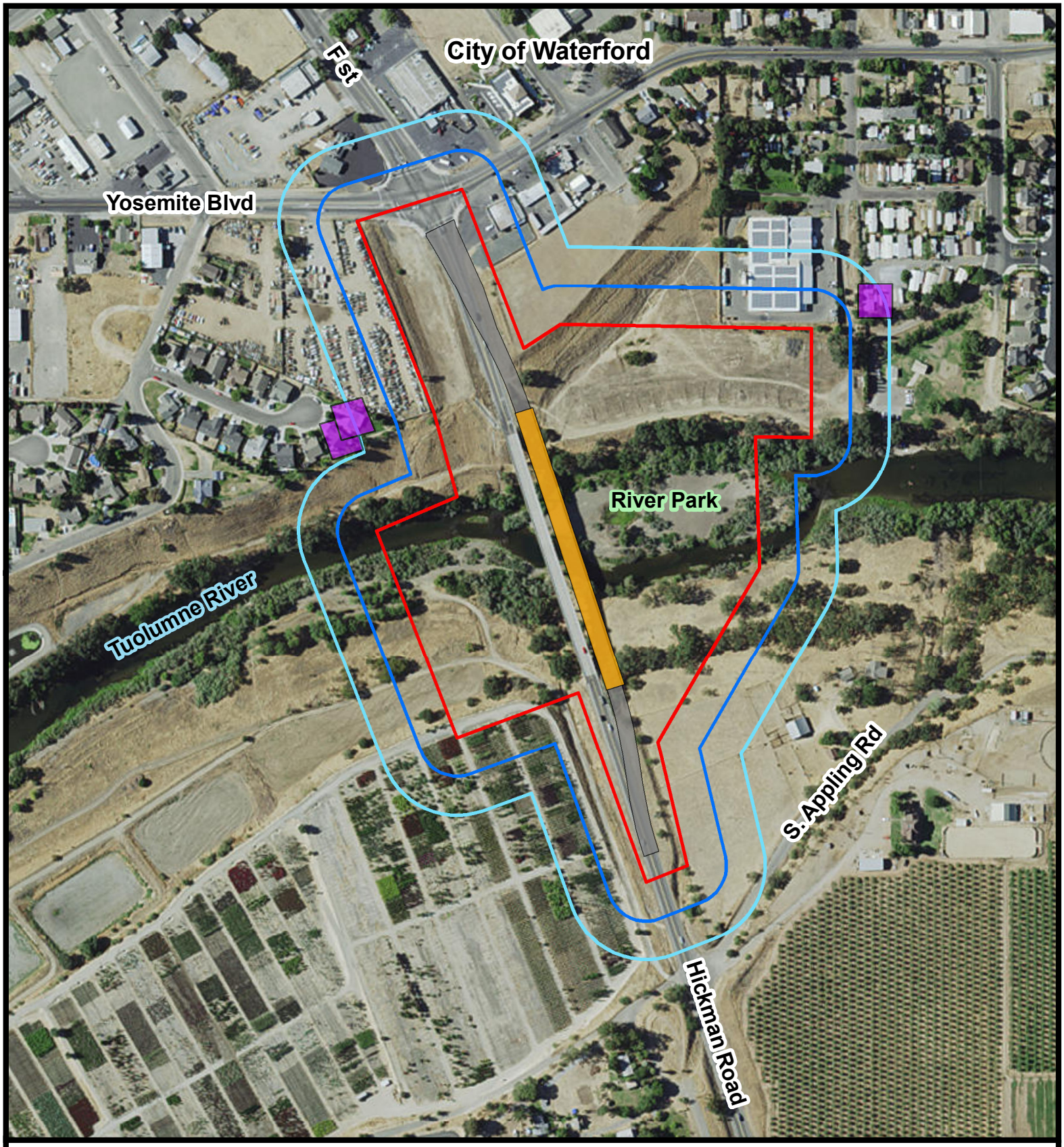
Project Location

Figure 2



Area of Direct Impacts (ADI)
100 ft Buffer
200 ft Buffer
Sensitive Receptors
Proposed Bridge
Proposed Road Alignmnet

N

0 250 500 Feet

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Sensitive Receptors

Figure 3