# NOISE TECHNICAL MEMORANDUM

## Del Rio Trail Project
## City of Sacramento
## DISTRICT 3—SAC— ATPL-5002(189)

Attention: Thaleena Bhattal, Associate Environmental Planner, Caltrans District 3

From: Amy Storck, Environmental Planner, Dokken Engineering

Subject: Del Rio Trail Project, Federal Project No. ATPL-5002(189)

Date: November 16, 2017

## Introduction

The City of Sacramento (City) proposes to construct 4.5 miles of Class 1 multi-use trail along the inactive railway corridor west of Freeport Boulevard from south of Meadowview Road/Pocket Road to the Sacramento River Parkway north of Sutterville Road. This memorandum discusses temporary construction noise impacts from implementation of the proposed project.

## Project Description

The City proposes to construct 4.5 miles of Class 1 multi-use trail along the inactive railway corridor west of Freeport Boulevard from south of Meadowview Road/Pocket Road to the Sacramento River Parkway north of Sutterville Road. The proposed Project consists of a Class I multi-use trail (12 feet wide with 2 foot wide shoulders) and an adjacent 5 foot wide unpaved walking trail. The trail would include at-grade crossings and intersection modifications at each major arterial location (See Figures 1 through 3).

The project begins approximately 0.4 mile south of Pocket Road near the Freeport Water Tower adjacent to the I-5 bridge over Freeport Boulevard, and extends 4.5 miles north along the inactive railway corridor within the City of Sacramento. At the southern entry, the bike trail would connect directly to the newly constructed Freeport Shores Trail and the South Sacramento Parkway West. The route would then cross at Meadowview-Pocket Road and continue north through the South Land Park neighborhood towards William Land Park and the Sacramento River Parkway. North of Sutterville Road, the trail connects to the Sacramento River Parkway via two alignments: west along Sutterville Road with Class 2 bike lanes, and northwest along the existing railway corridor.

## Purpose and Need

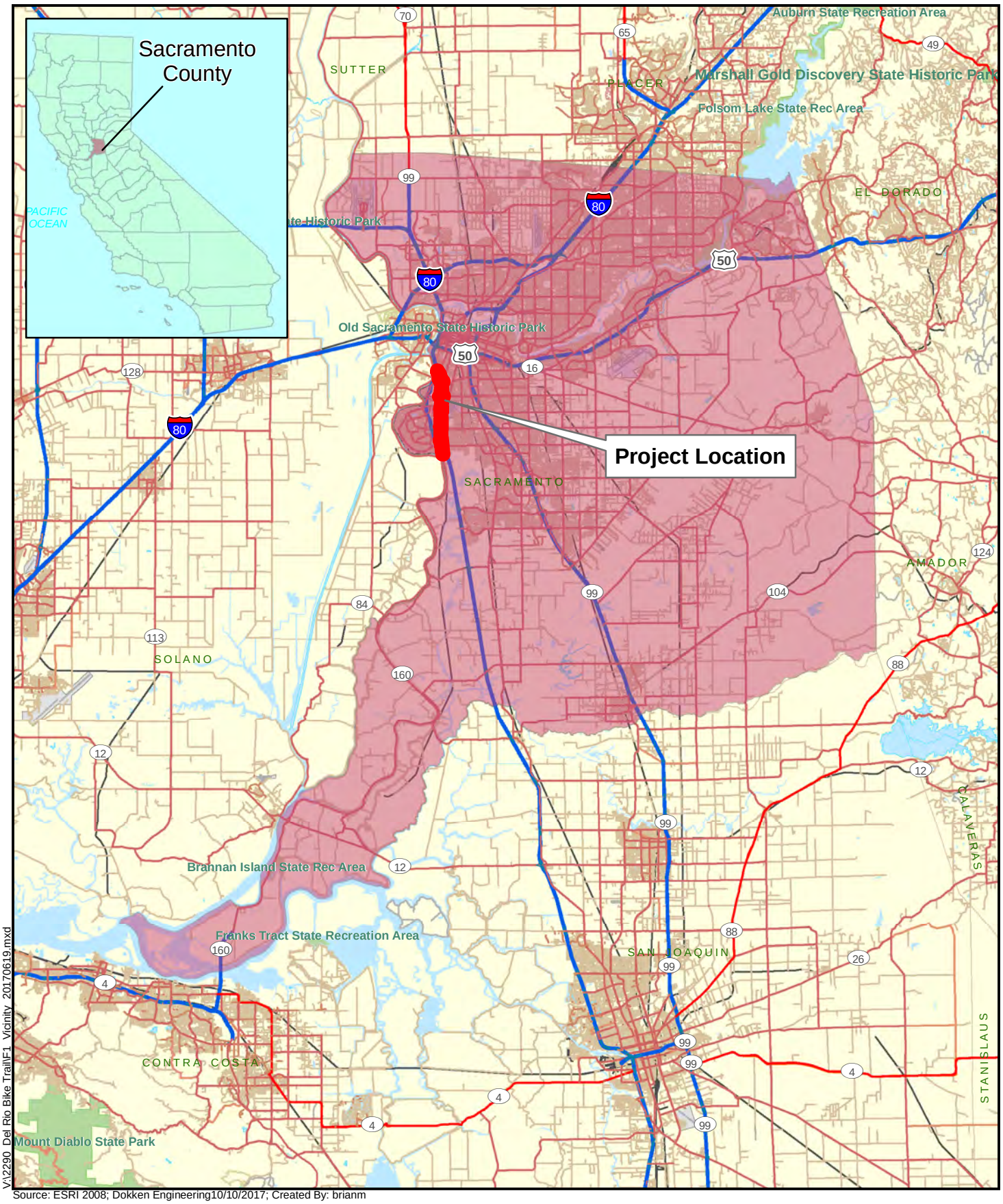
### Project Purpose

The purpose of the Del Rio Trail Project is to:

- Advance and complete the planned connection between the Sacramento River Parkway and the Freeport Shores Bikeway in accordance with the City of Sacramento Bikeway Master Plan utilizing public right of way and public agency parcels;
- Connect logical origins and destinations proximate to the trail alignment by improving pedestrian and bicycle access throughout the South Land Park, Freeport Manor, Z'berg, Land Park, Meadowview, and Pocket communities; and
- Provide an American's with Disabilities Act (ADA)-compliant, active transportation connection to adjacent communities throughout the south Sacramento area for pedestrians and bicyclists of all ages and abilities to access schools, retail, jobs, and recreational amenities.

### Project Need

The Del Rio Trail Project is needed because the South Land Park, Pocket, and adjacent communities in South Sacramento currently have limited ADA-compliant, active modes of transportation to schools, retail, jobs, and recreational amenities thereby increasing automotive dependency and Vehicle Miles Traveled (VMT), while reducing opportunities for those who do not drive or do not have access to a car including children, the elderly, the disadvantaged, and persons with disabilities.




V:\2290 Del Rio Bike Trail\F1 Vicinity 20170619.mxd

Source: ESRI 2008; Dokken Engineering10/10/2017; Created By: brianm

0 5 10 15 Miles

**FIGURE 1**
**Project Vicinity**
ATPL-5002(189)
Del Rio Trail Project
City of Sacramento, Sacramento County, California

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V:\2290_Del Rio Bike Trail\F2_Location.mxd

Source: ESRI Aerials Online; Dokken Engineering 10/30/2017; Created By: kchen

0 0.5 1 Miles

**FIGURE 2**
**Project Location**
ATPL-5002(189)
Del Rio Trail Project
City of Sacramento, Sacramento County, California

Freeport Blvd
Sutterville Rd
Fruitridge Rd
Florin Rd
Meadowview Blvd
Darnel Way
35Th Ave
43Rd Ave
Pocket Rd
Page 2
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Project Study Area

**Project Features**

- Alignment
- Edge of Pavement
- Concrete Curb/Wall
- Curbs Gutters Dikes
- Proposed Cut
- Proposed Fill

V:\2290 Del Rio Bike Trail\F3 Project Feature 11x17 2017-09-29.mxd

Source: ESRI Aerials Online; Dokken Engineering 10/24/2017; Created By: kchen

0 1,000 2,000 3,000 4,000 5,000 Feet

**FIGURE 3**
**Project Features**
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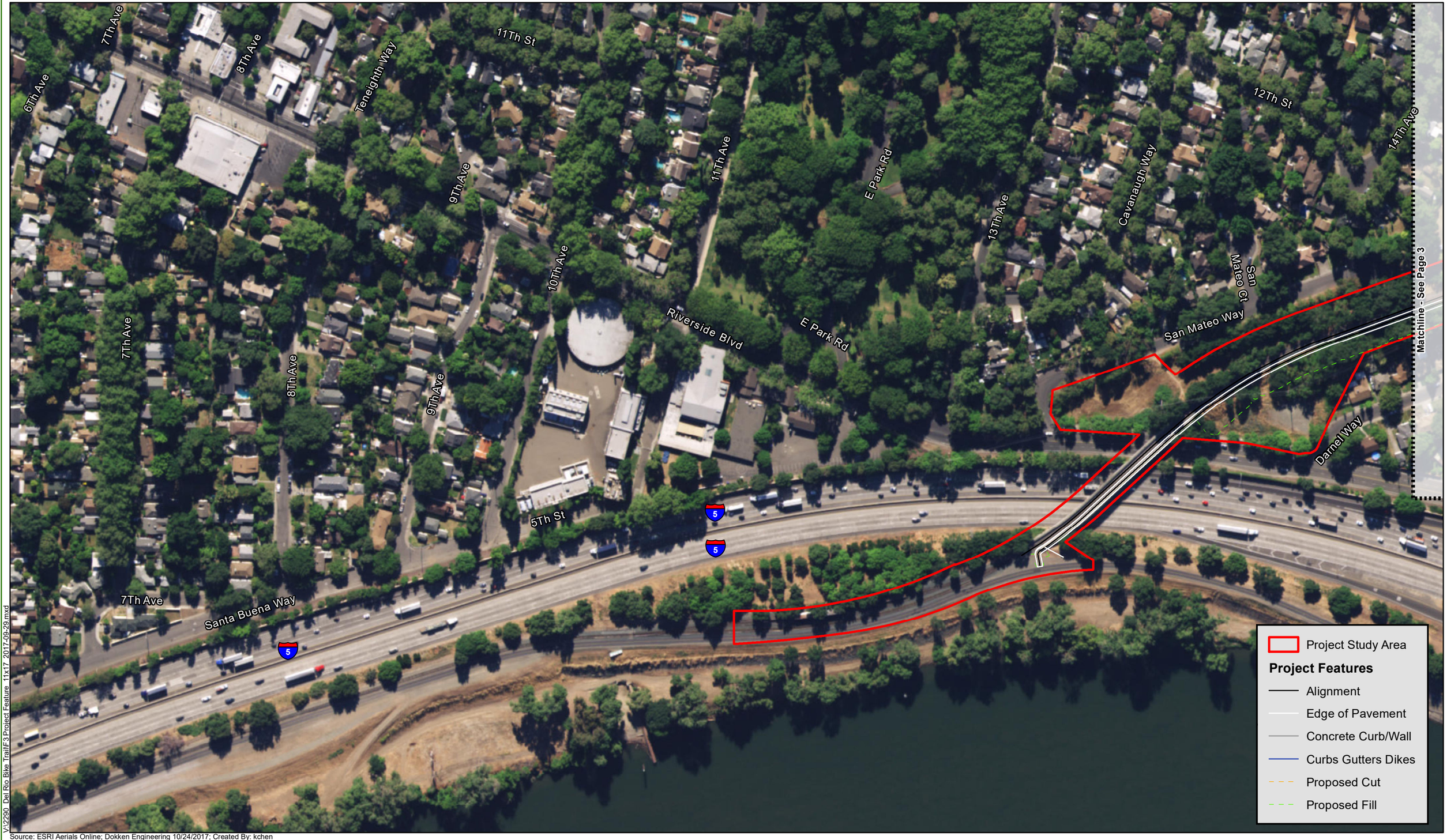
Del Rio Trail Project
City of Sacramento, Sacramento County, California




V:\2290_Del Rio Bike Trail\F3 Project Feature_11x17_2017-09-29.mxd

Source: ESRI Aerials Online; Dokken Engineering 10/24/2017; Created By: kchen

0 100 200 300 400 500 Feet

**FIGURE 3**
**Project Features**
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Del Rio Trail Project
City of Sacramento, Sacramento County, California


V:\2290_Del Rio Bike Trail\F3 Project Feature_11x17_2017-09-29.mxd

Source: ESRI Aerials Online; Dokken Engineering 10/24/2017; Created By: kchen

0 100 200 300 400 500 Feet

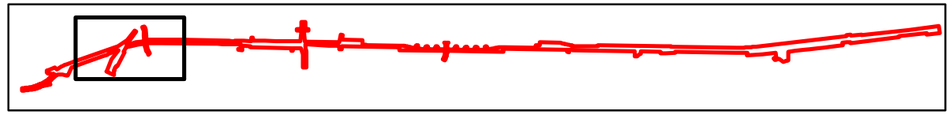

**FIGURE 3**
**Project Features**
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Del Rio Trail Project
City of Sacramento, Sacramento County, California


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Source: ESRI Aerials Online; Dokken Engineering 10/24/2017; Created By: kchen

0 100 200 300 400 500 Feet

**FIGURE 3**
**Project Features**
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City of Sacramento, Sacramento County, California


V:\2290_Del Rio Bike Trail\F3 Project Feature_11x17_2017-09-29.mxd

Source: ESRI Aerials Online; Dokken Engineering 10/24/2017; Created By: kchen

0 100 200 300 400 500 Feet

**FIGURE 3**
**Project Features**
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Del Rio Trail Project
City of Sacramento, Sacramento County, California

Atherton St
Coolbrith St
Stoddard St
Mcallister Ave
Hopkins St
Blair Ave
Thiery Rd
47Th Ave
48Th Ave
Freeport Blvd
160
Freeport Blvd
160
Belleau Wood Ln
Belleau Wood Ln
Belleau Wood Ln
Matchline - See Page 5
Matchline - See Page 7
14Th St
14Th St
14Th St
Annrud Way
42Nd Ave
43Rd Ave
47Th Ave
Longridge Way
13Th St

Project Study Area

**Project Features**

- Alignment
- Edge of Pavement
- Concrete Curb/Wall
- Curbs Gutters Dikes
- Proposed Cut
- Proposed Fill

V:\12290_Del Rio Bike Trail\F3 Project Feature_11x17_2017-09-29.mxd

Source: ESRI Aerials Online; Dokken Engineering 10/24/2017; Created By: kchen

0 100 200 300 400 500 Feet

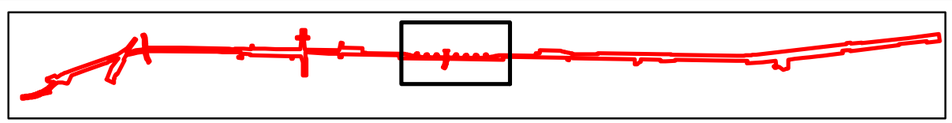

**FIGURE 3**
**Project Features**
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Del Rio Trail Project
City of Sacramento, Sacramento County, California


V:\12290_Del Rio Bike Trail\F3 Project Feature_11x17_2017-09-29.mxd

Source: ESRI Aerials Online; Dokken Engineering 10/24/2017; Created By: kchen

0 100 200 300 400 500 Feet

**FIGURE 3**
**Project Features**
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V:\2290_Del Rio Bike Trail\F3 Project Feature 11x17 2017-09-29.mxd

Source: ESRI Aerials Online; Dokken Engineering 10/24/2017; Created By: kchen

0 100 200 300 400 500 Feet

**FIGURE 3**
**Project Features**
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V:\2290_Del Rio Bike Trail\F3 Project Feature_11x17_2017-09-29.mxd

Source: ESRI Aerials Online; Dokken Engineering 10/24/2017; Created By: kchen

0 100 200 300 400 500 Feet

**FIGURE 3**
**Project Features**
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V:\2290 Del Rio Bike Trail\F3 Project Feature 11x17 2017-09-29.mxd

Source: ESRI Aerials Online; Dokken Engineering 10/24/2017; Created By: kchen

0 100 200 300 400 500 Feet

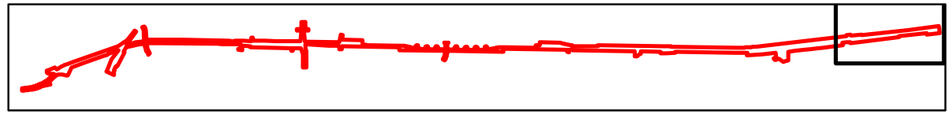

**FIGURE 3**
**Project Features**
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ATPL-5002(189)
Del Rio Trail Project
City of Sacramento, Sacramento County, California

The purpose of the proposed project is to improve pedestrian and bicycle access throughout the South Land Park and Pocket Communities, and provide multi-modal connectivity to adjacent communities throughout the Sacramento area. The project is needed because the inactive railway corridor is currently located within neighborhoods with no protected bikeways, minimal sidewalks, and limited connectivity for pedestrians to access schools, stores, jobs, and recreational facilities.

Permanent right-of-way acquisitions and temporary construction easements are needed where the trail passes through Sacramento Regional Transit and state-owned parcels along the trail.

This project is federally funded through the Active Transportation Program grant and therefore requires compliance with both the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA). The lead agency for CEQA compliance is the City; the federal lead agency for NEPA compliance is Caltrans.

## Noise Setting

In accordance with the Caltrans Environmental Handbook guidelines, noise is defined as unwanted sound. Sound levels usually are measured and expressed in decibels (dB), with 0 dB being the lowest threshold of hearing. Decibel levels range from 0 to 140: 50 dB for light traffic is considered a low decibel level, whereas 120 dB for a jet takeoff at 200 feet is considered a high decibel level.

Noise sources that contribute to ambient noise levels in and adjacent to the Project site include traffic from intersecting roadways and low amounts of noise from adjacent residential and recreational activities. Table 1 summarizes typical ambient noise levels based on population density.

**Table 1: Population Density and Associated Ambient Noise Levels**

| Population Density | dBA, Ldn |
|---|---|
| Rural Suburban | 40–50 |
| Quiet suburban residential or small town | 45–50 |
| Normal suburban residential urban | 50–55 |
| Normal urban residential | 60 |
| Noisy urban residential | 65 |
| Very noisy urban residential | 70 |
| Downtown, major metropolis | 75–80 |
| Under flight path at major airport, 0.5 to 1 mile from runway | 78–85 |
| Adjoining freeway or near a major airport | 80–90 |
| Sources: Cowan 1984, Hoover and Keith 1996 | |

The vicinity of the Project area is most similar to that of “Normal suburban residential urban”. Normal suburban residential uban areas have a typical noise level of 50-55 dBA.

The Technical Noise Supplement (Caltrans, 2009) defines a noise receiver or receptor as “any natural or artificial sensor that can perceive, register or be affected by sound, such as a human ear, or a microphone.”

Code of Federal Regulations (CFR) 23 CFR 772.5(h) defines a Type 1 Project as; “construction on new location or the physical alteration of an existing highway, which significantly changes either the horizontal or vertical alignment or increases the number of through-traffic lanes.” The proposed Project is a segment of 4.5-mile multiple-use trail that would provide connectivity between existing trails. The Project would not increase capacity or significantly change the horizontal or vertical alignment. As a result, the Project is not a Type 1 Project. Under the Caltrans Traffic Noise Analysis Protocol (CaTNAP), published in August 2006, projects that are not Type 1 only require an evaluation of predicted construction noise. Therefore, only construction noise impacts are discussed.

The Project would take place within areas designated by the City of Sacramento General Plan for Parks and Recreation, Suburban Low and Medium Density, and Public land use. Residences occur within 50 feet along the project limits. Construction activities would potentially occur within 50 feet away from these residences. In general, noise sensitive land-uses include residences, schools, hospitals, churches, and parks. The Project would take place near primarily residences in suburbs. The nearest residences occur within 50 feet from the project footprint.

## Regulatory Setting

Construction noise is regulated by the City of Sacramento. Chapter 8.68 of the City of Sacramento Municipal Code contains application noise regulations within City limits:

*Section 8.68.060 – Exterior Noise Standards*

a. *The noise standards that apply to all agricultural and residential properties are:*
    1. *From seven a.m. to ten p.m. the exterior noise standard shall be fifty-five (55) dBA.*
    2. *From ten p.m. to seven a.m. the exterior noise standard shall be fifty (50) dBA.*

Construction noise for the proposed project is exempt under City Code Section 8.68.080 as long as there is compliance with the noise code requirements. Construction activity that occurs outside the exempt hours of the day (7am to 6pm from Monday through Saturday, and 9am to 6pm on Sundays) could result in noise that exceeds the 55-dBA daytime standard or 50-dBA nighttime standard. The contractor would be required to comply with the noise ordinance during construction activities. However, if construction activities generate noise in violation of the timeframes described above, the contractor

will be required to obtain the proper variances as outlined in Sections 8.68.250 and 8.68.260.

## ENVIRONMENTAL CONSEQUENCES

*Construction Noise*

To measure construction noise it is necessary to consider both the context of construction activities and the kinds of construction equipment forecast to be used. A wide variety of construction activities would occur during the Project improvement process and would include the following:

1) Grading/Earthwork Preparation (Dump Truck, Excavator, Compactor, Front End Loader, Grader)
2) Paving (Dump Truck, Paver, Roller, Tractor)

Table 2 summarizes noise levels typically produced by construction equipment commonly used on roadway construction projects. Construction equipment is expected to generate noise levels ranging from 50 to 85 dB at a distance of 15 meters (50 feet), and noise produced by construction equipment would be reduced over distance at a rate of about 6 dB per doubling of distance. Construction noise would be intermittent, and noise levels would vary depending on the type of construction activity. The loudest construction activities would include engine noise from construction vehicles, and excavation. For this Project, the lowest construction equipment-related noise levels would be 50 dBA at a distance of 50 feet for sound from a pick-up truck. The highest noise levels would be up to 85 dBA (at a distance of 50 feet) from operation of the excavator or dozer.

The nearest sensitive receptors that would be most affected by construction noise impacts are single-family residences located within 50 feet to the southwest of the Project footprint. Activities would be generally less intensive noise generating activities. No pile driving or other more intensive noise generation is expected to occur.

Construction noise impacts to this sensitive receptor would be minimal, short term, intermittent, and would occur during daytime construction hours pursuant to the City of Sacramento Noise Ordinance. It is not anticipated that construction work would need to occur outside of established daytime hours; however, should the City determine that night work is necessary, a variance would be obtained. These impacts would be reduced with the inclusion of best management practices and the minimization measure **NOI-1**.

**TABLE 2: CONSTRUCTION EQUIPMENT NOISE EMISSIONS AND ACOUSTICAL USAGE FACTORS DATABASE**

| Equipment Description | Impact Device ? | Acoustical Use Factor ( % ) | Spec 721.560 (dBA, slow) | Actual Measured (dBA, slow) (samples averaged) | No. of Actual Data (Count) |
|---|---|---|---|---|---|
| All Other Equipment > 5 HP | No | 50 | 85 | -- N/A -- | 0 |
| Auger Drill Rig | No | 20 | 85 | 84 | 36 |
| Backhoe | No | 40 | 80 | 78 | 372 |
| Bar Bender | No | 20 | 80 | -- N/A -- | 0 |
| Blasting | Yes | -- N/A -- | 94 | -- N/A -- | 0 |
| Boring Jack Power Unit | No | 50 | 80 | 83 | 1 |
| Chain Saw | No | 20 | 85 | 84 | 46 |
| Clam Shovel (dropping) | Yes | 20 | 93 | 87 | 4 |
| Compactor (ground) | No | 20 | 80 | 83 | 57 |
| Compressor (air) | No | 40 | 80 | 78 | 18 |
| Concrete Batch Plant | No | 15 | 83 | -- N/A -- | 0 |
| Concrete Mixer Truck | No | 40 | 85 | 79 | 40 |
| Concrete Pump Truck | No | 20 | 82 | 81 | 30 |
| Concrete Saw | No | 20 | 90 | 90 | 55 |
| Crane | No | 16 | 85 | 81 | 405 |
| Dozer | No | 40 | 85 | 82 | 55 |
| Drill Rig Truck | No | 20 | 84 | 79 | 22 |
| Drum Mixer | No | 50 | 80 | 80 | 1 |
| Dump Truck | No | 40 | 84 | 76 | 31 |
| Excavator | No | 40 | 85 | 81 | 170 |
| Flat Bed Truck | No | 40 | 84 | 74 | 4 |
| Front End Loader | No | 40 | 80 | 79 | 96 |
| Generator | No | 50 | 82 | 81 | 19 |
| Generator (<25KVA, VMS | No | 50 | 70 | 73 | 74 |
| Gradall | No | 40 | 85 | 83 | 70 |
| Grader | No | 40 | 85 | -- N/A -- | 0 |
| Grapple (on backhoe) | No | 40 | 85 | 87 | 1 |
| Horizontal Boring Hydr. Jack | No | 25 | 80 | 82 | 6 |
| Hydra Break Ram | Yes | 10 | 90 | -- N/A -- | 0 |
| Impact Pile Driver | Yes | 20 | 95 | 101 | 11 |
| Jackhammer | Yes | 20 | 85 | 89 | 133 |
| Man Lift | No | 20 | 85 | 75 | 23 |
| Mounted Impact Hammer (hoe | Yes | 20 | 90 | 90 | 212 |
| Pavement Scarafier | No | 20 | 85 | 90 | 2 |
| Paver | No | 50 | 85 | 77 | 9 |
| Pickup Truck | No | 40 | 55 | 75 | 1 |
| Pneumatic Tools | No | 50 | 85 | 85 | 90 |
| Pumps | No | 50 | 77 | 81 | 17 |
| Refrigerator Unit | No | 100 | 82 | 73 | 3 |
| Rivit Buster/chipping gun | Yes | 20 | 85 | 79 | 19 |
| Rock Drill | No | 20 | 85 | 81 | 3 |
| Roller | No | 20 | 85 | 80 | 16 |
| Sand Blasting (Single Nozzle) | No | 20 | 85 | 96 | 9 |
| Scraper | No | 40 | 85 | 84 | 12 |
| Shears (on backhoe) | No | 40 | 85 | 96 | 5 |
| Slurry Plant | No | 100 | 78 | 78 | 1 |
| Slurry Trenching Machine | No | 50 | 82 | 80 | 75 |
| Soil Mix Drill Rig | No | 50 | 80 | -- N/A -- | 0 |
| Tractor | No | 40 | 84 | -- N/A -- | 0 |
| Vacuum Excavator (Vac-truck) | No | 40 | 85 | 85 | 149 |
| Vacuum Street Sweeper | No | 10 | 80 | 82 | 19 |
| Ventilation Fan | No | 100 | 85 | 79 | 13 |
| Vibrating Hopper | No | 50 | 85 | 87 | 1 |
| Vibratory Concrete Mixer | No | 20 | 80 | 80 | 1 |

Taken from Roadway Construction Noise Model User's Guide (FHWA 2006b)

*Construction Vibration*

Construction activities associated with the proposed Project may also result in ground vibration. Table 3 shows examples of the amount of vibration generated from the types of construction equipment close to a sensitive receptor in terms of Peak Particle Velocity (PPV) at a range of 25 feet.

**Table 3: Vibration Source Amplitudes for Construction Equipment**

| **Equipment** | **PPV at 50 ft (in/sec)** |
|---|---|
| Pile Driver (impact) | 0.537 |
| Pile Drive (sonic) | 0.620 |
| Vibratory Roller | 0.08 |
| Hoe Ram | 0.031 |
| Large Bulldozer | 0.031 |
| Caisson drilling | 0.031 |
| Loaded trucks | 0.027 |
| Jackhammer | 0.012 |
| Small bulldozer | 0.003 |

*Source: Federal Transit Administration, 2006. See also: http://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/handbook09.cfm*

Vibration can impact sensitive receptors by causing damage to a structure or by causing annoyance based on human perception. The threshold at which there is a risk of damage to older buildings is 0.3 PPV (in/sec) (Caltrans, 2013). As shown in Table 3 above, none of the activities have the potential to reach 0.3 PPV (in/sec) to the nearest residence 50 feet away; therefore, no potential for damage would occur.

Construction activities that would take place at least 50 feet from the sensitive receptor would range from Barely Perceptible to Distinctly Perceptible, depending on the distance and intensity of vibration generation. Table 4 outlines the amount of PPV that would potentially cause annoyance to human perception. Vibration from construction activity is typically below the threshold of perception when the activity is more than about 50 feet from the receiver. Considering the low intensity of vibration and the short term nature of the construction activities near affected sensitive receptors, this impact is not considered substantial and would not require additional minimization measures beyond those outlined below.

**Table 4: Guideline Vibration Annoyance Potential Criteria**

| Human Response | Maximum PPV (in/sec) | |
|---|---|---|
| | Transient Sources | Continuous/Frequent intermittent Sources |
| Barely Perceptible | 0.04 | 0.01 |
| Distinctly Perceptible | 0.25 | 0.04 |
| Strongly Perceptible | 0.9 | 0.10 |
| Severe | 2.0 | 0.40 |

Note: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Source: Caltrans Transportation- and Construction-Induced Vibration Guidance Manual (Caltrans 2004)

*Operational Noise*

Operation of the proposed project may introduce noise associated with the multi-use trail generated from recreational activities and pedestrians. The closest sensitive receptors that would be potentially exposed to operational noise from the proposed project are residential uses approximately 50 feet away. Trail-related noise impacts experienced by adjacent residences would not be considered a substantial increase in noise levels. Therefore, the project would not generate a significant increase in long-term operational noise within the project area.

## CONSTRUCTION NOISE CONTROL/MINIMIZATION MEASURES

The following minimization measures would be implemented during construction:

**NOI-1:** Noise Control Measures

- Construction activity that occurs outside the exempt hours of the day (7am to 6pm from Monday through Saturday, and 9am to 6pm on Sundays) that exceeds the 50-dBA daytime standard or 45-dBA nighttime standard must obtain the proper variances as outlined in Sections 8.68.250 and 8.68.260 of the City of Sacramento Noise Ordinance.
- Construction equipment and vehicles should be equipped with properly operating mufflers according to the manufacturers' recommendations. Air compressors and pneumatic equipment should be equipped with the manufacturer-recommended muffler, and tools should be equipped with shrouds or shields. An internal combustion engine will not be operated on the job site without the appropriate muffler.
- The use of loud sound signals shall be avoided in favor of light warnings except those required by safety laws for the protection of personnel.

## SUMMARY

From the above discussion, it is concluded that construction and operational noise due to the Project is anticipated to be minimal. The proposed construction duration is temporary and intermittent. Additionally, temporary construction-related noise and vibration impacts will be further minimized by implementation of measure **NOI-1**.

## REFERENCES

City of Sacramento, Sacramento City Code. May 2017.

California Department of Transportation: Division of Environmental Analysis. 2006. Traffic Noise Analysis Protocol: For New Highway Construction, Reconstruction, and Retrofit Barrier Projects.

California Department of Transportation. FHWA Roadway Construction Noise Model User's Guide. Final Report January 2006.

California Department of Transportation, Transportation and Construction Vibration Guidance Manual, September 2013

Federal Transit Administration. Transit Noise and Vibration Impact Assessment. May 2006. https://www.transit.dot.gov/regulations-and-guidance/environmental-programs/fta-noise-and-vibration-impact-assessment

Hoover, R.M., and R.H. Keith. 1996. Noise Control for Buildings, Manufacturing Plants, Equipment and Products.