APPENDIX G

Noise Analysis Technical Report

DRAFT
Noise Analysis Technical Report
for the
Municipal Waterways Maintenance Plan EIR
City of San Diego, California
PTS #616992

Prepared for:

The City of SAN DIEGO

Transportation & Storm Water Department

9370 Chesapeake Drive, Suite 100
San Diego, California 92123
Contact: Anne B. Jarque, Senior Planner
619.527.7507

Prepared by:

DUDEK

305 Third Street
Encinitas, California 92024

Principal Investigator: Mike Greene, INCE Bd. Cert.
Environmental Specialist / Acoustician

NOVEMBER 2019

Printed on 30% post-consumer recycled material.

Noise Analysis Technical Report for the Municipal Waterways Maintenance Plan EIR

TABLE OF CONTENTS

SECTION **PAGE NO.**

TABLE OF CONTENTS (CONTINUED)

SECTION **PAGE NO.**

APPENDICES

FIGURES

TABLE OF CONTENTS (CONTINUED)

PAGE NO.

TABLES

THIS PAGE INTENTIONALLY LEFT BLANK FOR DOUBLE-SIDED PRINTING

ACRONYMS AND ABBREVIATIONS

Acronym/Abbreviation	Definition
CEQA	California Environmental Quality Act
City	City of San Diego
CLUP	Comprehensive Land Use Plan
CNEL	Community Noise Equivalent Level
dB	decibel
dBA	A-weighted decibel
FMP	Facility Maintenance Plan
L_{eq}	equivalent sound level
L_{eq} (1-hr)	1-hour A-weighted equivalent sound level
L_{max}	maximum sound level during the measurement interval
MM	mitigation measure
MWMP	Municipal Waterways Maintenance Plan
PPV	peak particle velocity
RCNM	Roadway Construction Noise Model
VdB	velocity decibel

THIS PAGE INTENTIONALLY LEFT BLANK FOR DOUBLE-SIDED PRINTING

SUMMARY OF FINDINGS

The purpose of this technical report is to assess the potential noise and vibration impacts associated with implementation of the proposed City of San Diego (City) *Municipal Waterways Maintenance Plan* (MWMP). This assessment uses the significance thresholds in the City's *California Environmental Quality Act Significance Determination Thresholds* (City of San Diego 2016) and Appendix G of the California Environmental Quality Act (CEQA) Guidelines (14 CCR 15000 et seq.).

Project Overview

Under City Charter Section 26.1 and Council Policy 800-04, the City is responsible for maintaining adequate drainage facilities to remove storm water runoff in an efficient, economic, and environmentally and aesthetically acceptable manner for the protection of property and life. The City generally accepts responsibility for maintenance of public drainage facilities that are designed and constructed to City standards and located within a public street or drainage easement dedicated to the City. The City's storm water conveyance system serves to convey storm water flows to protect the life and property of its citizens from potential flooding within eight watersheds (Figure 1, Vicinity Map). The City's storm water conveyance system also serves to convey urban runoff from pervious and impervious surfaces and development, such as irrigated landscape areas, driveways, and streets that flow into drainage facilities and, ultimately, to the ocean. Additionally, the City's storm water conveyance system helps to protect water quality, and open facilities, such as channels, can support natural resources, including wetland habitat.

The regional landform features are typical of the coastal plain area. The coastal plain slopes gently upward to the eastern foothills and has eroded into separate mesas. The coastal plain has been incised by numerous side canyons flowing into major creeks and rivers that generally flow westward toward the coast. These major creeks and rivers systems consist of (from north to south) Los Peñasquitos Canyon Creek, Rose Creek, San Diego River, Alvarado Creek, Chollas Creek, Otay River, Nestor Creek, and Tijuana River. The eight watersheds within City jurisdiction are San Dieguito River, Los Peñasquitos, Mission Bay, San Diego River, Pueblo San Diego, Sweetwater, Otay, and Tijuana River. In general, development in the City is concentrated on flat mesas and valleys interspersed with natural and urbanized canyon areas.

Facilities covered within the MWMP would be distributed throughout the eight watersheds, with the highest concentration of facilities being in the San Diego River and Pueblo San Diego watersheds. Flood risk in these watersheds is higher due to lower or non-existent flood protection standards required at the time of development, as well as increase in runoff from the addition of impervious area from development.

Although City Council Policy 700-44 establishes the responsibility to protect private properties from flood damage to be with the property owners themselves (City of San Diego 1984), the City's Transportation & Storm Water Department is responsible for evaluating and conducting maintenance and repair of the storm water conveyance system throughout much of the City. To maintain the system's effectiveness, the proposed MWMP identifies specific activities, methods, and procedures that will guide ongoing maintenance and repair of facilities. The MWMP provides a comprehensive approach to identify and regulate maintenance and repair activities within open storm water facilities (i.e., those facilities located above ground and not within closed systems, such as pipes).

Maintenance and repairs are an important component of operating the storm water conveyance system and providing reliable flood risk reduction throughout the City. Many storm water facilities were originally designed in a manner that requires ongoing maintenance and repair. For example, concrete-lined trapezoidal channels are often designed to convey the 100-year storm event. However, if sediment/debris accumulates in the channels and vegetation establishes within the sediment/debris, the conveyance capacity is often reduced, and adjacent developed properties are at greater risk of flooding. In other cases, storm water facilities damaged during large storm events require repair (e.g., replacement of broken concrete lining or dislodged riprap) to continue to provide safe storm water conveyance according to the original facility design. Finally, there are areas of the City where development or conditions have changed within the watershed, resulting in greater or faster storm water flows than predicted during the facility design, or the original design does not meet current standards. In these cases, a Capital Improvement Program project is often needed to address the potential flood risk that exists or erosion potential due to a design that no longer meets the needs of the surrounding area; however, maintenance (removal of accumulated vegetation and sediment/debris) may help alleviate the flood risk until a Capital Improvement Program project is designed and constructed.

The following are the primary objectives of the MWMP:

- Public safety and flood risk reduction
    - Protect life and property adjacent to and downstream of affected channels from flooding and environmental degradation.
- Responsiveness to reduce flood risk
    - Provide for timely and consistent routine operations and maintenance in the affected channels and associated storm water conveyance infrastructure.

- Avoid, minimize, and/or mitigate potential effects to environmental resources
    - Avoid, minimize, and/or mitigate significant adverse environmental effects resulting from routine maintenance of storm water facilities.
    - Incorporate and adapt to water quality management strategies intended to protect water quality and address flooding impacts.
- Proactive and timely approval process
    - Provide project-level analysis upfront to expedite subsequent authorizations for routine and preventive maintenance activities within storm water facilities.
    - Identify a review-and-approval process to include additional storm water facilities and maintenance activities that follow the protocols and requirements of the MWMP.
    - Reduce the need to conduct emergency maintenance during significant storm events by implementing preventive maintenance activities.

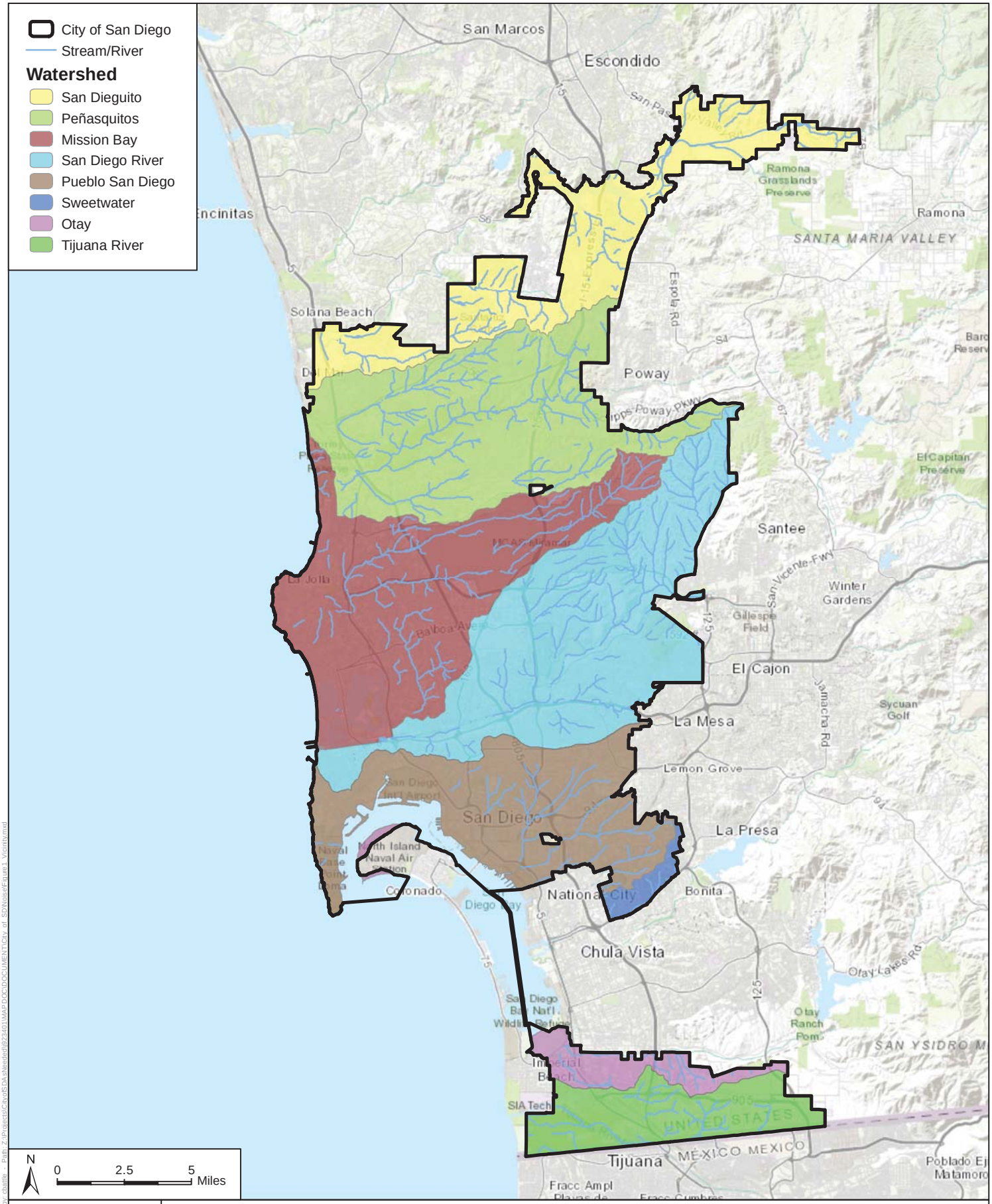
Noise and Vibration

The noise and vibration impact analysis evaluated the potential for adverse impacts during maintenance activities resulting from the MWMP. Impacts were evaluated for their significance based on the City's *California Environmental Quality Act (CEQA) Significance Determination Thresholds* (City of San Diego 2016). The report was prepared in accordance with the City of San Diego's Acoustical Report Guidelines (City of San Diego 2005), to the extent that the requirements therein applied to this project. The noise environments through most of the MWMP plan-wide area are characterized by a background or "ambient" noise level generated by vehicular traffic. Typical secondary noise sources include aircraft, rustling leaves, landscaping maintenance, construction noise, birds, children playing, and passing conversations. The noise assessment in this report quantifies maintenance activity and operational noise generation and the resulting noise levels at vicinity noise-sensitive receptors that are generally representative of the areas surrounding the MWMP components.

Maintenance activities associated with the MWMP components would result in temporary localized increases in noise levels from on-site construction equipment (used for maintenance activities) and off-site vehicles hauling materials. Noise generated by construction equipment would occur with varying intensities and durations during the various phases of the maintenance activities. Section 5.1 of this report discusses the maintenance/construction noise impacts in detail. As discussed in Sections 4.2.2, Approach and Methodology, and Section 5.2, following completion of maintenance activities, no operational noise would occur.

Noise Analysis Technical Report for the Municipal Waterways Maintenance Plan EIR

This noise impact analysis evaluates the potential for significant impacts due to maintenance of the MWMP components. Potential noise impacts during maintenance activities were found to be **potentially significant** under CEQA; however, with implementation of the recommended mitigation measures, noise impacts would be reduced to a level of **less than significant**. During operation (i.e., following completion of maintenance activities), there would be no noise**-**related impacts.



DUDEK

The City of SAN DIEGO

Municipal Waterways Maintenance Plan EIR

Noise Analysis Technical Report

Figure 1 - Vicinity Map

Date: 7/26/2019 - Last saved by: dbattle - Path: Z:\Projects\CityofSDAsNeeded\823401\MAPDOC\DOCUMENT\City_of_SDNoiseFigure1_Vicinity.mxd

THIS PAGE INTENTIONALLY LEFT BLANK FOR DOUBLE-SIDED PRINTING

Noise Analysis Technical Report for the Municipal Waterways Maintenance Plan EIR

1 INTRODUCTION

1.1 REPORT PURPOSE AND SCOPE

The purpose of this technical report is to assess the potential noise and vibration impacts associated with implementation of the proposed *Municipal Waterways Maintenance Plan* (MWMP). This assessment uses the significance thresholds in the City of San Diego (City) California Environmental Quality Act Significance Determination Thresholds and Appendix G of the California Environmental Quality Act (CEQA) Guidelines (14 CCR 15000 et seq.), and is based on the significance thresholds and noise/vibration standards of the City.

1.2 REGIONAL AND LOCAL SETTING

The municipal separate storm sewer system for the City is distributed throughout the 342-square-mile metropolitan area. In general, the municipal separate storm sewer system conveys storm water runoff from natural and developed areas to receiving waters. The City's municipal separate storm sewer system is an interconnected system of constructed drains, pipes, and engineered channels that discharge to natural drainages and receiving waters. As a result, the physical characteristics vary with the individual components of the storm water system.

1.3 PROJECT DESCRIPTION

Under City Charter Section 26.1 and Council Policy 800-04, the City is responsible for maintaining adequate drainage facilities to remove storm water runoff in an efficient, economic, and environmentally and aesthetically acceptable manner for the protection of property and life. The City's storm water conveyance system serves to convey storm water flows to protect the life and property of its citizens from potential flooding within eight watersheds (Figure 1). The City's storm water conveyance system also serves to convey urban runoff from pervious and impervious surfaces and development, such as irrigated landscape areas, driveways, and streets that flow into drainage facilities and, ultimately, to the ocean. Additionally, the City's storm water conveyance system helps to protect water quality, and open facilities, such as channels, can support natural resources, including wetland habitat.

City jurisdiction spans eight watersheds: San Dieguito River, Los Peñasquitos, Mission Bay, San Diego River, Pueblo San Diego, Sweetwater, Otay, and Tijuana River. In general, development in the City is concentrated on flat mesas and valleys interspersed with natural and urbanized canyon areas. Facilities covered within the MWMP would be distributed throughout the eight watersheds, with the highest concentration of facilities being in the San Diego River and Pueblo San Diego watersheds. Flood risk in these watersheds is higher due to lower or non-existent flood protection standards

required at the time of development, as well as increase in runoff from the addition of impervious area from development.

The following facilities comprise the City's storm water system:

- Approximately 50 miles of channels, ditches, and basins
- 48,561 drainage conveyance facilities (including storm drain pipes and channels)
- 55,334 structures (including inlets, outlets, cleanouts, and connectors)
- 3,724 drainage best management practice (BMP) facilities
- 85 Capital Improvement Program (CIP) facilities (outlets, BMPs, and stream restoration)

Although City Council Policy 700-44 (City of San Diego 1984) establishes the responsibility to protect private properties from flood damage to be with the property owners themselves, the City's Transportation & Storm Water Department is responsible for evaluating and conducting maintenance and repair of the storm water conveyance system throughout much of the City. To maintain the system's effectiveness, the MWMP identifies specific activities, methods, and procedures to guide ongoing maintenance and repair of facilities. The MWMP provides a comprehensive approach to identify and regulate maintenance and repair activities within open storm water facilities (i.e., those facilities located above ground and not within closed systems, such as pipes).

Maintenance and repairs are an important component of operating the storm water conveyance system and providing reliable flood risk reduction throughout the City. Many storm water facilities were originally designed to require ongoing maintenance and repair. For example, concrete-lined trapezoidal channels are often designed to convey the 100-year storm event. However, if sediment accumulates in the channels, and vegetation establishes within the sediment, the conveyance capacity is often reduced, and adjacent developed properties are at greater risk of flooding. In other cases, storm water facilities damaged during large storm events require repair (e.g., replacement of broken concrete lining or dislodged riprap) to continue to provide safe storm water conveyance according to the original facility design. Finally, there are areas of the City where development or conditions have changed within the watershed, resulting in greater or faster storm water flows than predicted during the facility design, or the original design does not meet current standards. In these cases, a Capital Improvement Program project is often needed to address the potential flood risk that exists or erosion potential due to a design that no longer meets the needs of the surrounding area; however, maintenance (removal of accumulated vegetation and sediment) may help alleviate the flood risk on an interim basis until a Capital Improvement Program project is designed and constructed.

The following are the primary objectives of the MWMP:

- Public safety and flood risk reduction
    - Protect life and property adjacent to, downstream, and upstream of affected channels from flooding and environmental degradation.
- Responsiveness to reduce flood risk
    - Provide for timely and consistent routine operations and maintenance in the affected channels and associated storm water conveyance infrastructure.
- Avoid, minimize, and/or mitigate potential effects to environmental resources
    - Avoid, minimize, and/or mitigate significant adverse environmental effects resulting from routine maintenance of storm water facilities.
    - Incorporate and adapt to water quality management strategies intended to protect water quality and address flooding impacts.
- Proactive and timely approval process
    - Provide project-level analysis upfront to expedite subsequent authorizations for routine and preventive maintenance activities within storm water facilities.
    - Identify a review-and-approval process to include additional storm water facilities and maintenance activities that follow the protocols and requirements of the MWMP.
- Reduce the need to conduct emergency maintenance during significant storm events by implementing preventive maintenance activities.

As stated above, the objectives of the MWMP require the ability for the City's Transportation & Storm Water Department to be responsive to newly identified flood risks while also streamlining approvals for routine preventive maintenance that reduces flood risks. To accomplish this, the MWMP identifies the following:

1. A range of plan-wide activities that may occur throughout the storm water system where flood risks may arise and that would be conducted in accordance with a regulatory framework identified under the MWMP and associated permits.
2. A list of Facility Maintenance Plans (FMPs) that provide specific details and requirements for the majority of facilities that are likely to require routine maintenance and repair.

Together, these two components provide operational flexibility while also providing specific detailed analysis for the majority of anticipated maintenance and repair activities to streamline the review

and approval process. This technical report forms a project-level analysis based on proposed FMPs that identify the majority of anticipated facility maintenance and repair activities in detail. The conclusions of this project-level analysis may be used to analyze additional similar or related activities identified for a program-level analysis in the MWMP; however, such program-level analysis is not included in this technical report.

Figures 3A–3C of EIR Appendix C, Air Quality and Greenhouse Gas Technical Report, illustrate three groups of facilities:

1. Project FMPs (identified in yellow, outlined in black, and labeled with a facility number); these facilities comprise the majority of anticipated maintenance and repair locations.
2. Representative FMPs (identified in yellow, outlined in cyan, and labeled with a facility group and segment name); these facilities are a subset of the project FMPs that were selected for the representative analysis discussed in more detail in Section 2.3.2, Approach and Methodology.
3. Additional facilities subject to limited program-level activities (identified in blue); not analyzed in this technical report, but the conclusions of this report may be used to develop a program-level analysis for similar or related activities.

2 FUNDAMENTALS OF NOISE AND VIBRATION

The following is a brief discussion of fundamental noise concepts and terminology.

2.1 SOUND, NOISE, AND ACOUSTICS

Sound is a process that consists of three components: the sound source, sound path, and sound receiver. All three components must be present for sound to exist. Without a source to produce sound, there is no sound. Similarly, without a medium to transmit sound pressure waves, there is no sound. Finally, sound must be received; a hearing organ, sensor, or object must be present to perceive, register, or be affected by sound or noise. In most situations, there are many different sound sources, paths, and receptors rather than just one of each. Acoustics is the field of science that deals with the production, propagation, reception, effects, and control of sound. Noise is defined as sound that is loud, unpleasant, unexpected, or undesired.

2.2 SOUND PRESSURE LEVELS AND DECIBELS

The amplitude of a sound determines its loudness. Loudness of sound increases with increasing amplitude. Sound pressure amplitude is measured in units of micronewton per square meter, also called micropascal. One micropascal is approximately one-hundred billionth (0.00000000001) of normal atmospheric pressure. The pressure of a very loud sound may be 200 million micropascals, or 10 million times the pressure of the weakest audible sound. Because expressing sound levels in terms of micropascal would be very cumbersome, sound pressure level in logarithmic units is used instead to describe the ratio of actual sound pressure to a reference pressure squared. These units are called bels. To provide a finer resolution, a bel is subdivided into 10 decibels (dB).

2.3 A-WEIGHTED SOUND LEVEL

Sound pressure level alone is not a reliable indicator of loudness. The frequency, or pitch, of a sound also has a substantial effect on how humans will respond. Although the intensity (energy per unit area) of the sound is a purely physical quantity, the loudness, or human response, is determined by the characteristics of the human ear.

Human hearing is limited not only in the range of audible frequencies, but also in the way it perceives the sound in that range. In general, the healthy human ear is most sensitive to sounds between 1,000 and 5,000 hertz, and it perceives a sound within that range as more intense than a sound of higher or lower frequency with the same magnitude. To approximate the frequency response of the human ear, a series of sound level adjustments is usually applied to the sound measured by a sound level meter. The adjustments (referred to as a weighting network) are frequency dependent.

The A-scale weighting network approximates the frequency response of the average young ear when listening to ordinary sounds. When people make judgments about the relative loudness or annoyance of a sound, their judgments correlate well with the A-scale sound levels of those sounds. Other weighting networks have been devised to address high noise levels or other special situations (e.g., B-scale, C-scale, D-scale), but these scales are rarely used in conjunction with most environmental noise. Noise levels are typically reported in terms of A-weighted sound levels. All sound levels discussed in this report are A-weighted decibels (dBA). Examples of typical noise levels for common indoor and outdoor activities are depicted in Table 1.

Table 1
Typical Sound Levels in the Environment and Industry

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
Jet fly over at 300 meters (1,000 feet)	110	Rock band
Gas lawn mower at 1 meter (3 feet)	100	Food blender at 1 meter (3 feet)
Diesel truck at 15 meters (50 feet), at 80 kilometers per hour (50 miles per hour)	90	Garbage disposal at 1 meter (3 feet)
Noisy urban area, daytime	80	Vacuum cleaner at 3 meters (10 feet);
Gas lawn mower at 30 meters (100 feet)	70	Normal speech at 1 meter (3 feet)
Commercial area	60	Large business office
Heavy traffic at 90 meters (300 feet)	50	Dishwasher next room
Quiet urban, daytime	40	Theater; large conference room (background)
Quiet urban, nighttime	30	Library
Quiet suburban, nighttime	20	Bedroom at night; concert hall (background)
Quiet rural, nighttime	10	Broadcast/Recording studio
Lowest threshold of human hearing	0	Lowest threshold of human hearing

Source: Caltrans 2009.
dBA = A-weighted decibel

2.4 HUMAN RESPONSE TO CHANGES IN NOISE LEVELS

Under controlled conditions in an acoustics laboratory, the trained, healthy human ear is able to discern changes in sound levels of 1 dBA when exposed to steady, single-frequency signals in the mid-frequency range. Outside such controlled conditions, the trained ear can detect changes of 2 dBA in normal environmental noise. It is widely accepted that the average healthy ear, however, can barely perceive noise level changes of 3 dBA. A change of 5 dBA is readily perceptible, and a change

of 10 dBA is perceived as twice or half as loud. A doubling of sound energy results in a 3 dBA increase in sound, which means that a doubling of sound energy (e.g., doubling the volume of traffic on a road) would result in a barely perceptible change in sound level.

2.5 NOISE DESCRIPTORS

Additional units of measure have been developed to evaluate the long-term characteristics of sound. The equivalent sound level (L_{eq}) is also referred to as the time-average sound level. It is the equivalent steady-state sound level that in a stated period of time would contain the same acoustical energy as the time-varying sound level during the same time period. The 1-hour A-weighted equivalent sound level, L_{eq} (1-hr), is the energy average of the A-weighted sound levels occurring during a 1-hour period and is the basis for the City's noise ordinance criteria.

People are generally more sensitive and annoyed by noise occurring during the evening and nighttime hours. Thus, another noise descriptor used in community noise assessments—the community noise equivalent level (CNEL)—was introduced. The CNEL scale represents a time-weighted, 24-hour average noise level based on the A-weighted sound level. The CNEL accounts for the increased noise sensitivity during the evening hours (7:00 p.m. to 10:00 p.m.) and nighttime hours (10:00 p.m. to 7:00 a.m.) by adding 5 dBA and 10 dBA, respectively, to the average sound levels occurring during the evening and nighttime hours.

2.6 SOUND PROPAGATION

Sound propagation (i.e., the passage of sound from a noise source to a receiver) is influenced by geometric spreading, ground absorption, atmospheric effects, and shielding by natural and/or built features.

Sound levels attenuate (diminish) at a rate of approximately 6 dBA per doubling of distance from an outdoor point source due to the geometric spreading of the sound waves. Atmospheric conditions such as humidity, temperature, and wind gradients can also temporarily either increase or decrease sound levels. In general, the greater the distance the receiver is from the source, the greater the potential for variation in sound levels due to atmospheric effects. Additional sound attenuation can result from built features such as intervening walls and buildings, and by natural features such as hills and dense woods.

2.7 GROUNDBORNE VIBRATION FUNDAMENTALS

Groundborne vibration is a small, rapidly fluctuating motion transmitted through the ground. The strength of groundborne vibration attenuates fairly rapidly over distance. Some soil types transmit vibration quite efficiently; other types (primarily sandy soils) do not. Several basic measurement units are commonly used to describe the intensity of ground vibration. The descriptors used by the

Federal Transit Administration are peak particle velocity (PPV), in units of inches per second, and velocity decibel (VdB).

The calculation to determine PPV at a given distance is as follows:

$$PPV_{dist} = PPV_{ref}*(25/D)^{1.5}$$

where:

PPV_{dist} = the peak particle velocity in inches per second of the equipment adjusted for distance

PPV_{ref} = the reference vibration level in inches per second at 25 feet

D = the distance from the equipment to the receiver

The velocity parameter (instead of acceleration or displacement) best correlates with human perception of vibration. Thus, the response of humans, buildings, and sensitive equipment to vibration is described in this section in terms of the root-mean square velocity level in VdB units relative to 1 micro-inch per second. As a point of reference, the average person can just barely perceive vibration velocity levels below 70 VdB (typically in the vertical direction). The calculation to determine the root-mean square at a given distance is as follows:

$$L_v(D) = L_v(25\ feet) - 30*\log(D/25)$$

where:

$L_v(D)$ = the vibration level at the receiver

$L_v(25\ feet)$ = the reference source vibration level

D = the distance from the vibration activity to the receiver

Typical background vibration levels are between 50 and 60 VdB, and the level for minor cosmetic damage to fragile buildings or blasting generally begins at 100 VdB.

3 REGULATORY SETTING

3.1 FEDERAL

There are no applicable federal regulations related to noise that would apply to the MWMP.

3.2 STATE

Government Code Section 65302(g)

California Government Code Section 65302(g) requires the preparation of a Noise Element, which shall identify and appraise the noise problems in the community. The Noise Element shall recognize the guidelines adopted by the Office of Noise Control in the State Department of Health Services and shall quantify, to the extent practicable, current and projected noise levels for the following sources:

- Highways and freeways
- Primary arterials and major local streets
- Passenger and freight online railroad operations and ground rapid transit systems
- Aviation and airport-related operations
- Local industrial plants
- Other ground stationary noise sources contributing to the community noise environment

3.3 LOCAL

3.3.1 CITY OF SAN DIEGO

City of San Diego Municipal Code Section 59.5.0401 (Noise Ordinance)

Section 59.5.0401 of the City's Municipal Code sets forth sound level limits. It is unlawful for any person to cause noise by any means to the extent that the 1-hour average sound level exceeds the applicable limit given in Table 2 at any location in the City of San Diego on or beyond the boundaries of the property on which the noise is produced. The noise subject to these limits is the part of the total noise at the specified location that is due solely to the action of said person/event.

Table 2
City of San Diego Applicable Limits

Land Use	Time of Day	1-Hour Average Sound Level Limit (dBA)
Single-family residential	7:00 a.m.–7:00 p.m.	50
	7:00 p.m.–10:00 p.m.	45
	10:00 p.m.–7:00 a.m.	40
Multi-family residential (up to a maximum density of 1/2,000)	7:00 a.m.–7:00 p.m.	55
	7:00 p.m.–10:00 p.m.	50
	10:00 p.m.–7:00 a.m.	45
All other residential	7:00 a.m.–7:00 p.m.	60
	7:00 p.m.–10:00 p.m.	55
	10:00 p.m.–7:00 a.m.	50
Commercial	7:00 a.m.–7:00 p.m.	65
	7:00 p.m.–10:00 p.m.	60
	10:00 p.m.–7:00 a.m.	60
Industrial or agricultural	Any time	75

Source: City of San Diego 2010.
dBA = A-weighted decibel.

City of San Diego Municipal Code Section 59.5.0404 (Noise Ordinance)

Construction Noise

Section 59.5.0404 of the City's Municipal Code sets forth limitations related to construction noise (City of San Diego 2010).

A. It shall be unlawful for any person, between the hours of 7:00 p.m. of any day and 7:00 a.m. of the following day, or on legal holidays as specified in Section 21.04 of the San Diego Municipal Code, with exception of Columbus Day and Washington's Birthday, or on Sundays, to erect, construct, demolish, excavate for, alter, or repair any building or structure in such a manner as to create disturbing, excessive, or offensive noise unless a permit has been applied for and granted beforehand by the Noise Abatement and Control Administrator. In granting such permit, the Administrator shall consider whether the construction noise in the vicinity of the proposed work site would be less objectionable at night than during the daytime because of different population densities or different neighboring activities; whether obstruction and interference with traffic, particularly on streets of major importance, would be less objectionable at night than during the daytime; whether the type of work to be performed

emits noises at such a low level as to not cause significant disturbances in the vicinity of the work site; the character and nature of the neighborhood of the proposed work site; whether great economic hardship would occur if the work were spread over a longer time; and whether proposed night work is in the general public interest; and he/she shall prescribe such conditions, working times, types of construction equipment to be used, and permissible noise levels as he/she deems to be required in the public interest.

B. Except as provided in Subsection C hereof, it shall be unlawful for any person, including the City of San Diego, to conduct any construction activity so as to cause, at or beyond the property lines of any property zoned residential, an average sound level greater than 75 decibels during the 12-hour period from 7:00 a.m. to 7:00 p.m.

C. The provisions of Subsection B of this section shall not apply to construction equipment used in connection with emergency work, provided the Administrator is notified within 48 hours after commencement of work.

City of San Diego Significance Determination Thresholds

The City has guidance for determination of significance according to CEQA, including what would constitute a significant noise impact (City of San Diego 2016). These thresholds are used in this analysis and are provided in Section 4.2. Threshold categories are as follows: (1) interior and exterior noise impacts from traffic-generated noise; (2) noise impacts on or from projects funded by the U.S. Department of Housing and Urban Development; (3) airport noise impacts; (4) noise impacts from adjacent stationary uses (noise generators), such as car washes or other noisy equipment; (5) noise impacts to sensitive wildlife; (6) noise impacts from temporary construction noise; and (7) noise/land use compatibility. Of these, threshold categories 5, 6, and 7 are applicable to the MWMP. Threshold category 5 is addressed in the MWMP's Biological Technical Report. Therefore, the Noise Analysis Technical Report focuses on the noise thresholds relating to category 6 (i.e., noise impacts from temporary construction-type (maintenance activity) noise) and category 7 (noise/land use compatibility).

THIS PAGE INTENTIONALLY LEFT BLANK FOR DOUBLE-SIDED PRINTING

4 EXISTING CONDITIONS

Given the wide geographical area encompassed by the MWMP, the existing noise environments are varied. In general, the MWMP plan-wide area mainly consists of suburban land uses. The noise environments through most of the MWMP plan-wide area are characterized by a background or "ambient" noise level generated by vehicular traffic. Typical secondary noise sources include distant aircraft, rustling leaves, landscaping maintenance, construction noise, birds, children playing, and passing conversations. Noise-sensitive receptors are locations where human activity may be adversely affected by noise. Examples of noise sensitive receptors are residences, hotels and motels, educational institutions, libraries, and hospitals and clinics. The locations of noise-sensitive receptors within 1,000 feet of the proposed MWMP plan-wide area are shown in Figure 2, City-Wide Overview/Index Map, and Figures 2a through 2g.

4.1 AMBIENT NOISE MONITORING

Noise measurements were made using a Rion NL-52 integrating sound-level meter equipped with a 0.5-inch pre-polarized condenser microphone with pre-amplifier. The sound-level meter meets the current American National Standards Institute standard for a Type 1 (Precision Grade) sound-level meter. The sound-level meter was calibrated before and after the measurements, and the measurements were conducted with the microphone positioned five feet above the ground and covered with a windscreen.

Short-term noise measurements were conducted at nine locations in the MWMP vicinity on November 6, 2017, as depicted in Figure 2 and Figures 2a through 2g, Noise Sensitive Receptors and Measurement Locations. These figures show noise sensitive receptors within 1,000 feet of MWMP facilities. These selected noise measurement locations are representative of the existing noise conditions throughout the MWMP plan-wide area. Long-term (i.e., 24-hour) noise measurements were not conducted because there would be no MWMP-related activity during the night-time hours.

A brief description of where each noise measurement was conducted, as well as the measured time-average sound level and maximum sound level during the measurement interval (L_{max}), is summarized in Table 3. Detailed noise measurement data are included as Appendix A to this report.

Table 3
MWMP Measured Noise Locations and Levels

Receptors	Description	L_{eq} (dBA)	L_{max} (dBA)
ST1	West of C3 Performing Arts Center; 25 feet south of Alvarado Creek.	56.1	63.2
ST2	North of 1850 Titus Street, San Diego, California 92110; along Robyn's Egg Trail	43.4	51.9
ST3	Southeast corner of 730 Camino del Rio North, San Diego, California 92108	74.4	87.9
ST4	Front yard of 3488 Fireway Drive, San Diego, California 92111	57.7	73.6
ST5	North of multi-family residential complex on Caminito Vecinos, San Diego, California; east of Pomerado Road, San Diego	59.4	72.7
ST6	North of Canyonside Recreation Facility, San Diego	63.3	77.5
ST7	East of Home Avenue Head Start Center, San Diego; East side of Spillman Drive	54.7	65
ST8	Southwest side of Southcrest Community Park	59.4	73.9
ST9	South of U.S. Border Patrol, San Diego Headquarters	57.2	77.6

Source: Appendix A. Figures 2a–2g.
L_{eq} = equivalent continuous sound level (time-averaged sound level); L_{max} = maximum sound level during the measurement interval; dBA = A-weighted decibel.

Previous individual noise assessments were conducted as part of a Master Storm Water System Maintenance Program between 2013 and 2018 at an additional 29 locations within the MWMP vicinity, as depicted on Figures 2a through 2g. Results of these measurements are summarized in Table 4. Detailed noise measurement data are included as Appendix A to this report.

Table 4
Additional Measured Noise Levels

Project Location	Site	L_{eq} (dBA)	L_{90} (dBA)
Alvarado	ST1	65	N/A
Stadium	ST1	65	62
	ST2	62	60
	ST3	67	65
	ST4	70	67
	ST5	64	61

Table 4
Additional Measured Noise Levels

Project Location	Site	L_{eq} (dBA)	L_{90} (dBA)
Tijuana River	ST1	56	46
	ST2	50	38
	ST3	51	37
	ST4	53	40
	ST5	46	41
	ST6	56	46
	ST7	45	34
	ST8	55	41
	ST9	69	51
Mission Bay	ST1	54	n/a
	ST2	54	n/a
	ST3	55	n/a
Sorrento	ST1	58	54
	ST2	73	47
	ST3	75	72
	ST4	69	62
	ST5	60	55
	ST6	64	60
Montezuma	ST1	41	n/a
	ST2	39	n/a
	ST3	42	n/a
Federal	ST1	71	n/a
	ST2	75	n/a

Sources: Appendix A. and Figures 2a–2g.
L_{eq} = equivalent continuous sound level (time-averaged sound level); L_{90} = sound level exceeded 90% over measurement interval; dBA = A-weighted decibel; N/A = not available.

THIS PAGE INTENTIONALLY LEFT BLANK FOR DOUBLE-SIDED PRINTING

City of San Diego

Noise Measurement Locations

Existing Noise Measurement Locations

- Alvarado
- Federal
- Mission Bay
- Montezuma
- Stadium
- Sorrento
- Tijuana River

Waterways Maintenance Plan

- Project Facility Maintenance Plans (FMPs)
- Additional Facilities (WMP Limited Program-Level Activities)

2a

2b

2c

2d

2e

2f

2g

Watershed

- San Dieguito River
- Los Peñasquitos
- Mission Bay
- San Diego River
- Pueblo San Diego
- Sweetwater
- Otay
- Tijuana River

N

0 2.5 5 Miles

DUDEK

The City of SAN DIEGO

SOURCE: ESRI, 2017; SANDAG, 2017; USGS, 2012

Noise Sensitive Receptors and Measurement Locations

Municipal Waterways Maintenance Plan EIR

Noise Analysis Technical Report

Figure 2 - City-Wide Overview/Index Map

THIS PAGE INTENTIONALLY LEFT BLANK FOR DOUBLE-SIDED PRINTING

City of San Diego
Noise Analysis Area
Noise Measurement Locations

Sensitive Receptor Location

Residential
Recreation
Public Institution

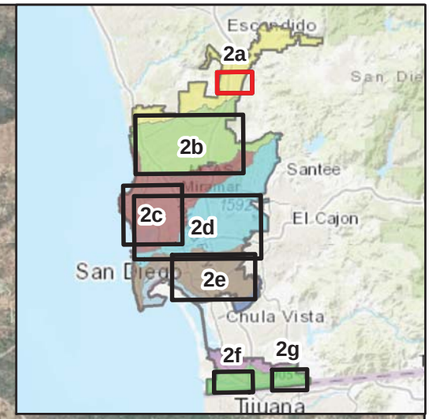
Waterways Maintenance Plan

Project Facility Maintenance Plans (FMPs)
Additional Facilities (WMP Limited Program-Level Activities)

Watershed

San Dieguito River
Los Peñasquitos

Green Valley Creek - Paseo del Verano
Green Valley Creek - Pomerado
ST5
15



N
0 0.25 0.5 Miles

SOURCE: ESRI, 2016; SANDAG, 2016; USGS, 2012

DUDEK

The City of SAN DIEGO

Noise Analysis Technical Report

Noise Sensitive Receptors and Measurement Locations
Municipal Waterways Maintenance Plan EIR

Figure 2a- San Dieguito Watershed

THIS PAGE INTENTIONALLY LEFT BLANK FOR DOUBLE-SIDED PRINTING

City of San Diego
Noise Analysis Area
Noise Measurement Locations

Existing Noise Measurement Locations

Sorrento

Sensitive Receptor Location

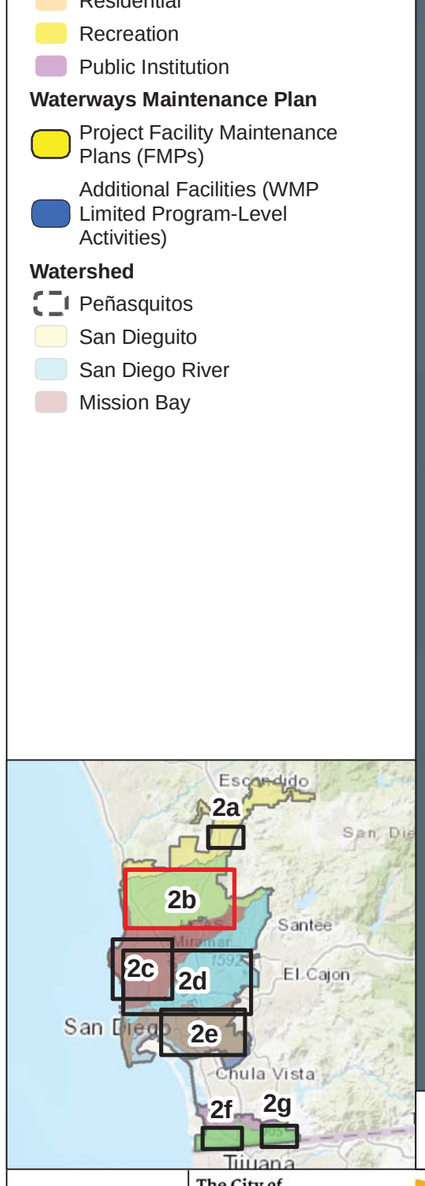
Residential
Recreation
Public Institution

Waterways Maintenance Plan

Project Facility Maintenance Plans (FMPs)
Additional Facilities (WMP Limited Program-Level Activities)

Watershed

Peñasquitos
San Dieguito
San Diego River
Mission Bay



SOURCE: ESRI, 2016; SANDAG, 2016; USGS, 2012

DUDEK

The City of SAN DIEGO

Noise Analysis Technical Report

Noise Sensitive Receptors and Measurement Locations
Municipal Waterways Maintenance Plan EIR

Figure 2b - Los Peñasquitos Watershed

THIS PAGE INTENTIONALLY LEFT BLANK FOR DOUBLE-SIDED PRINTING

City of San Diego

Noise Analysis Area

Noise Measurement Locations

Existing Noise Measurement Locations

Mission Bay

Sensitive Receptor Location

Residential

Recreation

Public Institution

Waterways Maintenance Plan

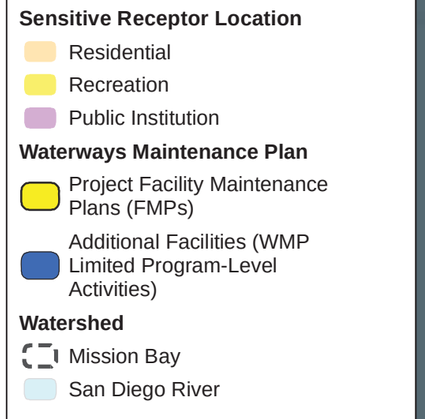
Project Facility Maintenance Plans (FMPs)

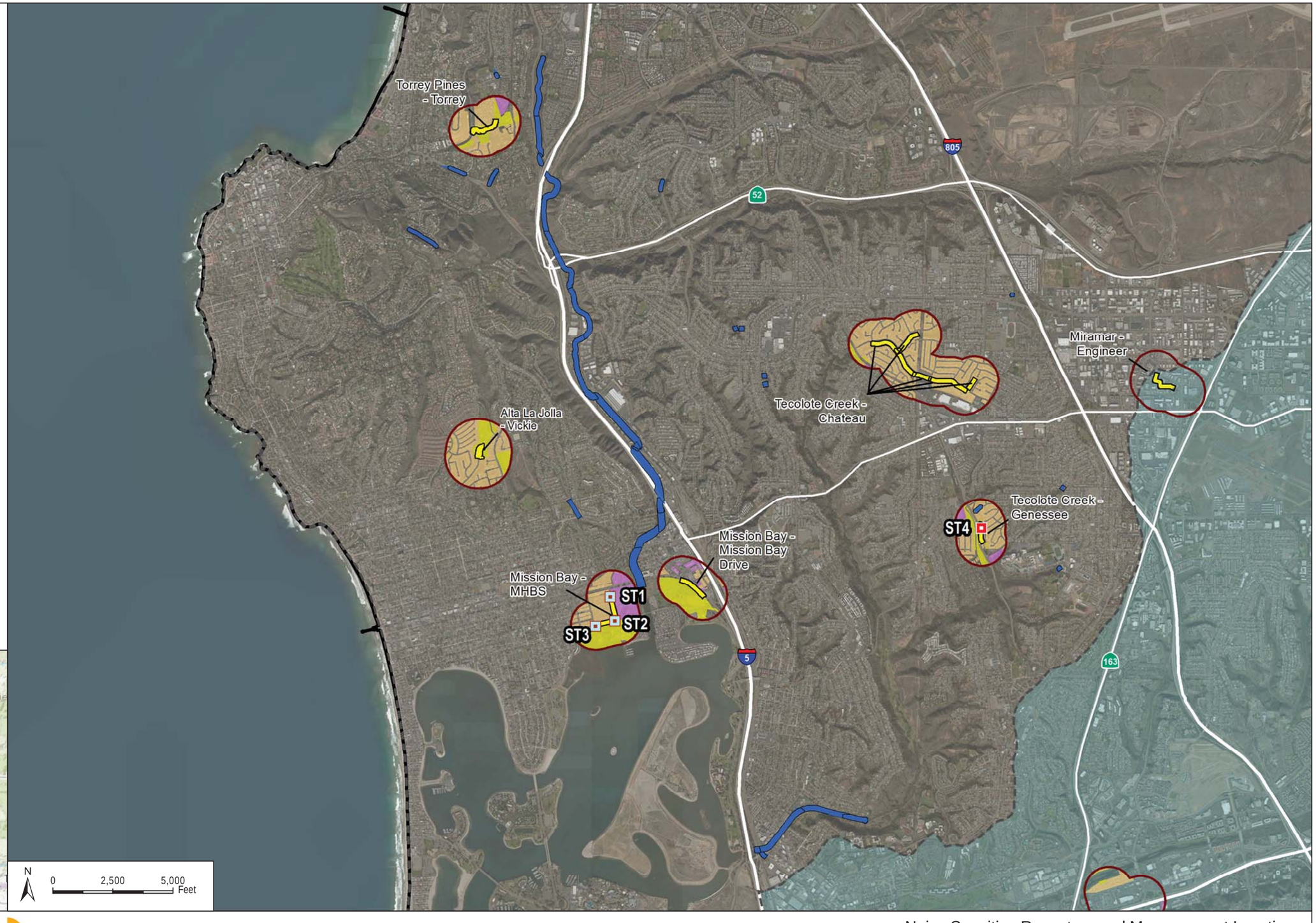
Additional Facilities (WMP Limited Program-Level Activities)

Watershed

Mission Bay

San Diego River





SOURCE: ESRI, 2016; SANDAG, 2016; USGS, 2012

DUDEK

The City of SAN DIEGO

Noise Analysis Technical Report

Noise Sensitive Receptors and Measurement Locations
Municipal Waterways Maintenance Plan EIR

Figure 2c - Mission Bay Watershed

THIS PAGE INTENTIONALLY LEFT BLANK FOR DOUBLE-SIDED PRINTING

City of San Diego

Noise Analysis Area

Noise Measurement Locations

Existing Noise Measurement Locations

Alvarado

Montezuma

Stadium

Sensitive Receptor Location

Residential

Recreation

Public Institution

Waterways Maintenance Plan

Project Facility Maintenance Plans (FMPs)

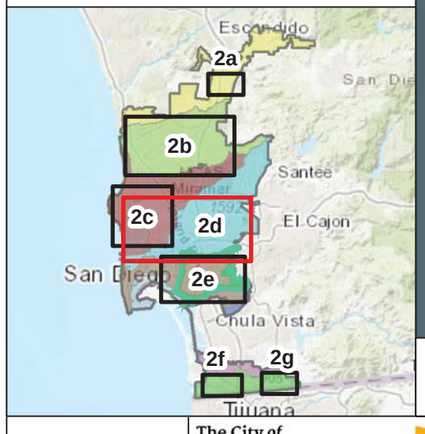
Additional Facilities (WMP Limited Program-Level Activities)

Watershed

San Diego River

Mission Bay

Pueblo San Diego



SOURCE: ESRI, 2016; SANDAG, 2016; USGS, 2012

DUDEK

The City of SAN DIEGO

Noise Analysis Technical Report

Noise Sensitive Receptors and Measurement Locations
Municipal Waterways Maintenance Plan EIR

Figure 2d - San Diego River Watershed

THIS PAGE INTENTIONALLY LEFT BLANK FOR DOUBLE-SIDED PRINTING

City of San Diego

Noise Analysis Area

Noise Measurement Locations

Existing Noise Measurement Locations

Federal

Sensitive Receptor Location

Residential

Recreation

Public Institution

Open Space

Waterways Maintenance Plan

Project Facility Maintenance Plans (FMPs)

Additional Facilities (WMP Limited Program-Level Activities)

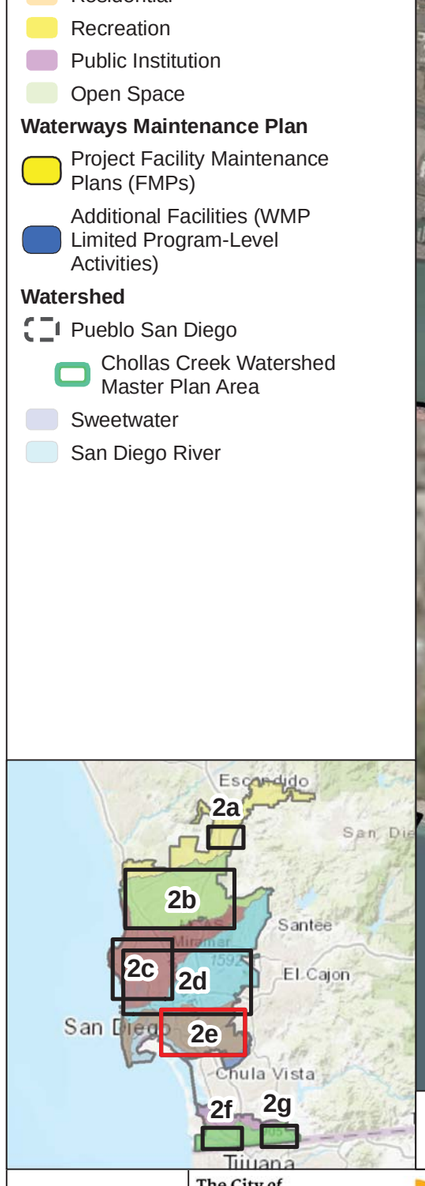
Watershed

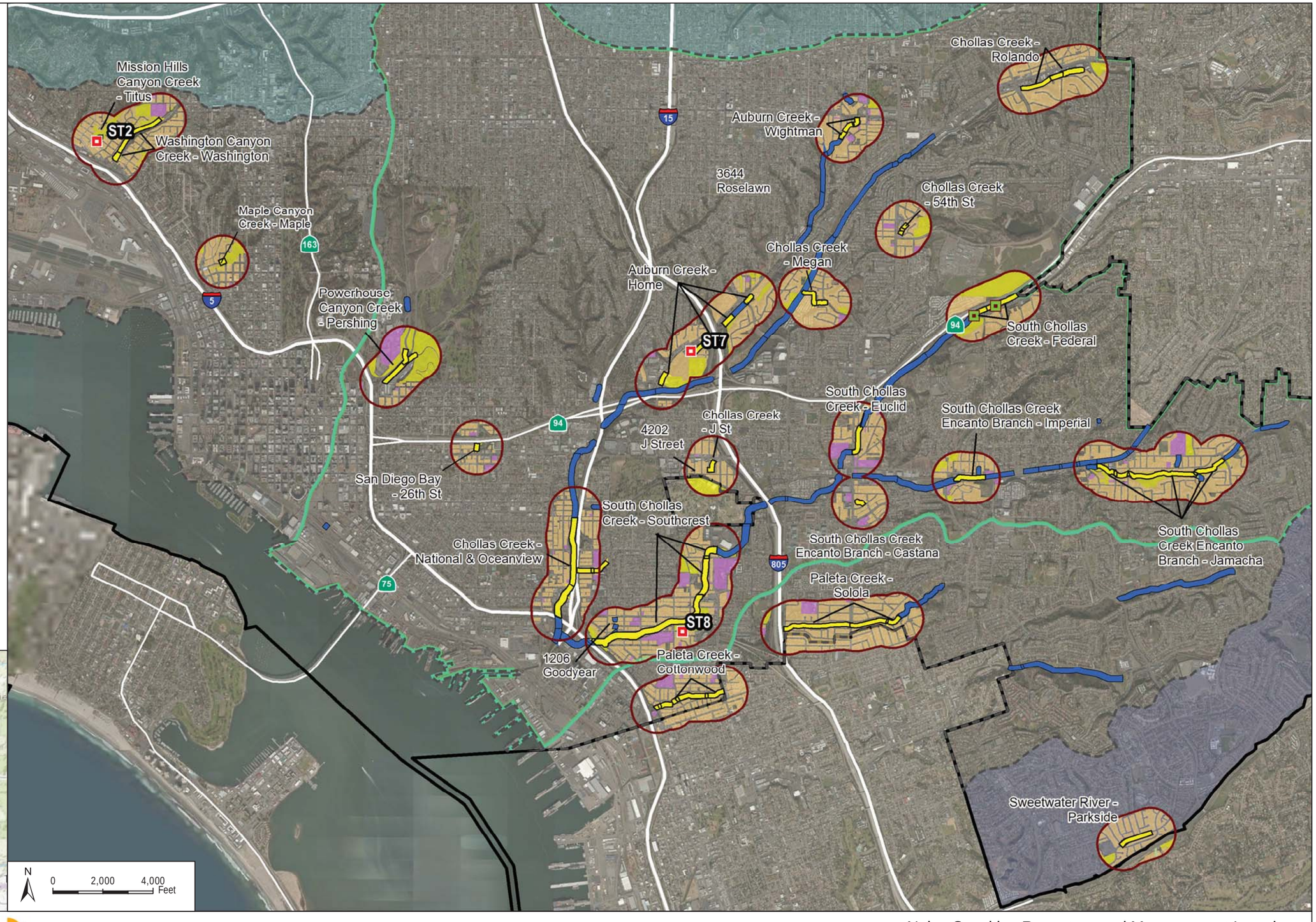
Pueblo San Diego

Chollas Creek Watershed Master Plan Area

Sweetwater

San Diego River





SOURCE: ESRI, 2016; SANDAG, 2016; USGS, 2012

DUDEK

The City of SAN DIEGO

Noise Sensitive Receptors and Measurement Locations
Municipal Waterways Maintenance Plan EIR

Noise Analysis Technical Report

Figure 2e - Pueblo San Diego and Sweetwater Watersheds

THIS PAGE INTENTIONALLY LEFT BLANK FOR DOUBLE-SIDED PRINTING

City of San Diego

Noise Analysis Area

Existing Noise Measurement Locations

Tijuana River

Sensitive Receptor Location

Residential

Recreation

Public Institution

Waterways Maintenance Plan

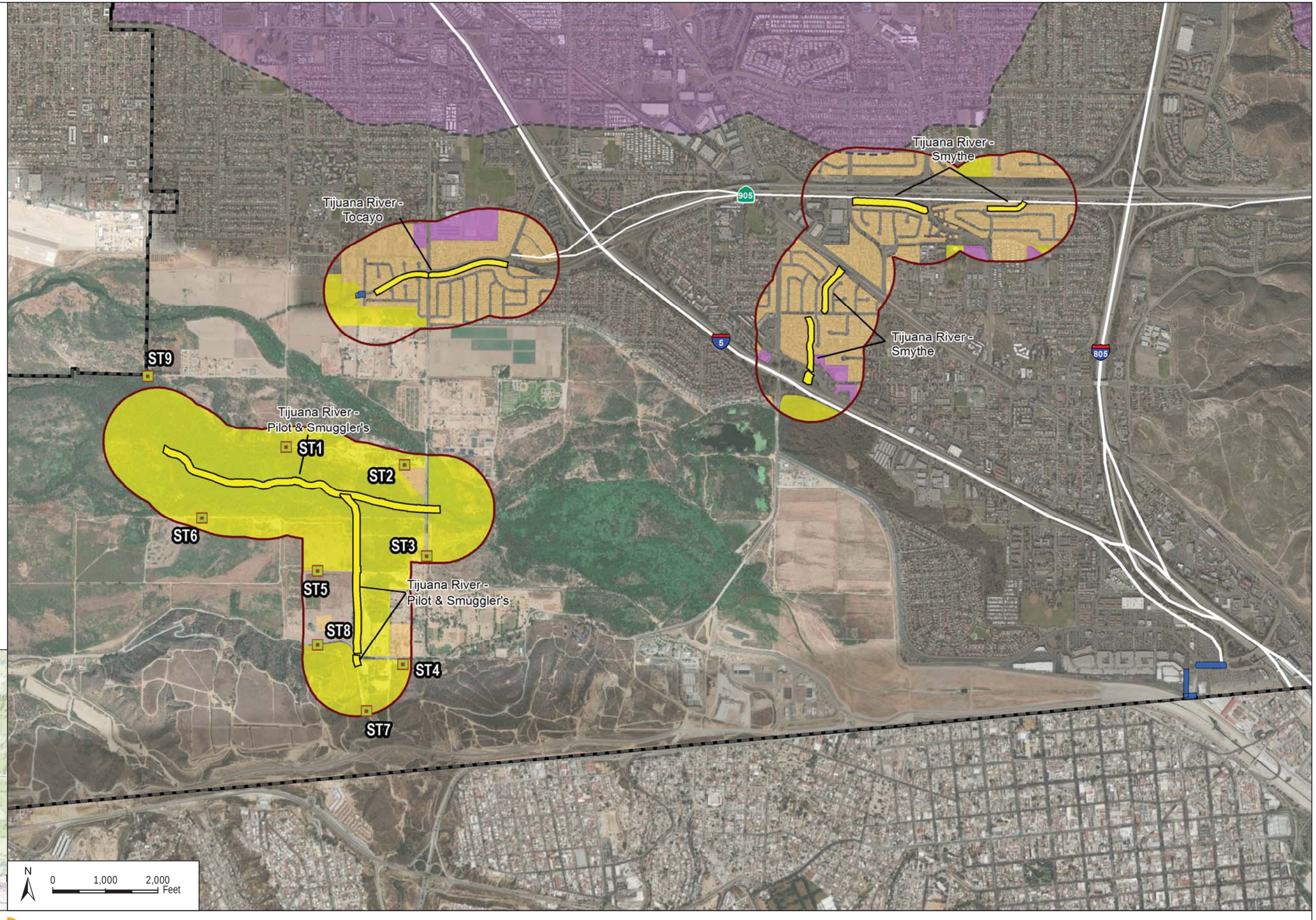
Project Facility Maintenance Plans (FMPs)

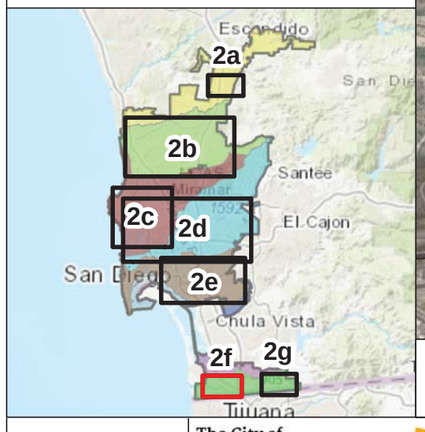
Additional Facilities (WMP Limited Program-Level Activities)

Watershed

Tijuana River Watershed (Sheet 1)

Otay





DUDEK

The City of SAN DIEGO

SOURCE: ESRI, 2016; SANDAG, 2016; USGS, 2012

Noise Analysis Technical Report

Noise Sensitive Receptors and Measurement Locations
Municipal Waterways Maintenance Plan EIR

Figure 2f - Tijuana River Watershed (Sheet 1)

THIS PAGE INTENTIONALLY LEFT BLANK FOR DOUBLE-SIDED PRINTING

City of San Diego

Noise Analysis Area

Noise Measurement Locations

Sensitive Receptor Location

Residential

Recreation

Public Institution

Waterways Maintenance Plan

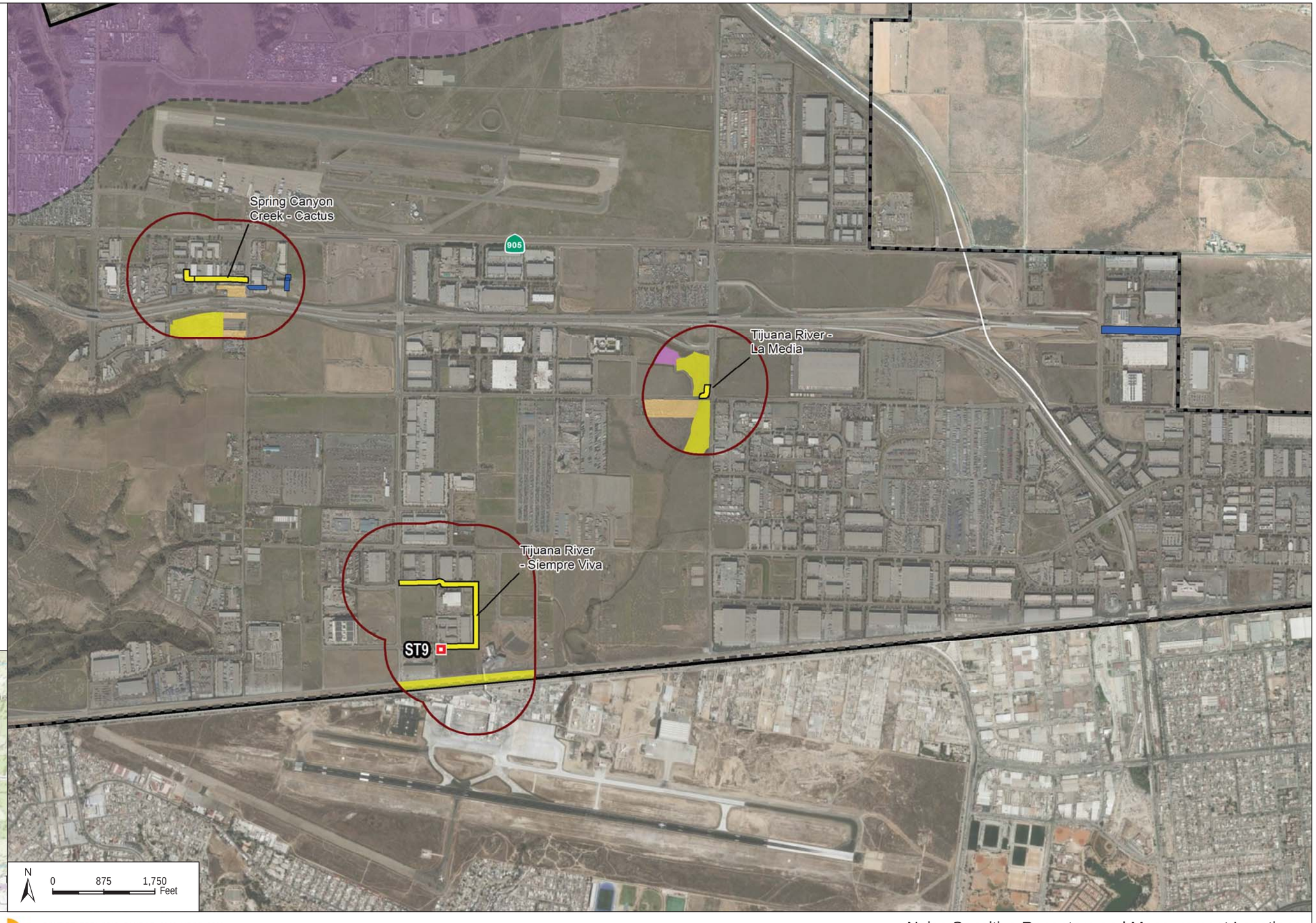
Project Facility Maintenance Plans (FMPs)

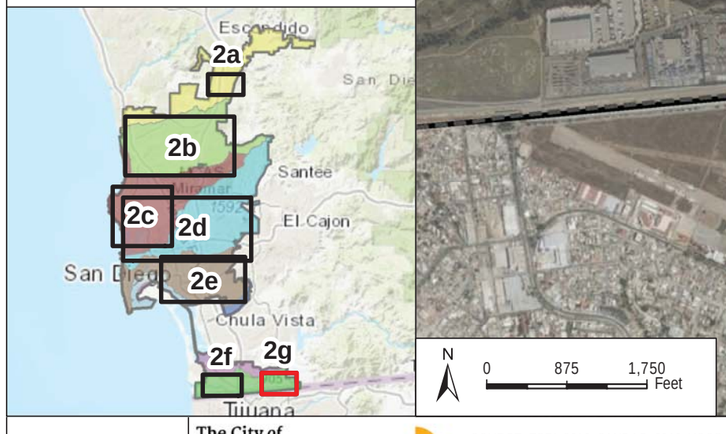
Additional Facilities (WMP Limited Program-Level Activities)

Watershed

Tijuana River Watershed (Sheet 2)

Otay





N

0 875 1,750 Feet

SOURCE: ESRI, 2016; SANDAG, 2016; USGS, 2012

DUDEK

The City of SAN DIEGO

Noise Analysis Technical Report

Noise Sensitive Receptors and Measurement Locations
Municipal Waterways Maintenance Plan EIR

Figure 2g - Tijuana River Watershed (Sheet 2)

THIS PAGE INTENTIONALLY LEFT BLANK FOR DOUBLE-SIDED PRINTING

4.2 SIGNIFICANCE CRITERIA AND METHODOLOGY

4.2.1 THRESHOLDS OF SIGNIFICANCE

The City's *California Environmental Quality Act (CEQA) Significance Determination Thresholds* (City of San Diego 2016) and Appendix G of the CEQA Guidelines contain significance guidelines related to noise. The following questions are adapted from the City's Significance Thresholds and Appendix G of the CEQA Guidelines, and provide guidance to determine potential significance for noise impacts:

1. Would the project result in or create a significant increase in the existing ambient noise level?
2. Would the project result in the exposure of people to noise levels which exceed the City's adopted noise ordinance or are incompatible with Table K-4?[1]
3. Would the project result in the exposure of people to current or future transportation noise levels which exceed standards established in the Transportation Element of the General Plan or an adopted airport Comprehensive Land Use Plan (CLUP)?
4. Would the project result in land uses which are not compatible with aircraft noise levels as defined by an adopted airport CLUP?
5. Would the project result in the exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?

The City's *California Environmental Quality Act (CEQA) Significance Determination Thresholds* (City of San Diego 2016) document provides guidance for City staff, project proponents, and the public for determining whether, based on substantial evidence, a project may have a significant effect on the environment under Section 21082.2 of CEQA.

4.2.2 APPROACH AND METHODOLOGY

4.2.2.1 Construction Noise Assumptions for Maintenance and Repair

To provide a conservative analysis of typical proposed projects, representative projects were identified by the City based on input from City engineers and operations staff. Information regarding a typical maintenance scenario, including anticipated phasing and phase duration, and equipment, was generated for each of these representative projects.

[1] City of San Diego Noise Land Use Compatibility Chart, California Environmental Quality Act Significance Determination Thresholds, Development Services Department, January 2016. Reproduced in this report as Table 17.

These representative projects are intended to represent a high-level intensity scenario associated with proposed MWMP implementation. Construction specifications of each activity would vary depending on the subject site characteristics, maintenance or improvement needs, and type of proposed solution; however, construction requirements for activities within the same category are not expected to differ substantially. Because several of the proposed activities address similar issues, the proposed solutions include similar procedures, many of which are techniques the City has historically used to resolve common issues, including routine activities that do not require advanced planning and design. Therefore, although maintenance of each proposed project- and program-level activity would differ from the scenarios analyzed in the MWMP EIR, the modeled representative projects and estimated maximum noise levels included herein represent a conservative assessment of noise impacts associated with anticipated project- and program-level maintenance. A discussion of programmatic activities and potential impacts is provided in Section 5.9, Noise, of the EIR.

The Federal Highway Administration's Roadway Construction Noise Model (RCNM) (FHWA 2008) and the representative projects' equipment information were used to estimate maintenance noise levels at the nearest noise-sensitive land uses. The RCNM is a national model based on the noise calculations and extensive construction noise data compiled for the Central Artery/Tunnel Project in Boston, Massachusetts. This project, which began in the early 1990s, was one of the largest urban construction projects ever built in the United States. The basis for the national model is a spreadsheet tool developed in support of the Central Artery/Tunnel Project. The Central Artery/Tunnel Project predictions originated from U.S. Environmental Protection Agency noise-level work and an Empire State Electric Energy Research Corporation Guide, which uses an "acoustical usage factor" to estimate the fraction of time each piece of construction equipment is operating at full power (i.e., its loudest condition) during a construction operation (FHWA 2006).

Input variables for the RCNM consist of the receiver/land use types, the equipment type and number of each equipment type (e.g., two excavators, one loader, one dump truck), the duty cycle for each piece of equipment (i.e., percentage of hours the equipment typically works per day), and the distance from the sensitive noise receptor. The RCNM has default duty cycle values for the various pieces of equipment, which were derived from an extensive study of typical construction activity patterns. Those default duty cycle values were used for this analysis.

Representative Projects

The representative projects are broadly characterized into two main site categories: concrete-lined and earthen-bottom segments. Both site categories include multiple representative segment Facility Maintenance Plans (FMPs) to provide a range of scenarios that could occur over the course of the

MWMP. See Selection of Representative Projects for the Municipal Waterways Maintenance Plan (Appendix K of the MWMP EIR).

Concrete-Lined Facilities

Proposed maintenance activities in concrete-lined facilities are represented by four representative segment FMPs of varying intensity: 20% or more of the facility requires vegetation removal, less than 20% of the facility requires vegetation removal, minor concrete repair, and major concrete repair. Of the 113 proposed segment FMPs, 43 segments (38%) consist of less than 20% vegetation removal and 11 segments (10%) would consist of 20% or more vegetation removal. Additionally, it was estimated that within the 113 FMPs, 50 segments may require minor concrete repair and five segments may require major concrete repair.[2]

Earthen-Bottom Facilities

Proposed maintenance activities in earthen-bottom facilities would include six representative segment FMPs of varying intensity: large to small channels/ditches and basins, outlet/inlet structures, and a facility that is atypical in size. Of the 113 proposed MWMP segment FMPs, 47 (42%) would consist of earthen-bottom channel/ditch or basin segments and 10 (9%) would consist of outlet/inlet structures. In addition, one project, the Tijuana River Smuggler's Gulch project, was analyzed to represent the maximum intensity of anticipated activities associated with earthen-bottom facilities. The Tijuana River Smuggler's Gulch project includes two segments and represents 2% of the FMPs. The earthen-bottom channel/ditch and basins are represented by four representative projects each to provide a more complete picture of geographies in the City for typical projects.

Maintenance Timing and Duration

Maintenance of all segments would be ongoing. However, based on the Transportation & Storm Water Department's fleet and personnel capacity, it was determined that a maximum of 10 maintenance activities[3] could occur concurrently and represent the most conservative possible daily scenario.

[2] Concrete repair represents additional facility work at locations where vegetation and sediment removal are also anticipated and do not represent separate facilities or standalone FMPs. These concrete repair projects therefore do not count toward the 113 segment FMPs.

[3] Representative projects used to estimate maximum concurrent daily activities include representative project ID's 1 through 5 and 7 through 10, with project ID 9 duplicated to represent two occurrences.

4.2.2.2 Representative Concrete-Lined Maintenance and Repair Projects

The representative proposed concrete-lined facility maintenance and repair projects selected for this noise analysis are described in this section. Table 5 presents a summary of the representative proposed concrete-lined facility maintenance and repair projects analyzed herein.

Table 5
Representative Concrete-Lined Maintenance and Repair Projects Summary

Project ID	Potential Scenarios	Approx. No. of FMP Segments Represented	Representative Facility Maintenance Plan	Approx. Linear Feet	Approx. Cubic Yards
1	Concrete with vegetation removal (20% or more vegetated)	11	San Diego River – Camino del Rio Segment 1	1,000	800
2	Concrete with vegetation removal (less than 20% vegetated)	43	Alvarado Canyon Creek – Mission Gorge Segment 2	600	1,400
3	Minor Concrete repair	50	Generic Concrete Repair FMP	50	32
4	Major concrete repair	5	Tijuana River – Via Encantadoras Segment 3	900	121

FMP = Facility Maintenance Plan

Details and maintenance activity assumptions for each representative project are provided in the following sections.

Concrete-Lined with 20% or More Vegetation Removal

Of the 113 proposed MWMP segment FMPs, 11 segments (10%) are estimated to require 20% or more vegetation removal (i.e., more than 20% of the facility supports mature vegetation cover). The San Diego River–Camino del Rio Segment 1 was chosen to represent these projects. The sediment/debris at this site was 3–4 feet deep with dense or very dense vegetation requiring mechanical removal. Maintenance scenario details for concrete-lined facilities requiring 20% or more vegetation removal are provided in Table 6.

Table 6
Representative Project 1 Assumptions – Concrete-Lined Facilities with 20% or More Vegetation Removal

Maintenance Activity Phase	Days	One-Way Vehicle Trips			Equipment		
		Average Daily Worker Trips	*Average Daily Vendor Truck Trips*	*Total Haul Truck Trips*	*Equipment Type*	*Quantity*	*Usage Hours*
Maintenance Activities	10	48	4	100	Excavators	1	8
					Skid steer loaders	1	8
					Crushing/ Processing Equipment[1]	1	8
					Sweeper/ scrubber[2]	1	2
Pump Use	2	0	0	0	Pumps	6	6

Notes: Equipment and activities listed are from the Facility Maintenance Plan San Diego River–Camino del Rio assumptions sheet.

1 Adjusted to 10 horsepower to reflect the use of EZ-Screen 1000XL.

2 Adjusted to 142 horsepower to reflect the weighted average of Global Sweeping 4 Wheel Center, Schwarze M6000, Tymco 500X, Allianz Johnston 4000SP, Allianz Johnston Madvac 4000, and Tymco 210SRE.

Concrete-Lined with Less than 20% Vegetation Removal

Of the 113 proposed MWMP segment FMPs, 43 segments (38%) are estimated to require less than 20% vegetation removal (i.e., less than 20% of the facility supports mature vegetation cover). The Alvarado Canyon Creek–Mission Gorge Segment 2 was chosen to represent these projects. The sediment/debris at this site was ranged between bare concrete to 2.5 feet of sediment/debris. Vegetation ranged from light to heavy. Maintenance scenario details for concrete-lined facilities that require 20% or less vegetation removal are provided in Table 7.

Table 7
Representative Project 2 Assumptions – Concrete-Lined Facilities with Less Than 20% Vegetation Removal

Maintenance Activity Phase	Days	One-Way Vehicle Trips			Equipment		
		Average Daily Worker Trips	*Average Daily Vendor Truck Trips*	*Total Haul Truck Trips*	*Equipment Type*	*Quantity*	*Usage Hours*
Maintenance Activities	14	48	2	175	Excavators	1	8
					Skid steer loaders	1	8
					Tractors/loaders/ backhoes	1	8
					Crane	1	4
					Sweeper/scrubber[1]	1	2
Pump Use	3	0	0	0	Pumps	6	6

Notes: Equipment and activities listed are from the Facility Maintenance Plan Alvarado Canyon Creek–Mission Gorge Segment 2 assumptions sheet and Facility Maintenance Plan assumptions sheets for similar representative projects.

[1] Adjusted to 142 horsepower to reflect the weighted average of Global Sweeping 4 Wheel Center, Schwarze M6000, Tymco 500X, Allianz Johnston 4000SP, Allianz Johnston Madvac 4000, and Tymco 210SRE.

Minor Concrete Repair

Of the 113 proposed MWMP segment FMPs, 50 segments (44%) with minor concrete repair are estimated to occur. A general concrete repair FMP Segment was chosen to represent these projects. The segment would include 50 feet of concrete repair and 6 cubic yards of haul. Maintenance scenario details for concrete repair are provided in Table 8.

Table 8
Representative Project 3 Assumptions – Minor Concrete Repair

Maintenance Activity Phase	Days	One-Way Vehicle Trips			Equipment		
		Average Daily Worker Trips	*Average Daily Vendor Truck Trips*	*Total Haul Truck Trips*	*Equipment Type*	*Quantity*	*Usage Hours*
Concrete Repair	10	48	6	2	Excavators	1	5
					Backhoes (tractors/	1	5

Table 8
Representative Project 3 Assumptions – Minor Concrete Repair

Maintenance Activity Phase	Days	One-Way Vehicle Trips			Equipment		
		Average Daily Worker Trips	*Average Daily Vendor Truck Trips*	*Total Haul Truck Trips*	*Equipment Type*	*Quantity*	*Usage Hours*
					loaders/ backhoes)		
					Pumps	2	5
					Concrete saws (concrete/ industrial saws)	1	5
					Sweeper/ scrubber[1]	1	2

Notes: Equipment and activities listed are from the Concrete Repair Methods Table assumptions sheet.
[1] Adjusted to 142 horsepower to reflect the weighted average of Global Sweeping 4 Wheel Center, Schwarze M6000, Tymco 500X, Allianz Johnston 4000SP, Allianz Johnston Madvac 4000, and Tymco 210SRE.

Major Concrete Repair

Of the 113 proposed MWMP segment FMPs, five segments (5%) are estimated to require major concrete repair. The Via Encantadoras Segment 3 was chosen to represent these projects. These projects were assumed to include the removal of 121 cubic yards of concrete. Maintenance scenario details for major concrete repair are provided in Table 9.

Table 9
Representative Project 4 Assumptions – Major Concrete Repair

Maintenance Activity Phase	Days	One-Way Vehicle Trips			Equipment		
		Average Daily Worker Trips	*Average Daily Vendor Truck Trips*	*Total Haul Truck Trips*	*Equipment Type*	*Quantity*	*Usage Hours*
Concrete Repair	80	48	6	16	Excavators	1	5
					Backhoes (tractors/loaders/ backhoes)	1	5
					Rubber-tired dozers	1	1
					Pumps	2	5
					Concrete saws (concrete/industrial saws)	1	5
					Sweeper/scrubber[1]	1	2

Notes: Equipment and activities listed are from the Facility Maintenance Plan Via Encantadoras Segment 3 assumptions sheet.

[1] Adjusted to 142 horsepower to reflect the weighted average of Global Sweeping 4 Wheel Center, Schwarze M6000, Tymco 500X, Allianz Johnston 4000SP, Allianz Johnston Madvac 4000, and Tymco 210SRE.

4.2.2.3 Representative Earthen-Bottom Facility Maintenance and Repair Projects

The representative proposed earthen-bottom facility maintenance and repair projects selected for this noise analysis are described in this section. Table 10 presents a summary of the representative proposed earthen-bottom facility maintenance and repair projects analyzed herein.

Table 10
Representative Earthen-Bottom Maintenance and Repair Projects Summary

Project ID	Potential Scenarios	Approx. No. of FMP Segments Represented	Representative FMP(s)	Approx. Linear Feet	Approx. Cubic Yards
5	Earthen Facility Typical – 1	8	Mission Bay – Mission Bay Drive Segment 1	1,000	2,600

Table 10
Representative Earthen-Bottom Maintenance and Repair Projects Summary

Project ID	Potential Scenarios	Approx. No. of FMP Segments Represented	Representative FMP(s)	Approx. Linear Feet	Approx. Cubic Yards
6	Earthen Facility Typical – 2	8	Murphy Canyon Creek – Stadium Segment 1	1,700	3,800
7	Earthen Facility Typical – 3	16	Tecolote Creek – Genesee Segment 1	700	3,600
8	Earthen Facility Typical – 4	15	Mission Hills Canyon Creek – Titus Segment 1	80	200
9	Earthen Facility Typical Outlet/Inlet Structure	10	Outlet/Inlet Structure – 4202 J Street	115	32
10	Tijuana River Smuggler's Gulch Project	2	Tijuana River & Smuggler's Gulch – Pilot and Smuggler's Gulch Segments	8,300[1]	30,000

Source: City of San Diego 2016.
Notes: FMP = Facility Maintenance Plan
[1] The Tijuana River Smuggler's Gulch represents two segments modeled as one project and should not be doubled to determine estimated emissions from these segments.

Details and maintenance assumptions for each representative project are provided in the following sections.

Earthen-Bottom Facilities Typical – 1 through 4

Of the 113 proposed MWMP segment FMPs, 47 segments (42%) are classified as earthen-bottom channel/ditch or basin facility maintenance areas. Due to the large proportion of these segments included in the MWMP, four representative projects were used for modeling: Mission Bay Drive, Murphy Canyon Creek Stadium, Tecolote Creek–Genesee, and Mission Hills Canyon Creek–Titus segments. Maintenance scenario details for these segments are provided in Tables 11, 12, 13, and 14.

Table 11
Representative Project 5 Assumptions – Earthen-Bottom Facilities Typical – 1

Maintenance Activity Phase	Days	One-Way Vehicle Trips			Equipment		
		Average Daily Worker Trips	*Average Daily Vendor Truck Trips*	*Total Haul Truck Trips*	*Equipment Type*	*Quantity*	*Usage Hours*
Maintenance Activities	14	60	6	325	Excavators	1	8
					Crushing/processing equipment[1]	1	8
					Crane	1	4
					Sweeper/scrubber[2]	1	2
Vegetation Clearing	2	0	0	0	Fuel-powered hand tools (concrete/ industrial saws)[3]	4	8
Pre-Maintenance Pumping	14	0	0	0	Pumps	2	8
Pump Use	3	0	0	0	Pumps	6	6

Notes: Equipment and activities listed are from the Facility Maintenance Plan Mission Bay; Mission Bay Drive Segment 1 assumptions sheet.

[1] Adjusted to 10 horsepower to reflect the use of EZ-Screen 1000XL.

[2] Adjusted to 142 horsepower to reflect the weighted average of Global Sweeping 4 Wheel Center, Schwarze M6000, Tymco 500X, Allianz Johnston 4000SP, Allianz Johnston Madvac 4000, and Tymco 210SRE.

[3] Adjusted to 9 horsepower to reflect the use of chainsaws.

Table 12
Representative Project 6 Assumptions – Earthen-Bottom Facilities Typical – 2

Maintenance Activity Phase	Days	One-Way Vehicle Trips			Equipment		
		Average Daily Worker Trips	*Average Daily Vendor Truck Trips*	*Total Haul Truck Trips*	*Equipment Type*	*Quantity*	*Usage Hours*
Maintenance Activities	45	72	2	238	Excavators	1	8
					Pumps	2	8
					Rubber-tired dozers	1	8
					Skid steer loaders	1	8

Table 12
Representative Project 6 Assumptions – Earthen-Bottom Facilities Typical – 2

Maintenance Activity Phase	Days	One-Way Vehicle Trips			Equipment		
		Average Daily Worker Trips	*Average Daily Vendor Truck Trips*	*Total Haul Truck Trips*	*Equipment Type*	*Quantity*	*Usage Hours*
					Sweepers/scrubbers[1]	1	2
					Tractors/loaders/ backhoes	1	8
Haul to Remove Stockpile	45	0	0	238	N/A	N/A	N/A
Pump Use	9	0	0	0	Pumps	6	6

Notes: Equipment and activities listed are from the Facility Maintenance Plan Murphy Canyon Creek Stadium Segment 1 assumptions sheet.

[1] Adjusted to 142 horsepower to reflect the weighted average of Global Sweeping 4 Wheel Center, Schwarze M6000, Tymco 500X, Allianz Johnston 4000SP, Allianz Johnston Madvac 4000, and Tymco 210SRE.

Table 13
Representative Project 7 Assumptions – Earthen-Bottom Facilities Typical – 3

Maintenance Activity Phase	Days	One-Way Vehicle Trips			Equipment		
		Average Daily Worker Trips	*Average Daily Vendor Truck Trips*	*Total Haul Truck Trips*	*Equipment Type*	*Quantity*	*Usage Hours*
Maintenance Activities	30	56	2	450	Excavators	1	8
					Pumps	2	8
					Rubber-tired dozers	1	8
					Skid steer loaders	1	8
					Tractors/loaders/ backhoes	1	8
					Sweeper/scrubber[1]	1	2
Pump Use	3	0	0	0	Pumps	6	6

Notes: Equipment and activities listed are from the Facility Maintenance Plan Tecolote Creek–Genesee assumptions sheet.

[1] Adjusted to 142 horsepower to reflect the weighted average of Global Sweeping 4 Wheel Center, Schwarze M6000, Tymco 500X, Allianz Johnston 4000SP, Allianz Johnston Madvac 4000, and Tymco 210SRE.

Table 14
Representative Project 8 Assumptions – Earthen-Bottom Facilities Typical – 4

Maintenance Activity Phase	Days	One-Way Vehicle Trips			Equipment		
		Average Daily Worker Trips	*Average Daily Vendor Truck Trips*	*Total Haul Truck Trips*	*Equipment Type*	*Quantity*	*Usage Hours*
Maintenance Activities	14	48	2	26	Excavators	1	8
					Pumps	2	8
					Rubber-tired dozers	1	8
					Skid steer loaders	1	8
					Tractors/loaders/ backhoes	1	8
					Sweeper/scrubber[1]	1	2
Pump Use	3	0	0	0	Pumps	6	6

Notes: Equipment and activities listed are from the Facility Maintenance Plan Mission Hills Canyon Creek–Titus assumptions sheet.

[1] Adjusted to 142 horsepower to reflect the weighted average of Global Sweeping 4 Wheel Center, Schwarze M6000, Tymco 500X, Allianz Johnston 4000SP, Allianz Johnston Madvac 4000, and Tymco 210SRE

Outlet and Inlet Structure

There are 10 structural FMPs (9% of the MWMP total) that involve outlet/inlet maintenance and repair. The 4202 J Street outlet/inlet structure was chosen to represent these projects. Maintenance scenario details are provided in Table 15.

Table 15
Representative Project 9 Assumptions – Typical Outlet and Inlet Structure

Maintenance Activity Phase	Days	One-Way Vehicle Trips			Equipment		
		Average Daily Worker Trips	*Average Daily Vendor Truck Trips*	*Total Haul Truck Trips*	*Equipment Type*	*Quantity*	*Usage Hours*
Inlet/Outlet Maintenance	5	48	6	4	Skid steer loaders	1	5
					Excavators	1	5
					Chainsaws (concrete/industrial saws)	2	5
					Sweeper/scrubber[1]	1	2

Notes: Equipment and activities listed are from the Facility Maintenance Plan 4202 J Street assumptions sheet.
[1] Adjusted to 142 horsepower to reflect the weighted average of Global Sweeping 4 Wheel Center, Schwarze M6000, Tymco 500X, Allianz Johnston 4000SP, Allianz Johnston Madvac 4000, and Tymco 210SRE.

Tijuana River Smuggler's Gulch Project

In addition to the representative projects, the MWMP would include one uncharacteristically large project, which does not resemble standard maintenance activities. The Tijuana River Smuggler's Gulch project maintenance scenario assumptions are provided in Table 16.

Table 16
Representative Project 10 Assumptions – Tijuana River Smuggler's Gulch

Maintenance Activity Phase	Days	One-Way Vehicle Trips			Equipment		
		Average Daily Worker Trips	*Average Daily Vendor Truck Trips*	*Total Haul Truck Trips*	*Equipment Type*	*Quantity*	*Usage Hours*
Grading	100	24	10	5,000	Excavators	2	6
					Metal-tracked dozers (crawler tractors)	2	6
					Front-end loader (rubber-tired loader)	1	6

Table 16
Representative Project 10 Assumptions – Tijuana River Smuggler's Gulch

Maintenance Activity Phase	Days	One-Way Vehicle Trips			Equipment		
		Average Daily Worker Trips	*Average Daily Vendor Truck Trips*	*Total Haul Truck Trips*	*Equipment Type*	*Quantity*	*Usage Hours*
					Backhoe (tractor/loader/ backhoe)	1	6
					Ditch witch trencher (trencher)	1	2
					Skid steer/bobcat	1	6
					Sweeper/scrubber[1]	1	2
Pump Use	25	0	0	0	Pumps	6	6

Notes: Equipment and activities listed are from the Tijuana River Valley Channel Maintenance Project Focused Air Quality and Greenhouse Gas Emissions Analysis Memorandum.

[1] Adjusted to 142 horsepower to reflect the weighted average of Global Sweeping 4 Wheel Center, Schwarze M6000, Tymco 500X, Allianz Johnston 4000SP, Allianz Johnston Madvac 4000, and Tymco 210SRE.

4.2.2.4 Operation

No operational (i.e., long-term fixed-location) noise emissions are anticipated. Since implementation of the MWMP would involve maintenance and repair of existing storm water facilities, no new development or land uses are proposed. The MWMP would not include any long-term development, operational equipment, or new employees. Therefore, operational noise would not be created as a result of implementation of the MWMP.

5 IMPACT ANALYSIS

5.1 WOULD THE PROJECT RESULT IN OR CREATE A SIGNIFICANT INCREASE IN THE EXISTING AMBIENT NOISE LEVEL?

This section evaluates potential impacts associated with noise that would result from the proposed MWMP. Maintenance activities under the proposed MWMP would generate noise from the use of heavy equipment (e.g., excavators, dump trucks, skid steers, backhoes, dozers, pumps, and other similar equipment) at the sites or vehicles transporting material to or from the maintenance sites. Equipment anticipated for the proposed MWMP would not include the type associated with substantially higher noise-generation characteristics (e.g., pile drivers, rock drills, and blasting equipment). This type of equipment would not be necessary for implementation of the proposed MWMP.

As described in Section 4.2.2.1, Maintenance, the Federal Highway Administration's RCNM and equipment assumptions based on input from City engineers and operations staff were used to estimate noise levels at a representative receiver distance of 100 feet from the equipment/activity. The input and output from this and the other RCNM analyses are included in Appendix B and Appendix B2, and the results are summarized in Table 17. As shown in Table 17, the highest hourly average (L_{eq} (1-hr)) sound levels associated with proposed maintenance activities would range from approximately 70 to 79 dBA L_{eq} at a distance of 100 feet. On an average 12-hour basis, the maintenance activity noise levels are estimated to range from approximately 69 to 75 dBA L_{eq}. The City's 12-hour average construction noise standard of 75 dBA L_{eq} would not be exceeded at a distance of 100 feet for any of the representative activities.

For instances in which noise-sensitive receivers are located less than 100 feet from maintenance activities, temporary significant noise increases could result. Therefore, maintenance noise impacts for the activities conducted under the MWMP would be **potentially significant**, absent mitigation. However, through implementation of Mitigation Measure (**MM**-) **NOI-1,** noise impacts from maintenance activities would be reduced to **less than significant**.

Table 17
Maintenance Noise Modeling Summary

Project	Potential Maintenance Phase	Days	Maintenance Activity Noise Level (dBA L_{eq} (1-hr)) at Representative Receiver Distance (100 feet)	Maintenance Activity Noise Level (dBA L_{eq} (12-hr))* at Representative Receiver Distance (100 feet)	City of San Diego Construction Noise Standard (75 dBA L_{eq} (12-hr)) Exceeded?
1. Concrete with Vegetation Removal (20% or more vegetated)	Maintenance Activities	10	77	73	No
	Pump Use	2	75	73	No
2. Concrete with Vegetation Removal (less than 20% vegetated)	Maintenance Activities	14	77	73	No
	Pump Use	3	74	73	No
3. Minor Concrete Repair	Concrete Repair	10	77	74	No
4. Major Concrete Repair	Concrete Repair	80	78	74	No
5. Earthen Facility Typical – 1	Maintenance Activities	14	77	72	No
	Vegetation Clearing	2	76	75	No
	Pre-Maintenance Pumping	14	71	69	No
	Pump Use	3	74	73	No
6. Earthen Facility Typical – 2	Maintenance Activities	45	79	75	No
	Haul to Remove Stockpile	45	N/A	N/A	No
	Pump Use	9	74	73	No
7. Earthen Facility Typical – 3	Maintenance Activities	30	78	75	No
	Pump Use	3	77	73	No

Table 17
Maintenance Noise Modeling Summary

Project	Potential Maintenance Phase	Days	Maintenance Activity Noise Level (dBA L_{eq} (1-hr)) at Representative Receiver Distance (100 feet)	Maintenance Activity Noise Level (dBA L_{eq} (12-hr))* at Representative Receiver Distance (100 feet)	City of San Diego Construction Noise Standard (75 dBA L_{eq} (12-hr)) Exceeded?
8 Earthen Facility Typical – 4	Maintenance Activities	14	75	75	No
	Pump Use	3	76	73	No
9 Earthen Facility Typical Outlet/Inlet Structure	Inlet/Outlet Maintenance	5	79	73	No
10. Tijuana River Smuggler's Gulch	Grading	100	70	75	No
	Pump Use	25	78	73	No

Notes: dBA = A-weighted decibel; Leq (1-hr) = 1-hour A-weighted equivalent sound level; Leq (12-hr) = 12-hour A-weighted equivalent sound level

* 12-hour average noise levels were derived by averaging the hours of anticipated activity hours over a 12-hour period, in the logarithmic domain. For example, Representative Project 4, in which there are typically approximately 5 hours of work, would produce an hourly noise level when work is in progress of up to approximately 78 dBA Leq, but when averaged over a 12-hour day in which there would be 5 hours of "on" time and 7 hours of "off" time, the average noise level is approximately 74 dBA Leq (12-hour).

Mitigation Measures

MM-NOI-1 **Noise Reduction Techniques**. Prior to the Notice to Proceed, Mitigation Monitoring Coordination (MMC) shall verify that projects (i.e., maintenance and repair activities) located within 100 feet of noise-sensitive receivers include noise-reduction measures to ensure activities do not exceed and comply with City of San Diego (City) Noise Standards (San Diego Municipal Code Section 59.5.0401, Sound Level Limits, and Section 59.5.0404, Construction Noise), as follows:

A. The City Transportation & Storm Water Department (TSW) crew or maintenance/construction contractor shall be required to work in such a manner so as not to exceed a 12-hour average sound level of 75 dBA between 7:00 a.m. and 7:00 p.m. Monday through Saturday.

B. Noise reduction measure(s) shall include implementation of any one or more of the following noise-reducing measures:

   a. Limit the number of equipment operating at once;

   b. Install temporary plywood noise barriers 8 feet in height between the maintenance site and sensitive receptors;

   c. Construction equipment shall be properly outfitted with sound control devices and maintained with manufacturer recommended noise-reduction devices to minimize construction-generated noise. "Properly outfitted" implies that the device (e.g., silencer, muffler) is effective in that it is the correct size and type for the specific equipment, it is in good working order, and is installed in such a way that it reduces the noise in the way it was intended;

   d. Stationary noise sources such as generators or pumps shall be located at least 100 feet from noise-sensitive land uses as feasible;

   e. Laydown and maintenance/construction vehicle staging areas shall be located as far from noise sensitive land uses as feasible; and/or

   f. As recommended by a qualified acoustician, implement any other alternative noise reducing best available technologies, methods or practices as approved by the MMC.

C. During maintenance or repair activities, noise monitoring can be conducted at any time to ensure that the work is in compliance with the City's construction noise standard of 75 dBA L_{eq} (12-hour). If activities are found to be in exceedance of this standard, alternative methods (e.g., such as the use of quieter equipment, fewer pieces of equipment operating at any one time) shall be implemented and verified by MMC to meet City noise standards.

D. Prior to the issuance of the Notice to Proceed or if work is stopped during maintenance or repair activities by the MMC, TSW shall obtain a permit or similar authorization from the Noise Abatement and Control Administrator if maintenance and repair activities does not comply with San Diego Municipal Code Section 59.5.0404 – Construction Noise.

E. If authorized emergency work is necessary and will likely occur or exceed these noise limitations, TSW shall notify the Noise Abatement and Control Administrator within 48 hours after commencement of work.

Effectiveness of this mitigation measure would vary from several decibels (which in general is a relatively small change) to 10 or more decibels (which subjectively would be perceived as a

substantial change), depending on the specific equipment and the original condition of that equipment, the specific locations of the noise sources and the receivers, and other variables. Installation of a noise barrier, for example, would vary in effectiveness depending on the degree to which the line-of-sight between the source and receiver is broken, and typically ranges from 5 to 10 dB. Installation of more effective silencers could affect noise levels from several decibels to well over 10 dB. Reduction of idling equipment could reduce overall noise levels from barely any reduction to several decibels. Cumulatively, however, these measures would result in substantial decreases in the noise from maintenance activities.

Level of Significance after Mitigation

Impacts would be less than significant after mitigation.

5.2 WOULD THE PROJECT RESULT IN THE EXPOSURE OF PEOPLE TO NOISE LEVELS WHICH EXCEED THE CITY'S ADOPTED NOISE ORDINANCE OR ARE INCOMPATIBLE WITH TABLE K-4?

As discussed in Section 5.1, noise levels from maintenance activities conducted under the proposed MWMP were estimated and are summarized in Table 17. None of the representative projects would exceed the City's Municipal Code Noise Ordinance standard for construction (75 dBA L_{eq} (12-hr)) when these activities take place within 100 feet of noise-sensitive receivers (residences, hotels and motels, educational institutions, libraries, and hospitals and clinics). However, other activities with noise levels less than 75 dBA L_{eq} (12-hr) at a distance of 100 feet could exceed the City's 75 dBA L_{eq} (12-hr) noise standard if residences are located less than 100 feet away. This would be a **potentially significant** noise impact, absent mitigation. **MM-NOI-1** would reduce noise impacts from maintenance/construction to **less than significant with mitigation provided**.

Table K-4, provided as Table 18, is primarily a planning tool to ensure long-term compatibility of various land uses. As discussed in Section 4.2.2.4, Operation, the proposed MWMP would not result in any long-term development, operational equipment, or new employees. Therefore, no operational noise would be created, and the proposed MWMP would be compatible with the standards in Table K-4. There are **no impacts** associated with operation of the MWMP.

Table 18
City of San Diego Noise Land Use Compatibility Chart

	Land Use	Annual Community Noise Equivalent Level in Decibels					
		50	*55*	*60*	*65*	*70*	*75*
1	Outdoor amphitheater						
2	Schools, libraries						
3	Nature preserves, wildlife preserves						
4	Residential single-family, multi-family, mobile homes, transient housing						
5	Retirement homes, intermediate care facilities, convalescent homes						
6	Hospitals						
7	Parks, playgrounds						
8	Office buildings, business and professional						
9	Auditoriums, concert halls, indoor arenas, churches						
10	Riding stables, water recreation facilities						
11	Outdoor spectator sports, gold courses						
12	Livestock farming, animal breeding						
13	Commercial-retail, shopping centers, restaurants, movie theaters						
14	Commercial-wholesale, industrial manufacturing, utilities						
15	Agriculture (except livestock), extractive industry, farming						
16	Cemeteries						

Mitigation Measures

Please see MM-NOI-1, previously outlined.

Level of Significance After Mitigation

Impacts would be **less than significant** after mitigation.

5.3 WOULD THE PROJECT RESULT IN THE EXPOSURE OF PEOPLE TO CURRENT OR FUTURE TRANSPORTATION NOISE LEVELS WHICH EXCEED STANDARDS ESTABLISHED IN THE TRANSPORTATION ELEMENT OF THE GENERAL PLAN OR AN ADOPTED AIRPORT COMPREHENSIVE LAND USE PLAN (CLUP)?

As discussed in Section 4.2.2.4, the proposed MWMP would not result in any long-term development, operational equipment, or new employees. Therefore, the proposed MWMP would not result in the exposure of people to current or future transportation noise levels that exceed standards established in the Transportation Element of the General Plan or an adopted airport CLUP. There are no impacts associated with operation of the MWMP.

Mitigation Measures

None required.

Level of Significance After Mitigation

There are no impacts associated with operation of the MWMP and no mitigation is required.

5.4 WOULD THE PROJECT RESULT IN LAND USES WHICH ARE NOT COMPATIBLE WITH AIRCRAFT NOISE LEVELS AS DEFINED BY AN ADOPTED AIRPORT CLUP?

As discussed in Section 4.2.2.4, the proposed MWMP would not result in any long-term development, operational equipment, or new employees. Furthermore, the proposed MWMP would not result in the creation of land uses. Therefore, the proposed MWMP would not result in land uses that are not compatible with aircraft noise levels as defined by an adopted airport CLUP. There are no impacts associated with operation of the MWMP.

Mitigation Measures

None required.

Level of Significance After Mitigation

There are no impacts associated with operation of the MWMP and no mitigation is required.

5.5 WOULD THE PROJECT RESULT IN THE EXPOSURE OF PERSONS TO OR GENERATION OF EXCESSIVE GROUNDBORNE VIBRATION OR GROUNDBORNE NOISE LEVELS?

Groundborne vibration from heavy equipment operations during the course of maintenance activities under the proposed MWMP was evaluated using the methodology contained in Section 12.2 of the FTA Manual (FTA 2006) and compared with relevant vibration impact criteria. Groundborne vibration information related to the use of heavy construction equipment has been collected by the California Department of Transportation. This information indicates that continuous vibrations with a peak particle velocity of approximately 0.1 inches per second begin to annoy people (Caltrans 2004).

At a distance of approximately 50 feet, the typical closest distance to the nearest residences, the vibration levels from heavy construction machinery (such as a large bulldozer, which could be used during construction of all components of the MWMP) would be 0.031 inches per second, or 0.074 inches per second from a vibratory roller. Vibration levels of this magnitude would be below the threshold of perception (0.10 inches per second) or the damage threshold for fragile structures (0.20 inch per second). Therefore, vibration levels resulting from heavy construction equipment would not result in excessive groundborne vibration levels, and impacts would be **less than significant**.

Mitigation Measures

None required.

Level of Significance After Mitigation

There are no impacts associated with operation of the MWMP and no mitigation is required.

6 REFERENCES CITED

Caltrans (California Department of Transportation). 2004. *Transportation- and Construction-Induced Vibration Guidance Manual*. Sacramento, California: Caltrans Noise, Vibration, and Hazardous Waste Management Office. Contract No. 43A0049, Task Order No. 18. June 2004.

Caltrans. 2007. *Chapter 12, Noise*. Accessed April 24, 2015. http://www.dot.ca.gov/ser/vol1/sec3/physical/ch12noise/chap12noise.htm.

Caltrans. 2009. *Technical Noise Supplement*. Caltrans, Division of Environmental Analysis. November 2009.

City of San Diego. 1984. City of San Diego, California, Council Policy 700-44: Flood Control Measures. Effective March 12, 1984. Accessed July 2018. http://docs.sandiego.gov/councilpolicies/cpd_700-44.pdf.

City of San Diego. 2005. Acoustical Report Guidelines.

City of San Diego. 2010. *Article 9.5: Noise Abatement and Control*. Section 59.5.0401. Accessed April 23, 2015. http://docs.sandiego.gov/municode/MuniCodeChapter05/Ch05Art9.5Division04.pdf.

City of San Diego. 2016. *California Environmental Quality Act Significance Determination Thresholds.* July 2016.

City of San Diego. 2017. City of San Diego Scoping Letter for the MWMP.

FHWA (Federal Highway Administration). 2008. *Federal Highway Administration's Roadway Construction Noise Model*.

FTA (Federal Transit Administration). 2006. Office of Planning and Environment. May 2006. FTA-VA-90-1003-06. Transit Noise and Vibration Impact Assessment. (Prepared under contract by Harris, Miller, Miller and Hanson). Burlington, MA.

THIS PAGE INTENTIONALLY LEFT BLANK FOR DOUBLE-SIDED PRINTING

7 LIST OF PREPARERS

Mike Greene, Noise Specialist; Qualifications:

- Board Certified, Institute of Noise Control Engineering (Reg. Number 97008).
- Member, Institute of Noise Control Engineering
- Friend of the Committee, Transportation Research Board
- County of San Diego, Noise Consultants List
- Bachelor of Sciences Degree, Applied Mechanics and Engineering Sciences, University of California, San Diego
- More than 25 years as a noise consultant in Southern California, including extensive project experience in City and County of San Diego

Connor Burke, Noise Specialist

Corinne Price, Technical Editor

THIS PAGE INTENTIONALLY LEFT BLANK FOR DOUBLE-SIDED PRINTING

APPENDIX A

Field Noise Measurement Data Files

DUDEK
CREATOR OF KERATA TECHNOLOGY

FIELD DATA REPORT

Field Noise Measurement Data

Record: 809	
Project Name	*San Diego WMP*
Project #	*9234*
Observer(s)	*Connor Burke*
Date	*2017-11-06*
autoemail	*cburke@dudek.com*

Meteorological Conditions	
Temp (F)	*70*
Humidity % (R.H.)	*45*
Wind	*Light*
Wind Speed (MPH)	*4*
Wind Direction	*East*
Sky	*Partly Cloudy*

Instrument and Calibrator Information	
Instrument Name List	*(ENC) Rion NL-52*
Instrument Name	*(ENC) Rion NL-52*
Instrument Name Lookup Key	*(ENC) Rion NL-52*
Manufacturer	*Rion*
Model	*NL-52*
Serial Number	*553896*
Calibrator Name	*(ENC) LD CAL150*
Calibrator Name	*(ENC) LD CAL150*
Calibrator Name Lookup Key	*(ENC) LD CAL150*
Calibrator Manufacturer	*Larson Davis*
Calibrator Model	*LD CAL150*
Calibrator Serial #	*5152*
Pre-Test (dBA SPL)	*94*
Post-Test (dBA SPL)	*94*
Windscreen	*Yes*
Weighting?	*A-WTD*
Slow/Fast?	*Slow*
ANSI?	*Yes*

Recordings	
Record #	*1*
Site ID	*ST9*
Site Location	*Latitude:32.548675, Longitude:-116.977634, Altitude:147.324966, Speed:0.000000, Horizontal Accuracy:5.000000, Vertical Accuracy:6.000000, Time:10:54:49 AM PST*
Begin (Time)	*10:54:00*
End (Time)	*11:09:00*
Leq	*57.2*
Lmax	*77.6*
Lmin	*42.7*
Other Lx?	*L90, L50, L10*
L90	*44.4*
L50	*47.3*
L10	*54.8*
Primary Noise Source	*Aircraft*

Primary Noise Source Other	*Distant traffic*
Other Noise Sources (Background)	*Birds, Distant Aircraft, Distant Industrial, Distant Traffic, Rustling Leaves*
Other Noise Sources Additional Description	*Mexico airport noise dominates.*
Is the same instrument and calibrator being used as previously notated?	*Yes*
Are the meteorological conditions the same as previously notated?	*Yes*

Description / Photos

Site Photos

Photo	
Comments / Description	*Facing south.*

Recordings

Record #	*2*
Site ID	*ST8*
Site Location	*Latitude:32.692452, Longitude:-117.107482, Altitude:5.394867, Speed:0.000000, Horizontal Accuracy:5.000000, Vertical Accuracy:4.000000, Time:11:31:53 AM PST*
Begin (Time)	*11:31:00*
End (Time)	*11:41:00*
Leq	*59.4*
Lmax	*73.9*
Lmin	*48.3*
Other Lx?	*L90, L50, L10*
L90	*52.4*
L50	*58.3*
L10	*61.9*
Primary Noise Source	*Traffic*
Other Noise Sources (Background)	*Birds, Distant Aircraft, Distant Conversations / Yelling, Distant Gardener / Landscape Noise, Distant Traffic, Rustling Leaves*

Other Noise Sources Additional Description	*Landscapers blowing leaves.*
Is the same instrument and calibrator being used as previously notated?	*Yes*
Are the meteorological conditions the same as previously notated?	*Yes*

Source Info and Traffic Counts	
Distance to Roadway (feet)	*40*
Distance to Roadway - Centerline/Edge of Pavement	*Centerline*
Estimated Vehicle Speed (MPH)	*25*
Count Duration (Min)	*10*

Traffic Counts	
Counting Both Directions?	*Yes*
Autos	*1*
Number of Vehicles - Autos	*101*
Motorcyles	*1*
Number of Vehicles - Motorcyles	*1*

Description / Photos

Site Photos	
Photo	
Comments / Description	*Facing northwest.*

Recordings	
Record #	*3*
Site ID	*ST7*
Site Location	*Latitude:32.723212, Longitude:-117.106285, Altitude:24.146942, Speed:0.000000, Horizontal Accuracy:10.000000, Vertical Accuracy:16.000000, Time:11:57:44 AM PST*
Begin (Time)	*11:57:00*
End (Time)	*12:07:00*
Leq	*54.7*
Lmax	*65*
Lmin	*47.1*
Other Lx?	*L90, L50, L10*
L90	*48.5*
L50	*51.2*
L10	*59.1*
Other (Specify Metric)	
Primary Noise Source	*Other*
Primary Noise Source Other	*Distant traffic*
Other Noise Sources (Background)	*Birds, Distant Aircraft, Distant Conversations / Yelling, Distant Industrial, Distant Traffic, Rustling Leaves*
Is the same instrument and calibrator being used as previously notated?	*Yes*
Are the meteorological conditions the same as previously notated?	*Yes*

Description / Photos

Site Photos	
Photo	
Comments / Description	*Facing north towards Home Ave.*

Recordings	
Record #	*4*
Site ID	*ST3*
Site Location	*Latitude:32.765359, Longitude:-117.157778, Altitude:8.672588, Speed:0.000000, Horizontal Accuracy:10.000000, Vertical Accuracy:4.000000, Time:12:22:34 PM PST*
Begin (Time)	*12:22:00*
End (Time)	*12:37:00*
Leq	*74.4*
Lmax	*87.9*
Lmin	*62*
Other Lx?	*L90, L50, L10*
L90	*63.9*
L50	*65.8*
L10	*76.8*
Primary Noise Source	*Other*
Primary Noise Source Other	*Construction noise.*
Other Noise Sources (Background)	*Distant Aircraft, Distant Conversations / Yelling, Distant Industrial, Distant Traffic*
Other Noise Sources Additional Description	*Freeway noise. Trucks loading on construction site. Hammering. Drills. Nail guns. Food trucks. Back up alarms.*
Is the same instrument and calibrator being used as previously notated?	*Yes*
Are the meteorological conditions the same as previously notated?	*Yes*

Description / Photos

Site Photos	
Photo	
Comments / Description	*Facing south towards 8 freeway.*

Recordings	
Record #	*5*
Site ID	*ST4*
Site Location	*Latitude:32.808183, Longitude:-117.175746, Altitude:84.897110, Speed:0.000000, Horizontal Accuracy:5.000000, Vertical Accuracy:8.000000, Time:10:58:28 AM PST*
Begin (Time)	*10:58:00*
End (Time)	*11:13:00*
Leq	*57.7*
Lmax	*73.6*
Lmin	*42.4*
Other Lx?	*L90, L50, L10*
L90	*51*
L50	*55.2*
L10	*59.9*
Primary Noise Source	*Other*
Primary Noise Source Other	*Distant traffic*
Other Noise Sources (Background)	*Birds, Distant Aircraft, Distant Traffic, Rustling Leaves*
Other Noise Sources Additional Description	*Sirens.*
Is the same instrument and calibrator being used as previously notated?	*Yes*
Are the meteorological conditions the same as previously notated?	*Yes*

Description / Photos

Site Photos	
Photo	
Comments / Description	*Facing west.*

Recordings	
Record #	*6*
Site ID	*ST2*
Site Location	*Latitude:32.745576, Longitude:-117.183461, Altitude:33.173901, Speed:0.000000, Horizontal Accuracy:10.000000, Vertical Accuracy:4.000000, Time:11:46:02 AM PST*
Begin (Time)	*11:46:00*
End (Time)	*11:56:00*
Leq	*43.4*
Lmax	*51.9*
Lmin	*38.1*
Other Lx?	*L90, L50, L10*
L90	*39.4*
L50	*41.2*
L10	*46.5*
Primary Noise Source	*Aircraft*
Other Noise Sources (Background)	*Birds, Distant Aircraft, Distant Traffic, Rustling Leaves*
Is the same instrument and calibrator being used as previously notated?	*Yes*
Are the meteorological conditions the same as previously notated?	*Yes*

Description / Photos

Site Photos	
Photo	
Comments / Description	*Facing east.*

Recordings	
Record #	*7*
Site ID	*ST1*
Site Location	*Latitude:32.782065, Longitude:-117.094937, Altitude:13.973461, Speed:0.000000, Horizontal Accuracy:10.000000, Vertical Accuracy:32.000000, Time:12:11:41 PM PST*
Begin (Time)	*12:11:00*
End (Time)	*12:22:00*
Leq	*56.1*
Lmax	*63.2*
Lmin	*53.6*
Other Lx?	*L90, L50, L10*
L90	*54.3*
L50	*55.4*
L10	*57.8*
Primary Noise Source	*Other*
Primary Noise Source Other	*Distant freeway traffic*
Other Noise Sources (Background)	*Birds, Distant Aircraft, Distant Gardener / Landscape Noise, Distant Traffic, Rustling Leaves*
Other Noise Sources Additional Description	*HVAC on roof*
Is the same instrument and calibrator being used as previously notated?	*Yes*
Are the meteorological conditions the same as previously notated?	*Yes*

Description / Photos

Site Photos	
Photo	
Comments / Description	*Facing west towards channel*

Recordings	
Record #	*8*
Site ID	*ST6*
Site Location	*Latitude:32.943246, Longitude:-117.130518, Altitude:86.788799, Speed:0.000000, Horizontal Accuracy:10.000000, Vertical Accuracy:4.000000, Time:12:52:19 PM PST*
Begin (Time)	*12:52:00*
End (Time)	*13:02:00*
Leq	*63.3*
Lmax	*77.5*
Lmin	*37.9*
Other Lx?	*L90, L50, L10*
L90	*45.1*
L50	*52.5*
L10	*60.2*
Primary Noise Source	*Traffic*
Other Noise Sources (Background)	*Birds, Distant Aircraft, Distant Conversations / Yelling, Distant Traffic, Rustling Leaves*
Other Noise Sources Additional Description	*Jet flyover*
Is the same instrument and calibrator being used as previously notated?	*Yes*
Are the meteorological conditions the same as previously notated?	*Yes*

Source Info and Traffic Counts	
Distance to Roadway (feet)	*60*
Distance to Roadway - Centerline/Edge of Pavement	*Edge of Pavement*
Estimated Vehicle Speed (MPH)	*45*
Count Duration (Min)	*10*

Traffic Counts	
Counting Both Directions?	*No*
Direction	*SB*
Autos	*1*
Number of Vehicles - Autos	*110*
Medium Trucks	*1*
Number of Vehicles - Medium Trucks	*1*
Heavy Trucks	*1*
Motorcyles	*1*
Number of Vehicles - Motorcyles	*1*

Description / Photos

Site Photos	
Photo	
Comments / Description	*Facing east towards channel*

Recordings	
Record #	*9*
Site ID	*ST5*
Site Location	*Latitude:33.014573, Longitude:-117.058054, Altitude:155.337253, Speed:0.000000, Horizontal Accuracy:5.000000, Vertical Accuracy:3.000000, Time:1:23:38 PM PST*
Begin (Time)	*13:23:00*
End (Time)	*13:33:00*
Leq	*59.4*
Lmax	*72.7*
Lmin	*44.4*
Other Lx?	*L90, L50, L10*
L90	*50.9*
L50	*58.3*
L10	*62.6*
Primary Noise Source	*Traffic*
Other Noise Sources (Background)	*Birds, Distant Aircraft, Distant Traffic, Rustling Leaves*
Is the same instrument and calibrator being used as previously notated?	*Yes*
Are the meteorological conditions the same as previously notated?	*Yes*

Source Info and Traffic Counts	
Distance to Roadway (feet)	*60*
Distance to Roadway - Centerline/Edge of Pavement	*Edge of Pavement*
Estimated Vehicle Speed (MPH)	*45*
Count Duration (Min)	*10*

Traffic Counts	
Counting Both Directions?	*Yes*
Autos	*1*
Number of Vehicles - Autos	*170*
Medium Trucks	*1*
Number of Vehicles - Medium Trucks	*2*
Motorcyles	*1*
Number of Vehicles - Motorcyles	*1*

Description / Photos

Site Photos	
Photo	
Comments / Description	*Facing west towards Pomerado st.*

APPENDIX B1

Roadway Construction Noise Model Input/Output Files

Roadway Construction Noise Model (RCNM),Version 1.1

Report dat 4/2/2018
Case Descr Outlet/Inlet Structure 4202 J Street_Inlet/Outlet Maintenance

---- Receptor #1 ----

	Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Nearest Re	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	100	0
Backhoe	No	40		77.6	125	0
Dump Truck	No	40		76.5	200	0
Dump Truck	No	40		76.5	225	0
Chain Saw	No	20		83.7	125	0
Chain Saw	No	20		83.7	250	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Excavator	74.7	70.7	N/A	N/A	N/A	N/A	N/A
Backhoe	69.6	65.6	N/A	N/A	N/A	N/A	N/A
Dump Truck	64.4	60.4	N/A	N/A	N/A	N/A	N/A
Dump Truck	63.4	59.4	N/A	N/A	N/A	N/A	N/A
Chain Saw	75.8	68.8	N/A	N/A	N/A	N/A	N/A
Chain Saw	69.7	62.8	N/A	N/A	N/A	N/A	N/A
Total	75.8	74.3	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

	Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Typical Rec	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	175	0
Backhoe	No	40		77.6	175	0
Dump Truck	No	40		76.5	175	0
Dump Truck	No	40		76.5	175	0

Chain Saw	No	20	83.7	175	0
Chain Saw	No	20	83.7	175	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Excavator	69.8	65.8	N/A	N/A	N/A	N/A	N/A
Backhoe	66.7	62.7	N/A	N/A	N/A	N/A	N/A
Dump Truck	65.6	61.6	N/A	N/A	N/A	N/A	N/A
Dump Truck	65.6	61.6	N/A	N/A	N/A	N/A	N/A
Chain Saw	72.8	65.8	N/A	N/A	N/A	N/A	N/A
Chain Saw	72.8	65.8	N/A	N/A	N/A	N/A	N/A
Total	72.8	72.1	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report dat 3/22/2018
Case Descr San Diego River_Maintenance Activites

---- Receptor #1 ----

	Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Nearest Re	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	75	0
Front End Loader	No	40		79.1	125	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Excavator	77.2	73.2	N/A	N/A	N/A	N/A	N/A
Front End Loader	71.2	67.2	N/A	N/A	N/A	N/A	N/A
Total	77.2	74.2	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

	Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Typical Rec	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	300	0
Front End Loader	No	40		79.1	300	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Excavator	65.1	61.2	N/A	N/A	N/A	N/A	N/A
Front End Loader	63.5	59.6	N/A	N/A	N/A	N/A	N/A
Total	65.1	63.5	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report dat 3/26/2018
Case Descr San Diego River_Pump Use

---- Receptor #1 ----

	Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Nearest Re	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Pumps 20%	No	20		80.9	75	0
Pumps 20%	No	20		80.9	125	0
Pumps 20%	No	20		80.9	150	0
Pumps 20%	No	20		80.9	85	0
Pumps 20%	No	20		80.9	200	0
Pumps 20%	No	20		80.9	150	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Pumps 20%	77.4	70.4	N/A	N/A	N/A	N/A	N/A
Pumps 20%	72.9	66	N/A	N/A	N/A	N/A	N/A
Pumps 20%	71.4	64.4	N/A	N/A	N/A	N/A	N/A
Pumps 20%	76.3	69.3	N/A	N/A	N/A	N/A	N/A
Pumps 20%	68.9	61.9	N/A	N/A	N/A	N/A	N/A
Pumps 20%	71.4	64.4	N/A	N/A	N/A	N/A	N/A
Total	77.4	74.8	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

	Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Typical Rec	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Pumps 20%	No	20		80.9	300	0
Pumps 20%	No	20		80.9	300	0
Pumps 20%	No	20		80.9	300	0
Pumps 20%	No	20		80.9	300	0

Pumps 20%	No	20	80.9	300	0
Pumps 20%	No	20	80.9	300	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Pumps 20%	65.4	62.4	N/A	N/A	N/A	N/A	N/A
Pumps 20%	65.4	62.4	N/A	N/A	N/A	N/A	N/A
Pumps 20%	65.4	62.4	N/A	N/A	N/A	N/A	N/A
Pumps 20%	65.4	62.4	N/A	N/A	N/A	N/A	N/A
Pumps 20%	65.4	62.4	N/A	N/A	N/A	N/A	N/A
Pumps 20%	65.4	62.4	N/A	N/A	N/A	N/A	N/A
Total	65.4	70.1	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Report date 3/22/2018
Case Descri Alvarado Creek_Maintenance Activities

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Nearest Re	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	50	0
Front End Loader	No	40		79.1	75	0
Tractor	No	40	84		85	0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Excavator	80.7	76.7	N/A	N/A	N/A	N/A	N/A
Front End Loader	75.6	71.6	N/A	N/A	N/A	N/A	N/A
Tractor	79.4	75.4	N/A	N/A	N/A	N/A	N/A
Total	80.7	79.8	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Typical Rec	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	300	0
Front End Loader	No	40		79.1	330	0
Tractor	No	40	84		330	0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Excavator	65.1	61.2	N/A	N/A	N/A	N/A	N/A
Front End Loader	62.7	58.7	N/A	N/A	N/A	N/A	N/A
Tractor	67.6	63.6	N/A	N/A	N/A	N/A	N/A
Total	67.6	66.4	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date 3/26/2018
Case Descri Alvarado Creek_Pump Use

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Nearest Re	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Pumps 20%	No	20		80.9	50	0
Pumps 20%	No	20		80.9	65	0
Pumps 20%	No	20		80.9	100	0
Pumps 20%	No	20		80.9	150	0
Pumps 20%	No	20		80.9	75	0
Pumps 20%	No	20		80.9	100	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Pumps 20%	80.9	73.9	N/A	N/A	N/A	N/A	N/A
Pumps 20%	78.6	71.6	N/A	N/A	N/A	N/A	N/A
Pumps 20%	74.9	67.9	N/A	N/A	N/A	N/A	N/A
Pumps 20%	71.4	64.4	N/A	N/A	N/A	N/A	N/A
Pumps 20%	77.4	70.4	N/A	N/A	N/A	N/A	N/A
Pumps 20%	74.9	67.9	N/A	N/A	N/A	N/A	N/A
Total	80.9	78.1	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Typical Rec	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Pumps 20%	No	20		80.9	300	0
Pumps 20%	No	20		80.9	330	0
Pumps 20%	No	20		80.9	330	0
Pumps 20%	No	20		80.9	330	0
Pumps 20%	No	20		80.9	330	0
Pumps 20%	No	20		80.9	330	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Pumps 20%	65.4	62.4	N/A	N/A	N/A	N/A	N/A
Pumps 20%	64.5	61.5	N/A	N/A	N/A	N/A	N/A
Pumps 20%	64.5	61.5	N/A	N/A	N/A	N/A	N/A
Pumps 20%	64.5	61.5	N/A	N/A	N/A	N/A	N/A
Pumps 20%	64.5	61.5	N/A	N/A	N/A	N/A	N/A
Pumps 20%	64.5	61.5	N/A	N/A	N/A	N/A	N/A
Total	65.4	69.5	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report dat 4/5/2018
Case Descr Via Encantadoras Segment 4_Concrete Repair

---- Receptor #1 ----

	Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Nearest Re	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	25	0
Backhoe	No	40		77.6	50	0
Dump Truck	No	40		76.5	75	0
Dump Truck	No	40		76.5	100	0
Pumps 20%	No	20		80.9	125	0
Pumps 20%	No	20		80.9	150	0
Concrete Saw	No	20		89.6	175	0

	Calculated (dBA)		Results	Noise Limits (dBA)			
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Excavator	86.7	82.8	N/A	N/A	N/A	N/A	N/A
Backhoe	77.6	73.6	N/A	N/A	N/A	N/A	N/A
Dump Truck	72.9	68.9	N/A	N/A	N/A	N/A	N/A
Dump Truck	70.4	66.5	N/A	N/A	N/A	N/A	N/A
Pumps 20%	72.9	66	N/A	N/A	N/A	N/A	N/A
Pumps 20%	71.4	64.4	N/A	N/A	N/A	N/A	N/A
Concrete Saw	78.7	71.7	N/A	N/A	N/A	N/A	N/A
Total	86.7	83.9	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

	Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Typical Rec	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	125	0
Backhoe	No	40		77.6	125	0

Dump Truck	No	40	76.5	125	0
Dump Truck	No	40	76.5	125	0
Pumps 20%	No	20	80.9	125	0
Pumps 20%	No	20	80.9	125	0
Concrete Saw	No	20	89.6	125	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Excavator	72.8	68.8	N/A	N/A	N/A	N/A	N/A
Backhoe	69.6	65.6	N/A	N/A	N/A	N/A	N/A
Dump Truck	68.5	64.5	N/A	N/A	N/A	N/A	N/A
Dump Truck	68.5	64.5	N/A	N/A	N/A	N/A	N/A
Pumps 20%	72.9	66	N/A	N/A	N/A	N/A	N/A
Pumps 20%	72.9	66	N/A	N/A	N/A	N/A	N/A
Concrete Saw	81.6	74.6	N/A	N/A	N/A	N/A	N/A
Total	81.6	77.3	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report dat 4/2/2018
Case Descr Repair of Concrete Channel Lining_Concrete Repair

---- Receptor #1 ----

	Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Nearest Re	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	100	0
Backhoe	No	40		77.6	100	0
Dump Truck	No	40		76.5	200	0
Dump Truck	No	40		76.5	200	0
Concrete Saw	No	20		89.6	300	0
Pump Use 20%	No	20		80.9	100	0
Pump Use 20%	No	20		80.9	200	0

	Calculated (dBA)		Results	Noise Limits (dBA)			
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Excavator	74.7	70.7	N/A	N/A	N/A	N/A	N/A
Backhoe	71.5	67.6	N/A	N/A	N/A	N/A	N/A
Dump Truck	64.4	60.4	N/A	N/A	N/A	N/A	N/A
Dump Truck	64.4	60.4	N/A	N/A	N/A	N/A	N/A
Concrete Saw	74	67	N/A	N/A	N/A	N/A	N/A
Pump Use 20%	74.9	67.9	N/A	N/A	N/A	N/A	N/A
Pump Use 20%	68.9	61.9	N/A	N/A	N/A	N/A	N/A
Total	74.9	75.1	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

	Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Typical Rec	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	200	0
Backhoe	No	40		77.6	200	0

Dump Truck	No	40	76.5	200	0
Dump Truck	No	40	76.5	200	0
Concrete Saw	No	20	89.6	200	0
Pump Use 20%	No	20	80.9	200	0
Pump Use 20%	No	20	80.9	200	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Excavator	68.7	64.7	N/A	N/A	N/A	N/A	N/A
Backhoe	65.5	61.5	N/A	N/A	N/A	N/A	N/A
Dump Truck	64.4	60.4	N/A	N/A	N/A	N/A	N/A
Dump Truck	64.4	60.4	N/A	N/A	N/A	N/A	N/A
Concrete Saw	77.5	70.5	N/A	N/A	N/A	N/A	N/A
Pump Use 20%	68.9	61.9	N/A	N/A	N/A	N/A	N/A
Pump Use 20%	68.9	61.9	N/A	N/A	N/A	N/A	N/A
Total	77.5	73.2	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report dat 4/2/2018
Case Descr Mission Bay_Maintenance Activities

---- Receptor #1 ----

	Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Nearest Re	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	170	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Excavator	70.1	66.1	N/A	N/A	N/A	N/A	N/A
Total	70.1	66.1	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

	Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Typical Rec	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	375	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Excavator	63.2	59.2	N/A	N/A	N/A	N/A	N/A
Total	63.2	59.2	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report dat 4/2/2018
Case Descr Mission Bay_Pre-Maintenance Pumping

---- Receptor #1 ----

	Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Nearest Re	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Pump Use 20%	No	20		80.9	170	0
Pump Use 20%	No	20		80.9	250	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Pump Use 20%	70.3	63.3	N/A	N/A	N/A	N/A	N/A
Pump Use 20%	66.9	59.9	N/A	N/A	N/A	N/A	N/A
Total	70.3	64.9	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

	Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Typical Rec	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Pump Use 20%	No	20		80.9	375	0
Pump Use 20%	No	20		80.9	375	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Pump Use 20%	63.4	56.4	N/A	N/A	N/A	N/A	N/A
Pump Use 20%	63.4	56.4	N/A	N/A	N/A	N/A	N/A
Total	63.4	59.4	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report dat 4/2/2018
Case Descr Mission Bay_Pump Use

---- Receptor #1 ----

	Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Nearest Re	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Pump Use 20%	No	20		80.9	170	0
Pump Use 20%	No	20		80.9	225	0
Pump Use 20%	No	20		80.9	400	0
Pump Use 20%	No	20		80.9	200	0
Pump Use 20%	No	20		80.9	350	0
Pump Use 20%	No	20		80.9	275	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Pump Use 20%	70.3	63.3	N/A	N/A	N/A	N/A	N/A
Pump Use 20%	67.8	60.8	N/A	N/A	N/A	N/A	N/A
Pump Use 20%	62.8	55.8	N/A	N/A	N/A	N/A	N/A
Pump Use 20%	68.9	61.9	N/A	N/A	N/A	N/A	N/A
Pump Use 20%	64	57	N/A	N/A	N/A	N/A	N/A
Pump Use 20%	66.1	59.1	N/A	N/A	N/A	N/A	N/A
Total	70.3	68.2	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

	Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Typical Rec	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Pump Use 20%	No	20		80.9	300	0
Pump Use 20%	No	20		80.9	330	0
Pump Use 20%	No	20		80.9	330	0
Pump Use 20%	No	20		80.9	375	0

Pump Use 20%	No	20	80.9	375	0
Pump Use 20%	No	20	80.9	375	0

			Results				
	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Pump Use 20%	65.3	58.3	N/A	N/A	N/A	N/A	N/A
Pump Use 20%	64.5	57.5	N/A	N/A	N/A	N/A	N/A
Pump Use 20%	64.5	57.5	N/A	N/A	N/A	N/A	N/A
Pump Use 20%	63.4	56.4	N/A	N/A	N/A	N/A	N/A
Pump Use 20%	63.4	56.4	N/A	N/A	N/A	N/A	N/A
Pump Use 20%	63.4	56.4	N/A	N/A	N/A	N/A	N/A
Total	65.3	64.9	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report dat 4/2/2018
Case Descr Mission Bay_Vegetation Clearing

---- Receptor #1 ----

	Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Nearest Re	Residential	65	60	55

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Pneumatic Tools	No	50		85.2	200	0
Chain Saw	No	20		83.7	170	0
Chain Saw	No	20		83.7	250	0
Chain Saw	No	20		83.7	300	0

			Results				
	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Pneumatic Tools	73.1	70.1	N/A	N/A	N/A	N/A	N/A
Chain Saw	73.1	66.1	N/A	N/A	N/A	N/A	N/A
Chain Saw	69.7	62.8	N/A	N/A	N/A	N/A	N/A
Chain Saw	68.2	61.2	N/A	N/A	N/A	N/A	N/A
Total	73.1	72.4	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

	Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Typical Rec	Residential	65	60	55

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Pneumatic Tools	No	50		85.2	375	0
Chain Saw	No	20		83.7	375	0
Chain Saw	No	20		83.7	375	0
Chain Saw	No	20		83.7	375	0

			Results				
	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night

Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Pneumatic Tools	67.7	64.7	N/A	N/A	N/A	N/A	N/A
Chain Saw	66.2	59.2	N/A	N/A	N/A	N/A	N/A
Chain Saw	66.2	59.2	N/A	N/A	N/A	N/A	N/A
Chain Saw	66.2	59.2	N/A	N/A	N/A	N/A	N/A
Total	67.7	67.4	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report dat 4/2/2018
Case Descr Qualcomm_Maintenance Activities

---- Receptor #1 ----

	Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Nearest Re	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	370	0
Pumps	No	50		80.9	425	0
Pumps	No	50		80.9	400	0
Dozer	No	40		81.7	370	0
Front End Loader	No	40		79.1	450	0
Flat Bed Truck	No	40		74.3	500	0
Tractor	No	40	84		550	0
All Other Equipment >	No	50	85		750	0

	Results						
	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Excavator	63.3	59.3	N/A	N/A	N/A	N/A	N/A
Pumps	62.4	59.3	N/A	N/A	N/A	N/A	N/A
Pumps	62.9	59.9	N/A	N/A	N/A	N/A	N/A
Dozer	64.3	60.3	N/A	N/A	N/A	N/A	N/A
Front End Loader	60	56	N/A	N/A	N/A	N/A	N/A
Flat Bed Truck	54.3	50.3	N/A	N/A	N/A	N/A	N/A
Tractor	63.2	59.2	N/A	N/A	N/A	N/A	N/A
All Other Equipment >	61.5	58.5	N/A	N/A	N/A	N/A	N/A
Total	64.3	67.6	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

	Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Typical Rec	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)

Excavator	No	40		80.7	710	0
Pumps	No	50		80.9	710	0
Pumps	No	50		80.9	710	0
Dozer	No	40		81.7	710	0
Front End Loader	No	40		79.1	710	0
Flat Bed Truck	No	40		74.3	710	0
Tractor	No	40	84		710	0
All Other Equipment >	No	50	85		710	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Excavator	57.7	53.7	N/A	N/A	N/A	N/A	N/A
Pumps	57.9	54.9	N/A	N/A	N/A	N/A	N/A
Pumps	57.9	54.9	N/A	N/A	N/A	N/A	N/A
Dozer	58.6	54.6	N/A	N/A	N/A	N/A	N/A
Front End Loader	56.1	52.1	N/A	N/A	N/A	N/A	N/A
Flat Bed Truck	51.2	47.2	N/A	N/A	N/A	N/A	N/A
Tractor	61	57	N/A	N/A	N/A	N/A	N/A
All Other Equipment >	62	58.9	N/A	N/A	N/A	N/A	N/A
Total	62	64.2	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date 3/26/2018
Case Descri Qualcomm_Pump Use

---- Receptor #1 ----

	Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Nearest Re	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Pumps 20%	No	20		80.9	370	0
Pumps 20%	No	20		80.9	450	0
Pumps 20%	No	20		80.9	500	0
Pumps 20%	No	20		80.9	650	0
Pumps 20%	No	20		80.9	750	0
Pumps 20%	No	20		80.9	400	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Pumps 20%	63.5	56.5	N/A	N/A	N/A	N/A	N/A
Pumps 20%	61.8	54.8	N/A	N/A	N/A	N/A	N/A
Pumps 20%	60.9	53.9	N/A	N/A	N/A	N/A	N/A
Pumps 20%	58.6	51.6	N/A	N/A	N/A	N/A	N/A
Pumps 20%	57.4	50.4	N/A	N/A	N/A	N/A	N/A
Pumps 20%	62.8	55.8	N/A	N/A	N/A	N/A	N/A
Total	63.5	62.1	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

	Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Typical Rec	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Pumps 20%	No	20		80.9	710	0
Pumps 20%	No	20		80.9	710	0
Pumps 20%	No	20		80.9	710	0
Pumps 20%	No	20		80.9	710	0
Pumps 20%	No	20		80.9	710	0
Pumps 20%	No	20		80.9	710	0

	Results						
	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Pumps 20%	57.9	54.9	N/A	N/A	N/A	N/A	N/A
Pumps 20%	57.9	54.9	N/A	N/A	N/A	N/A	N/A
Pumps 20%	57.9	54.9	N/A	N/A	N/A	N/A	N/A
Pumps 20%	57.9	54.9	N/A	N/A	N/A	N/A	N/A
Pumps 20%	57.9	54.9	N/A	N/A	N/A	N/A	N/A
Pumps 20%	57.9	54.9	N/A	N/A	N/A	N/A	N/A
Total	57.9	62.7	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report dat 4/2/2018
Case Descr Tecolote Creek_Maintenance Activities

---- Receptor #1 ----

	Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Nearest Re	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	50	0
Pumps	No	50		80.9	75	0
Pumps	No	50		80.9	125	0
Dozer	No	40		81.7	150	0
Front End Loader	No	40		79.1	75	0
Tractor	No	40	84		100	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Excavator	80.7	76.7	N/A	N/A	N/A	N/A	N/A
Pumps	77.4	74.4	N/A	N/A	N/A	N/A	N/A
Pumps	73	70	N/A	N/A	N/A	N/A	N/A
Dozer	72.1	68.1	N/A	N/A	N/A	N/A	N/A
Front End Loader	75.6	71.6	N/A	N/A	N/A	N/A	N/A
Tractor	78	74	N/A	N/A	N/A	N/A	N/A
Total	80.7	81.2	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

	Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Typical Rec	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	175	0
Pumps	No	50		80.9	175	0
Pumps	No	50		80.9	175	0
Dozer	No	40		81.7	175	0

Front End Loader	No	40		79.1	175	0
Tractor	No	40	84		175	0

			Results				
	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Excavator	69.8	65.8	N/A	N/A	N/A	N/A	N/A
Pumps	70.1	67	N/A	N/A	N/A	N/A	N/A
Pumps	70.1	67	N/A	N/A	N/A	N/A	N/A
Dozer	70.8	66.8	N/A	N/A	N/A	N/A	N/A
Front End Loader	68.2	64.2	N/A	N/A	N/A	N/A	N/A
Tractor	73.1	69.1	N/A	N/A	N/A	N/A	N/A
Total	73.1	74.7	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report dat 4/2/2018
Case Descr Tecolote Creek_Pump Use

---- Receptor #1 ----

	Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Nearest Re	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Pumps 20%	No	20		80.9	50	0
Pumps 20%	No	20		80.9	75	0
Pumps 20%	No	20		80.9	150	0
Pumps 20%	No	20		80.9	85	0
Pumps 20%	No	20		80.9	200	0
Pumps 20%	No	20		80.9	100	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Pumps 20%	80.9	73.9	N/A	N/A	N/A	N/A	N/A
Pumps 20%	77.4	70.4	N/A	N/A	N/A	N/A	N/A
Pumps 20%	71.4	64.4	N/A	N/A	N/A	N/A	N/A
Pumps 20%	76.3	69.3	N/A	N/A	N/A	N/A	N/A
Pumps 20%	68.9	61.9	N/A	N/A	N/A	N/A	N/A
Pumps 20%	74.9	67.9	N/A	N/A	N/A	N/A	N/A
Total	80.9	77.4	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

	Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Typical Rec	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Pumps 20%	No	20		80.9	175	0
Pumps 20%	No	20		80.9	175	0
Pumps 20%	No	20		80.9	175	0
Pumps 20%	No	20		80.9	175	0

Pumps 20%	No	20	80.9	175	0
Pumps 20%	No	20	80.9	175	0

	Calculated (dBA)		Results	Noise Limits (dBA)			
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Pumps 20%	70	63	N/A	N/A	N/A	N/A	N/A
Pumps 20%	70	63	N/A	N/A	N/A	N/A	N/A
Pumps 20%	70	63	N/A	N/A	N/A	N/A	N/A
Pumps 20%	70	63	N/A	N/A	N/A	N/A	N/A
Pumps 20%	70	63	N/A	N/A	N/A	N/A	N/A
Pumps 20%	70	63	N/A	N/A	N/A	N/A	N/A
Total	70	70.8	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report dat 4/2/2018
Case Descr Mission Hills_Maintenance Activites

---- Receptor #1 ----

	Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Nearest Re	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	100	0
Dozer	No	40		81.7	150	0
Front End Loader	No	40		79.1	250	0

	Results						
	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Excavator	74.7	70.7	N/A	N/A	N/A	N/A	N/A
Dozer	72.1	68.1	N/A	N/A	N/A	N/A	N/A
Front End Loader	65.1	61.2	N/A	N/A	N/A	N/A	N/A
Total	74.7	72.9	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

	Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Typical Rec	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	200	0
Dozer	No	40		81.7	200	0
Front End Loader	No	40		79.1	200	0

	Results						
	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Excavator	68.7	64.7	N/A	N/A	N/A	N/A	N/A
Dozer	69.6	65.6	N/A	N/A	N/A	N/A	N/A

Front End Loader	67.1	63.1	N/A	N/A	N/A	N/A	N/A
Total	69.6	69.4	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report dat 4/2/2018
Case Descr Mission Hills_Pump Use

---- Receptor #1 ----

	Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Nearest Re	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Pumps 20%	No	20		80.9	100	0
Pumps 20%	No	20		80.9	150	0
Pumps 20%	No	20		80.9	200	0
Pumps 20%	No	20		80.9	250	0
Pumps 20%	No	20		80.9	125	0
Pumps 20%	No	20		80.9	175	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Pumps 20%	74.9	67.9	N/A	N/A	N/A	N/A	N/A
Pumps 20%	71.4	64.4	N/A	N/A	N/A	N/A	N/A
Pumps 20%	68.9	61.9	N/A	N/A	N/A	N/A	N/A
Pumps 20%	66.9	59.9	N/A	N/A	N/A	N/A	N/A
Pumps 20%	72.9	66	N/A	N/A	N/A	N/A	N/A
Pumps 20%	70	63	N/A	N/A	N/A	N/A	N/A
Total	74.9	72.4	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

	Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Typical Rec	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Pumps 20%	No	20		80.9	200	0
Pumps 20%	No	20		80.9	200	0
Pumps 20%	No	20		80.9	200	0
Pumps 20%	No	20		80.9	200	0

Pumps 20%	No	20	80.9	200	0
Pumps 20%	No	20	80.9	200	0

	Results						
	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Pumps 20%	68.9	61.9	N/A	N/A	N/A	N/A	N/A
Pumps 20%	68.9	61.9	N/A	N/A	N/A	N/A	N/A
Pumps 20%	68.9	61.9	N/A	N/A	N/A	N/A	N/A
Pumps 20%	68.9	61.9	N/A	N/A	N/A	N/A	N/A
Pumps 20%	68.9	61.9	N/A	N/A	N/A	N/A	N/A
Pumps 20%	68.9	61.9	N/A	N/A	N/A	N/A	N/A
Total	68.9	69.7	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report dat 3/22/2018
Case Descr Tijuana River_Grading

---- Receptor #1 ----

	Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Nearest Re	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Tractor	No	40	84		300	0
Tractor	No	40	84		350	0
Excavator	No	40		80.7	400	0
Excavator	No	40		80.7	325	0
Front End Loader	No	40		79.1	325	0
Front End Loader	No	40		79.1	500	0
Tractor	No	40	84		550	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Tractor	68.4	64.5	N/A	N/A	N/A	N/A	N/A
Tractor	67.1	63.1	N/A	N/A	N/A	N/A	N/A
Excavator	62.6	58.7	N/A	N/A	N/A	N/A	N/A
Excavator	64.5	60.5	N/A	N/A	N/A	N/A	N/A
Front End Loader	62.9	58.9	N/A	N/A	N/A	N/A	N/A
Front End Loader	59.1	55.1	N/A	N/A	N/A	N/A	N/A
Tractor	63.2	59.2	N/A	N/A	N/A	N/A	N/A
Total	68.4	69.4	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

	Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Typical Rec	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Tractor	No	40	84		1300	0
Tractor	No	40	84		1300	0

Excavator	No	40		80.7	1300	0
Excavator	No	40		80.7	1300	0
Front End Loader	No	40		79.1	1300	0
Front End Loader	No	40		79.1	1300	0
Tractor	No	40	84		1300	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Tractor	55.7	51.7	N/A	N/A	N/A	N/A	N/A
Tractor	55.7	51.7	N/A	N/A	N/A	N/A	N/A
Excavator	52.4	48.4	N/A	N/A	N/A	N/A	N/A
Excavator	52.4	48.4	N/A	N/A	N/A	N/A	N/A
Front End Loader	50.8	46.8	N/A	N/A	N/A	N/A	N/A
Front End Loader	50.8	46.8	N/A	N/A	N/A	N/A	N/A
Tractor	55.7	51.7	N/A	N/A	N/A	N/A	N/A
Total	55.7	58.3	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report dat 3/26/2018
Case Descr Tijuana River_Pump Use

---- Receptor #1 ----

	Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Nearest Re	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Pumps 20%	No	20		80.9	300	0
Pumps 20%	No	20		80.9	500	0
Pumps 20%	No	20		80.9	400	0
Pumps 20%	No	20		80.9	800	0
Pumps 20%	No	20		80.9	500	0
Pumps 20%	No	20		80.9	350	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Pumps 20%	65.3	58.3	N/A	N/A	N/A	N/A	N/A
Pumps 20%	60.9	53.9	N/A	N/A	N/A	N/A	N/A
Pumps 20%	62.8	55.8	N/A	N/A	N/A	N/A	N/A
Pumps 20%	56.8	49.8	N/A	N/A	N/A	N/A	N/A
Pumps 20%	60.9	53.9	N/A	N/A	N/A	N/A	N/A
Pumps 20%	64	57	N/A	N/A	N/A	N/A	N/A
Total	65.3	63.3	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

	Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Typical Rec	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Pumps 20%	No	20		80.9	1300	0
Pumps 20%	No	20		80.9	1300	0
Pumps 20%	No	20		80.9	1300	0
Pumps 20%	No	20		80.9	1300	0

Pumps 20%	No	20	80.9	1300	0
Pumps 20%	No	20	80.9	1300	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Pumps 20%	52.6	49.6	N/A	N/A	N/A	N/A	N/A
Pumps 20%	52.6	49.6	N/A	N/A	N/A	N/A	N/A
Pumps 20%	52.6	49.6	N/A	N/A	N/A	N/A	N/A
Pumps 20%	52.6	49.6	N/A	N/A	N/A	N/A	N/A
Pumps 20%	52.6	49.6	N/A	N/A	N/A	N/A	N/A
Pumps 20%	52.6	49.6	N/A	N/A	N/A	N/A	N/A
Total	52.6	57.4	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

APPENDIX B2

Construction Noise Modeling Worksheets

To User: bordered cells are inputs, unbordered cells have formulae

noise level limit for construction phase, per County = 75
allowable hours over which Leq is to be averaged (example: 8 for County of San Diego, FTA guidance) = 12

Construction Phase	Equipment	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Client Equipment Description, Data Source and/or Notes	Source to NSR Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 12-hour Leq
Representative Project 1										
Maintenance Activities	Excavator	1	40	81		100	75.0	8	480	69
	Front End Loader	1	40	79		100	73.0	8	480	67
	Concrete Batch Plant	1	15	83	Crushing/processing equipment	100	77.0	8	480	67
	Flat Bed Truck	1	40	74	Sweeper	100	68.0	2	120	56
								Total for Maintenance Activities Phase:		72.8
Pump Use	Pumps	6	50	77		100	71.0	6	360	73
								Total for Pump Use Phase:		72.7
Representative Project 2										
Maintenance Activities	Excavator	1	40	81		100	75.0	8	480	69
	Front End Loader	1	40	79		100	73.0	8	480	67
	Backhoe	1	40	78		100	72.0	8	480	66
	Crane	1	16	81		100	75.0	4	240	62
	Flat Bed Truck	1	40	74	Sweeper	100	68.0	2	120	56
								Total for Maintenance Activities Phase:		73.0
Pump Use	Pumps	6	50	77		100	71.0	6	360	73
								Total for Pump Use Phase:		72.7
Representative Project 3										
Concrete Repair	Excavator	1	40	81		100	75.0	5	300	67
	Backhoe	1	40	78		100	72.0	5	300	64
	Pumps	2	50	77		100	71.0	5	300	67
	Concrete Saw	1	20	90		125	82.0	5	300	71
	Flat Bed Truck	1	40	74	Sweeper	125	66.0	2	120	54
								Total for Concrete Repair Phase:		74.3
Representative Project 4										
Concrete Repair	Excavator	1	40	81		100	75.0	5	300	67
	Backhoe	1	40	78		100	72.0	5	300	64
	Dozer	1	40	82		100	76.0	1	60	61
	Pumps	2	50	77		125	69.0	5	300	65
	Concrete Saw	1	20	90		125	82.0	5	300	71
	Flat Bed Truck	1	40	74	Sweeper	125	66.0	2	120	54
								Total for Concrete Repair Phase:		74.2
Representative Project 5										
Maintenance Activities	Excavator	1	40	81		100	75.0	8	480	69
	Crane	1	16	81		100	75.0	8	480	65
	Concrete Batch Plant	1	15	83	Crushing/processing equipment	100	77.0	4	240	64
	Flat Bed Truck	1	40	74	Sweeper	100	68.0	2	120	56
								Total for Maintenance Activities Phase:		71.7
Vegetation Clearing	Chain Saw	4	20	84		100	78.0	8	480	75
								Total for Vegetation Clearing Phase:		75.2
Pre-Maintenance Pumping	Pumps	2	50	77		100	71.0	8	480	69
								Total for Pre-Maintenance Pumping Phase:		69.2
Pump Use	Pumps	6	50	77		100	71.0	6	360	73
								Total for Pump Use Phase:		72.7
Representative Project 6										
Maintenance Activities	Excavator	1	40	81		100	75.0	8	480	69
	Pumps	2	50	77		100	71.0	8	480	69
	Dozer	1	40	82		100	76.0	8	480	70

	Front end loader	1	40	79		125	71.0	8	480	65
	Flat bed truck	1	40	74	Sweeper	125	66.0	2	120	54
	backhoe	1	40	78		125	70.0	8	480	64
								Total for Maintenance Activities Phase:		75.3
Pump Use	Pumps	6	50	77		100	71.0	6	360	73
								Total for Pump Use Phase:		72.7
Representative Project 7										
Maintenance Activities	Excavator	1	40	81		100	75.0	8	480	69
	Pumps	2	50	77		100	71.0	8	480	69
	Dozer	1	40	82		100	76.0	8	480	70
	Front end loader	1	40	79		125	71.0	8	480	65
	Flat bed truck	1	40	74	Sweeper	125	66.0	2	120	54
	backhoe	1	40	78		125	70.0	8	480	64
								Total for Maintenance Activities Phase:		75.3
Pump Use	Pumps	6	50	77		100	71.0	6	360	73
								Total for Pump Use Phase:		72.7
Representative Project 8										
Maintenance Activities	Excavator	1	40	81		100	75.0	8	480	69
	Pumps	2	50	77		100	71.0	8	480	69
	Dozer	1	40	82		100	76.0	8	480	70
	Front end loader	1	40	79		125	71.0	8	480	65
	Flat bed truck	1	40	74	Sweeper	125	66.0	2	120	54
	backhoe	1	40	78		125	70.0	8	480	64
								Total for Maintenance Activities Phase:		75.3
Pump Use	Pumps	6	50	77		100	71.0	6	360	73
								Total for Pump Use Phase:		72.7
Representative Project 9										
Inlet/Outlet Maintenance	Front End Loader	1	40	79		100	73.0	5	300	65
	Excavator	1	40	81		100	75.0	5	300	67
	Chain Saw	2	20	84		100	78.0	5	300	70
	Flat Bed Truck	1	40	74	Sweeper	100	68.0	2	120	56
								Total for Inlet/Outlet Maintenance Phase:		72.9
Representative Project 10										
Grading	Excavator	2	40	81		100	75.0	6	360	71
	Dozer	2	40	82		110	75.2	6	360	71
	Front End Loader	1	40	79		115	71.8	6	360	65
	Backhoe	1	40	78		120	70.4	6	360	63
	Slurry Trenching Machine	1	50	80	Ditch witch Trencher	125	72.0	2	120	61
	Flat Bed Truck	1	40	74	Sweeper	125	66.0	2	120	54
	backhoe	1	40	78	Bobcat	125	70.0	6	360	63
								Total for Grading Phase:		75.4
Pump Use	Pumps	6	50	77		100	71.0	6	360	73
								Total for Pump Use Phase:		72.7