HELIX Environmental Planning

City of San Diego
Dam Maintenance Program

Noise Assessment Study

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Prepared for:

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ACRONYMS AND ABBREVIATIONS

Caltrans	California Department of Transportation
City	City of San Diego
County	County of San Diego
dB	decibel
dBA	A-weighted decibel
DSOD	Division of Safety of Dams
Hz	hertz
kHz	kilohertz
L_{EQ}	time-averaged noise level
mPa	micro Pascal
NSLU	noise-sensitive land use
Program	Dam Maintenance Program
PUD	Public Utilities Department
RCNM	Roadway Construction Noise Model
SPL	sound pressure level
USDOT	U.S. Department of Transportation
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service

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EXECUTIVE SUMMARY

This report presents an assessment of potential noise impacts associated with the proposed City of San Diego (City) Public Utilities Department (PUD), Dam Maintenance Program (Program). This report details the environmental setting, including noise and sound level descriptors/terminology, and provides the regulatory framework for evaluation of compliance with relevant regulations and conditions established by each of the jurisdictions within the service area. It provides an analysis of potential noise impacts the Program activities may have on noise sensitive land uses (NSLUs) and biologically sensitive habitat and identifies mitigation to reduce potential adverse noise impacts that may result from ongoing implementation of the Program.

The Program would use construction equipment for regular maintenance of PUD facilities. Implementation of the Program would result in activities that would generate elevated noise levels at nearby biologically sensitive habitat and NSLUs. Due to its programmatic nature, exact locations of NSLUs and habitat cannot be identified for future activities. Noise impacts are therefore assumed to be significant without mitigation. Mitigation measure NOI-1 would require the reduction of construction noise for activities located within setback distances of equipment. Mitigation measure NOI-2 would limit the use of helicopters in the vicinity of biologically sensitive habitats during the avian breeding seasons.

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1.0 INTRODUCTION

1.1 PROJECT BACKGROUND AND BACKGROUND

The City of San Diego (City) Public Utilities Department (PUD) owns and manages 13 dams, spillways, and other associated infrastructure, including the approximately 13-mile Dulzura Conduit, located throughout San Diego County as part of the City's drinking water infrastructure. Each dam has a unique system of outlet works and spillway components to control the reservoir water levels and to safely release water during severe storm events or impending dam failure. Associated dam infrastructure includes, but is not limited to, groins, toes, saddle dams, spillways and auxiliary spillways, training and parapet walls, outlet works, storm drain headwalls that are associated with the outlet works, and appurtenant structures. These facilities are subject to the regulatory jurisdiction of the Division of Safety of Dams (DSOD), part of the California Department of Water Resources. The DSOD oversees dam safety in California with the goal of avoiding dam failure which could lead to potential loss of life and destruction of property. As part of the dam safety program, the DSOD completes detailed semi-annual inspections and provides an annual report of the City's dams to identify maintenance activities such as vegetation removal, grading, dredging, and repairs to infrastructure and may request certain maintenance work to be performed to improve dam safety.

The proposed Dam Maintenance Program (Program) would cover the long-term maintenance of these facilities and would include maintenance activities that are routinely included in these DSOD annual inspection reports. As of recent, DSOD is in the process of providing a regulatory framework that could potentially penalize an agency through monetary fines should violations occur. The proposed Program provides the City oversight to address items in DSOD's inspection reports and avoid potential violations. The Program describes the maintenance methods and overall potential impacts that are anticipated to occur by implementation of the Program. It also includes the protocols to address the impact of maintenance activities with respect to environmental resources.

1.1.1 Maintenance Activities

Maintenance activities covered under the proposed Program include maintenance of access roads and pedestrian footpaths, maintenance of staging and material storage areas, trimming and clearing of vegetation, dredging, maintenance of outlet/intake towers and trash racks, removal of debris along spillways and other appurtenant structures to provide a clear path and remove obstructions, maintenance and repair of the dams and appurtenant structures to prevent deterioration that could lead to dam failure, concrete maintenance and repairs, maintenance and replacement of piezometers and survey monuments, and geotechnical investigations. The dams covered under this Program include Barrett, Black Mountain, Chollas, El Capitan, Hodges, Miramar, Morena, Murray, Rancho Bernardo, San Vicente, Savage, Sutherland, and Upper Otay (see Figures 2a through 2m). The Dulzura Conduit is depicted in Figure 3.

Access Road and Staging Area Maintenance

Under the proposed Program, existing access roads, pedestrian footpaths, and staging and material storage areas would continue to be maintained in a useable condition along the current path alignments and existing disturbed/developed footprints. No widening, expansion, relocation, or establishment of new access roads, footpaths, or staging areas are proposed as part of the Program. Routine maintenance activities include patching and minor surface repaving of paved access roads and staging

areas; patching and minimal grading of gravel and dirt access roads and staging areas; filling of erosional voids, rills, and gullies caused by winter storms; and minor trimming of vegetation to remove overhanging branching and other encroaching vegetation. Minor trimming of vegetation would also occur along footpaths which are necessary to maintain pedestrian access to the toe of dams, dam leakage measuring structures, and weir and outlet work structures. Maintenance and repair activities along existing paved, gravel, and dirt access roads would be limited to the current road width, generally 10 feet wide, and established road rights-of-way, where present. Maintenance of pedestrian footpaths would be limited to minor trimming of vegetation along the path alignment; no soil disturbance or removal of vegetation would occur as part of footpath maintenance. Maintenance and repair activities within staging and material storage areas would be limited to the current disturbed and developed footprints.

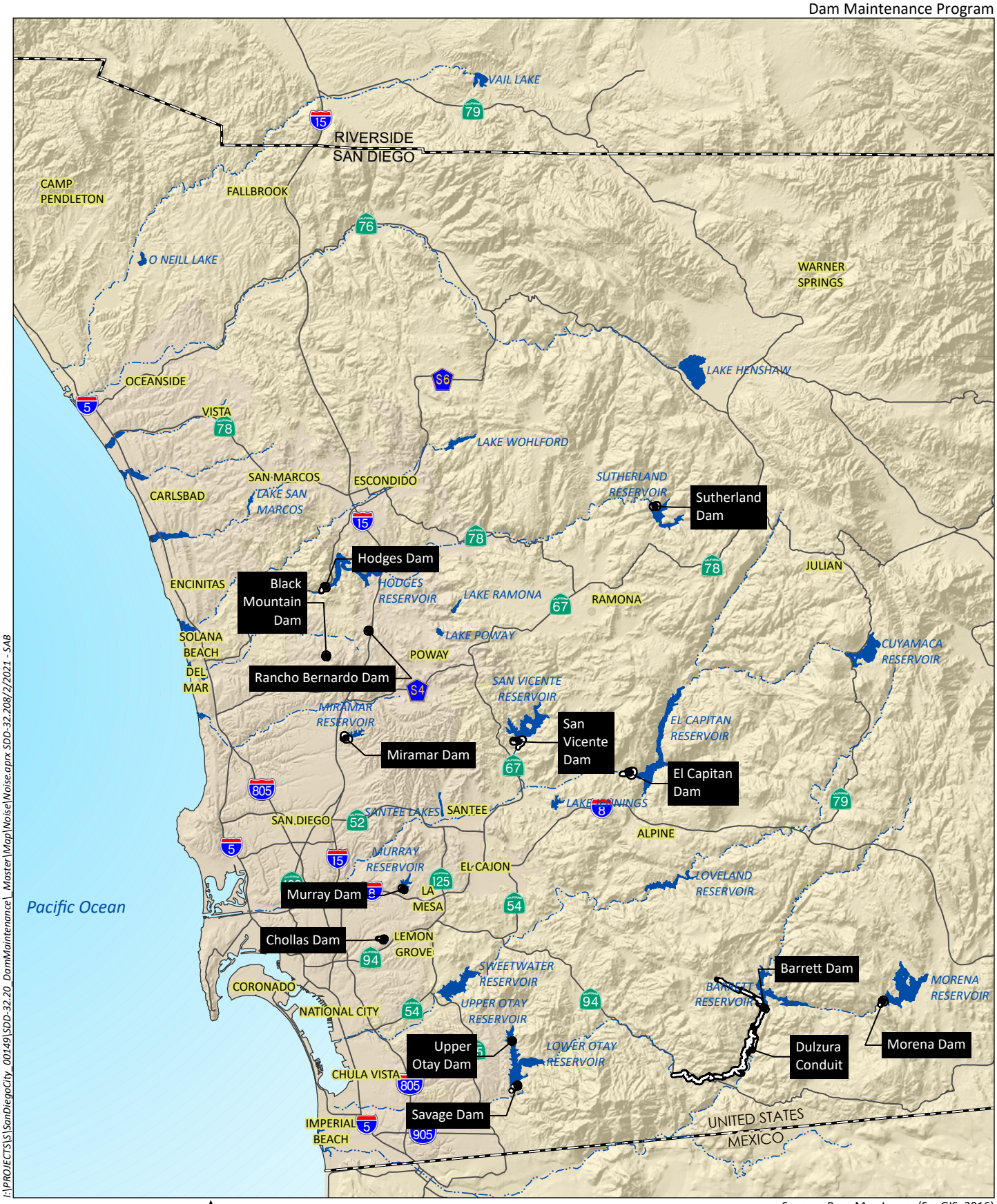
Access to the dams and associated infrastructure to complete maintenance activities covered under this Program, and detailed below, would occur along established access roads and pedestrian footpaths. Any staging of equipment or materials required to complete activities would occur within existing staging and material storage areas, within disturbed and developed portions of the dam, or within existing developed lands on nearby City property at the reservoirs. These areas are maintained as parking and operational space for dam and reservoir maintenance staff. If direct access to outlet/intake towers from the dam is not available, crews, materials, and the necessary equipment to perform maintenance and repair activities, including dredging, would be transported to the outlet/intake towers utilizing a boat or barge launched from the reservoir's boat ramp.

Vegetation Clearing

Vegetation growing on and adjacent to the dams and associated infrastructure has potential to hinder site access and safety inspections, visually obstruct dam components, interfere with safe operations, damage critical infrastructure, and possibly lead to dam failure. Removal of vegetation and debris is critical to the functioning of the dams and associated infrastructure, and Dulzura Conduit, as vegetation could reduce design capacity and prevent proper inspection of infrastructure. Clearing of vegetation would continue to be conducted on a routine basis under the Program to keep the maintenance area free and clear of vegetation. This will avoid re-establishment of upland and wetland vegetation, as well as decrease the chances of introducing a new species into an existing maintenance area.

Vegetation clearing would be limited to the following activities and areas:

- Clearing of all vegetation located within at least five feet of Dulzura Conduit;
- Clearing of all vegetation located within 10 feet of the dams and associated infrastructure;
- Clearing of all marsh habitat (i.e., giant reed [*Arundo donax*], cattail [*Typha* spp.], bulrush [*Schoenoplectus* spp.], etc.) located within 10 feet of the dam;
- Removal of all trees located within 10 feet of the dams, saddle dams, parapet walls, and spillways;
- Removal of all eucalyptus (*Eucalyptus* spp.) trees located within 50 feet of the dam, saddle dams, parapet walls, and spillways;



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0 8 Miles

Source: Base Map Layers (SanGIS, 2016)

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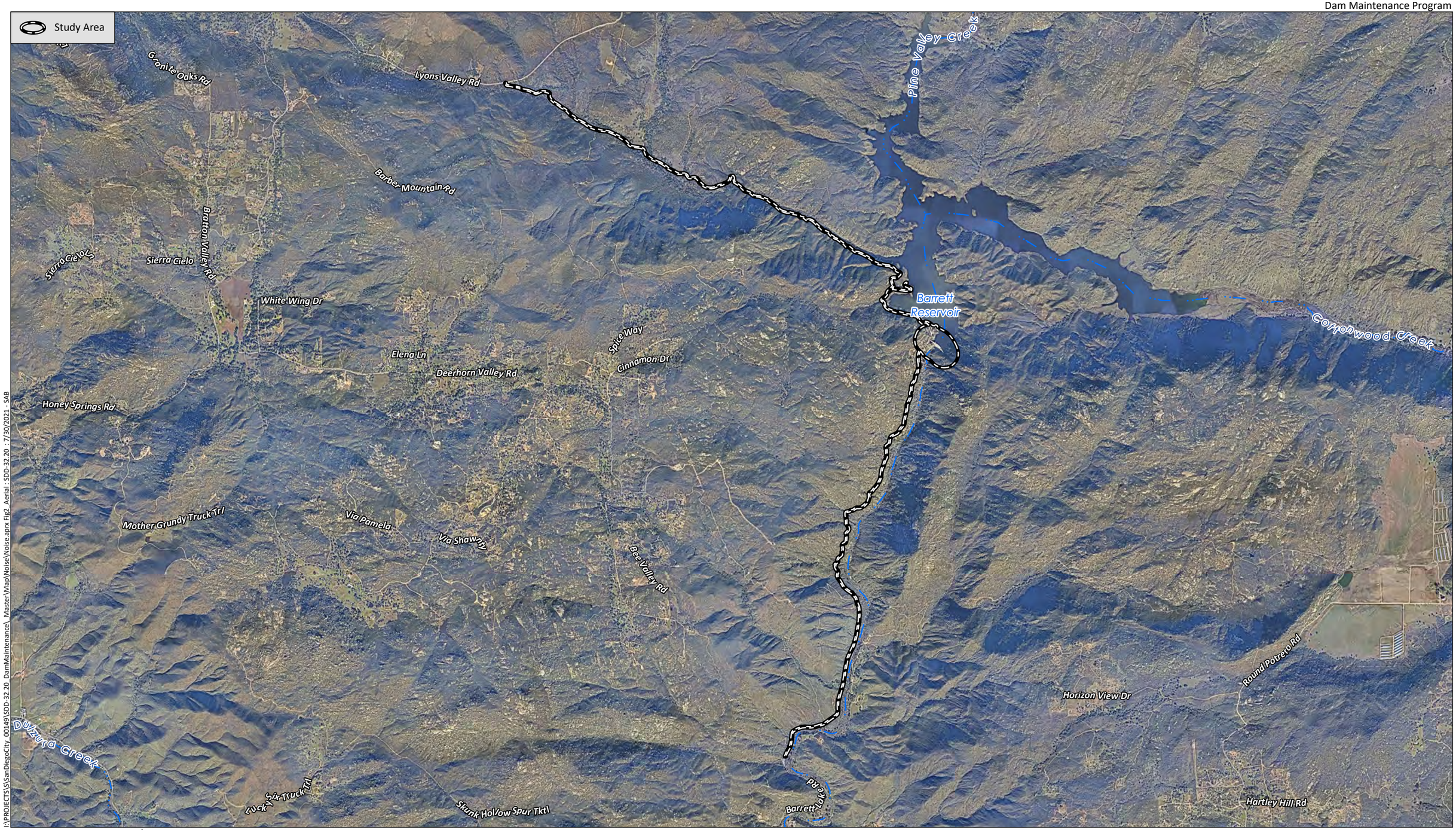
Regional Location

Figure 1



Source: Aerial (NearMap, 2019)

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Aerial Photograph - Barrett Dam & Access Roads

Figure 2a

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Source: Aerial (NearMap, 2019)

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Aerial Photograph - Black Mountain Dam

Figure 2b

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Source: Aerial (NearMap, 2019)

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Aerial Photograph - Chollas Dam

Figure 2c

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0 300 Feet

Source: Aerial (NearMap, 2019)

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Aerial Photograph - El Capitan Dam

Figure 2d

Study Area

Lake Dr

Lake Dr

Hodges Reservoir

Del Dios Hwy

San Dieguito River

0 300 Feet

N

Source: Aerial (NearMap, 2019)

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Aerial Photograph - Hodges Dam

Figure 2e

Study Area

Miro Cir
Mira Mesa Blvd
Hibert Dwy
Scripps Ranch Blvd
Hibert St
Miramar Reservoir
Scripps Lake Dr
Unnamed 20A St
Unnamed 20A St
Unnamed 20A St
Unnamed 20A St
Red Cedar Dr

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0 300 Feet

N

Source: Aerial (NearMap, 2019)

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Aerial Photograph - Miramar Dam

Figure 2f

Study Area

Morena Reservoir

Morena Reservoir Rd

Cottonwood Creek

0 300 Feet

N

Source: Aerial (NearMap, 2019)

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Aerial Photograph - Morena Dam

Figure 2g

Study Area

Ciudad Leon Ct
Elaine Way
Murray Reservoir
Tema St
Edinburgh Ct
Cavite Ct
Del Cerro Blvd
Delaware Ave
Connecticut Ave
Wyoming Ave
Oregon Ave
Lake Murray Blvd

0 200 Feet

N

Source: Aerial (NearMap, 2019)

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Aerial Photograph - Murray Dam

Figure 2h

Study Area

Bernardo Center Dr
Turtleback Ln
Rinstone Ln
Cloudcrest Dr
Trailside Ct
Trailside Way
Caminito Tierra Del Sol
Sunnydale Ct
Big Springs Way
Lojay Trail Dr
Caminito Tomas
Blazewood Pl
Blazewood Way
Earthstar Ct
Caminito De Las Noches
Turtleback Rd
Willowwood Dr
Caminito De Las Missiones
Windrose Ct
Sun Summit Pl
15

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0 200 Feet

Source: Aerial (NearMap, 2019)

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Aerial Photograph - Rancho Bernardo Dam

Figure 2i

Study Area

San Vicente Reservoir

Moreno Ave

San Vicente Creek

0 400 Feet

N

Source: Aerial (NearMap, 2019)

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Aerial Photograph - San Vicente Dam

Figure 2j

Study Area

Lower Otay Reservoir

Boy Scout Camp Rd

Wueste Rd

Wueste Rd

Otay River

0 300 Feet

Source: Aerial (NearMap, 2019)

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Aerial Photograph - Savage Dam

Figure 2k

Study Area

Sutherland Dam Rd

Santa Ysabel Creek

Sutherland Reservoir

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0 200 Feet

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Source: Aerial (NearMap, 2019)

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Aerial Photograph - Sutherland Dam

Figure 2l

Study Area

Upper Otay Reservoir

Wueste Rd

Otay Lakes Rd

0 200 Feet

N

Source: Aerial (NearMap, 2019)

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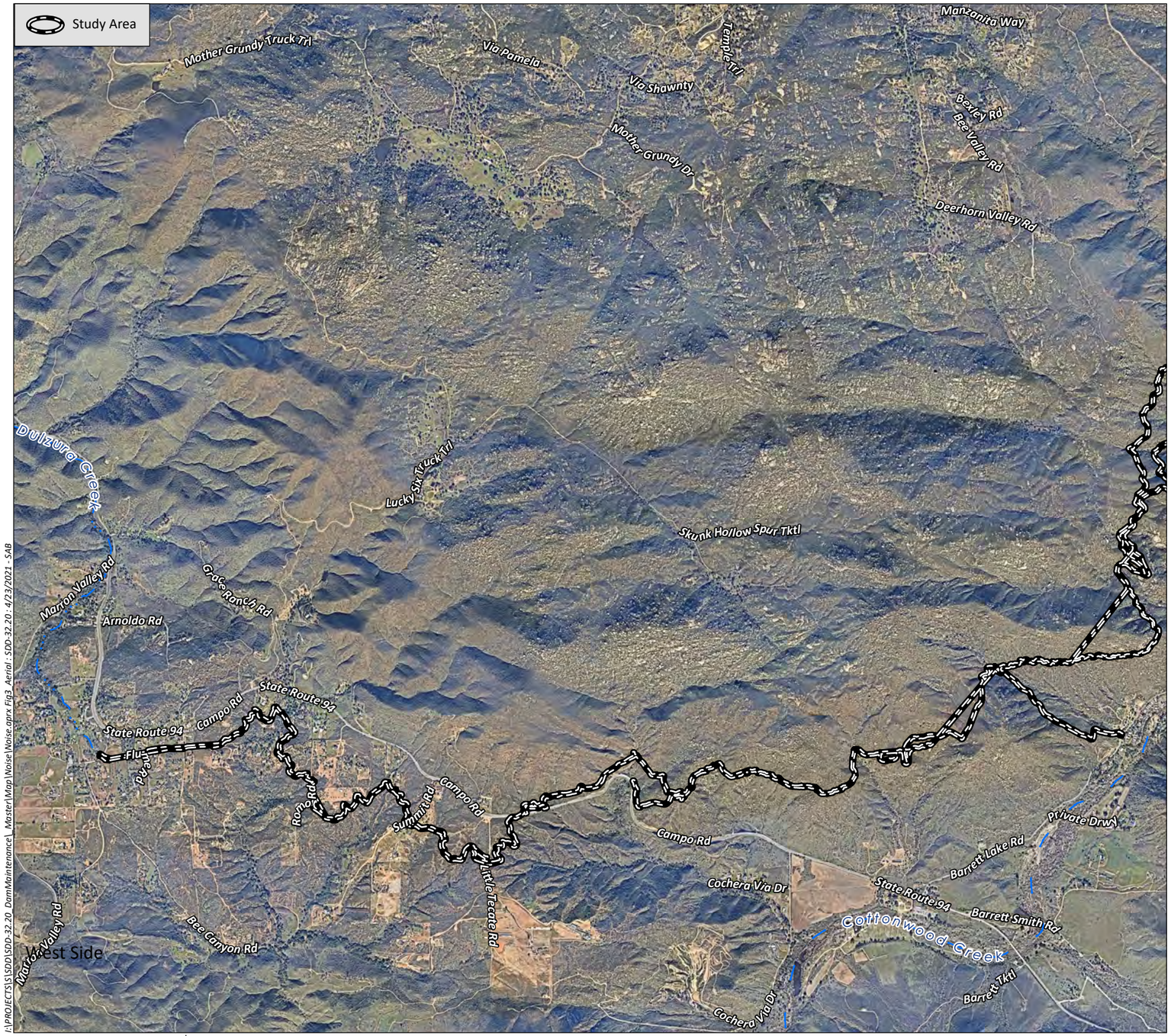
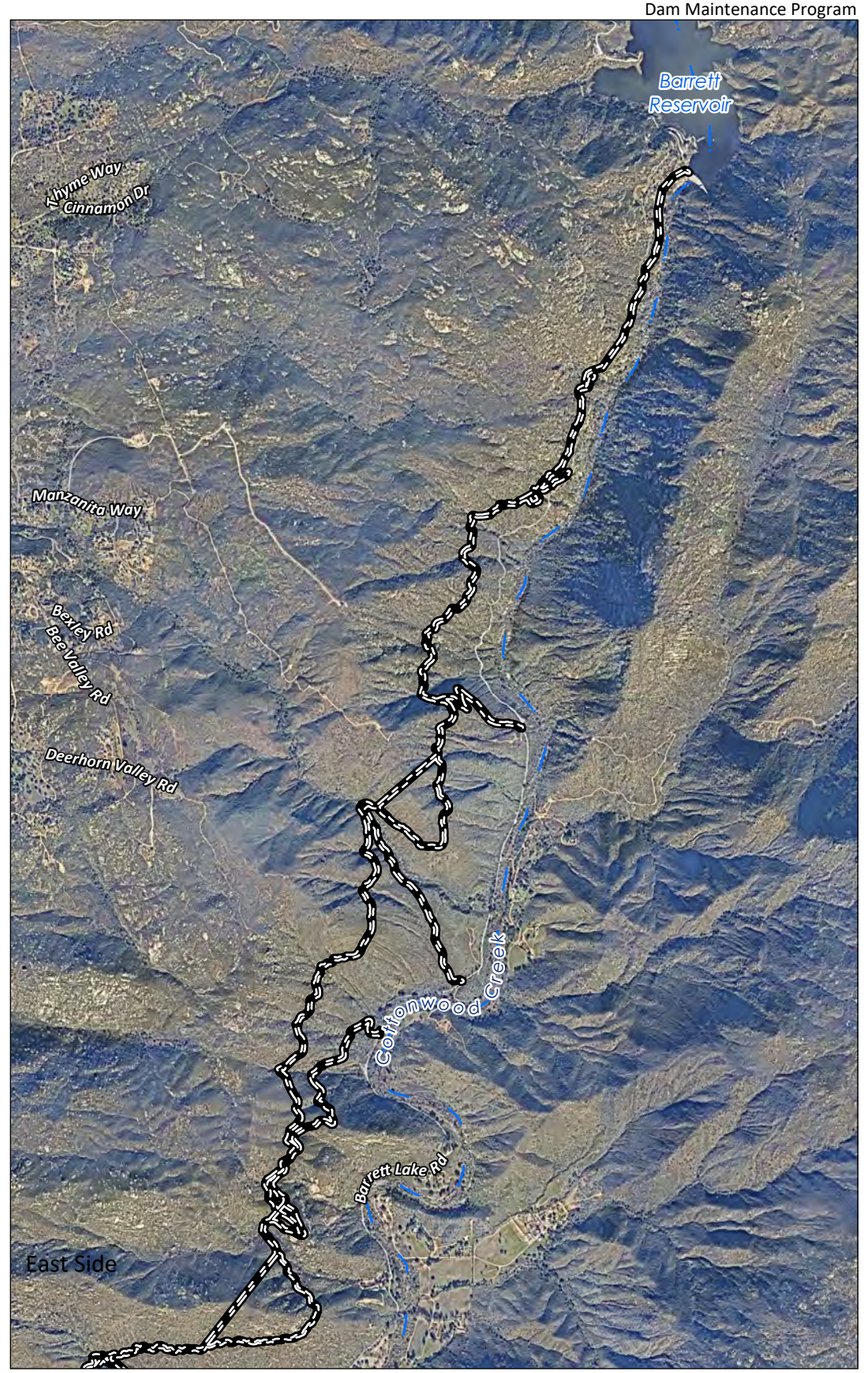
Aerial Photograph - Upper Otay Dam

Figure 2m





0 2,500 Feet

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Source: Aerial (NearMap, 2019)

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Aerial Photograph - Dulzura Conduit

Figure 3

- Clearing and maintenance of all vegetation within 10 feet of all weirs; headwalls; blow-off and outlet valves; inlet and outlet pipes; discharge, leakage, and seepage pipes and associated discharge paths; and

- Maintenance of slopes surrounding Black Mountain and Rancho Bernardo Dams so that no trees are permitted to establish. The slopes shall be maintained in their current condition so that only herbaceous vegetation and low-growing shrubs occur.

Clearing of vegetation on land surfaces would be limited to above ground level, and the roots of all cut vegetation will be left in place to prevent soil disturbance and reduce potential erosion. Clearing of eucalyptus and other tree species would be completed by cutting trees at the base and treating the stumps with herbicide. Aquatic vegetation, such as marsh habitat, would either be cut at the water surface and treated with an herbicide approved for aquatic use by the U.S. Environmental Protection Agency (USEPA) by a licensed applicator, or removed with the use of mechanical equipment where feasible. All vegetation clearing work would be conducted with hand tools such as pole saws, chain saws, and weed eaters. Felled trees and aquatic would be removed from the area with the use of mechanized equipment (such as a bobcat, backhoe, or excavator), where feasible, and transported to an appropriate waste management facility for disposal. Felled trees in areas inaccessible to mechanized equipment would be removed via helicopter.

Dredging

Accumulated lake bottom sediment covering dam infrastructure, such as lower saucer valve ports, would be removed through dredging to maintain operational function. Dredging would occur within a 50-foot radius of the outlet/intake tower base at Barrett, Chollas, El Capitan, Miramar, Morena, Murray, San Vicente, and Savage Dams, and within a 50-foot radius at the low-level outlet intake at Barrett, Hodges, and San Vicente Dams. The depth of dredging activities would be variable depending on site conditions.

There are two main dredging methods that are anticipated to be employed under the proposed Program: mechanical and hydraulic. Mechanical dredging typically involves a stationary, bucketed machine (such as a boom, clamshell, or backhoe) positioned on a barge that is lowered into the water to scoop up material. The dredged material is then raised above the water surface and deposited on a barge or other above-water surface. Hydraulic dredging utilizes a high-powered water pump to suction up material that is then pumped away from the dredge site. A dredging plan would be prepared and approved prior to the commencement of dredging activities at each proposed location. The dredging plan would describe the scope of work, amount of material to be removed, method of dredging, equipment, access roads and points, staging area(s), duration and schedule, and protocols to be implemented. Dredged material would be removed from the reservoir and either disposed of at an appropriate disposal facility or reused in a beneficial capacity (i.e., agricultural).

Outlet Tower & Trash Rack Maintenance

The Program includes maintenance and minor repairs to the outlet/intake towers to maintain and improve the operational safety of the towers. These activities include filling cored holes on the operating platform; repairing the valve rack; repairing concrete spalls; applying top seal to waterproof and protect concrete surfaces and seal hairline cracks; coating metal covers, access ladders, and handrails to prevent corrosion; repair and replacement of access ladders; replacement of access hatches (in-kind); replacement of the safety chains across rails at the landing (in-kind); replacement or

refurbishment of fall arrests; coating of the roof structural steel; and strengthening the concrete roof slab with the application of a fabric reinforced matrix. Equipment required to complete these activities would be limited to the use of manual and mechanical hand tools; no heavy machinery would be required. Additionally, trash racks would be regularly cleared and maintained and kept free of debris that may block intake and outlet valves and other critical dam infrastructure, hindering operational functionality.

Spillway Clearing

Accumulated debris such as dirt, rocks, boulders, and vegetation present on the spillways, spillway channels, and auxiliary spillways would be removed as part of the Program to maintain operational function and prevent damage to infrastructure. Debris would be removed by hand, where feasible, and heavy equipment including, but not limited to, a truck-mounted crane, rubber-wheeled front-end loader, track-mounted long arm excavator, track-mounted bobcat with jackhammer attachment, and dump trucks. Small equipment (such as a bobcat) would be lowered into the spillways and other appurtenant structures with a truck-mounted crane to move the debris to a point where it can be accessed by a long arm-track mounted excavator positioned at the top of the structure. Boulders would be broken up into manageable pieces with a hydraulic jackhammer to allow for removal. A track-mounted excavator would lift the debris from the spillway and appurtenant structures and place it in a dump truck to be hauled away and disposed of at a licensed landfill or stock-piled on-site within disturbed/developed areas of the dam. Spillway clearing activities would be contained within the un-vegetated spillways and appurtenant structures, existing access roads, previously disturbed workspaces and staging areas, and disturbed and developed areas adjacent to the dams.

Removal of soil, debris, and vegetation along the El Capitan Dam spillway, lower dam spillway, and spillway channel will be conducted as part of the El Capitan Dam Spillway Vegetation Removal Project. Long-term maintenance of these areas will also be covered under the El Capitan Dam Spillway Vegetation Removal Project and are not included as part of the proposed Program.

Dam Maintenance and Repairs

Maintenance and repair of the dams and appurtenant structures would be completed as part of the Program to prevent deterioration and maintain the integrity and functionality of critical dam infrastructure. The 13 City-owned dams covered under this Program include four earthen dams (Chollas, El Capitan, Miramar, and Morena Dams), seven concrete dams (Barrett, Hodges, Murray, San Vicente, Savage, Sutherland, and Upper Otay Dams), and two concrete reservoirs (Black Mountain and Rancho Bernardo).

Maintenance of earthen dams would include filling of voids, gullies, and rills caused by erosion on the upstream and downstream faces of the dam, and minor grading and regular compaction of the dam face and toe of dam. Maintenance of concrete dams, reservoirs, and concreted appurtenant structures at earthen and concrete dams (i.e., saddle dams, parapet walls, spillways, etc.) would include repairs such as sealing of all joints and cracks with gaps with a flexible sealant to prevent infiltration of water and buildup of stagnation pressures; repairing all degraded concrete, spalls, and boulder impact areas within the spillway (channel floor and walls) and dam face and walls by cutting-out existing material then replacing and patching material to prevent further damage; repair of spalled concrete on all elements of the dam, especially where reinforcing steel is exposed; and smoothing vertically-displaced joints on concrete surfaces by surface grinding or other approved methods.

Additionally, auxiliary infrastructure located on or within the dams would be maintained, repaired, and or replaced, including perimeter fencing, piezometers and survey monuments, ladders, micrometers, electronic level sensors, and other instrumentation. All maintenance and repairs activities would be performed on existing structures with work activities limited to disturbed and developed portions of the dam.

Dulzura Conduit

Maintenance and repair of Dulzura Conduit is required to prevent flow impairment through the conduit and maintain design capacity. The Dulzura Conduit is an approximately 13-mile-long aqueduct that was constructed to divert water from Barrett Dam Reservoir to Lower Otay Reservoir through a series of canals, flumes, and tunnels. Water is released into the conduit through the Barret Dam outlet tower by a 30-inch drainpipe. The conduit has been updated as recently as 2011, with a majority of the conduit now constructed of concrete channels and steel pipes. The average depth of the concrete trench segments is approximately four and a half feet, with a bottom width of three feet, and a top width of approximately six feet. The flume is a combination of enclosed metal flumes measuring approximately four feet in interior diameter, and board-formed poured concrete. Existing access roads and trails are constructed of decomposed granite, gravel, or concrete. Pedestrian footpaths primarily consist of dirt paths, and in some cases small steel catwalks.

Maintenance activities along Dulzura Conduit involve the removal of landslide debris, rocks and boulders, and vegetation within the concrete conduit, and the repair of damaged or deteriorating sections of the existing conduit with in-kind materials. Repairs of the existing concrete conduit would be completed with shotcrete and include the installation of reinforcing mesh, ground wires, and compound curing. The shotcrete would be broom finished by hand. Activities also include chemical rock breaking of large boulders that are found to be blocking the conduit.

All inspection, repair, and maintenance activities along Dulzura Conduit would occur within the existing developed footprint of the conduit, pedestrian footpaths, and access roads and trails. The remote location of the conduit, rugged terrain, and limited vehicle access makes typical maintenance activities challenging. Maintenance and construction personnel would access the site through existing access roads, access trails, and pedestrian footpaths. Helicopters would airlift all supplies, equipment (i.e., mini-excavator, bobcat, etc.), and debris that cannot be hand carried to and from the repair sites. Helicopter landing, materials, and equipment staging areas would be located within existing developed lands on nearby City property at Barrett Reservoir. These areas are maintained as parking and operational space for dam and reservoir maintenance staff.

Geotechnical Investigations

Subsurface geotechnical investigation of the dams, foundations, and associated infrastructure would occur as part of periodic condition assessments under the proposed Program. Geotechnical investigations would include seismic stability analysis using modern techniques, penetration tests, and borings. The techniques used to perform the investigations would be limited to a small footprint within existing disturbed and developed areas associated with the dams and along access roads. No vegetation would be removed as part of the geotechnical investigation activities, and no native soil would be impacted, as excavations would be conducted within disturbed soils of previously installed infrastructure (i.e., rockfill and concrete).

1.1.2 Frequency of Maintenance Activities

The frequency of maintenance activities would be based upon routine inspections and recommendations identified in the DSOD annual inspection reports. Factors influencing the timing and frequency of maintenance events would include, but is not limited to, current conditions, past maintenance history, and risk assessment. In general, clearing of vegetation is anticipated to occur annually, though the extent of clearing would be dependent on the current conditions at each site. Other maintenance activities would occur on an as needed basis as directed by the DSOD and City PUD.

Maintenance activities may need to be conducted in the event of an emergency. "Emergency" means a sudden, unexpected occurrence, involving a clear and imminent danger, demanding immediate action to prevent or mitigate loss of, or damage to, life, health, property, or essential public services. Physical evidence, such as observation of surcharging conditions, blockages by debris/rocks/roots, or holes/cracks/offsets in dam infrastructure, or where impacts to vegetation, wetlands, and landforms have resulted from surcharging conditions (unanticipated water releases) would demonstrate emergency conditions.

2.0 ENVIRONMENTAL SETTING & EXISTING CONDITIONS

2.1 NOISE AND SOUND LEVEL DESCRIPTORS AND TERMINOLOGY

All noise level or sound level values presented herein are expressed in terms of decibels (dB), with A weighting (dBA) to approximate the hearing sensitivity of humans. Time-averaged noise levels are expressed by the symbol L_{EQ}, with a specified duration.

Sound can be described as the mechanical energy of a vibrating object transmitted by pressure waves through a liquid or gaseous medium (e.g., air) to a hearing organ, such as a human ear. Noise is defined as loud, unexpected, or annoying sound.

In the science of acoustics, the fundamental model consists of a sound (or noise) source, a receiver, and the propagation path between the two. The loudness of the noise source and obstructions or atmospheric factors affecting the propagation path to the receiver contribute to the sound level and characteristics of the noise perceived by the receiver. The field of acoustics deals primarily with the propagation and control of sound.

Continuous sound can be described by frequency (pitch) and amplitude (loudness). A low frequency sound is perceived as low in pitch. Frequency is expressed in terms of cycles per second, or Hertz (Hz) (e.g., a frequency of 250 cycles per second is referred to as 250 Hz). High frequencies are sometimes more conveniently expressed in kilohertz (kHz), or thousands of Hertz. The audible frequency range for humans is generally between 20 Hz and 20,000 Hz.

The amplitude of pressure waves generated by a sound source determines the loudness of that source. A logarithmic scale is used to describe sound pressure level (SPL) in terms of dBA units. The threshold of hearing for the human ear is about 0 dBA, which corresponds to 20 micro Pascals (mPa).

Because decibels are logarithmic units, SPL cannot be added or subtracted through ordinary arithmetic. Under the decibel scale, a doubling of sound energy corresponds to a 3-dBA increase. In other words, when two identical sources are each producing sound of the same loudness, the resulting sound level at a given distance would be 3 dBA higher than one source under the same conditions.

To place noise levels measured in dBA in context, typical noise levels for common outdoor and indoor noise sources are shown in Table 1, *Typical Noise Levels*.

Table 1
TYPICAL NOISE LEVELS

Common Outdoor Noise	Noise Level (dBA)	Common Indoor Noise
	110	Rock band
Jet flyover at 1000 feet		
	100	
Gas lawn mower at 3 feet		
Diesel truck at 50 feet at 50 mph	**90**	
		Food blender at 3 feet
Noisy urban area, daytime	**80**	Garbage disposal at 3 feet
Gas lawn mower at 100 feet	**70**	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	**60**	
		Large business office
Quiet urban area, daytime	**50**	Dishwasher in next room
Quiet urban area, nighttime	**40**	Theater, large conference room (background)
Quiet suburban area, nighttime		
	30	Library
Quiet rural area, nighttime		Bedroom at night, concert hall (background)
	20	
		Broadcast/recording studio
	10	
	0	

Source: Caltrans 2013a

2.2 REGULATORY FRAMEWORK

2.2.1 Biologically Sensitive Habitat

Associated guidelines produced by the U.S. Fish and Wildlife Service (USFWS) require that project construction or operation noise be limited to a level not to exceed 60 dBA L_{EQ} or, if the existing ambient noise level is above 60 dBA L_{EQ}, increase the ambient noise level by 3 dBA L_{EQ} at the edge of occupied habitat during the avian species breeding season. Some research, such as that completed by the Bioacoustics Research Team (1997), also conclude that 60 dBA is a criterion to use as a starting point for passerine (songbirds) impacts until more specific research is done.

Additionally, the City's Land Development Code Biology Guidelines (City 2018) and California Environmental Quality Act Significance Determination Thresholds (City 2020) require mitigation for significant noise impacts to certain sensitive avian species if found to occur within or adjacent to the project area. Mitigation is required if construction generated noise levels would exceed 60 dB(A), or the existing ambient noise level if already above 60dB(A), during the breeding season of the following species:

- Coastal California gnatcatcher (*Polioptila californica californica*): March 1 – August 15;
- Least Bell's vireo (*Vireo bellii pusillus*): March 15 – September 15;
- Southwestern willow flycatcher (*Empidonax traillii extimus*): May 1 – August 30;
- Coastal cactus wren (*Campylorhynchus brunneicapillus sandiegensis*): February 15 – August 15;
- Tricolored blackbird (*Agelaius tricolor*): March 1 – August 1;
- Western snowy plover (*Charadrius nivosus nivosus*): March 1 – September 15;
- California least tern (*Sternula antillarum browni*): April 1 – September 15.

2.2.2 Local Ordinances

The Program would be located at locations throughout San Diego County (County). Work would be conducted both within the limits of the City and within unincorporated areas of the County. Program-related activities at Savage and Upper Otay Dams may occur adjacent to the City of Chula Vista, and activities at Lake Murray would be located adjacent to the City of La Mesa. The City and County specify allowable hours for construction from 7:00 a.m. to 7:00 p.m. and noise levels resulting from construction during certain times of day. The cities of Chula Vista and La Mesa do not provide numerical noise limits for construction activities. Because Program activities would not be located within the City of La Mesa or City of Chula Vista, the Program would not be subject to their applicable hours. Furthermore, applicable construction hours for the City and County would be more restrictive. A summary of local regulations applicable to the Program are shown in Table 2, *Summary of Noise Regulations*.

Table 2
SUMMARY OF NOISE REGULATIONS

Jurisdiction	Applicable Hours[1]	Temporary Noise Level Limit[2]
County of San Diego	7:00 a.m. to 7:00 p.m.	75 dBA L_{EQ} (8 hour)
City of Chula Vista	7:00 a.m. to 10:00 p.m.	N/A
City of La Mesa	7:00 a.m. to 10:00 p.m.	N/A
City of San Diego	7:00 a.m. to 7:00 p.m.	75 dBA L_{EQ} (12 hour)

[1] Applicable hours indicate the hours when construction noise is not prohibited, per each jurisdiction's Municipal Code. Hours may vary by day of week and by holidays, depending on jurisdiction. Hours listed in this table apply to typical weekdays.

[2] N/A = not applicable; indicates that the jurisdiction has not set a numerical construction noise standard.

Note: The Program would not be subject to the limits for the City of Chula Vista and City of La Mesa. Their noise regulations are provided here for informational purposes.

2.2.2.1 County of San Diego – Noise Ordinance

Sections 36.401 through 36.423 of the County of San Diego Code of Regulatory Ordinances discuss further County noise requirements. The purpose of the Noise Ordinance is to regulate noise in the unincorporated area of the County to promote the public health, comfort, and convenience of the County's inhabitants and its visitors.

Section 36.408, Hours of Operation of Construction Equipment

Except for emergency work, it shall be unlawful for any person to operate or cause to be operated, construction equipment:

a. Between the hours of 7:00 p.m. and 7:00 a.m.

b. On a Sunday or a holiday. For the purposes of this section a holiday means January 1, the last Monday in May, July 4, the first Monday in September, December 25, and any day appointed by the President as a special national holiday or the Governor of the State as a special State holiday. A person may, however, operate construction equipment on a Sunday or holiday between the hours of 10:00 a.m. and 5:00 p.m. at the person's residence or for the purpose of constructing a residence for himself or herself, provided that the operation of construction equipment is not carried out for financial consideration or other consideration of any kind and does not violate the limitations in Sections 36.409 and 36.410**.**

Section 36.409, Construction Noise

Except for emergency work, it shall be unlawful for any person to operate construction equipment or cause construction equipment to be operated that exceeds an average sound level of 75 dBA for an 8-hour period, between 7:00 a.m. and 7:00 p.m., when measured at the boundary line of the property where the noise source is located or on any occupied property where the noise is being received.

The minimum measurement period for any measurements is one hour. During the measurement period, a measurement must be conducted every minute from a fixed location on an occupied property. The measurements must measure the maximum sound level during each minute of the measurement period. If the sound level caused by construction equipment or the producer of the impulsive noise exceeds the maximum sound level for any portion of any minute, it will be deemed that the maximum sound level was exceeded during that minute.

2.2.2.2 City of San Diego

Section 59.5.0404 of the San Diego Municipal Code states that it shall be unlawful for any person, including staff employed by 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 dBA during the 12-hour period from 7:00 a.m. to 7:00 p.m.

2.2.3 Federal Aviation Administration

CFR Title 14: Aeronautics and Space, Chapter I: Federal Aviation Administration, Department of Transportation, Subchapter H for helicopter noise contain standards related to aircraft.

Section 137.49: Operations Over Other than Congested Areas

Notwithstanding Part 91 of this chapter, during the actual dispensing operation, including approaches, departures, and turnarounds reasonably necessary for the operation, an aircraft may be operated over other than congested areas below 500 feet above the surface and closer than 500 feet to persons, vessels, vehicles, and structures, if the operations are conducted without creating a hazard to persons or property on the surface.

Section 137.51: Operation over Congested Areas: General

(a) Notwithstanding Part 91 of this chapter, an aircraft may be operated over a congested area at altitudes required for the proper accomplishment of the agricultural aircraft operation if the operation is conducted:

(1) With the maximum safety to persons and property on the surface, consistent with the operation, and

(2) In accordance with the requirements of paragraph (i) of this section

(i) No person may operate an aircraft over a congested area except in accordance with the requirements of this paragraph.

(3) Prior written approval must be obtained from the appropriate official or governing body of the political subdivision over which the operations are conducted.

(4) Notice of the intended operation must be given to the public by some effective means, such as daily newspapers, radio, television, or door-to-door notice.

(5) A plan for each complete operation must be submitted to, and approved by appropriate personnel of the FAA Flight Standards District Office having jurisdiction over the area where the operation is to be conducted. The plan must include consideration of obstructions to flight, the emergency landing capabilities of the aircraft to be used, and any necessary coordination with air traffic control.

(6) Single engine aircraft must be operated as follows:

(i) Except for helicopters, no person may take off a loaded aircraft, or make a turnaround over a congested area.

(ii) No person may operate an aircraft over a congested area below the altitudes prescribed in Part 91 of this chapter except during the actual dispensing operation, including the approaches and departures necessary for that operation.

(iii) No person may operate an aircraft over a congested area during the actual dispensing operation, including the approaches and departures for that operation, unless it is operated in a pattern and at such an altitude that the aircraft can land, in an emergency, without endangering persons or property on the surface.

Section 137.53: Operation over Congested Areas: Pilots and Aircraft

(a) General. No person may operate an aircraft over a congested area except in accordance with the pilot and aircraft rules of this section.

(b) Pilots. Each pilot in command must have at least:

(1) 25 hours of pilot-in-command flight time in the make and basic model of the aircraft, at least 10 hours of which must have been acquired within the preceding 12 calendar months.

(2) 100 hours of flight experience as pilot in command in dispensing agricultural materials or chemicals.

(c) Aircraft.

(1) Each aircraft must –

(i) If it is an aircraft not specified in paragraph (c)(1)(ii) of this section, have had within the preceding 100 hours of time in service a 100-hour or annual inspection by a person authorized by Part 65 or 145 of this chapter, or have been inspected under a progressive inspection system.

(ii) If it is a large or turbine-powered multiengine civil airplane of U.S. registry, have been inspected in accordance with the applicable inspection program requirements of Section 91.409 of this chapter.

(2) If other than a helicopter, it must be equipped with a device capable of jettisoning at least one-half of the aircraft's maximum authorized load of agricultural material within 45 seconds. If the aircraft is equipped with a device for releasing the tank or hopper as a unit, there must be a means to prevent inadvertent release by the pilot or other crewmember.

2.3 EXISTING CONDITIONS

The San Diego region is a diverse region with a variety of land uses, habitats, and climatic and topographic conditions. The existing conditions at each dam location and along the Dulzura Conduit corridor range from urban to suburban to rural and open space. Dams located within or adjacent to urban or suburban areas include Chollas, Rancho Bernardo, Miramar, Upper Otay, Black Mountain, and Murray. Dams located in largely undeveloped or rural locations include Savage, Hodges, San Vicente, El Capitan, Sutherland, Morena, and Barrett. The areas surrounding the Dulzura Conduit are largely open space or undeveloped.

3.0 METHODOLOGY AND EQUIPMENT

3.1 NOISE MODELING SOFTWARE

Modeling of the exterior noise environment for this report was analyzed using the Roadway Construction Noise Model (RCNM; USDOT 2008), which incorporates estimates of sound levels from

standard construction equipment based on manufacturers' specifications and measured reference noise levels.

3.2 NOISE-GENERATING ACTIVITIES

Noise-generating construction associated with the Program would include mobile equipment used for access road maintenance, vegetation clearing, tree removal, dredging, spillway cleaning, and dam and conduit repairs. Noise levels are addressed at a programmatic level based on the types of equipment that may be used during each activity. Due to the programmatic nature of this document, the exact locations and extent of all activities to be conducted under the Program are not known at this time. As such, site-specific evaluation of noise sources and potential effects is not included in this programmatic evaluation.

With regard to permanent increases in noise levels, noise from the Program would be temporary and would last only for the duration of each activity. No potential exists to produce permanent increases in noise as a result of the Program, and therefore are not discussed further.

3.2.1 Equipment Noise Levels

The full list of equipment to be used in the Program is provided in Table 3, *Construction Equipment Noise Levels*. Some equipment such as hand-held tools and non-motorized equipment would not generate elevated noise levels and were therefore excluded from this analysis. Noise levels are based on a standard modeled distance of 50 feet as a reference, and do not assume the incorporation of noise attenuation measures. Noise levels for a helicopter are from a Bell 407 helicopter hovering at 100 feet (National Park Service 2007) and calculated to the 50-foot distance. For the purposes of this report, a helicopter is assumed to be in use at a given location for 8 percent of a given hour, due to the aircraft's primary functions of airlifting supplies and removing or transporting trees to otherwise inaccessible locations.

Table 3
CONSTRUCTION EQUIPMENT NOISE LEVELS

Unit	Program Activity	Percent Operating Time	L_{MAX} at 50 feet	dBA L_{EQ} at 50 feet
Backhoe	Access Road Maintenance, Tree Removal, Dam Repair	40	77.6	73.6
Dozer	Access Road Maintenance	40	81.7	77.7
Dump Truck	Tree Removal, Dredging	50	76.5	72.5
Excavator	Tree Removal, Dredging, Spillway Maintenance, Dam Repair	40	80.7	76.7
Front End Loader	Spillway Maintenance	40	79.1	75.1
Jackhammer	Spillway Maintenance	20	88.9	81.9
Crane	Spillway Maintenance	16	80.6	72.6
Bobcat/Skid-steer	Access Road Maintenance, Tree Removal, Dam Repair	40	75.0	71.0
Chainsaw	Veg Clearing, Tree Removal	20	78.0	74.0
Helicopter (Bell 407)	Dulzura Conduit Repairs, Tree Removal	8	101.9	90.9

Source: RCNM, National Park Service 2007
L_{MAX} = maximum noise level; dBA = A-weighted decibel; L_{EQ} = equivalent sound level

3.2.2 Traffic

Traffic increases related to the Program would be short-term and temporary. Work associated with the Program would be performed between 7:00 a.m. and 7:00 p.m. Monday through Friday, in accordance with both the City and County's Municipal Code requirements. Individual Program activities associated with the Proposed Project would not require a high number of workers or generate a high number of worker commute trips to and from individual sites. As described in Section 2.1, a doubling of noise-generating activity (i.e., traffic) would cause a doubling in noise (a 3-dBA increase), which would be considered a significant increase. Additionally, the types of vehicles that would be used (e.g., pickup trucks and other light vehicles) do not generate louder noise levels than other common vehicles. Individual Program activities, and therefore the vehicles associated with them, would be dispersed over multiple locations. As such, noise level increases associated with Program-related traffic are anticipated to be less than double any trafficked roadway, and noise levels from Program traffic are not further analyzed.

4.0 GUIDELINES FOR THE DETERMINATION OF SIGNIFICANCE

The following significance threshold categories for noise are based on the City Significance Determination Thresholds (City 2020) and Noise Ordinance, as applicable to the project.

The Program would result in a potentially significant noise impact if it would:

1. Result in temporary construction noise that exceeds 75 dBA L_{EQ} (12 hour) at the property line of a NSLU in the City of San Diego from 7:00 a.m. to 7:00 p.m. (as identified in Section 59.0404 of the City's Municipal Code) or if non-emergency construction occurs during the 12-hour period from 7:00 p.m. to 7:00 a.m.

2. Result in temporary construction noise that exceeds 75 dBA L_{EQ} (8 hour) at the property line of a NSLU in the County from 7:00 a.m. to 7:00 p.m. (as identified in Section 36.409 of the County's Code of Regulatory Ordinances) or if non-emergency construction occurs during the 12-hour period from 7:00 p.m. to 7:00 a.m.

5.0 ANALYSIS OF PROJECT EFFECTS

Construction equipment that would be used for the Program's access road maintenance, vegetation clearing, tree removal, dredging, spillway cleaning, dam and concrete repairs includes skid-steers, dozers, backhoes, excavators, dump trucks, cranes, loaders, and helicopters. Analysis of noise levels are provided by each Program activity.

Because construction would not be used at a standard distance from nearby land uses or biologically sensitive habitats, this letter analyzes individual construction equipment to determine the distances within which construction noise would be significant. If a sensitive land use, such as a nearby residence or habitat, is located within these distances, impacts from construction noise would be potentially significant.

5.1 CONSTRUCTION EQUIPMENT NOISE LEVELS

Table 4, *Construction Equipment Setback Distances*, shows the distances within which noise levels would exceed the 60 dBA L_{EQ} (one hour) limit for biologically sensitive habitat and 75 dBA L_{EQ} (8 hour or 12 hour) limit for NSLUs.

Table 4
CONSTRUCTION EQUIPMENT SETBACK DISTANCES

Equipment Type	Percentage Used per Hour	Distance within which Noise Levels Would Exceed Threshold Biologically Sensitive Habitat[1]	Distance within which Noise Levels Would Exceed Threshold Noise-Sensitive Land Uses[2]
Bobcat/Skid-steer	40	178 feet	31 feet
Dozer	40	385 feet	68 feet
Backhoe	40	240 feet	43 feet
Chainsaw	20	178 feet	32 feet
Excavator	40	343 feet	61 feet
Dump Truck	40	211 feet	38 feet
Crane	16	214 feet	38 feet
Loader	20	202 feet	36 feet
Jackhammer	20	623 feet	111 feet

Source: RCNM (Attachment A); CadnaA

[1] Threshold is noise levels exceeding 60 dBA L_{EQ} (one hour)

[2] Threshold is noise levels exceeding 75 dBA L_{EQ} (8 hour or 12 hour)

Because it cannot be guaranteed that individual construction equipment would be used outside the setback distances provided in Table 4, or that construction equipment would be used for shorter time periods than assumed in Table 4, impacts from temporary construction noise would be significant without mitigation. Mitigation measure NOI-1 would implement a construction noise management plan to reduce noise levels to NSLUs to a less than significant level. For an analysis of impacts associated with biological resources and mitigation to reduce potentially significant impacts to below a significant level, refer to the Biological Technical Report prepared for the Program (HELIX 2022).

5.2 AIRCRAFT

Aircraft, such as helicopters, are anticipated to be used for loading and unloading of equipment or to remove large trees in areas inaccessible to vehicles. Therefore, aircrafts would be required near undeveloped areas away from NSLUs. Aircraft use associated with individual Program activities would be brief and would not remain stationary over any specific location. Impacts would be significant if a helicopter is located within 1,760 feet of a biologically sensitive habitat or within 313 feet of a NSLU. Because the Program would only require the use of helicopters in inaccessible areas, impacts to NSLUs are considered less than significant. However, helicopter use during the breeding seasons of sensitive avian species would exceed the 60 dBA L_{EQ} (one hour) noise limits if used within 1,760 feet of occupied habitat, and impacts would be potentially significant. Mitigation measure NOI-2 would restrict non-emergency aircraft use for Program activities to outside the avian breeding season.

5.3 MITIGATION MEASURES

The following mitigation measure would be required to reduce construction noise levels near NSLUs to below a level of significance. Mitigation for impacts to sensitive biological resources, refer to the Biological Technical Report (HELIX 2020).

NOI-1 **Construction Noise Management Plan**. Noise from project construction activities shall comply with the thresholds and hours specified by the City of San Diego and County of San Diego. Construction shall not occur outside the hours of 7:00 a.m. and 7:00 p.m. Construction noise shall not exceed 75 dBA L_{EQ} (8 hour) at nearby residential land uses in the County of San Diego and 75 dBA L_{EQ} (12 hour) at residential land uses in the City of San Diego.

If work is conducted within the setback distances found in Table 4 of this project's Noise Technical Report, noise levels may exceed the thresholds at a given work site. Appropriate measures shall be implemented to reduce construction noise including, but not be limited to, the following:

- Construction equipment shall be properly outfitted and maintained with manufacturer-recommended noise-reduction devices.
- Diesel equipment shall be operated with closed engine doors and equipped with factory-recommended mufflers.
- Mobile or fixed "package" equipment (e.g., arc-welders and air compressors) shall be equipped with shrouds and noise control features that are readily available for that type of equipment.
- Electrically powered equipment shall be used instead of pneumatic or internal-combustion powered equipment, where feasible.
- Unnecessary idling of internal combustion engines (e.g., in excess of 5 minutes) shall be prohibited.
- The use of noise-producing signals, including horns, whistles, alarms, and bells, shall be for safety warning purposes only.
- Any truck or equipment equipped with back-up alarm moving within 300 feet of a noise-sensitive land use should have the normal back-up alarm disengaged and safety provided by lights and flagman or broad-spectrum noise backup alarm (as appropriate for conditions) used in compliance with the Occupational Safety and Health Administration safety guidelines.
- Temporary sound barriers or sound blankets shall be installed between construction operations and adjacent noise-sensitive land uses. The project Contractor shall construct a temporary noise barrier at least 6 feet in height meeting the specifications listed below (or of a Sound Transmission Class [STC] 19 rating or better) to attenuate noise.
- If a temporary barrier is used, all barriers shall be solid and constructed of wood, plastic, fiberglass, steel, masonry, or a combination of those materials, with no cracks or gaps

through or below the wall. Any seams or cracks must be filled or caulked. If wood is used, it can be tongue and groove or close butted seams and must be at least ¾-inch thick or have a surface density of at least 3.5 pounds per square-foot. Sheet metal of 18-gauge (minimum) may be used if it meets the other criteria and is properly supported and stiffened so that it does not rattle or create noise itself from vibration or wind. Noise blankets, hoods, or covers also may be used, provided they are appropriately implemented to provide the required sound attenuation.

- A noise monitor shall be provided to ensure noise levels do not exceed thresholds. The monitor, in cooperation with the on-site construction manager, shall have the authority to halt construction activities in the event that noise levels exceed thresholds. Monitors shall submit regular reports to the City documenting noise levels and compliance.

NOI-2 **Aircraft Noise**. Non-emergency use of helicopters for Program activities shall occur outside of the general bird breeding season (February 1 to September 15) when activities would occur within or adjacent to biologically sensitive habitat occupied by sensitive avian species as defined by the City's Biology Guidelines including, but not limited to, coastal California gnatcatcher and least Bell's vireo.

With implementation of mitigation measures NOI-1 and NOI-2, construction noise impacts from Program activities would be reduced to less than significant levels.

6.0 REFERENCES

California Department of Transportation (Caltrans). 2013a. Technical Noise Supplement. Environmental Program, Noise, Air Quality, and Hazardous Waste Management Office. Available at: http://www.dot.ca.gov/hq/env/noise/pub/tens_complete.pdf.

City of Chula Vista. Municipal Code Section 17.24.040. Available at: https://chulavista.municipal.codes/CVMC.

City of La Mesa. Municipal Code Section 10.80.100. Available at: https://library.municode.com/ca/la_mesa/codes/code_of_ordinances?nodeId.

City of San Diego. San Diego, City of (City). 2020. California Environmental Quality Act Significance Determination Thresholds. December. Available at: https://www.sandiego.gov/sites/default/files/sdtceqa.pdf.

2018. City of San Diego Municipal Code, Land Development Code, Biology Guidelines. Amended. February 1 by Resolution No. R-311507. Available at: https://www.sandiego.gov/sites/default/files/amendment_to_the_land_development_manual_biology_guidelines_february_2018_-_clean.pdf.

Municipal Code Section 59.5.0404. Available at: https://docs.sandiego.gov/municode/MuniCodeChapter05/Ch05Art9.5Division04.pdf.

County of San Diego. Code of Regulatory Ordinances Section 36. Available at: https://www.sandiegocounty.gov/content/sdc/cob/ordinances.html.

HELIX Environmental Planning, Inc. 2022. Biological Technical Report. February.

U.S. National Park Service. 2007. Sound levels of Helicopters Used for Administrative Purposes at Grand Canyon National Park. Available at: https://www.nps.gov/grca/learn/nature/upload/GRCA-07-05-SoundLevels-Helicopters.pdf.

U.S. Department of Transportation (USDOT). 2008. Roadway Construction Noise Model.

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Appendix A

Construction Modeling Results

All Equipment - Construction Setback Distances (Biologically Sensitive Habitat)											
	Reference @ 50 ft				Reference @ 50 ft.						
Equipment	dBA L_{MAX}	Percentage	Use per day (hours)	Ordinance Limits (Hours)	Noise Levels (dBA Leq)		Measured Distance (ft)	Noise Levels at Distance (dBA Leq)		Ordinance Limit (dBA Leq)	Distance to Ordinance Limit (ft.)
Noise Sum	101.9	N/A	N/A	N/A	92.0	#	50.0	92.0	#	60	2000.8
Skidsteer	75.0	40%	1	1	71.0	#	50.0	71.0	#	60	177.8
Bulldozer	81.7	40%	1	1	77.7	#	50.0	77.7	#	60	384.6
Backhoe	77.6	40%	1	1	73.6	#	50.0	73.6	#	60	239.9
Chainsaw	78.0	20%	1	1	71.0	#	50.0	71.0	#	60	177.6
Excavator	80.7	40%	1	1	76.7	#	50.0	76.7	#	60	342.8
Truck (Dump Truck, Flatbed Truck)	76.5	40%	1	1	72.5	#	50.0	72.5	#	60	211.3
Crane	80.6	16%	1	1	72.6	#	50.0	72.6	#	60	214.3
Loader	79.1	20%	1	1	72.1	#	50.0	72.1	#	60	201.6
Jackhammer	88.9	20%	1	1	81.9	#	50.0	81.9	#	60	623.0
Helicopter (Bell 407)	101.9	8%	1	1	90.9	#	50.0	90.9	#	60	1760.0

All Equipment - Construction Setback Distances (NSLUs)											
	Reference @ 50 ft				Reference @ 50 ft.						
Equipment	dBA L_{MAX}	Percentage	Use per day (hours)	Ordinance Limits (Hours)	Noise Levels (dBA Leq)		Measured Distance (ft)	Noise Levels at Distance (dBA Leq)		Ordinance Limit (dBA Leq)	Distance to Ordinance Limit (ft.)
Noise Sum	101.9	N/A	N/A	N/A	92.0	#	115.1	92.0	#	75	355.8
Skidsteer	75.0	40%	1	1	71.0	#	50.0	71.0	#	75	31.6
Bulldozer	81.7	40%	1	1	77.7	#	50.0	77.7	#	75	68.4
Backhoe	77.6	40%	1	1	73.6	#	50.0	73.6	#	75	42.7
Chainsaw	78.0	20%	1	1	71.0	#	50.0	71.0	#	75	31.6
Excavator	80.7	40%	1	1	76.7	#	50.0	76.7	#	75	61.0
Truck (Dump Truck, Flatbed Truck)	76.5	40%	1	1	72.5	#	50.0	72.5	#	75	37.6
Crane	80.6	16%	1	1	72.6	#	50.0	72.6	#	75	38.1
Loader	79.1	20%	1	1	72.1	#	50.0	72.1	#	75	35.8
Jackhammer	88.9	20%	1	1	81.9	#	50.0	81.9	#	75	110.8
Helicopter (Bell 407)	101.9	8%	1	1	90.9	#	50.0	90.9	#	75	313.0